

stances employed to adulterate honey are, like honey itself, characterized by a very low ash content. Owing to the valuelessness of this determination for purposes of detecting adulteration, I have not considered it necessary to carry out the test on the present collection.

Very few articles of food have been more extensively adulterated than honey; and it is important to examine how far the above definition of (U.S.) legal honey, enables surrogate samples to be detected.

Bees naturally gather the raw material for honey production at the nearest point; and this has been taken advantage of by bee-keepers. Sugar, syrup and other foods, are very properly fed to bees, in order to tide over periods of scarcity; but the feeding of syrup to bees to enable them to fill their combs with honey for the market, is another matter. Even when bees are fed exclusively on cane sugar (sucrose), the honey which they store up, consists chiefly of invert sugar, the organization of the insect effecting the change. But notable amounts of the cane sugar so fed, escape inversion; and as much as 30 per cent of the whole has been found, as unchanged sucrose, in the resultant honey. When bees have access to the normal, raw-material for honey making, it is well established that the honey will contain not more than from traces, to 10 per cent of cane sugar (sucrose). In the event of coniferous trees (pines &c.) being largely accessible, the honey may contain slightly higher amounts of cane sugar; but even in such case, 15 or 16 per cent of sucrose is a maximum amount. The Swiss Agricultural Chemists have fixed the maximum at 16 per cent. "In northern climes, where the pine and other coniferous trees abound, it may be safer to fix a somewhat higher maximum for sucrose than 8 per cent as established by the United States standard already quoted.

I have, for purposes of this Bulletin, adopted 16 per cent sucrose.

Glucose (Corn syrup) is a frequent adulterant of *extracted* or *strained* honey, i.e. honey which has been separated from the comb. Such surrogate honey always shows a marked right-hand rotation; and, by this means, (and others) is readily detected.

Cane sugar syrup is less often employed, as a honey substitute, partly because of its higher cost, and partly because of its ready detection, if employed in profitable amounts. There can, however, be no doubt that cane sugar syrup is in use, as an adulterant to honey. One of the samples now reported (See No. 25812) contains an explicit statement of the fact, that it consists of "*Honey and Sugar Syrup*." This sample gives a reading $+17.8^\circ$. The addition of cane syrup as already remarked, to the finished product, is not difficult of detection. This becomes quite otherwise when it is fed to the bees and subjected to the influence of the organism of the bee itself. There is a strong presumption against the purity of any honey sample which contains 10 per cent or more of cane sugar; but owing to circumstances already described, I consider it advisable, for the present, to give the benefit of any doubt, to the producer, and to permit samples, up to 16 per cent of cane sugar, to pass as "presumably genuine," in the absence of other evidence against them.

When cane sugar in solution is inverted (as by an acid) the resultant "*invert sugar*" is practically identical with honey, so far as the sugar content of the latter is concerned. Particulars as to the use of invert sugar as a honey substitute, or adulterant, will be found in the introduction to Bull. No. 90.