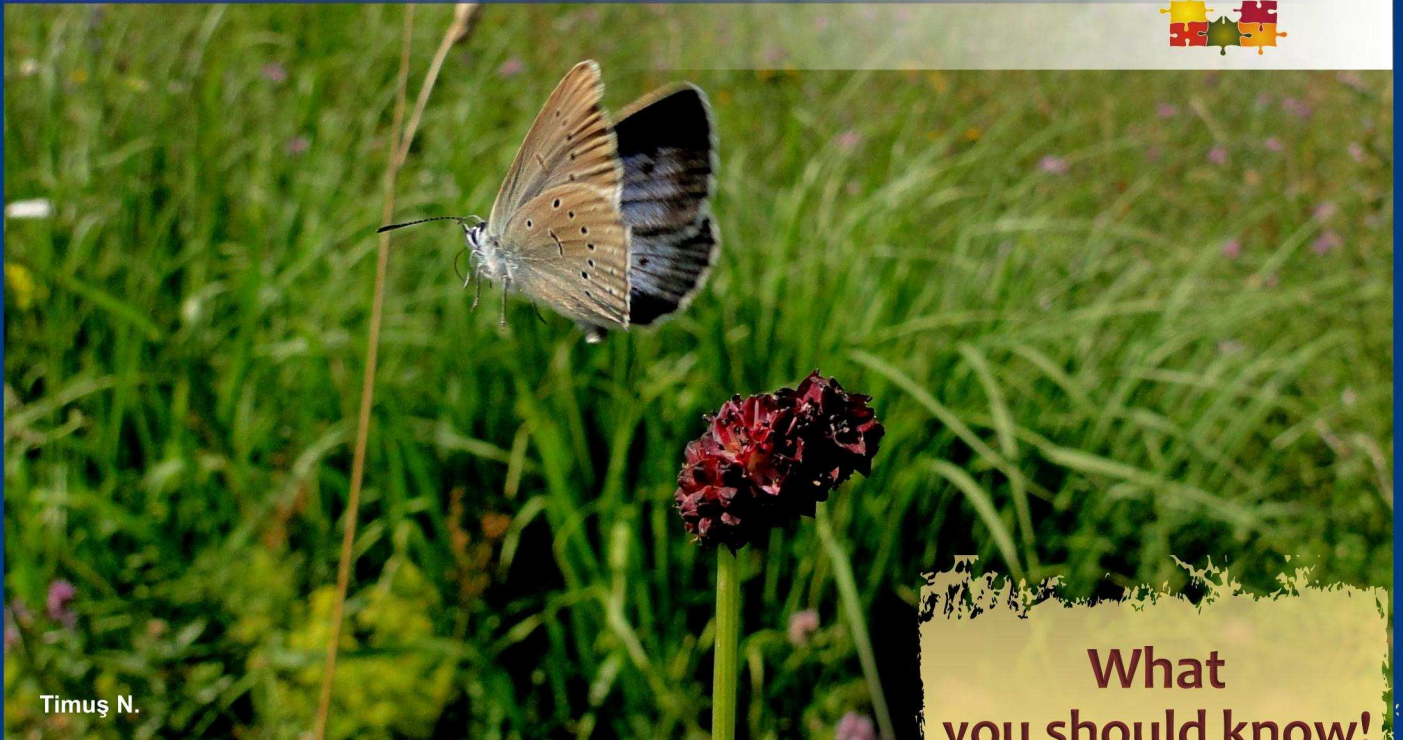


# Maculinea butterflies



Timuș N.

## What you should know!



Romania is home to all European species of Blues (*Maculinea* spp).



Blues are found on the Romanian Red List of butterflies at various threat levels.



*Maculinea* species lay their eggs only on certain host plants: Great Burnet, Gentian, Thyme and Oregano.



*Maculinea* caterpillars survive only in the nests of certain red ant species of the genus *Myrmica*.



Characteristic habitats for *Maculinea* are wet and dry grasslands.

**T**raditional European temperate grasslands harbour high levels of animal and plant biodiversity. However, in recent decades the majority of grasslands have been transformed, by changing the type of land use, by abandonment or by intensification. Land use is intensified through increasing the amount of pesticides and herbicides used in combination with changes in the grazing or cutting regime.

Only a few regions of Europe, where difficult economic conditions have prevented intensive land use, are less affected by these changes. Romania is one of these regions, and still enjoys a high level of biodiversity due to the persistence of traditional land use and extensive agricultural practices.

Changes in the agricultural system, which are happening increasingly since the integration of Romania into the EU, are threatening the biodiversity associated with traditional landscapes. Abandonment of grasslands, or in contrast their intensification, fragmentation and isolation results in a dramatic decline in species that depend on this habitat. The *Maculinea* butterflies are an example of species adapted to traditional agricultural landscapes, but are threatened at the European level and their conservation is becoming a real challenge for specialists.

