

IMITATION, TRUE AND FALSE.

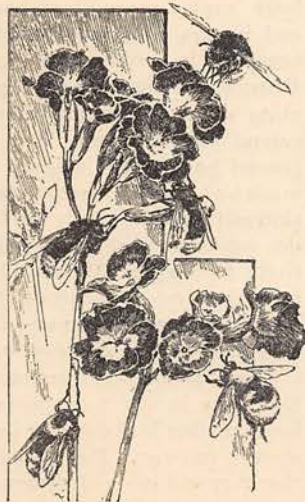
BY FRANK BEDDARD, M.A., F.R.S., PROSECTOR TO THE ZOOLOGICAL SOCIETY OF LONDON.



IN the later months of summer a handsome green fly makes its appearance, often in such great numbers that every tree-trunk affords a resting-place to several individuals. It is not necessary to go farther away from home than the wilds of Regent's Park to see this insect. It has a bright green body and also delicate gauzy wings, on account of which it has received the name of the "Lace-winged Fly."

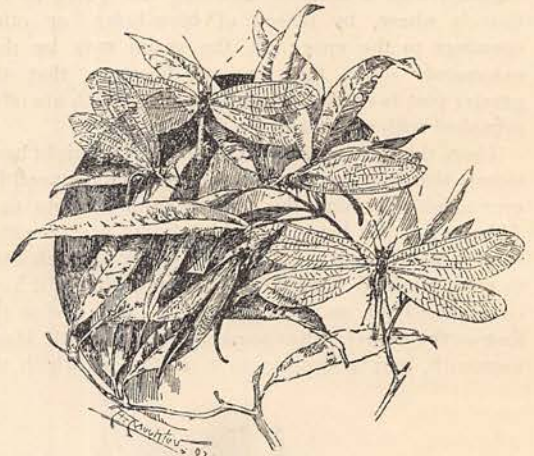
Although beautiful enough to the eye, this insect will not by any means charm another sense which is often brought into play in judging of the merits of animals: it has an odour which appears to be unrivalled for strength and nastiness in the insect world, and which disgusts not only the comparatively refined senses of our species, but also the blunter susceptibilities of birds—which creatures, as a rule, severely let it alone. Hence its abundance and universal presence in suitable localities in this country. To a certain extent, however, and in another sense, the birds are a good deal greener than the fly, for it is only some individuals which have the disagreeable smell and (presumably) taste; but, fortunately for the insect, birds appear to be just intelligent enough to grasp what force there is in the expression, *Ex uno disce omnes*, and not quite up to the level of comprehending the truth of the proverb, "No rule without exceptions." An unfortunate venture or two was enough to convince its insect-eating foes that the "Lace-winged Fly" was too strongly flavoured a morsel even for the most hungry of birds. The immunity of the race as a whole, is thus due to a few individuals who have happened, luckily for the majority, to render themselves offensive to their enemies.

This kind of deception appears to be more widely spread than has been hitherto believed. It is generally held that insects can be divided into two classes—



PARASITIC FLY, MIMIC OF BUMBLE BEES.

those which are conspicuous, and those which are inconspicuous. The inconspicuous insects pass their lives in peaceful seclusion, and often reach a green old age by virtue of their invisibility. The conspicuous insects, on the other hand, are believed to be, to some extent, sheltered by their very conspicuousness, which, without further explanation, will probably strike the reader as rather too pronounced a paradox. The explanation is this: it has often been found by experiment that such brightly coloured insects have either an unpleasant flavour, or, by possessing a sting, are undesirable articles of food. Hence it is to their advantage to duly advertise to the insect-eating world in general their inedibility. Many brightly-tinted insects are, therefore, walking advertisements—frequently



COMMON LACE-WING.

highly-coloured advertisements—of the inedibility of their kind.

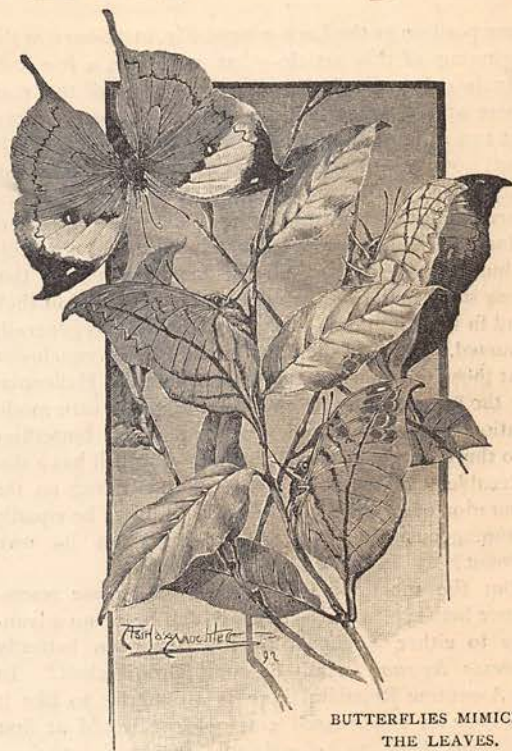
But, in addition to the brightly-coloured and bitter-tasting insects, there are many which have been shown to be not disagreeable in flavour, and yet are as brightly coloured as possible. It is believed that these escape many dangers by the resemblance which they show to the nasty-tasting insects. One example of this phenomenon, which is known by the name of "mimicry," will render the matter clear. The hornet has a sting and a banded yellow-and-black body; it is, therefore, easily seen, and, on account of its evil reputation, let alone. There is a moth in this country which has also a yellow-and-black banded abdomen and transparent wings nearly devoid of the fluffy scaling which covers the wings of most moths; this insect is considered to delude birds into the belief that it actually is a hornet, and so to escape annihilation, or at least decimation. The resemblance here is wonderfully perfect, but in tropical countries there are even more perfect instances of similarity between a noxious and innocuous insect.

