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Improving the Color Of Beeswax

"We have developed a simple procedure by which the discoloration of beeswax from metal contamination may be removed."

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SEVERAL YEARS AGO we collected a number of samples of United States beewax for a study of the detection of mixing of other waxes with beeswax (1,2). Every effort was made to obtain authentic samples of old-comb wax and of cappings wax. With the much appreciated cooperation of many producers and wax processors, over 60 wax samples of known history were obtained. Complete analyses of these waxes were reported (1) together with a procedure to detect admixture of microcrystalline petroleum wax (1,2).

Since we had specifically asked for crude waxes, all of the samples (25 old-comb, 34 cappings) were washed and filtered through paper in the laboratory before any work was done on them. The range of colors of these waxes was quite wide. While one would expect old-comb waxes to be dark and brown or brownish-black, and cappings wax to be light, many of the cappings wax samples were not of a clear pale or bright yellow color, but showed various degrees of brown or gray in their colors. The actual colors of all of the samples were estimated by comparing with Munsell color chips (3) and is recorded for each sample (1). When bees are denied access to pollen and honey the beeswax as secreted is perfectly white. The true color of cappings wax or new-comb wax as we know it evidently arises from plant pigments from pollen and possibly propolis (4).

It is well known that beeswax is quite susceptible to discoloration by contact with such metals as iron, copper, brass, monel (nickel-copper-iron), and zinc, with iron being particularly objectionable (4). This discoloration appears as a darkening or smudging of the clear yellow or yellow-orange of the wax.

By examination of the recorded colors for the 34 cappings waxes mentioned above it can be seen that only six of them were of a clear color without a tinge of brown or gray. All samples had been filtered through paper in the laboratory so it appears that the treatment given the waxes by the producers had caused the discoloration. Frequently beeswax samples in State or National shows and exhibitions have this type of defect. Once the wax is damaged in this manner, it has been practically impossible to restore it to its original condition (4, 5).

The presence of this defect in exhibition wax indicates that perhaps it is not even recognized as a defect by producers.

We have developed a simple procedure by which the discoloration of beeswax from metal contamination may be removed and thus the original yellow or yellow-orange color of the wax may be restored. The process is not a bleach and has no effect on natural beeswax colors.

The process takes advantage of a class of chemical compounds known as "chelating agents". They preferentially form stable complexes with metal ions in solutions and prevent undesired effects caused by these metals. Thus, by treating an off-color wax containing the discoloring metal compounds of wax constituents, the metal appears to be removed, the gray or brown tint of the wax disappears, and the clear tint of the wax is revealed. The process does not use any corrosive substances and is equally suitable for small or large-scale use.

Material: A water solution of disodium salt of ethylenediamine tetraacetic acid: ¼ oz. (7.1 g, 110 grains) per gallon of water (1.88 grams per liter).

Process: One part by weight of fairly clean discolored beeswax is either melted in or melted and added to 2.33 parts of the above solution (3½ lb. wax per gal. of solution) in a glass, stainless steel, or aluminum vessel. Do not use enamelware. It is then heated near boiling (203-210°F, 95-99°C) with mechanical stirring, and kept in this temperature range with stirring (fast enough for good mixing of the wax and solution) for 1 hour.

CAUTION:- Do not heat beeswax with an open flame. Only sufficient heat is used to keep it in the range noted. If a large quantity is being treated, no additional heat may be needed after reaching 210°, especially if the container is insulated. After an hour, stirring is stopped, the container insulated to slow the cooling, and let cool. The solidified cold cake is removed, any coagulated material scraped from the underside, and then the wax is remelted with fresh water [1/], stirred a few minutes, again cooled, and the underside scraped. Sometimes a finely-divided black material is found in discolored beeswax and is not removed by this treatment. Filtration through paper is the best way to remove such material.