Romania is home to all European species of *Maculinea*. The vulnerability of this group of butterflies to any habitat modification, as well as their highly specialised lifestyle and the intensification of human impact, has led to a decline in populations throughout Europe and a shrinkage of their distribution. They are currently highly endangered.

# The *Maculinea* Calendar

## June

*Maculinea* start to fly. The first to emerge is the Alcon Blue (*Maculinea alcon*) (1) and Large Blue (*Maculinea arion*) (2).

## July

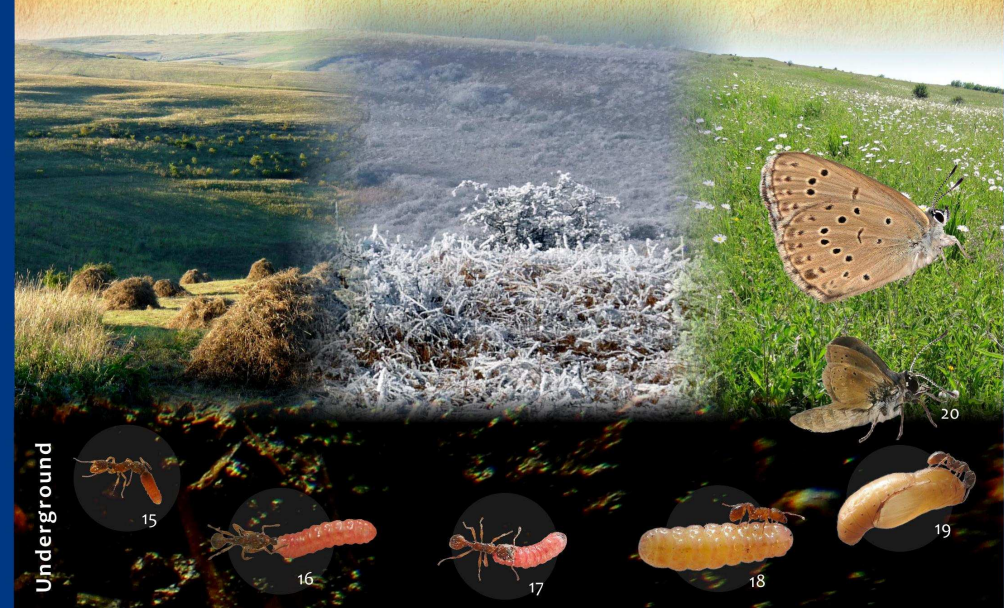
The Alcon Blue (*Maculinea alcon*) (6), the Scarce Large Blue (*Maculinea teleius*) (7) and the Dusky Large Blue (*Maculinea kijeensis*) (8) are flying.

## August

This is the month when the most Dusky Large Blues fly, but Scarce Large Blues and Alcon Blues can also be found.

September October November December January February March April May June

Ants are legendary for their hard working reputation and ability to form well organized and defended colonies that are almost impenetrable fortresses. So how do the *Maculinea* caterpillars manage to trick the ants? This is a question that researchers are still trying to answer. The relationship between *Maculinea* caterpillars and *Myrmica* ants is one of the most complex and spectacular natural phenomena. Amazing strategies used by the small caterpillars to attract the attention of the ants and enter into their colonies are poorly understood. After ten years of study, the *Maculinea* butterflies still remain a mystery.



Females of these two species of Blue lay their eggs on specific host plants. After several days, the caterpillars hatch. In colonies of *Myrmica* ants, large caterpillars of *Maculinea* can be found (4) which transform into pupae (5). After about 2 weeks, the butterflies hatch from the pupae.

Females lay eggs until August. After 2-3 weeks, caterpillars descend from the host plants and are collected and transported by *Myrmica* ants into their nest (9). Mature caterpillars before pupation (10) as well as pupae (11) can be found in the ants nests.

Towards the end of August, although eggs and caterpillars are still found on host plants (13), the majority of *Maculinea* caterpillars are now inside *Myrmica* ant colonies (14). The caterpillars of some *Maculinea* species are fed and cared for by the ants, others feed as predators on the larvae and pupae of the ants (12).

From autumn until spring the *Maculinea* caterpillars remain and feed in the ants nests (15). In the period from August to October, the caterpillars feed intensively to accumulate sufficient fat reserves in preparation for hibernation (16).

The ants, their larvae and the caterpillars hibernate from November to April. The caterpillars slow their growth and use up their fat reserves accumulated in autumn (17). Some caterpillars spin a cocoon from silk in which they hibernate.

In spring, ants and caterpillars emerge from hibernation and start to feed, growing rapidly in the month of May (18), after which they pupate. Pupation (19) takes place in the upper chamber of the ants nests, called a solarium. The butterflies emerge from the pupae (20) starting in June, and the cycle continues.



