

Entomology.

Antennæ of Insects.

In carefully examining the various parts and organs of insects, we are generally able, without much difficulty, to determine their special functions and properties; but there is one set of organs which has always been a puzzle to the student of natural history, viz., the *Antennæ*, or "Horns," as they are commonly termed. What is the real use of these appendages to the head, so universally found in all orders and kinds of insects, we are only able to guess at; what want of the insect they supply, or what sense they are the channels of, has not yet been ascertained with any degree of certainty. The difficulty is, that we and all animals whose functions and faculties resemble our own at all, and with which we are therefore better acquainted, have no organs that can be compared with these antennæ, or that resemble them in the least; we have thus no ground of analogy to go upon, but must base our views entirely upon the results of experiments. It is evident that they are used to a considerable extent as organs of feeling, and they have long been thought by many to be organs of hearing as well; at any rate the insect appears to employ them in deriving some sensations from the air as well as from surrounding objects, and in the case of ants we see them used apparently as organs of communication.

The late Dr. Clemen, in his valuable monograph on North American Sphingidæ (Hawk Moths) gives a detailed account of some experiments he made upon the antennæ of our largest Emperor Moth (*Samia Cecropia*). He states that he had long thought that the well-known habit of moths of spinning with their heads downwards, on any surface they chance to come in contact with, when they have singed their antennæ in a flame, was the mere expression of pain, and not caused by any loss of power of directing their movements; but that his experiments on these organs seemed to point to quite a different reason. He first tried the effect of cutting off the antennæ of a specimen that had just come out of its cocoon. When night approached, the insect having its wings then fully expanded, made no attempt to fly away, but remained quite docile, and permitted itself to be handled, without any desire to escape, or sense of danger. Upon being thrown into the air it seemed to have no control over its wings, but fell helplessly to the ground, and when forced at last to use its wings in flight, it appeared to be utterly unable to guide itself, and had completely lost all its usual power of hovering in the air. On other specimens, he made the experiment of cutting off only a portion of the antennæ at a time, and found that the more he cut off the less power the insect had over its wings, till at last, after finding itself quite unable to guide its flight, it ceased to employ its wings at all, and remained perfectly passive and helpless. From these experiments, he drew the inference that "the antennæ, instead of being the organs of any special sense, are in Lepidoptera instruments of atmospheric palpation, having especial reference to the action and use of the wings during flight." Of course, these experiments afford us no insight as to the uses of the antennæ of ants and other insects that are provided with these organs, even when destitute of wings.

But though we are unable to discover the exact objects and purposes for which insects are provided with these curious appendages, we yet cannot but admire their manifold beauties and wondrous variety of structure. Sometimes they are mere threads or bristles, at others they resemble saws, clubs, feathers, whips, strings of beads, spindles, combs, or even the leaves of a book; sometimes they are very long and composed of many joints, at others they are short and inconspicuous, with as few as only two joints. Some of the wood-boring beetles have antennæ five or six inches in length, with between

twenty and thirty joints in each, and a little moth, about a quarter of an inch long, has them five times her own length. This long-horn moth (*Adela*) is thus described by Mr. Wood.—"It sits on a leaf, basking in the glaring sunbeams, while its antennæ, waving about in graceful curves, are only to be traced by the light that sparkles about them. They are as slender as the gossamer threads floating in the air, and, like them, only seen as lines of light. They are too delicate even for Queen Mab's chariot traces. The grey-coated gnat might use one of them as his whip; but it would only be for show, as becometh the whip of a state-coach; for it could not hurt the tiniest atomy ever harnessed. And yet the little *Adela* flies undauntedly among the trees, threading her way with perfect ease through the thickest foliage, her wondrous antennæ escaping all injury, and gleaming now and then, as a stray sunbeam touches them."

We have referred above to the apparent use of the antennæ as organs of communication in ants; Kirby and Spence thus describe their language, if it may be so termed, as expressed by these organs. "When the military ants go upon their expeditions, previously to setting off they touch each other on the trunk with their antennæ and forehead; this is the signal for marching, for as soon as any one has received it, he is immediately in motion. When they have any discovery to communicate, they strike with them those that they meet in a particularly impressive way. If a hungry ant wants to be fed, it touches with its two antennæ, moving them very rapidly, those of the individual from which it expects its meal."

The same authors quote Huber's experiments to show that these organs have the same use with bees. "He wished to ascertain how, when they had lost a queen (intelligence which traverses a whole hive in about an hour), they discovered the sad event. He first divided a hive by a grate, which kept the two portions about three or four lines apart; so that they could not come at each other, though scent would pass. In that part in which there was no queen, the bees were soon in great agitation; and as they did not discover her where she was confined, in a short time they began to construct royal cells, which quieted them. He next separated them by a partition through which they could pass their antennæ, but not their heads. In this case the bees all remained tranquil, neither intermitting the care of the brood, nor abandoning their other employments; nor did they begin any royal cell. The means they used to assure themselves that their queen was in their vicinity, and to communicate with her, was to pass their antennæ through the openings of the grate. An infinite number of these organs might be seen at once, as it were, inquiring in all directions; and the queen was observed answering these anxious inquiries of her subjects in the most marked manner; for she was all ways fastened by her feet to the grate, crossing her antennæ with those of the inquirers. Various other experiments, which are too long to relate, prove the importance of these organs, as the instruments of communicating with each other, as well as to direct the bee in all its proceedings."

