FURTHER COMMENTS ON POSSIBLE MIMICRY OF *CAENURGINA CAERULEA* (NOCTUIDAE)

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Dr. J. C. Downey (1965), proposes the theory that *Caenurgina caerula* Grt. is a mimic of *Plebejus icarioides* (Bdv.) or, possibly, other blue butterflies. At the suggestion of the author, I am submitting my own observations on the habits of *C. caerulea* and possible models. These are set forth with the idea of making the evidence as complete and accurate as possible, I do not claim that they produce any conclusive arguments either for or against the mimicry theory.

A most certainly incorrect assumption is that *C. caerulea* feeds on lupins. In experiments with caged females, I have found that they oviposit readily on grass, that the larvae thrive on this diet, and produce healthy full sized imagines. Added to this evidence is the fact that other species of the same genus are grass feeders.[1] Thirdly *C. caerulea* is sometimes found a long way from any stand of lupins.

In the matter of flight seasons, *C. caerulea* is a much earlier emerging insect than *P. icarioides*. The moth tends to persist for a rather long period, hence there is considerable overlapping with the butterfly. On southern Vancouver Island at about 1000′, the lowest elevation at which these insects are commonly found, *C. caerulea* flies in a normal season from late April into perhaps the first week of July. *P. icarioides* under the same conditions would be on the wing from early June to early August. Wet, cool weather will cause late emergence in both species, but the flight season of the moth would be more prolonged by such conditions.

The fact that the two species under discussion are often found flying together, is not a good indication of identical ecological requirements. *P. icarioides* is always found near to lupins. Since this is a plant which, on Vancouver Island, keeps to a rather restricted environment, the habitat of the butterfly is similarly limited. As for *C. caerulea*, if the food plant, grass, were the only controlling factor, it would of course be found almost anywhere. Actually it does not appear to invade areas of rich, moist soil, where grass grows strongly. Here it is usually replaced by *C. erechtea* Cramer. *C. caerulea* does, however, have a much less spotty distribution than *P. icarioides*.

[1] According to Crumb (1956, U.S.D.A., Tech. Bull. 1135) *Caeurgina chloropha* feeds on vetch (*Vicia*) and *C. erechtea* and *C. crassiuscula* feed on "clover, lupin and grasses"—ED.

During the early 1950's several Lepidoptera species normally subalpine in habitat occurred plentifully near sea level. *C. caerulea* was noticeable among these, though it still held to its preference for rather barren, dry areas. *P. icarioides* of course, tied to lupins, did not follow the trend. Incidentally, three of the British Columbia localities in Downey's data for *caerulea*, Goldstream, Quamichan, and Victoria, are very unlikely places for *P. icarioides*.

For several winters preceding the above mentioned extraordinary proliferation of subalpine insects, the snowfall had been exceptionally heavy. The theory that winter snow cover is the main factor governing the distribution of some insects is plausible and well supported by the evidence available. Dr. J. A. Powell has, however, pointed out (*in litt.*) that some California localities given by Downey are not subject to any snowfall. The restriction, on Vancouver Island, of *Caenurgina caerulea* to moderate elevations must be for reasons not yet understood.

Of other butterflies mentioned by Downey, *Plebejus melissa* is even later flying than *P. icarioides*, and is similarly limited to lupin areas. On Vancouver Island *Glaucopsyche lygdamus* is only single brooded, and its flight season comes close to coinciding with that of *C. caerulea*. Though commonest around lupins, there are always a few around close to the sea, where they appear to feed on wild peas, *Vicia* spp. Around Victoria *G. lygdamus* is common, using as a host plant cultivated lupins escaped from gardens.

There is really no point in examining each of these butterflies with a view to selecting one as a possible model for *C. caerulea*. Downey seems to exaggerate the predominance of *P. icarioides* in the lupin areas. In this habitat, at least where I have collected, *P. icarioides, P. melissa*, and *G. lygdamus* are about equally plentiful, and their flight seasons overlap to a great extent. I do not think that any one of them can be considered separately. If birds are going to be considered as predators, we must add several other Plebejinae species to the compound model. Birds always range over a good deal of territory, while the lupin patches are fairly restricted. In other nearby habitats, *Everes amyntula* Bdv. and *Lycaenopsis argiolus* Bdv. are very common.

If we suppose the Plebejinae as a whole to be distasteful to some predators, it is difficult to account for so large a group, including many very common species, not having developed more mimics. We can resort to a theory that the predator concerned passes all its life in a small area, such a predator might be a reptile, amphibian or insect. Lizards and toads might be found in the lupin patches, but they do not seem to fulfill the requirements as the distinguishing predators.

They do not habitually take flying insects, and *C caerulea* does not make a showing of imitating a butterfly when at rest.

Downey has suggested insects as predators, but he does not go into the question of whether they could influence the evolution of this mimic. Nor, so far as I know, has anyone else. In the study of other mimicry associations, there have always been plenty of predators, usually birds, to account for the situation. If insects are known to prey on the model, it has not been deemed necessary to mention them. It is not known whether insects can be induced to alter its prey preferences. Since the prey they take is relatively large, in a given time they must get much fewer stimuli, than is the case with a bird, which can eat hundreds of insects in a day. In addition their lives are short; if they take only as long as a bird to learn a lesson, they have far less time than the bird to exert selective pressure on the potential model.

The insect which most resembles *C. caerulea* in habits and habitat, is a related moth, *Euclidina cuspidea* (Hbn.). These two species seem inseparable, they fly at the same times in the same places (see: Heitzman, 1964). During the expansion of their range, discussed above, both species always turned up together in the same spots. Though I have, once or twice, netted a *C. caerulea* thinking it was a blue, I have far more often taken *E. cuspidea* for the large, dark skippers, *Thorybes pylades* and *Erynnis* spp. The skippers settle usually on the ground, and their flight is of short duration, like that of the moth. One could easily advance the theory that *E. cuspidea* is a mimic of some Hesperiidae, but the actions of both butterflies and moth suggest reliance on cryptic coloration, thus it seems likely that both are palatable to predators. *C. caerulea* also acts very much as if it were trying to escape notice. I intend on future collecting trips to note more carefully whether the grey color (it looks blue only in flight) has any concealing effect when the moth is resting.

LITERATURE CITED

DOWNEY, J. C., 1965. Mimicry and distribution of *Caenurgina caerulea* (Noctuidae). Jour. Lepid. Soc., 19(3): 165–170.

HEITZMAN, R., 1964. The story of a "mixed-up" *Thorybes pylades* (Hesperiidae). Jour. Lepid. Soc., 18(3): 169–170.