## Did you know that?

### Caterpillars of the *Maculinea* butterflies:

...spend between 11 and 23 months in ants nests?

...depending on their method of feeding, they can be divided into two groups: “cuckoo” caterpillars – which are fed and looked after by the ants, and “predator” caterpillars – which feed only on the larvae of the ants?

...the “cuckoo” type are fed by the host ants with a specially prepared paste?

...emit a special scent which reduces the aggressiveness of the ants?

...bribe the ants by offering them sweet secretions?

...emit sounds to attract the attention of the ants?

...mature caterpillars just before pupation are 98% heavier than when they were adopted?



[www.mozaic-romania.org](http://www.mozaic-romania.org)

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# Adoption ritual

It is not easy to convince ants to offer you food and lodging. Therefore, at the first meeting with the *Myrmica* ants, the *Maculinea* use all of their “arsenal”, as the result of this meeting determines their fate. This confrontation takes place in several stages following a specific order, like a true ritual, at the end of which the ants “adopt” the caterpillar. Success at one stage means a step closer to being rescued by the ants:



The caterpillars emit an odor through special pores, with the role of reducing the aggressiveness of the ants.

As a result, the odor awakens the curiosity of the ants, which approach and feel the body of the caterpillar with their antennae.



On the back of the caterpillar there is a gland that, in response to being touched by the ant, secretes a sweet liquid.

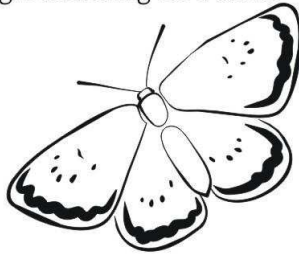
As a result, the ant is addicted to these sweet secretions.



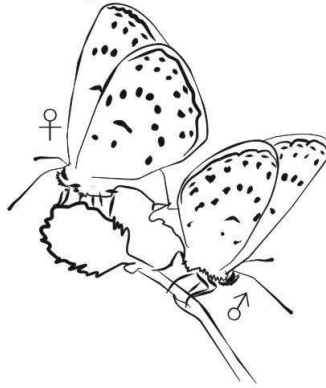
The ant, bribed and tamed by the sweet secretions, is persuaded to adopt the caterpillar, transporting it into the nest.

# Lifecycle of *Maculinea* butterflies

Butterfly in flight searching for a mate.



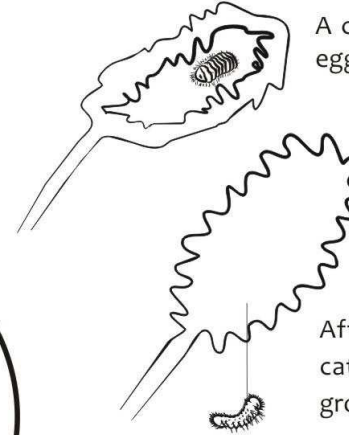
Mating – male ♂ and female ♀.



Female depositing eggs on a host plant.



A caterpillar hatches from the egg, which moults to grow.



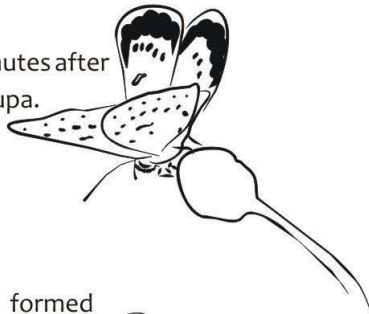
After the third instar, the caterpillar descends to the ground and waits for a host ant.



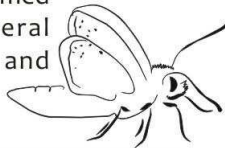
The caterpillar attracts *Myrmica* ants with sweet secretions.

The ant drinks the sweet droplets and adopts the caterpillar.

A butterfly a few minutes after hatching from the pupa.



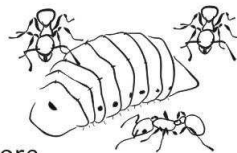
Not yet completely formed wings, needing several minutes to expand and strengthen.



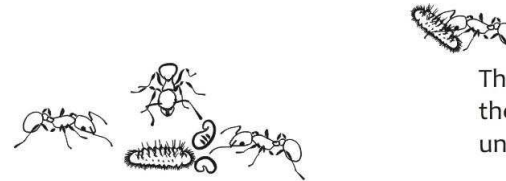
Pupa of *Maculinea* (=chrysalis, nymph).



Mature caterpillars before pupating are 98% heavier than when they were adopted.



The caterpillar may stay in the nest for 11 to 23 months. Some caterpillars feed on the larvae of the ants, whilst others are cared for and fed by the ants.



The tricked ant transports the caterpillar into their underground colony.