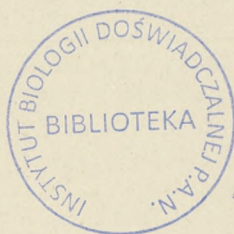
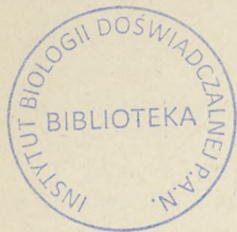


MIMICRY.



S. 1561.





ON
MIMICRY.

BY

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A VERY condensed abstract of all that I can find recorded upon the subject of "mimicry" is given below: I divide the description into a series of stages, each of which corresponds to a marked advance in our knowledge of the subject.

(1.) H. W. Bates was the discoverer of "mimicry"; he noticed that the conspicuous and slow-flying Heliconian butterflies in South America were attended by a relatively small number of butterflies belonging to widely different families, and in some instances by moths; and he found that there was a considerable degree of superficial resemblance between the members of the groups thus found together. He suggested the term "mimicry" for the resemblance of the rare to the abundant species, and he further suggested that the latter were protected by the possession of some unpleasant taste or smell, so that they would be avoided by their natural enemies. Although unfortunately too little tested, this explanation has really NEVER BEEN SHAKEN. There is indeed some direct evidence for it. Thus R. Meldola has found "that, in an old collection destroyed by mites, the least mutilated specimens were species of *Danais* and *Euploea*, genera which are known to serve as models for 'mimicry.'" —*Proc. Ent. Soc. Lond.*, 1877, p. xii.

This observation has been since confirmed by J. Jenner Weir (*Entomologist*, vol. xv., 1882, p. 160). Again, M. de Nicéville "has found that *Acræa viola* is the only butterfly which all the species of *Mantis* he has experimented with, refuse to eat" (*Butterflies of India, Burmah, and Ceylon*, vol. i. pt. ii. p. 318). I do not feel any doubt about the widest proofs of the accuracy of Bates's great suggestion when experiments are generally made. Bates's epoch-making paper was read November 21, 1861, and appeared in the *Trans. Linn. Soc.*, vol. xxiii. His observations were subsequently

extended by the record of analogous facts in the Malay Archipelago by A. R. Wallace, and at the Cape by Roland Trimen.

(2.) One great difficulty had been observed by Bates, but remained unexplained by him and the other naturalists. Bates found that not only were the presumably nauseous Heliconians "mimicked" by the palatable groups, but that the different species of the former mimicked each other in certain cases. This remained a complete mystery until the appearance of an important paper by Fritz Müller in 1879 (*Kosmos*, May, p. 100). He suggested that advantage was gained by each of two convergent and nauseous species, because the number of individuals which must be sacrificed to the inexperience of young birds or other enemies would be made up by both of them instead of by each independently. Müller's paper was translated by Meldola, and appeared in the *Proc. Ent. Soc. Lond.*, 1879, p. xx. Wallace also accepted the results (*Nature*, vol. xxvi. p. 86), but the mathematical aspects of the subject were revised and perfected by Blakiston and Alexander (*Nature*, vol. xxvii. p. 481, and vol. xxix. p. 405).

(3.) The next advance was made by Meldola, who brought forward the following suggestion in *Ann. Mag. Nat. Hist.*, Dec. 1882. He saw in the wider application of Fritz Müller's principle an explanation of "the prevalence of one type of marking and colour throughout immense numbers of species in protected groups, such as the tawny species of *Danais*, the barred *Heliconias*, the blue-black *Euploëas*, and the fulvous *Acraëas*. While the unknown factors of species-transformation have in these cases caused divergence in certain characters, other characters, viz., superficial colouring and marking, have been approximated or prevented from diverging by the action of natural selection, every facility having been afforded for the action of this agency *by virtue of the near blood-relationship of the species concerned.*"

Under this suggestion we expect to find, and we do find, a far greater similarity between the species of a large group of closely-allied nauseous insects in any country than between those of other large groups protected in other ways.

(4.) On March 1, 1887, I read a paper on this subject (*Proc. Zool. Soc.*), attempting to bring together all that had been previously proved by direct experiments and including a number of experiments of my own. Carefully comparing the colours of all the insects of our own country which have been *proved by direct experiment* to be nauseous or dangerous, and neglecting all

others, I was able to show that Meldola's generalisation may be still further extended and may be made applicable to the whole of the scattered small groups and isolated species which are defended by the possession of such unpleasant attributes, the convergence being often *independent of relative affinity*. If such insects are looked at as a whole, it is seen that the same colours are repeated again and again, and are those which are known to produce the greatest effect upon the vertebrate eye. So, also, there are a few eminently conspicuous and simple patterns which are met with again and again in totally distinct groups of insects. The advantage of this convergence in colour and in pattern is certainly found in the fact that it facilitates the education of the vertebrate enemies of insects. Such convergence also passes into and always contains an element of true "mimicry"; and Dr. Walker will find an example of the undoubted protective effects of "mimicry" among our own lepidopterous fauna, which I proved by experiment during the past summer (*P. auriflua* and *L. salicis*. *Abstract of British Association at Manchester*, Section D). Further references and details upon the subject will be found in my paper in the *Zool. Soc. Proc.*, and I have only here attempted to bring forward mere notes of the course of our knowledge on this most interesting subject.



