lymph tubes at low temperature*. This material is at present being used to study antigenic variation.

H. A. W. SOUTHON*
M. P. CUNNINGHAM

East African Trypanosomiasis Research Organization,
Tororo, Uganda.

*Present address: International Biological Programme, 7, Marylebone Road, London N.W.1.

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Natural Selection in the Mimetic Butterfly *Hypolimnas misippus* L. in Ghana

ONE of the most common mimetic associations among the Lepidoptera in West Africa is that between the model *Danaus chrysippus* L. and the mimetic female of *Hypolimnas misippus* L. In Ghana the hind wings of *D. chrysippus* are mostly white, while those of *H. misippus* are usually brownish orange, but some individuals have a white patch on the orange¹.

Between May 14 and July 7, 1965, the population of these two species was sampled at Legon, Ghana, by the technique of mark, release and recapture. Table 1 gives the numbers of each species caught during 14-day periods. It is clear that of the total numbers of insects caught, the models decreased from 30.6 per cent to zero ($\chi^2_{31} = 24.1$, $P < 0.001$). The most striking decrease occurred between May 14–27 and May 28–June 10, where χ^2_{11} , using the 2×2 contingency table, is 6.53 ($P < 0.02$).

Table 1. RELATIVE ABUNDANCE OF *D. chrysippus* AND FEMALE *H. misippus*

Date	<i>D. chrysippus</i>	<i>H. misippus</i>	Percentage of models out of total caught
May 14–27	34	77	30.6
May 28–June 10	9	61	12.9
June 11–24	4	62	6.1
June 25–July 7	0	56	0.0

Table 2 gives the numbers of *H. misippus* with pure orange hind wings and of those with some white present in the orange during the same periods of time. At the same time as the models were decreasing from 30.6 per cent of the total insects caught to zero, the percentage of mimics with some white on the hind wings decreased from 44.4 per cent to 12.5 per cent. The four sets of data are again heterogeneous ($\chi^2_{31} = 19.0$, giving $P < 0.001$), and the biggest change again occurred between May 14–27 and May 28–June 10 ($\chi^2_{11} = 4.55$, $P < 0.05$).

Table 2. RELATIVE ABUNDANCE OF FEMALE *H. misippus* WITH AND WITHOUT WHITE ON THE HIND WINGS

Date	White absent	White present	Percentage of total with white
May 14–27	35	28	44.4
May 28–June 10	46	15	24.6
June 11–24	51	11	17.8
June 25–July 7	49	7	12.5

These results show that a change in the population of the model of a mimetic association is accompanied by a change in the ratios of the different morphs of its mimic. Selection is probably responsible for this change, for in the absence of the model selection would not be expected to favour mimics with white on the hind wings. Further, Stride¹ has shown that *H. misippus* males will court females with orange hind wings more actively than they court females with some white present in the orange. Thus the balance of the selective forces operating will

depend on the behaviour of the males of *H. misippus* and on the abundance of the models. It must, however, be pointed out that although the mimic was far more abundant than the model during the course of these observations, this is not so during all the year. Further work on this mimetic association is in progress.

MALCOLM EDMUNDS

Department of Zoology,
University of Ghana,
Legon, Ghana.

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PHYSIOLOGY

Effects of Diet on the Composition of Body Fat in *Lucilia sericata* (Meigen)

THIS is the third investigation of the effects of diet on the composition of body fat in related species of Diptera. The effects on two species, *Pseudosarcophaga affinis* auct. nec Fallén and *Musca domestica* Linnaeus, were usually qualitatively similar, though probably quantitatively greater in the latter^{1,2}. Despite their similarity in many respects, these insects have somewhat different feeding habits in that *M. domestica* is omnivorous and in this laboratory is reared on plant material with added yeast and other micro-organisms, whereas *P. affinis* is carnivorous and is reared on fresh pork liver. The two organisms also have different requirements for fatty acids in that *M. domestica* requires none³, whereas *P. affinis* benefits from the addition of fats, particularly oleic acid, to its diet⁴. The results of the present investigation of a third, related, species, *Lucilia sericata* (Meigen), gave information on the composition of its body fats and its requirements, or lack of them, for fatty acids, and emphasized the similarities and differences among the three species.

A laboratory colony of *L. sericata* was maintained on fresh pork liver. Eggs were sterilized with benzalconium chloride and allowed to hatch in sterile tubes as described for houseflies². Larvae were placed individually on 1 ml. of sterile chemically defined medium in a 10 × 75 mm test-tube. The media were those used for *P. affinis*¹ except that the concentration of agar was doubled (1.5 per cent). Methods of rearing, of assessment of growth rates, and of extraction and analysis of the fatty acids have been described before^{5,6}. The amounts of fatty acids in the media are shown in Table 1. One hundred larvae were reared on each diet in each experiment; three experiments were carried out. The results shown here are the averages for the three experiments.

There was no evidence that the presence of fatty acids in the diet accelerated growth or development. In this respect, *L. sericata* is similar to *M. domestica* and differs from *P. affinis*.

The percentages of the various fatty acids in the fats of the larvae reared on the diets are shown in Table 1. Compared with the results of previous work, diets containing linoleic acid produced a relatively high concentration of this acid in the larval fats. In *P. affinis* there was 3 per cent to 5 per cent, in *M. domestica* 15 per cent to 17 per cent, but in *L. sericata* there was 40 per cent to 45 per cent, that is about five times its concentration in the fat mixture of the diet.

To measure other effects on the three species, linoleic acid was disregarded and the concentrations of the various fatty acids were expressed as percentages of the remainder. In Table 2 the effects on the three chief components of the fats—palmitic, palmitoleic and oleic acids—are compared by rank. The diets were arranged according to the concentration of each fatty acid in the fats of *L. sericata*; the numbers in parentheses are the percentages of the fatty acid in the fats of the species.

In respect to these three fatty acids, the effects caused by the diet are obviously the same in *L. sericata* as in *M.*