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WILD BIRDS AND BUTTERFLIES

PROF. MACBRIDE and I entirely disagree on the subject of natural selection and the validity of Darwin's metaphor, and I leave the subject at that all the more willingly because his letter has been, in my opinion, fully answered by Dr. G. D. H. Carpenter and Prof. W. Garstang.

The relation of birds to butterflies is so large a subject that I can only attempt to indicate certain essential points which are not touched upon by Dr. W. E. Collinge in his letter in NATURE of Aug. 31 (p. 334). I may also remark that I did not fail, as Prof. MacBride asserts (NATURE, Aug. 10, p. 225), to notice his words 'serious attack', and he might have seen that I even quoted them in my reply (NATURE, June 8, p. 874).

(1) *The Examination of Birds' Stomachs.*—Dr. Collinge does not mention the investigations of Lamborn and Swynnerton, which prove that Lepidoptera are so quickly reduced to minute fragments in the bird's digestive tract that a careful examination under the compound microscope is required before it can be asserted that such remains are absent. Lamborn wrote of a bird which he had shot: "though . . . seen to eat two butterflies barely two hours previously, I could recognise no portions of them except with the aid of a microscope" (*Proc. Ent. Soc. Lond.*, 1920, p. xxvi). In how many of the "100,000 post-mortem examinations" referred to by Dr. Collinge has such a careful examination been made?

(2) *Injured Wings as Evidence of Attack.*—The suggestion conveyed by the question-begging words used by Prof. MacBride (l.c.) when he speaks of "the jealously guarded treasure of butterfly wings which Prof. Poulton has collected after a search of many years", is entirely devoid of foundation. Such evidence is extremely common, as any observant naturalist will find if he looks for it. Furthermore, the shape and situation of many injuries are characteristic, and resemble those caused by observed attacks. Oftentimes the unmistakable imprint of a bird's beak remains on the wing.

(3) *The Value of Negative Evidence.*—An example will serve to indicate the value of the negative evidence sometimes confidently brought forward by naturalists who have not made the relation of birds to butterflies the subject of specially directed observations. I may also add that the keener such a naturalist is the less

likely is he to make them, because his faculties are all the more certain to be otherwise engaged.

The *Danainæ* are the commonest and most conspicuous butterflies of the Old World tropics. The males of the great majority bear scent-pockets or scent-patches on the hind wings, and from these the scent-brushes at the extremity of the body are charged and then used in courtship. (It may be remarked here, as bearing on Dr. Collinge's letter, that the epigamic scents of male butterflies which are presumably pleasant, or at any rate stimulative to their females, are also pleasant to man. Furthermore, many of the other presumably aposematic scents common to male and female butterflies of certain species are unpleasant to man. The subject is too large to deal with adequately on the present occasion, but it must be mentioned that there is remarkable unanimity in the treatment of conspicuous insects by insect-eaters of diverse groups.)

To return to the male *Danaines*, which certainly perform their toilet and emit the scent in courtship many times in their lives. We may safely infer this from the fact that males of all ages, as shown by their condition, may be found *in coitu*. Well, so far as I am aware, W. A. Lamborn is the only naturalist who has seen the brushes charged with scent, but he has recorded it in two African and one Oriental species. The behaviour was observed when the butterflies were freely exposed at rest on leaves and in one instance, *Amauris niavius dominicanus*, he was able to approach sufficiently close to smell the scent, which he describes as resembling 'an aromatic snuff'. Furthermore, the subsequent use of the brushes in courtship has only been recorded by a single naturalist, Dr. G. D. H. Carpenter, who observed it in two African species, the males of which performed these epigamic functions on the wing in full sunlight, the expanded brushes being conspicuous even at a little distance. Why have not these observations been made again and again? For the twofold reason that attention has been concentrated elsewhere while this subject has been neglected. Negative evidence, here proved to be valueless, is, I believe, also valueless when it is offered in support of the conclusion that butterflies are not seriously attacked by birds.

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