The Earth-Worm.

We have been applied to by Mr. Thomas Good, of Richmond, for some information respecting the common Earth-Worm. He desires to know "whether they are an injury to the soil, and if so, what would be the best way to banish them;" and he further states that "there are some fields in our neighbourhood polluted with them; one thing I know, they make the land very hard to plough."

We fear that Mr. Good has rather jumped at a conclusion. His land is hard to plough, and there are worms in it, therefore worms make the land hard to plough! Now, in reality, the very opposite is the case, instead of making the ground hard, the worms are doing their best to improve it. Their great office is to under-drain and till the ground, by burrowing through it in every direction, and thus loosening it and rendering it permeable by air and water; they do for the under soil what digging and ploughing do for the upper. In the first number of last year's volume of the CANADA FARMER (vol. iv, 1867, page 8), we

gave an account of the earth-worm, and some of the benefits we derive from it; to which we beg to refer our correspondent. It is true that it is sometimes injurious in gardens from eating off, at night, young and tender vegetables; but it is admitted on all hands, that the good done by this animal to ploughed fields, pastures, and meadows, more than counterbalances any robberies it may commit in the garden, while even there it is of great use. We should be very sorry indeed to suggest any method for its destruction.

The Apiary.

Bees and Fruit Blossoms.

The people of Wenham, (Mass.) have voted, by a two-thirds majority, that no bees shall be kept in the town; they have judged that bee-keeping and fruit-raising are incompatible, and that bees are a nuisance. In reference to this subject the *Bee Journal* remarks:—

A silly prejudice against bees is entertained by some fruit-growers, based on the notion that the crops of fruit are injuriously affected, both in quality and quantity, by the visits of bees during the blossoming period. A more unfounded notion, or one deriving less support from observation and science, can scarcely be conceived. Yet it regularly looms up once or twice in a century, and creates as much alarm and consternation among the wisacres, as the appearance of a comet used to do in by-gone days.

Repeated instances of the resuscitation of this prejudice are presented in the history of bee-culture in Germany, especially in the period between 1530 and 1800. On some of these occasions it was so widely prevalent and so rabid in its demonstrations, as to constrain the almost total abandonment of bee-culture in districts where fruit-raising bore away. To the aid of this, came the substitution of cider and beer for the ancient mead or metheglin, as the popular beverage; and amid such opposition and discouragement, bee-culture rapidly sank to be of very subordinate interest, except in some favourable localities.

In 1774, Count Anthony, of Torringes-Seefeld, in Bavaria, President of the Academy of Science at Munich, striving to re-introduce bee-culture on his patrimonial estate, found in this generally prevalent prejudice the chief obstacle to success. To overcome it he laboured assiduously to show that bees, far from being injurious, were directly beneficial in the fructification of blossoms—causing the fruit to set by conveying the fertilizing pollen from tree to tree and from flower to flower. He proved, moreover, by official family records, that a century earlier, when bees were kept by every tenant on the estate, fruit was abundant; whereas then, when only seven kept bees, and none of these had more than three colonies, fruit was scarcer than ever among his tenants.

At the Apiarian General Convention, held at Stuttgart, in Württemberg, in September, 1838, the subject of honey-yielding crops being under discussion, the celebrated Pomologist, Professor Lucas, one of the directors of the Hohenheim Institute, alluding to the prejudice, went on to say:—"Of more importance, however, is an improved management of our fruit trees. Here the interests of the horticulturist and the bee-keeper combine and run parallel. A judicious pruning of our fruit-trees will cause them to blossom more freely and yield honey more plentifully. I would urge attention to this, on those particularly who are both fruit-growers and bee-keepers. A careful and observant bee-keeper at Potsdam, writes to me that his trees yield decidedly larger crops since he has established an apiary in his orchard, and the annual product is now more certain and regular than before, though his trees had always received due attention."

Some years ago, a wealthy lady in Germany established a green-house at considerable cost, and stocked it with a great variety of choice native and exotic fruit-trees, expecting in due time to have remunerating crops. Time passed, and annually there was a superabundance of blossoms with only very little fruit. Various plans were devised and adopted to bring the trees into bearing, but without success, till it was suggested that the blossoms needed fertilization, and that by means of bees the needed work could be effected. A hive of busy honey-gatherers was introduced next season; the remedy was effectual—there was no longer any difficulty in producing crops there. The bees distributed the pollen, and the setting of the fruit followed naturally.