

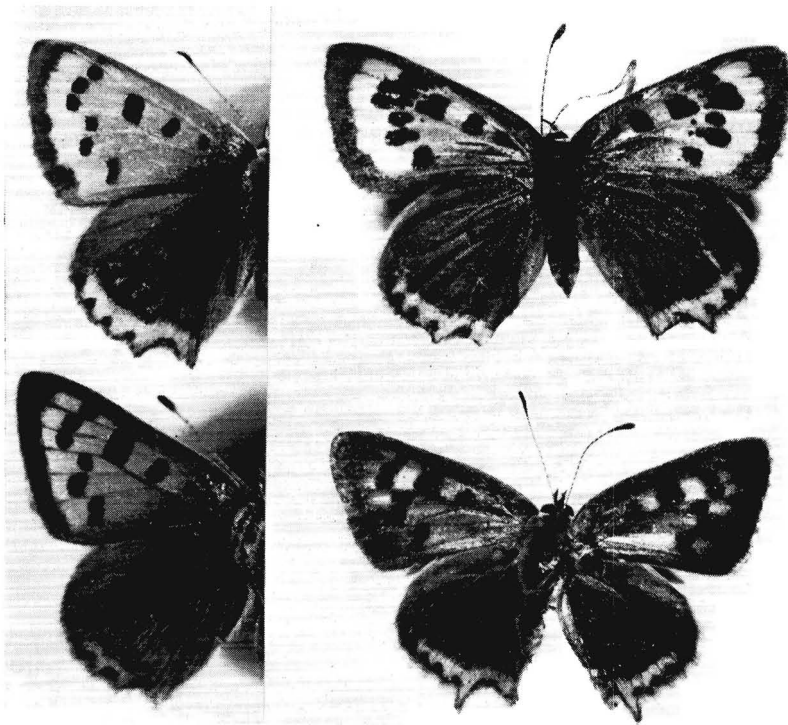
EXPERIMENTALLY INDUCED SEXUAL DIMORPHISM  
IN *LYCAENA PHLAEAS* (LYCAENIDAE)

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*Lycaena phlaeas* L. is widely distributed throughout the Holarctic Region and many subspecies have been recognized and described. In the majority of subspecies the wing coloration and pattern of both male and female butterflies is the same. However, in a few, *e. g.*, *L. p. daimio* from Japan, sexual dimorphism does occur and the forewings of the male have a much darker and less coppery ground coloration than in the female. Many other species of the genus *Lycaena* exhibit a marked sexual dimorphism.

In view of the marked tendency towards sexual dimorphism in the genus *Lycaena* and its exceptional absence in the majority of *L. phlaeas* subspecies, it was decided to subject immature stages of the British subspecies *L. p. phlaeas* to extreme environmental conditions, in order to determine whether or not it is possible to induce differences of color or pattern between the two sexes. To this end larvae and pupae were raised in the laboratory from parents from Ilkley, Yorkshire, at a constant temperature of 35°C, which is considerably higher than the temperature normally experienced by this species in the field. The dates of the experiment were: 10-25 Sept. 1962. The larvae were fed on their normal foodplant Sheep's Sorrel, *Rumex acetosella*, and their development took place very rapidly. Probably because of the high temperature, the mortality rate of the larvae was rather high and only twelve pupae were obtained. These gave rise to ten adult insects, of which six were males and four females. The males were markedly different from the females in both coloration and pattern. Furthermore all these experimentally produced insects differed from the normal wild type, *L. p. phlaeas*. The appearance of the male and female butterflies obtained in these experiments is illustrated in the figure.

The experimental females retain the bright copper color of the forewings characteristic of the wild type insects. The spots nearest the apex of the wing, however, have become elongated in the direction of the veins and are much larger and no longer rounded as in the wild type. In addition there are several smaller patches of black pigment present, which are not present in the wild type. The experimental males are all very dark and the deposition of melanin pigment is much heavier than in the wild type. The ground color of the forewings is a dull brown rather



Right: *Lycaena phlaeas*, forms obtained experimentally; top — female; bottom — male. Left: normal forms: ♀ (above) captured Ilkley, Yorkshire, England, 11 Sept. 1961; ♂ (below) captured Ilkley, Yorkshire, 6 June 1962.

than a bright coppery orange except for a lighter patch in the middle of the wing. The spotting in the male resembles that of the wild-type insect but the spots are less obvious because of the dark background. All these characteristics apply to the upper-surfaces of the wings, the under-surfaces are somewhat darker but not otherwise different from the wild type.

It would appear, therefore, that under certain environmental conditions the genes of *L. p. phlaeas* can give rise to a marked sexual dimorphism. The male phenotype produced in these experiments closely resembles the male wild type of *L. p. daimio*. The experimentally produced females are rather distinct and do not show marked similarity to those of any other subspecies.