

may come in part from the fat eaten, though this is not certain. It is certainly true that all does not, as animals are often known to store much more fat than is taken with their food. It is quite likely that most fat eaten goes to serve the current needs, while some of the carbohydrates and the nitrogenous food and quite likely some fat is through the wondrous economy of the vital organism changed into and stored up as fat. That nitrogenous tissues may be robbed of their nitrogen and further changed into fat is proved by disease where fatty degeneration is noticed. This may occur in all organs. In some cases as in fatty degeneration of the heart, almost pure muscle is transformed into fat. Bees get but little fat in their food, and so this group of food elements interests us less than do the others.

The albumenoids or nitrogenous food elements make up our last group. These have in addition to the oxygen, hydrogen and carbon, nitrogen. All protoplasm or active vital tissue, whether animal or vegetable consists largely of this nitrogenous material. But as all organs get their substance from the food, it becomes evident that the albumenoids are absolutely essential in food. Higher animals get this albumenous food in all vegetables, in muscle, eggs, cheese, etc. Bees also get it from vegetables, usually from honey which contains from 2 to 6 per cent. albumenoids and from pollen, often from fungoid spores and occasionally from various kinds of flour or meal. This kind of food *must* furnish the elements for the building up all the protoplasm of the body which forms a large proportion of all the vital organs and tissues. We have already seen that some of this nitrogenous food may be transformed into fat.

As no animal can possibly be developed from the egg to adult life without this albumenous food, and as in all vital action some of this material in the body is used up and must be restored, it follows that brood rearing in the hive and activity of the bees necessitates the presence of these albumenoids in the food.

As honey contains no albumenous food except the pollen in it, it follows that bees must have bee bread to rear brood, and also to preserve their organisms intact during the busy part of their existence. To say that bees may breed with no bee bread, or that the active workers need none, is to say that you can have an ocean without water, a desert without sand, or bricks without clay.

We know that hibernating animals, and animals long sick, often fast for months. Yet here the vital forces must be kept up and must have nourishment. We have seen that in such cases the fat is used up, and without doubt the protoplasm

in muscle and other inactive tissues yield up of their substance to furnish the small amount of albumenous nutriment needed. If we could keep our minds and bodies wholly inactive we should need but little nitrogenous food.

We may conclude then, reasoning from real hibernation, where animals are wholly inactive, from cases of long sickness and from higher animals in a state of quiescence, that our bees during their winter quiet in cellar or clamp, when the vital activities are at a minimum have enough of the albumenoid elements in blood and tissues and may thrive on a pure carbonaceous diet. Analogies as pointed out make the hypothesis tenable.

Again, bees are naturally very neat and do not void their excreta in the hive except under the severest stress of circumstances. I have more than once gathered all the refuse under a full colony of bees at the close of a long winter's sojourn in the cellar, and found almost no nitrogenous matter. If then bees are to be forced to long confinement we should spare no pains to secure the greatest possible quietude. Just the proper temperature I think will under favorable circumstances of food and air secure this quiescence. But in case the temperature or ought else should irritate, then t'were better that no pollen should be eaten, for without it breeding, which demands great activity, would be impossible, and in its absence the active digestion necessary to liquify albumenous food would be avoided. It is a generally recognized fact that an inactive life needs little and is better with little albumenous food. Indeed albumenous food, as we have seen subserves the vital activities, of course then as we reduce these, we reduce the required amount of nitrogenous aliment.

Again the indigestible portion of the carbonaceous food, especially the carbohydrates is very slight. Not so with pollen. We can readily see then that where the feces are to be retained in the intestines so long the pollenaceous food would be or might be irritating, and were better withheld.

We thus see that from experience, from analogy, and from what we know of foods and the vital activities we may well believe that our bees were better off in many cases were pollen absent from their winter aliment.

A. J. COOK.

DEATH'S RECORD—THE ABSENTEES.

SINCE last I had the pleasure of meeting with this Continental Society of Apiculturists, many of those who have been our companions in these