

tween invert sugar produced by the bee and invert sugar produced artificially. These slight differences, due to presence of by-products, afford the analyst a means of discriminating between these two kinds of invert sugar. Of this I shall speak later.

Glucose syrup is marked by a decided percentage of a gummy substance known as dextrin, or British gum, which enables it to be identified if used as a honey material, and apart from this fact it consists mainly of dextrose, while invert sugar consists of dextrose and levulose in equal amounts. Bees feed very unwillingly upon glucose, and cannot long survive an exclusive glucose diet.

The main adulteration of honey takes place in the honey separated from the comb, so-called strained honey. With strained honey it becomes possible to make additions directly. The most evident method of adulteration is the addition of water. It is for this reason that a maximum limit for water is needed in the legal definition. Under ordinary conditions of temperature, the bee finds honey workable with about 16 to 20 per cent. of water. We have seen that in certain cases a somewhat higher content may be present, but with much above 20 per cent. the honey does not keep well, being apt to ferment. It is safe to say that when water above 30 per cent. is found, this has been added for fraudulent purposes.

Other adulterations of honey are **gelatinized starch, glucose syrup, cane sugar syrup and invert sugar syrup**. The first-named, gelatinized starch, is only interesting as matter of history, being seldom or never employed at the present time. It is too unlike honey to be satisfactory for purposes of fraud, and too easily detected by simple chemical methods, as by the blue reaction of iodine. The lack of sweetness can be contemplated by addition of a very small quantity of saccharine. Glucose syrup is a cheap material, very closely resembles honey in appearance, has a certain degree of sweetness

(about half that of cane sugar syrup), and has, for these reasons, been very largely employed to adulterate strained honey. It is claimed that its use actually improves certain grades of honey, as by making lighter the color of the very dark honeys, and by reducing the too marked flavor of certain strong-flavored natural honeys—golden-rod, buckwheat, sumac, etc. Most natural honeys granulate on standing, and glucose prevents granulation.

The dextrin present in glucose syrup serves for its easy detection with iodine, and the small amounts of dextrin found in some honeys does not seriously interfere with the reaction, or it may be precipitated by alcohol, preferably methyl alcohol.

Quantative estimations of glucose syrup can only be made approximately exact, since the article as occurring in commerce is not of constant composition. The methods of working are too complex to admit of presentation here; and they involve the use of apparatus of very delicate construction. In certain products of starch inversion, known as grape sugar or commercial dextrose, the dextrins, on which we depend for the detection of commercial glucose syrup, may be quite absent. If a syrup of this character be used, the product will be strongly dextrorotatory, and when examined at a temperature (87° C.) at which levulose is optically inactive, the change in the reading will be less than if levulose had been present in such proportion as it should be in a genuine honey. By this lowering of the difference in the readings at 20° and 87° the presence of added dextrose is manifested.

(The balance of this paper will appear in our next issue.)

The value of honey imported into the United Kingdom in the month of September, 1908, was £1,781.—From a Return supplied to the Irish Bee Journal by the Statistical Office, H. M. Customs London.

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