The current theory on the subject is that the resemblance has been gradually produced through a long series of generations, those which showed most likeness to the model escaping destruction and handing on this useful quality to their offspring, until it ultimately reached the perfection we now see. In the particular instance of the wasp, there is a solid enough reason for imitation on the part of the moth; it is a case of the ass in the lion's skin, though (it is thought) with a happier result. The ass foolishly forgot to act up to his disguise. The moth, it is said, not only looks like a wasp or hornet, but writhes its abdomen about in a suggestive way, as if about to sting, and actually smells like a hornet; it does its very best to play a difficult part, and reaps an undeserved reward for its duplicity.

So far, we have been dealing with one of the most familiar facts of zoology, familiar to everyone who reads the current popular literature of the subject; but the problems involved in the phenomena termed "mimicry" are not so simple as they are generally made out to be. The very obviousness of the current explanation, ingenious though it is, ought to be a warning against its too hasty acceptance.

We find in Nature plenty of examples of likeness, more or less pronounced, between insects, birds, reptiles, and almost every group of animals, which cannot always be explained on the principle of utility, and which cannot, therefore, be due to Natural Selection.

In some parts of Germany, in the very early spring months, a gaily-coloured moth, which has no less technical a name than *Brephos nothum*, is very common. This insect flies in a rapid fashion—which is most foolhardy, considering that there is only one other moth common at the same

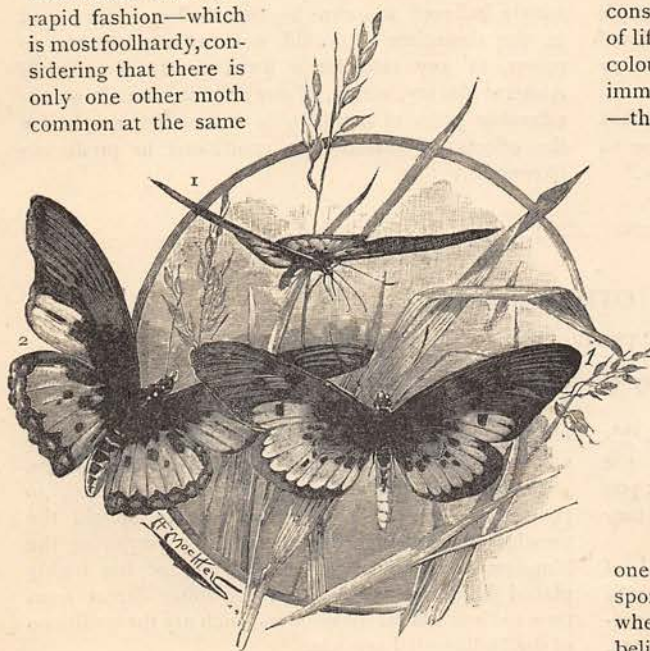


BUTTERFLIES MIMICKING THE LEAVES.

time, and that, insects generally being then scarce, birds would be apt to take them more. This other moth, though belonging to quite a different family, is an absolute copy of the first, and they are both highly conspicuous, not only in their colour, but in their way of life. If there were plenty of other moths, the bright colours of these two might possibly secure them some immunity by conveying the impression—true or false—that both were unpleasantly flavoured. One of the two might in that case be trading on the reputation of the other, and thus furnish an example of mimicry. But in a season when insect life is not abundant, a bird's appetite would be apt to be less fanciful, and therefore not much advantage would be derived by the insect, even if it were unpalatable—which has yet to be proved. Some other cause must be at work here, of which at present we know nothing.

The classical instance of mimicry is afforded by certain South American butterflies. A whole group belonging to that division, typified in this country by that ubiquitous insect the "Garden White," have taken on the livery of quite a distinct family of butterflies, the Heliconias.

