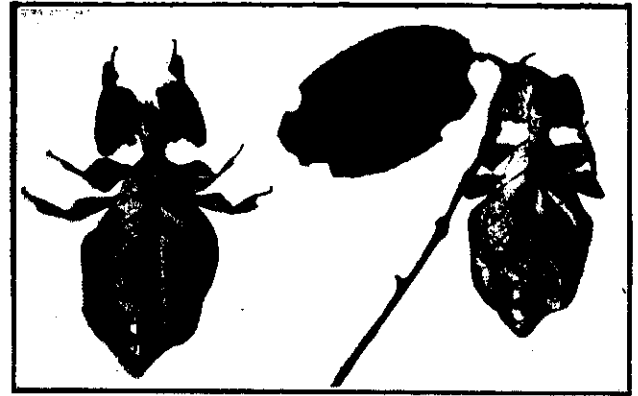


# The Protective Mimicry of Insects.

By WALDEMAR B. KAEMPFERT.

IN the eyes of the naturalist the world is a vast arena, and every creature a gladiator engaged in a fierce combat with a myriad of enemies—a combat in which mercy is unknown, in which thumbs are relentlessly turned down, and in which treachery and cunning are qualities as virtuous as courage and strength. Not merely in the instinctive hatred of one animal for another is this combat rooted but chiefly in the lust of life, in the desire to escape starvation. Lack of food means weakness to an animal; and weakness means death. Every hour, every minute, every second this bloody battle is waged. Darwin called this incessant warfare “natural selection,” or “the struggle for existence”—terms that have taken their

Hood, many insects have adopted liveries that harmonise closely with the flowers and the trees upon which they habitually repose. So exact is the protective resemblance that even the professional collector is often deceived. Instances of this form of concealment are well-nigh innumerable. The *Catocala* moth, a widely distributed genus, is conspicuous enough in flight; but once it rests on a tree-trunk, flattened against the bark, with its well-defined dark hind wings drawn beneath the mottled gray fore wings, it defies discovery. So accurately has nature painted and spotted the fore wings to imitate the effect of rough bark that the most vigilant enemy of the moth must pass it by. Often the adaptation is so refined that these moths are tinted



THE INDIAN WALKING LEAF.

An insect in which adaptation to foliage has been so faithfully carried out that even the legs are leaflike in form.

in a dun-coloured disguise that is an accurate reproduction in colour of the leaf-strewn forest soil where they abound. They are all of one family. These beetles and yet no two species exactly alike in hue. To escape its enemies each has donned a mask best suited for its purpose in its struggle for existence.

A moth usually rests with his forewings outspread over the prominent pattern of his hind wings. In any other posture he would inevitably meet a swift death. A butterfly, on the contrary, rests usually with his wings uplifted and pressed together. Otherwise, the gaudy surface would be as conspicuous as the black ink on this white paper—a signal for attack by relentless and voracious foes. In order, to hide himself, the butterfly has, therefore, lavished all the resources of his imitative art on the under surface of his wings. By far the most astonishing instance of this kind is afforded by the East Indian *Kallima* butterfly, the blue upper surface

of which is richly and ostentatiously adorned with a stripe of orange, but the under surface of which bears a truly staggering likeness to a leaf, when the wings are drawn together. Here we have an insect that apes not merely the approximate shape and colour of a dead leaf but also the midrib with the delicate veining, the sharp point, and the short stem common to many tropical leaves. It might be supposed that this imitation of an ordinary object is sufficiently minute to protect the *Kallima* from its enemies. Self-preservation apparently demands touches even more exquisite; for the resemblance has been so carefully carried out that not merely is a dead leaf simulated but in the lighter-coloured varieties a dead, shrivelled leaf flecked with parasitic growths, stained, and spotted to give the appearance of lices eaten by caterpillars. Is it any wonder that Alfred Russel Wallace, trained naturalist, keen-eyed observer, was unable to find the *Kallima* when it sought refuge from his net in a bush of dead leaves? How absolutely impenetrable is this disguise may be gath-



A BIRCH-BARK MOTH.

The American *Catocala* moth has two sets of wings, differing vastly in marking. When the rear wings are folded under the forward wings and the moth seeks its usual resting-place, a birch tree, it can scarcely be distinguished from the bark.

place in the vocabulary of everyday life. Although the weapons and the tactics employed in this struggle are much the same among both the higher and the lower animals, the most striking confirmation of the Darwinian theory is to be found in the insect world. In that world we find that both the hunter and the hunted have unconsciously contrived almost incredibly subtle artifices for outwitting each other, and that each insect is given a disguise by nature, designed to render its wearer invisible to his foe and sometimes to his prey.

We have been told that one method whereby the weak are enabled to escape the strong and the cowards to elude the brave consists in a protective simulation of surrounding objects. For the same reason that a woodsman has clad himself in green ever since the days of Robin

to resemble one tree more closely than another, because that particular kind of tree is usually selected for feeding or for rest. Thus we find a species of *Catocala* that looks for all the world like a piece of birch bark, even to the blotches of black. A certain South American beetle is found on one kind of tree only, and is so marvelously well assimilated to the bark that it can be discovered only when it stirs. Some caterpillars that live on trees resemble the lichens and moss of bark, the imitation being so true that the tuft-like appearance of such growths is produced. The numerous species of the tiger beetle all vary in colour to suit their surroundings, some having the sandy colour of the seashore where they are found; some simulating the green, wet, slimy stones on which they crawl; and some fluting protection



THE "WALKING STICK."

This insect mimics the twigs of a tree so minutely that in order to distinguish it from its surroundings it must actually be touched and frightened into movement.