

found in the *Noctuidæ* where they are bristled beneath, scaled above, and about two-thirds the length of the fore wings.

The thorax supports the organs of locomotion, the legs and wings. The former are six in number and consist of five joints. They are attached to the thorax by the basal joint or *coxa*, and there is a small piece, the *trochanter*, between this and the *femur*, which is stouter than the following *tibia*, the leg terminating in jointed toes or *tarsi*. The *tibie* are often armed with spines or prickles, while the fore pair terminate sometimes in claws at the sides. In addition the middle and hind legs bear a pair of *spurs*. When the thorax is denuded of its vestiture it is seen to consist of three principal divisions, *prothorax*, *mesothorax* and *metathorax*, of which the middle piece is the largest. The wings are four in number, and are attached usually in the moths by a bristle and hook; the former is divided in the females and simple in the males, and is situated on the hind wings beneath near the upper edge of the wing; the bristle fits into a sort of socket on the under surface of the fore wings near the base. This character is wanting in the butterflies and in some moths, and seems to be an aid in keeping the wings together when flying. According to the system originally proposed by Dr. Herrich-Schaeffer, the ribs or nervures of the wing are numbered from one on, commencing on the inner margin of each wing. The marginal nervure is wanting, and the subcostal and median nervures form a median cell and branch out into secondary veinlets thrown on the costa and external margin. An accessory cell is sometimes formed beyond the median cell, but the median cell is often open, and there are, as a rule, no cross veins on the wing. The submedian vein or nervure is usually simple. The interspaces between the nervures are also indicated in descriptions so that the markings may be more accurately located. The fore wings are, according to this system, 9 to 12 veined, the number depending on the secondary veins which afford generic characters. The hind wings are similar in structure to the fore wings. They also vary in the number of secondary veins, of which there are usually 7 to 8. These veins are in reality hollow rods through which, when the insect escapes from the chrysalis, air and blood are forced by an action of the muscles of the thorax. They finally become dry and rigid. The wings in insects are thus not analogous to the wings of birds; they are outgrowths of the tracheal system and have only a common function with the wings of vertebrate animals. In order to study the neurulation of Lepidoptera the wing must be denuded of scales. This is most easily accomplished by a process invented by Mr. George Dimmock by which the coloring matter is removed from the scales. For this process the wing, previously moistened with ether to remove all fatty matter, is placed in a solution of chloride of lime. From this it may be transferred from time to time to a weak solution of acid to hasten the action of the lime water which, in a short time, decolorizes the scales, rendering them entirely transparent and allowing the course of the veins to be exactly made out. Wings prepared in this manner may be transferred to glass slides and mounted for the microscope.

A study of the wings and external parts of the Lepidoptera leads to the conclusion that the genera are founded on comparative characters. Rarely does the presence of a peculiar structure of some of the organs give a strong character to the genus. The conclusions, with regard to classification, to which I have arrived are, that the generic characters must be dealt with in principle as are those separating the individuals into species. The limits of the genera depend on the want of intermediate forms, the important point being that the combination of characters which constitute the genus shall be readily seizable by the student and verifiable. Nature seems to be concerned with the individual rather than with our divisions, which are to a certain extent arbitrary and matters of convenience for our better understanding of these organisms.

Subordinate to structure in the moths are the pattern of ornamentation and coloration. The former is of the most value in associating species, although the latter is very characteristic in the different groups. In the butterflies we see for instance that the *Satyridae*, or Meadow Browns, are of a dusky gray or blackish brown color, shading to reddish or yellow, while the wings are usually ornamented with eye-like spots. The *Pieridae* are usually white, yellow or orange of various shades with black margin to the

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