

the way in which they said about them. The dark days or during an per contra, are most noonlight. The habits und. Well deserving *Noctuidæ* and *Hydro-*lls for water breathing. ung carries with it a xperience that comes e morning to catch the before the birds had ties and being amply , before or soon after we have learned to

the study of the habits g its faculties and, if t of unselfish pleasures. which our moral char-

and moths. We have the different, spring, ne sex, as in *Ennomos* of males, etc. Then is, on the authority of *H. Thysbe*. It is not and which the parent, ie first form that was unscientific to merit character, in which by by a change from the The cause of variation l shown the influence light, the geological in truth, the factors,

While varieties are latively true and that s insufficient character ter colours. Natural . The butterflies are day-flying moths are a are as dusky as the e circumstances under lours of the moth. It ents are made by the moth are also directly e moths are a survival ted, and that formerly en, during the whole e globe than it is now. witnessed in the case k genus of *Bombyces*. in colour from other ariation by which the the light are the least rresponds with upper

surface of secondaries, as if the pattern of one were photographed upon the other, is deserving of especial notice in this particular. All shadows are photographs which may deepen with time.

Among tropical butterflies *Mimicry*, as illustrated by Bates, Wallace, Fritz Müller, Darwin, plays an important part. The fact that certain species (*Ituna*, *Euplœa*) are protected by a peculiar smell from their natural enemies, seems to have induced a variation in other *Lepidoptera* not so protected, by which they approach in colour, pattern the protected species and are so preserved. But not only do the *Lepidoptera* mimic each other, but also other orders of insects and natural objects such as leaves and sticks, the bark of trees, etc. It may be assumed as a general principle that any variation in a direction which would protect the species would be preserved, although it is difficult to think out the steps in such a process. The fact that through-out nature form is conditioned by environment covers such general resemblances as caterpillars to stalks and butterflies to the leaves of plants. It is only when we take animals out of their usual surrounding that they afford contrasts and strike the eye. The resemblances of the *Sesiidæ*, or Clear Wings, to wasps has been often noted (Fig. 43). We have a species in our Fauna, *Sciapteron simulans*, in which this resemblance is carried to a startling extent. I was much struck by the way in which an Orthopterous insect, living on the leaves of garden Okra, which I observed near Savannah, copied the beetle *Tetracha Virginica*. A special enumeration of the cases of protective mimicry already well ascertained would alone fill a large volume.

The mass of living forms of butterflies and moths must be regarded as the descendants of original fewer and simple types. The probability that the *Lepidoptera* root in the *Neuroptera*, is assisted by the known transformation of the mouth parts and the survival of genera with decidedly neuropterous habit, structure, form. Fritz Müller, whose researches are worthy of our most sincere admiration, has traced the resemblances between the *Phryganidæ* and the *Lepidoptera*. Speyer considers the *Psychidæ* and *Tineidæ* the nearest to the *Neuroptera*, and Packard's early studies on the structure of the thorax in *Hepialus* have shown how near existing types of these two suborders of insects approach each other. No doubt in *Hepialus* and *Cossus* we have ancient types surviving; many years ago I read a paper trying to show that our primitive *Lepidoptera* had aquatic larvæ (like *Arzama* yet retains), and less perfect transformations. I differ with Butler as to *Cossus*, not being able to consider it structurally as allied either to *Castnia* or *Sphinxæ*, but as more directly representing a low or old type from which the spinners were, later on, derived. An outgrowth of a primitive unsightly structure, the *Lepidoptera* now fill the world with beauty and add to the pleasures of mankind. Life, always transforming itself, perishing to appear in new shapes, is the *perpetuum mobile* of the universe. It is certainly not to be proved that this will ever disappear if we leave out of sight the speculations as to the extinguishing of the sun, which are perhaps more curious than probable. It is a condition of our minds that we imagine a necessary end to all things. Nature, in fact, ends every instant only to transform—bearing children and devouring them. It is our poetical idealization of Nature which makes life supportable to thinking minds. We answer the unanswerable questions, whence, whither, wherefore, of our existence by a poetical apotheosis, or a scheme of usefulness. But when we lay these toys of the mind aside, the misery and faithlessness is only too real. To perish, and to perish in such company! Nor does the materialistic selfishness and insincerity of the present century console us! At a time when more than ever the principles of Christianity are needed, Christianity is going out. Almost do we prefer the intellectual swindle of the last century to what we now suffer. Money rules the world, and the commercial balance sheet is waited for; not the spring and the new year. Everybody asks me, Does your Entomology, your Art, pay? How much do you get by it? I have even been suspected of using it merely to make money by it, which, in one sense, complimented me. But

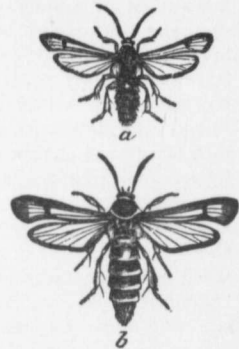


FIG. 43.