

THE INTER-RELATION OF INSECTS AND FLOWERS.

During the last 8 years there have appeared from the pen of Mr. Charles Robertson, of Carlinville, Ill., several most interesting articles on the inter-relation of insects and flowers. The titles are as follows:

Botanical Gazette—

- 1886. Notes on the pollination of *Asclepias*.
- 1887. Insect relations of certain *Asclepiads*.
- 1887. Fertilization of *Calopogon parviflorus*.
- 1888. Effect of the wind on bees and flowers.
- 1888. Zygomorphy and its causes: I-III.
- 1889-93. Flowers and Insects: I-XI.

Trans. Am. Ent. Soc.—

- 1889. Synopsis of North American species of *Oxybelus*.
- 1891-93. Descriptions of new species of North American Bees.

Trans. St. Louis Acad. of Science—

- 1891-92. Flowers and Insects: *Asclepiadaceæ* to *Scrofulariaceæ*, *Umbellifereæ*, *Labiataæ*.

Mr. Robertson began in 1886 to study the visits of insects to flowers and by his persevering observations he has succeeded in collecting an enormous number of facts which he has published mostly in the *Botanical Gazette* and in the Transactions of the St. Louis Academy of Science.

He has studied the subject especially from a botanical point of view and has given particular attention to the attractions offered to insects by the flowers of different species of plants, to the peculiarities of arrangement of their different parts, to their coloration, and to the modifications which many flowers seem to have undergone from their being constantly frequented by certain species of insects.

Such studies have nevertheless an immediate bearing on entomology, as they give us at the same time an insight into the purposes of insects in visiting flowers, into their habits of feeding and collecting either nectar or pollen, or both at once, and into the intelligence they display in order to attain their end. The close attention thus necessarily given to insects, has had besides the natural result of causing Mr. Robertson to discover that many of those insects which he was observing in his locality, Carlinville, Ill., had not even been described. Therefore, he found it necessary at first to pay particular attention to collecting and determining insects. He was helped in this work by specialists in *Diptera* and *Coleoptera*, and had himself to work out and describe many species of *Hymenoptera*: 10 out of 14 species of *Oxybelus*, 28 out of 30 of *Andrena* and at least thirty other species of *Andrenidæ*. The descriptions of these have appeared in the *Trans. Am. Ent. Soc.*, 1889-1893.

The two great agencies of cross-fertilization of flowers are the wind and insects; hence Mr. Robertson has thus been led to notice some interesting facts concerning the effect of wind on bees and flowers.—*Bot. Gaz.*, xiii, 1888, p. 33.

The first papers by Mr. Robertson are on the pollination of *Asclepias*, the flowers of which are most interesting in their peculiar adaptation for cross-fertilization by the agency of insects. Their structure and the great difficulty the smaller insects have in effecting pollinations, leads Mr. Robertson to believe, "that bumble-bees have had most influence in modifying the flowers, and they are the most common visitors after the hive bees. Hive bees, it is to be remembered, do not belong to our fauna."

Our space is too limited to allow us to follow the writer into what he has observed in all the different orders and species of flowering plants studied; but the names of all the insects observed visiting the flowers, are given, as well as tabular data of the respective number of visitors of the different classes, *Hymenoptera*, *Diptera*, *Lepidoptera*,

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