has been noted. The contribution of birds to soil nutrients has been measured directly in the Antarctic[6] where the structurally simple environment may reveal such effects more clearly. These analyses show that much greater quantities of calcium and potassium were imported into the two Leicestershire woods by rooks within 8 weeks than would be expected to be derived from one year's rainfall. In regions of the wood up to 100 m from the rookery, the grit input fell to one twentieth of the average input throughout the rookery area. This scatter of faeces by birds in flight and by wind action seems to result in large areas of the wood receiving a measurable input of extraneous material. These data refer to small woods in farmland, and they are typical of many woodlands in Britain. The wood pigeon, which has been shown to be involved in the regeneration of large oakwoods[7], is likely to have an important role in nutrient importation into larger woods.

If, as has been stated[2], "many investigations in the past have tended to regard the nutrients in the tree litter fall as the total nutrient fall", then to other sources of autochthonous nutrients such as ground flora litter, leachates and insect frass must be added the egesta and faecal downput of birds resident in and feeding in the wood. To sources of allochthonous nutrients such as rainfall and dust must be added the faecal downput from birds resident within the wood but feeding on adjacent land, and from transients using the wood temporarily. The derivation of nutrient budgets by calculation of the soil-derived components may otherwise prove unrealistic. It seems likely that woodlands in farming areas obtain much of their nutrient requirements from the activities of relatively small bird populations. It is noteworthy that the composition of food, the behavioural selection of material for ingestion and the physiological processing of ingested material result, in this case, in a nutrient input in which sodium is a relatively small component compared with calcium and potassium. Thus the effect of bird populations is not only to introduce organic and inorganic nutrients into the woodland but to alter the overall composition of the total inorganic nutrient input.

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Evidence for Sexual Selection in the Mimetic Butterfly *Hypolimnas misippus* L.

STRIDE[1,2] has shown that the males of *Hypolimnas misippus* (Nymphalidae) court artificial test insects with orange hind wings more actively than they court test insects with white hind wings. He gives evidence to suggest that white on the hind wings inhibits courtship, and suggests that this negative sexual selection is the reason why a white hind-winged form of *Hypolimnas misippus* has not become abundant in West Africa where it is protected by its mimetic resemblance to the white hind-winged *Danaus chrysippus*. His conclusions were based on the responses of free-living males towards dead and artificial test insects. This report is based on observations of free living individuals of both sexes.

A characteristic feature of the courtship behaviour of *Hypolimnas misippus* is the female's "ascending flight" response to the male[1,3]. This is apparently a means whereby an already fertilized female can escape the persistent attentions of a courting male because she only breaks off the ascending flight when the male has given up the pursuit and returned to the ground. My own observations confirm that out of many ascending flights observed at Legon, Ghana, not one was followed by copulation. If males court and copulate less frequently with white than with orange females as Stride infers, then one would expect proportionately more of the white ones to be virgin and receptive, while proportionately more of the orange would be unreceptive and hence liable to display the ascending flight response. Table 1 gives the numbers of ascending flight responses of orange and white females observed at Legon in 1968 compared with the numbers of the two morphs seen on the same days which were not giving the ascending flight response. There is actually a fractionally higher proportion of ascending flights in the white than in the orange insects, but the difference is not significant. Thus although experimental work using artificial test insects suggests that there is sexual selection of orange females by the males, there is no evidence for the occurrence of such selection in natural conditions. Probably the live female provides behavioural and other stimuli which are so attractive to the male that they mask any difference in courtship activity due to hind wing coloration. Alternatively, there may be so many actively courting males present that every female, whatever its colour, gets fertilized within a few hours of emerging.

Table 1. PROPORTIONS OF ORANGE AND WHITE FEMALE *Hypolimnas misippus* OBSERVED GIVING THE ASCENDING FLIGHT RESPONSE TO COURTING MALES

	Orange	White
Number of females giving response	22	21
Number of females not giving response	110	67
Percentage of females giving response	16·7	23·9
$\chi^2_{(1)}$	1·312	
P	$<0·3, >0·2$	

These observations underline the danger of assuming that conclusions made from experimental work based on the use of artificial models apply equally in natural conditions. A detailed account of this work is being published elsewhere[4].

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Kinetic Evidence for an Intermediate Stage in the Fertilization of the Sea Urchin Egg

ELECTRON microscopy has provided evidence for a series of anatomically distinct stages in the process of fertilization. In the polychaete worm *Hydroides hexagonus*, Colwin and Colwin[1,2] have described how production of the acrosome filament is followed by fusion of the gamete membranes and passage of the male pronucleus into the egg cytoplasm. Apart from this anatomical description, little is known of the early stages of fertilization. We