Hemiptera-Heteroptera

Geotomus punctulatus (Costa) (Pentatomidae)
Gonocerus acuteangulatus (Goeze) (Coreidae)

Hemiptera-Homoptera

Cicadetta montana (Scopoli) (Cicadidae) (New Forest Cicada)

Lepidoptera ("Microlepidoptera")

Hypercallia citrinalis (Scopoli) (Oecophoridae)
Nothris verbascella (Hübner) (Gelechiidae)
Aethes rutilana (Hübner) (Cochylidae)
Agrotera nemoralis (Scopoli) (Pyralidae)
Cnaemidophorus rhododactyla (Denis & Schiff.) (Pterophridae)
Stenoptilia pneumonanthes (Büttner) (Pterophoridae)

Coleoptera

Omophron limbatum F. (Carabidae)
Chrysolina cerealis (L.) (Chrysomelidae)

A Possibly Abnormal Sex-ratio in *Zygaena carniolica* Scopoli (Lep.: Zygaenidae)

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Introduction

In August and September 1973, I paid repeated visits to the area of Jabal Kesrouan on the Lebanon Mountain range with a view to collecting large-scale quantitative information on *Zygaena carniolica* Scopoli. The phytogeographical characteristics of the area, on the lower fringes of the Subalpine Zone, have been summarised elsewhere (Larsen, 1974, Pabot, 1959). The quantitative results will be published later, but as information on the sex-ratio was not part of the over-all investigation these results will be noted here. They turned out to be so interesting that special attention will be focused on this aspect if the author remains in Lebanon.

Material

The whole of the Jabal Kesrouan above 1700 m. is dotted with almost discrete colonies of the butterfly; each colony has thousands and thousands of individuals, while intervening ground only displays very occasional specimens. On 19.8.1973 215 specimens were caught in a random sample of one such colony, 97 of which were in perfect condition and were kept. On the same day 456 pupae were collected, of which 170 successfully hatched and developed. Most of the rest were parasitized.

The investigation was made in the later part of the season for the butterfly. The very first few pupae had been found in

late June, and by late July the species was super-abundant in the colony*. By September only occasional fresh specimens could be found. The prime season appears to be 20th July to 30th August or so. This is long, but the length is not surprising as the species hibernates in the first larval instar and development must be heavily influenced by local microclimatic conditions. Accordingly there is no reason to suspect that the two samples should deviate from the theoretical sex-ratio of 100 males to 100 females.

Sex-ratios of Two Samples

The table below gives the sex-ratios of the two subsamples and the total samples, as well as the deviation from the expected norm when measured against the theoretical ratio using the binominal approximation to the normal distribution (see statistical appendix).

Table 1

Sex-proportion of two samples of *Zygaena carniolica* and the combined sample, with value of the u-test in relation to the expected proportion of 0·500

Sample	N	per cent male	per cent female	value of u
97 freshly hatched specimens	97	71	29	4.6
170 specimens bred from pupae	170	67	33	4.7
Combined sample	267	68	32	6.8

The values of u are all significant at the 0.00001 level, and only the fact that samples from other times of the season are not available leaves the conclusion somewhat tentative. However, as the samples were certainly drawn in the later part of the main season, one would, if anything, have expected a slight preponderance of females.

Discussion

Abnormal sex-ratios in insects are highly unusual. A summary article (HAMILTON 1967) lists 26 species, all with a strong preponderance of females. The only butterfly with an abnormal sex-ratio which has been extensively studied is *Acraea encedon* where predominantly female populations are found (OWEN 1971). A number of moths have regular or irregular parthenogenetic broods (IMMS 1923, LEMAIRE 1969, SEVASTOPULO 1972). No records exist of predominantly male populations of insects.

The evidence presented is strongly suggestive that the sex-ratio in *Zygaena carniolica* on the Jabal Kesrouan is 200 males

*About 150,000 on an area of 4,000 m²

to 100 females. I very much hope to prove this suggestion through a longitudinal study throughout the period of flight of the species, but would appreciate additional information on other populations of *Zygaena*. It should be noted that huge, discrete populations, such as the one studied, may be among the most conducive to genetic abnormality. The possibility that a population-limiting factor is activated by density must be entertained.

Statistical Appendix

When the expected frequency of males to females is 0.50, we are faced with a binomial situation, which in view of the high number and high Ø may be transformed to a normal distribution. The significance test thus becomes:

$$\frac{h - 0{\cdot}50}{\sqrt{\frac{h\,(1-h)}{N}}}$$

where h signifies the observed frequency, 0·50 the theoretical Ø frequency and N the sample size (HALD 1952).

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Notes and Observations

MYTHIMNA (ALETIAI L-ALBUM (L.) (L-ALBUM WAINSCOT) IN ESSEX.—In view of Dr Watkinson's note on this species (in *Ent. Rec.*, **85**: 268) it is perhaps worth mentioning the occurrence here of a ♀ and ♂ of *M. l-album* at m.v. light on 6th October 1972 and 8th October 1972 respectively. Although eggs were obtained they appear to have been infertile.—A. J. DEWICK, Curry Farm, Bradwell-onSea, Southminster, Essex.

[Is this the first record of *l-album* for Essex, also its furthest north appearance in Britain?—Edit.].