

cept under the most unusual circumstances, at the same time honey may generally be removed at the close of each flow, so that the total quantity will have the characteristic flavor imparted by a single kind of flower.

### The Granulation of Honey

Almost all honeys granulate or "candy" after a certain time, and may become solid. This phenomenon varies greatly with different honeys. For example, alfalfa honey produced in Colorado will often granulate solid within a few weeks from the time it is extracted, while the white-sage honey of southern California will often remain liquid and entirely clear of crystal for two years and sometimes longer, if properly put up. The reason for this difference in the time of granulation will be discussed under the heading of "Types of Honey." Honey from the same species of plant varies somewhat in this respect in different localities.

Formerly the general public was suspicious of granulated honey, in the belief that it contained cane sugar, but, fortunately, it is now generally understood that pure honeys will granulate in time, and this crystallization is generally considered as a test of purity. The education of the purchasing public has so far progressed that now some bee-keepers prefer to sell their honey in a solid granulated condition, it being cut up into bricks and wrapped in oil paper.

In bottling honey, or in putting honey from any large receptacle into smaller ones, it is necessary to liquefy the entire quantity completely before the operation is begun. This may be done by immersing the receptacle in water which has been heated to 160 or 170° F., and letting it remain until the honey is all liquid and free from crystals. Honey should never be liquefied by direct application of heat, and it is extremely important that it should not reach a tem-

perature of more than 160° F. It is well known to almost all bee-keepers that honey heated to higher temperatures will become darker in color and lose flavor, and, consequently, they are generally very careful on this point. There is, however, a very much more important reason for avoiding high temperatures. When honey is heated to 180° F. or more, the higher alcohols which give honey its aroma are driven off, and, more than that, a decomposition of certain of the sugars takes place; this is what gives the darker color to the honey. Of all the various substances used for the adulteration of honey the one most nearly resembling pure honey is invert sugar, of which Herzfelt's artificial honey is one of the best illustrations. In the detection of adulteration, one of the tests for the addition of invert sugar is based on the presence of decomposition products due to heat. These decomposition products in invert sugar are probably identical with the decomposition products in overheated honey; at any rate, honey which has been heated to more than 180° F. for any considerable time gives the test for invert sugar and would, therefore, be declared to be adulterated if this test were applied by a chemist. A bee-keeper might argue that he was not infringing on the pure food law in overheating his honey, since he had added nothing in the way of an adulterant. If, however, he changes the chemical composition of his honey by injudicious treatment it is no longer pure honey, and he has no right to sell it under that name.

It is very much safer to liquefy honey at a temperature of about 140° F. and thus avoid any danger of decomposition. If this lower temperature is used it is, of course, necessary to keep the honey at this temperature for a considerable time, but the safety of such a proceeding makes the extra time well worth while.

Two or three of the most widely-circulated American text-books on bee-keeping

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