

truth, that, unless such objects are properly mounted, it is worse than useless to exhibit them to the public at all. They should be taken down and stowed away in drawers, or preserved in any other way that may be convenient for scientific study. Left in their glass cases, they are much more likely to repel than to attract the ordinary observer, for whose benefit the exhibition is intended.

Under such circumstances we cannot receive otherwise than with pleasure a treatise prepared with the view of teaching the true principles of the art of taxidermy and their proper application. The Royal Cabinet of Natural History at Stuttgart is well known to those who have visited it as one of the few institutions of this kind where real care and skill are exhibited in the mounting of the specimens, and no one can be more fitted than its energetic "*préparateur*" to give instructions upon a subject of which he has shown such perfect knowledge. Herr Martin has, moreover, obtained the assistance of several individuals who are fully qualified to assist him in his task, which appears to have somewhat of a comprehensive scope. In a former part of the present work, Herr Martin has treated of the various methods of collecting animals of all sorts in the field, and of preserving them for scientific purposes. The fact of a third edition of this former part having been already called for shows that the work has been appreciated by those or whose instruction it is designed. In the present section of his volume, Mr. Martin and his fellow-workers treat more especially of the processes to be performed in the museum itself, such as the modelling in plaster of beasts large and small, the formation of preparations of the internal organs, the making of skeletons, and the mounting of microscopical objects. Full instructions are likewise given upon every point connected with the practical working of a public museum, not only as regard the objects themselves, and the best mode of exhibiting them, but also in relation to the wants and requirements of the visitors that resort to such institutions.

P. L. S.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his Correspondents. *No notice is taken of anonymous communications.]

Mimicry versus Hybridity

BEFORE attempting to combat the old theory under which Mr. Murray has taken refuge, in opposition to the theory propounded by Mr. Bates, I must first make a few remarks upon the different forms of mimicry to which the Lepidoptera are subject.

Mimicry may be divided into two heads, viz. :—the mimicry of one lepidopterous insect by another, and the mimicry of the vegetable kingdom, and of backgrounds generally, by Lepidoptera. As Mr. Murray doubtless refers to only the first of these heads when he speaks of hybridisation, I need not trouble the reader with any remarks respecting the second. Mimicry, then, between butterflies and moths, may again be divided into three sections : that which modifies both sexes, that which chiefly modifies the females, and, lastly, that which chiefly modifies the males ;* these variations of modification are all easily explained by the theory of protective assimilation variously adapted to the economy of the different modified species ; but it can in no way be explained by the theory of modification by hybridity. Mr. Murray speaks of hybridisation as if it were a thing recognised by lepidopterists, and of no uncommon occurrence, whereas it has, so far as I know, only occurred in the Heterocerous Lepidoptera, and only between species of the same genus ; there is, indeed, a case on record of a skipper butterfly and a burnet moth being taken *in coitu*, but no reasonable being could expect that any issue would result from such an union ; again, I maintain that if it were even possible for hybridity to occur between different sub-

* An interesting illustration of this type of mimicry exists between the genera *Belenois* and *Mylothris*, the males of the African group of *Mylothris* being identical in colour with males of the genus *Belenois* (sub-family Peirinae).

orders, families, or even genera of Lepidoptera (which, by the way, is as likely as hybridity between a vulture and a dove or a horse and a rabbit), the offspring would inevitably be modified in structure just as much as hybrids between distinct races or species of vertebrates are ; they would moreover, if fertile, certainly revert to one or other of the parent stocks, which, however we do not find to be the case ; if the fertilisation of flowers and butterflies were the same, hybrids might be as common in the one case as the other, and the results attained might be more nearly alike ; but as butterflies are not fertilised through the transmission of pollen by external agencies, and as they seem to have a decided preference for mates belonging to their own peculiar species, hybridisation must needs be a thing almost unknown amongst them. Lastly, I need scarcely say that the fact of birds hunting by sight and not by smell only does not in any way destroy the argument respecting the favoured and non-favoured species of Lepidoptera ; the same thing may be said of lizards, frogs, dragon-flies, and spiders, which all of them persecute the order, and which all avoid not those insects only which have a peculiar odour, but those which, like the *Danaïnae*, *Heliconinae*, *Acarinae*, and others, have an acrid taste resulting from an offensive liquid which they exude from the body. I have been more fortunate than Mr. Scudder, inasmuch as I have frequently seen birds catch and devour the unprotected species upon the wing, whilst I have received abundant evidence both from scientific and non-scientific collectors respecting the perfect immunity which the *Danaïnae*, &c., enjoy from all kinds of persecution, whilst their less fortunate brethren come to an untimely end.*

British Museum

ARTHUR G. BUTLER

I AM rather surprised that Mr. Andrew Murray should have advanced his theory of mimicry being due to hybridisation, without adducing one solitary fact to prove that hybridisation between distinct families of insects ever occurs, or that, if it do occur, the offspring are fertile *inter se*. Mimicry is most frequent between very distinct families or higher groups, and often between different orders of insects. We may fairly consider that the "natural orders" of plants, as being the next well-marked groups above genera, are about equivalent to the families of insects, so that the analogy furnished by hybridisation among plants, on which alone Mr. Murray's theory is founded, wholly breaks down, unless he can show (which he has not done) that such hybridisation occurs between species of different "natural orders," or of well-marked groups higher than genera. It would be mere waste of time to discuss the details of a theory whose fundamental assumption is not only quite unsupported by fact, but is diametrically opposed to the almost, if not quite, universal fact that hybrids do not occur between species of different families or higher groups.

Mr. Scudder's letter contains some interesting and suggestive facts, and opens up a new field of investigation as to the immunity of certain species, in their egg or larva state, from the attacks of hymenopterous and dipterous parasites. It is, I believe, now stated for the first time, that the peculiar secretions which render the Danaidæ distasteful to birds not only extend to their larva and egg state, but act as a safeguard from the attacks of parasites. The objection that it would have been more advantageous for the larva than for the imago of the *Limenitis misippus* to mimic the *Danaï archippus*, appears to me to have no weight. We do not know, for instance, if such mimicry would be any defence against parasites who may be guided by smell rather than sight ; and from the frequent limitation of certain odours and secretions to whole genera or families, the variations necessary to produce them may be of rare occurrence.

The fact that *Limenitis misippus* and *L. ursula* are about equally plentiful is not at all remarkable, since there are species of all degrees of rarity in every extensive group ; but in this case it happens that both insects are mimickers, *Limenitis ursula* resembling the common N. American *Papilio philenor*, especially on the under side, which is exposed when the insects are at rest. This case of mimicry is not so perfect or so striking as the other, but that it is one is pretty certain, and there are several other

* The Hon. Mr. Justice Newton, who assiduously collected and took notes upon the Lepidoptera of Bombay, informed me that the *Charaxes Psaphon* of Westwood was continually persecuted by the bulbul, so that he rarely captured a specimen of this species which had not a piece snipped out of the hind wings ; he offered one to a bulbul which he had in a cage, and it was greedily devoured, whilst it was only by repeated persecution that he succeeded in inducing the bird to touch a *Danaï*, which he offered to it.