Down to almost the minutest particular the one group has imitated the other, species corresponding to species. The imitation in this case, whether flattering or not, is certainly sincere, and is believed to be successful in protecting the model from the attacks of birds. Many of the Heliconias have been shown to be spurned as food on account of their odour and taste, which do not meet the views of birds and monkeys; others, on the contrary, are in the

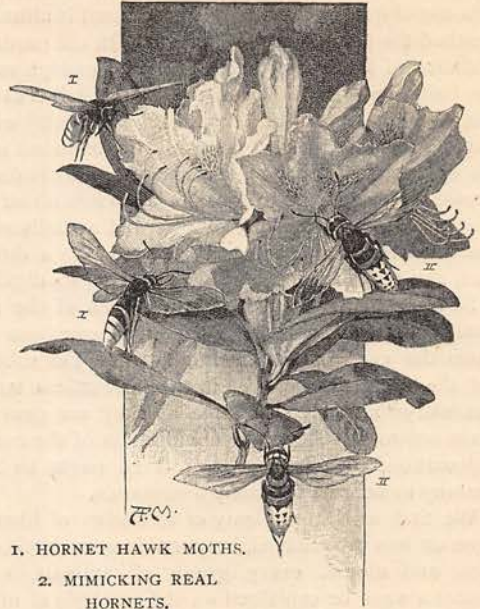


1. PSEUDACRGEA BOIS-DUVALLII, IN COLOUR MIMICKING NO. 2 FOR PROTECTION, BUT OF WHOLLY DISTINCT SPECIES FROM EGINA.
2. ACRGEA EGINA, SPECIES OF BUTTERFLY PROTECTED BY ITS ODOUR.

same position as the Lace-winged Fly, mentioned at the beginning of this article—that is to say, a few individuals only are odoriferous, to the profit of the rest. There appears thus to be a motive for the mimicry. But two rather important facts are often insufficiently dwelt upon when this matter is explained to the scientific, as well as the non-scientific, public. In the first place, many of the mimicking "Whites," instead of being palatable, have an odour which is "disagreeable to human noses;" secondly, it has been argued that those same butterflies have not gone so far out of their road in their imitation of the *Heliconias* as is generally assumed. Fritz Müller has come to the conclusion that those forms which most resemble the *Heliconias* are the most ancient, so that comparatively little modification was needed to convert one of these butterflies into the very model of a *Heliconia*. But if it has a disagreeable taste, what is the use of its trading on the reputation of another insect? Would it not be equally advantageous for it to do business on its own account?

But the most remarkable case of a close resemblance between two insects which can be of no advantage to either is shown by the European butterfly *Vanessa levana*, an ally of our "Tortoiseshell." In the Argentine Republic there is a butterfly so like it that even an experienced entomologist would at first put them down as belonging to the same species; and, curiously enough, both butterflies occasionally show an identical variation. As a matter of fact, these insects do not even belong to the same genus. The resemblance must be due to similar climatic conditions, or to some obscure cause of that kind. Europe and the Argentine Republic furnish another example of the same kind. The common "Clouded Yellow" butterfly so abundant in some seasons in this country has a well-marked variety which is much paler in colour. A closely-allied form in the Argentine has also a variety which bears about the same relation to it as does the pale variety to the "Clouded Yellow."

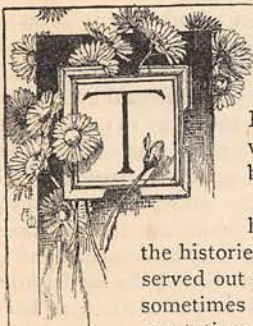
No theory of mimicry will explain this. In a certain circumscribed area of forest in South America Dr. Seitz found the insect fauna almost entirely blue in colour.



Out of twenty butterflies ten were entirely blue, and the remaining ten partially blue. Nor was blue confined to the butterflies: other insects showed the same prevailing hue. We have, in fact, a good deal to do before the ingenious theory of mimicry—so widely believed in—can be regarded as true; and in the meantime it would not be unprofitable to revert, at any rate for a little, to the theories of Andrew Murray, which, in our opinion, contain a considerable germ of truth, in so far as they emphasise the effects of surrounding conditions in producing likenesses.

"THAT OTHER STORY."

BY THE AUTHOR OF "THE ROCK OF KAZIM," ETC. ETC.



THIS is that other story of the Rock of Kazim.

Properly speaking, this story is a part of the History of England; but you will not find it in the history books.

There is a good deal of history which never gets into the histories. Silence is sometimes preserved out of regard for public interests, sometimes out of respect for personal reputations. The facts are known and

discussed in certain circles, but do not get beyond the official or professional classes which are chiefly in-

terested in them. This is especially the case in our Indian Empire, where an exceptionally able body of officials are animated by a deep feeling of their responsibilities and bound together by a strong *esprit de corps*.

To maintain the authority of the British "Raj," to protect the native population, and to uphold the prestige of the British Government, by retrieving the blunders and screening the mistakes of the highly placed bunglers, with whom Downing Street from time to time afflicts the empire—such are the traditions of the Indian civil servant.

The history of the Rock of Kazim is well known among Anglo-Indians of the last generation; and it is possible that the confidential communication upon this subject, which General Bamford addressed to the