

very crude, and in this direction (formic acid) there is still open a wide field for research. We do not yet know if the percentage of formic acid in honey varies in varieties of bees. That is, do Italian, black, Cyprian, Caucasian, etc., show a marked difference in this respect? If not, do individual colonies show the difference? Does honey gathered early have less formic acid than honey gathered late, irrespective of the source. If so, may it be because honey gathered early has longer time and more favorable conditions under which it can thicken and be less liable to ferment than that gathered later? At what stage, or stages, of ripening is the formic acid put in by the bees, and how? Is it added to as are the secretions which invert the honey, or is it added through the organ of defence? I am not afraid to uphold or condemn the "sting trowel theory." In part it may be correct. Is this formic acid valuable, and do the bees keep adding it as it is being ripened? If so, nectar evaporated outside of the hive will vary in this respect. I would guess that formic acid is added to the nectar in its early stages of evaporation, to prevent fermentation, for without the formic acid in warm and muggy weather, the condition would be favorable to start fermentation, the temperature of the hive never being high enough to destroy the germs of fermentation floating in the atmosphere passing through the hive.

The formic acid may also be there to disinfect the honey to be fed to the larvae, to prevent the spread of diseases peculiar to bees. The constitutional strength of the bee, the vigor of the bacillus, and the percentage of formic acid in the honey, may all have a bearing upon the spread of disease in

the hive, and may be a factor in the degree of immunity from diseases of certain strains of bees. When the above points are answered, we can better answer what is the difference between ripening nectar in the hive and evaporating it artificially.

#### Aroma.

As to the difference in the aroma or flavor, it may be that the formic acid in combination with the essential oil causes the flavor or aroma to undergo a change. This I do not know. The milder honey, however, changes its flavor less than more pronounced flavors in the process of ripening. It may be that if there is no essential oil, the formic acid would not have an oil to combine with, and so the change would not take place. We know that the odor in the apiary, especially marked at night, during the gathering season must be at the sacrifice of something. Is this odor not a combination of the peculiar odor of the hive in union with the odor from the nectar? If so, no similar artificial condition can be created. This odor is certainly not similar to that from a ripening tank of nectar.

To illustrate the change: The past summer we had 240 colonies located in an apiary in the neighborhood of a species of mint. I tasted a peculiarly strong flavored honey in the hive, but could not discover its source, until I traced through, first capped and then uncapped honey, back until I tasted the nectar shaken from the comb, and then the smell of the mint blossom. All formed a perfect chain when there appeared to be no connection in flavor between the ripe honey and its fresh nectar. Several of my apicultural students remarked the same thing.

In closing, let me say that we as bee-keepers do not realize how much there is yet to learn in our profession.

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#### HONEY

Friend Craig track of more i will have to g Very little offer the prices and for honey in t the assistance of If they will on there will be wholesale prices short crops and the only way to is to get better this, and there