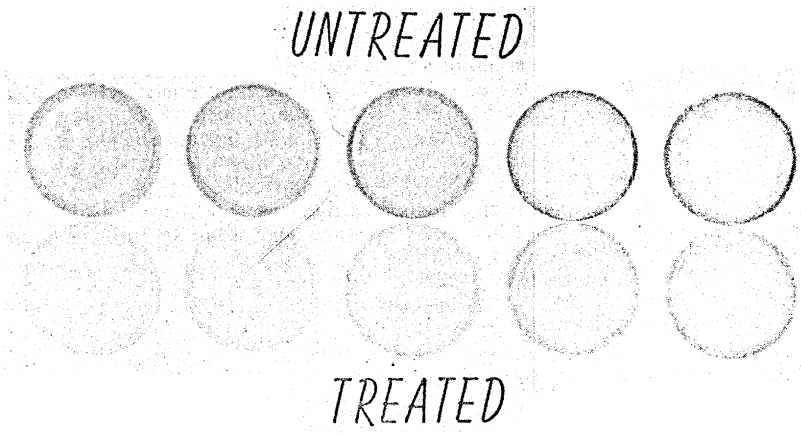
The reagent used in this process is available from several chemical manufacturers. It is sold as "Versene NA" by Dow Chemical Company, Abbot Road Buildings, Midland, Michigan, or "Sequestrene NA2" by Geigy Industrial Chemicals, Saw Mill River Road, Ardsley, New York. [2/]

The illustration shows the "before and after" condition of five beeswaxes: four old-comb and one cappings wax.

1/ If only hard water is available, dilute 1 part fresh treating solution with 2 parts water and use this for the rinse.

2/ Mention of trade and company names does not imply endorsement by the Department over others not named.

The effect upon color of beeswax of the treatment described in the text. **Upper row** - filtered, untreated samples. **Lower row** - corresponding treated samples. Each pair is of same thickness. Pair at left is cappings wax, others are old-comb wax.



anish. The prologue is by Professor J. Dyce of Cornell University who has made several trips to the area.

There is no indication of the price on the copy I have before me. The book was printed in Mexico; copies are available from the editor: Bartolome Trucco, 5 de Mayo 10, Mexico 1, D. F., Mexico.

Oxdetx, Gonzalo S. and Dario Espina Perez La apicultura en los tropicos. 412 pgs. 1966.

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The color-improving action of the process will take place whether the water used is hard or soft. It is stated that the presence of calcium ions from hard water is undesirable in beeswax (5) since they form soaps with wax acids which favor retention of water in the wax, increase the viscosity of melted wax, thus increasing settling times of impurities in the liquid wax and impairing burning qualities of candles (5). In commercial wax processing, sulfuric acid is often used to avoid this but the same effect is obtained by the chelating agent in the process, since it complexes the ions causing water hardness (calcium and magnesium) and does not permit them to react with the beeswax. The amount of material required for this is quite small (2.8 g (1/10 oz.) per gal. of 10-grain water); the recommended strength of the treating solution for the wax allows for any water hardness normally encountered, plus a safety factor for badly contaminated beeswax. The use of small amounts in the rinsing solutions (if needed because of water hardness) helps retain the quality improvement obtained in the process.

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MONTHLY HONEY REPORT

rs' shelf have been caused by increased middleman expenses rather than the beekeeper increasing his prices.

According to our Monthly Honey Reporters the most active retail honey market has been in the roadside stands with honey demanding p r e m i u m prices. It appears to me that if these roadside stands are active in honey sales every honey producer should consider selling to local stands or try putting one up himself.

Each reporter states that bees in his area seem to have gone into the winter in excellent shape and very few areas will have to feed if conditions remain normal throughout the winter and spring.

It's hard to believe that this Monthly Honey Report will be the last for 1966 when it seems like yesterday that I was wishing each of you a Happy New Year for 1966. I was just thinking about all those resolutions that I intended to make for this year; they must not have been too important, because I can't seem to remember one of them at this time. At any rate, a Very Merry Christmas to each and every one of you and a Happy and Prosperous New Year.

While traveling to a bee meeting, I stopped at an inn near Howard University, a college for colored people and was awakened early Christmas morning by the students singing Christmas Carols. It seemed almost as though the sky had again opened and the angelic hosts were singing, "Peace on earth, good will toward men"...a beautiful awakening, surely.

J. E. Crane, Middleburg, Vt., Gleans. 1912