

HONEY—PURE AND ADULTERATED

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The next point to be investigated is this: "What does the bee do to the raw material in making this into honey?"

Perhaps the most notable change produced by the work of the bee is the concentration of the sugar solution on which it works. Nectars contain from 70 to 85 per cent. of water. Honey-dew from the pine contains about 55 per cent. of water. The average water-content of 138 samples of honey listed by Konig is 20.60 per cent. One hundred samples of genuine honeys exhibited at the St. Louis Exposition in 1903 were analyzed at Washington, and gave an average of 17.59 per cent. water, with a range of from 12.42 to 26.88 per cent. The average moisture-content of honey may safely be taken as about 20 per cent. If honey be taken from uncapped combs it may contain decidedly higher moisture, as has been pointed out by Mr. Shutt, of the Experimental Farms at Ottawa (1902 Rep., p. 163), and is apparently considered by the bees themselves as unripe. The definition of honey adopted by the Department of Agriculture at Washington fixes 25 per cent. as a maximum amount of water permissible in legal honey.

On looking over the record of our work upon honey, covering the last ten years, I find that 730 samples have been examined. These are reported as follows:

Bulletin	Date	Total Samples	Samples containing above 25% of Water
(about 18c).	47 1897	183	47
(about 35c).	90 1903	99	10
(70c).	122 1906	54	5
(98c).	145 1908	253	31
s (\$1.58).	148 1908	141	19
11.75 marks		730	112

It will be seen that about 15 per cent. of all honeys examined contain above 25 per cent. of water. Many of these samples are adulterated, either by the intentional addition of water, or by the use of glucose or any other adulterant. But

there remains, when due allowance is made for such samples, a small percentage of genuine honeys, carrying more than 25 per cent. moisture.

I cannot therefore feel quite sure that in the light of present knowledge of Canadian honey it would be just to establish a standard of 25 per cent. water. Undoubtedly any samples showing more than 25 per cent. must be regarded as exceptional, but that is a different thing from condemning them as adulterated.

Very few samples are reported as containing more than 30 per cent. of water, and most of these are contained in the collections of 1897 and 1903. As noted in Bulletin 47, we had not then decided upon a fixed mode of working in water estimations, and the differing methods employed by different analysts introduced some uncertainty into a comparison of results. Bearing this in mind, I am of opinion that a limit of 30 per cent. of water may safely be fixed as a maximum amount permissible in genuine honey. If this be conceded, we are in a position to add a third term to our definition of honey.

Honey must be (1) made by bees (2) from the nectar and saccharine exudations of plants, (3) and must contain not more than 30 per cent. of water.

The second point of change brought about in the raw material of honey, by the operation of the bee, is the conversion of the cane sugar (i.e., ordinary sugar, as found in the sap of the sugar cane, the beet, the maple tree, and in floral nectar) into two other sugars known as dextrose and levulose. This change is easily brought about by laboratory methods, and we usually speak of the resultant mixture of dextrose and levulose as invert sugar. The process of making this change is known as inversion, and it may be induced by a great variety of treatments. A ferment (known as diastase) present in malted grain answers the purpose perfectly, and it is probable that a somewhat similar ferment (enzyme) present in the bee's economy is

to the C.B.J. industry.