

they are free from insects, you will find in time the drops of honey-dew form on these leaves." Apparently quite an easy matter, but we would respectfully ask Mr. Cowan whether he had himself ever tested the experiment? He is more explicit than M. Bonnier for he adds that the exudation forms in small drops on the **under side** of the leaves, and drops from one leaf to another." so that **both** sides according to the chairman of the British Bee-Keepers' Association carry the honey-dew. Some years previously Mr. Cowan had written as follows: "To remove a false impression in regard to honey dew, let us say it is not the excreta of the Aphis, but on the contrary is a saccharine substance which exudes from the surface of the leaves of trees and plants." We should much like to hear why, if the honey-dew exudes through the pores of the leaves, none of it is found on the under sides.

The whole of the trouble appears to be caused by the absence of insects from the affected trees. At the time of writing there are a number of fruit trees within ten yards of us that a couple of weeks ago were covered with honey-dew. We made a careful search for aphids without success. Minute examination failed to reveal a single particle of honey-dew on the lower surfaces, but instead we readily found the punctures of the insects. We shall refer later to the rapidity with which the aphid forsakes one plant host for another, but here let us assert that the presumed absence of aphids from a tree or plant is no proof of the non-aphidian origin of the honey-dew found thereon.

One writer in the B.B.J. calls honey-dew "extra floral nectar." He says that "in the case of trees, under certain weather conditions, the accumulated nectar forces itself through openings called stomata (sic) or where these are wanting through the cuticle of the plant, thus producing honey-dew." This statement

scarcely needs comment. Neither "nectar" nor the secretions of the extra-floral nectaries are honey-dew.

Last year we received the following communication from Professor F. V. Theobald, the well-known authority on insect pests, bearing on the subject:

"After working at aphides for 10 years, I am quite convinced honey-dew is only produced by them and some coccids. You never find honey-dew where there are no aphides **near**. You never find honey-dew except on the upper surfaces of leaves—on the leaves above you get the aphid on the lower sides. Honey-dew often drops from the sky. You see no aphids—they are high up migrating. I have followed this twice, watching clouds of hop aphid coming down. Several people have sent me leaves covered with honey-dew and smut fungus on it, and said there were no aphid on the plants. Examination showed swarms of aphid on the leaves of **trees above the plants**. This (1909) has been one of the worst years for aphid in Britain I have known. Personally I feel quite certain honey-dew is formed by them and a few coccids alone and has nothing to do with any exudate from the leaves.

Yours truly  
F. V. THEOBALD."

The Director of the Royal Gardens at Kew wrote us as follows:

"Nothing is known of the exudation of nectar through stomata or leaf cuticles, and such a process is highly unlikely—in fact it can be stated that it does not occur."

Perhaps a short account of the life history of the insects which are generally recognized as the sole cause and producers of honey-dew may be of interest to our readers. The aphids (plant lice) coccids (scale insects) and psyllids (jumping plant lice), belong to the Hemiptera or Bugs. All are sucking insects and spend their whole lives in imbibing the juices of plants. Their mouths are character-

istic and beaks, with length of plant. In arrangement of salivary glands, the structure of the mouthparts is an irritation to the surrounding tissue, and the wound thus formed is a source of infection to the plant. The continuous natural discharge of this liquid is regarded as a pest, and various cases of honey-dew, psyllids, and leaf-miners, and coccids, which surround the "growth" of the plant. The manner in which the honey-dew is formed by other substances might be a source of infection to the plant. The order Hemiptera, however, which is the great source of certain species to all who garden or grow, is a source of injury that is a source of damage to the plant. It is an important factor in the bacterial decay of the plant. (See Bulletin of the Department of Agriculture.)

The rapidity of their destruction of the plant is a source of injury until the plant has been destroyed or perhaps