

"THE GREATEST POSSIBLE GOOD TO THE GREATEST POSSIBLE NUMBER."

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N opinion prevails with many that the teachings of Prof. Cook as to the very small quantity of air actually necessary for bees in repose are misleading and may

be the cause of bee-keepers losing their bees by making them less careful than they should be about a proper change of air in their hives. Some of his recent statements on questions of physiology and dietetics indicate his reasons for differing from others with regard to the quantity of air needed, and the evolution of animal heat. I shall endeavor to compare Prof. Cook's views on the two great factors of life, food and air, with those of some of the leading physiologists of the day and discuss the experiments he gives in support of his opinions.

On page 728, Vol. 1, of the C. B. J., Prof. Cook says: "The vital process is so far from mere oxidation or combustion that it is not that at all." On page 648 he says "All food is to nourish" and "heat is incidental."

In Bulletin No. 8 of the Michigan Agricultural College, Prof. Cook says, regarding bees in repose: "The physiologist and especially the physio-entomologist will not be easily persuaded that insects, whose functional activity is so slight that a minimum of food supplies their wants, stand in need of much air."

Here we have his theory in a nutshell as follows :--No air is needed for the oxidation or combustion of food because no such 'process takes place; the quantity of air needed is in proportion to the degree of functional activity, and as this "is very slight" "they do not need much air;" the function of "all food is to nourish"

only; "a minimum of food supplies their wants;" hence there is hardly any nutritive action; "hear is incidental" to nutrition, therefore the amount of heat produced is small, being in proportion to the diminished nutritive action.

From the foregoing theory it follows that the temperature of bees in repose should be about the same as that of the lowest of the cold blooded animals, only a degree or two above that of the surrounding medium. But experiment shows that in the most quiescent state attainable, the temperature of a cluster of bees is at least from 20° to 30° higher than that of the air outside their hives, that is, they keep up a nearly constant temperature of about 70°, no matter how inactive the nutritive process may be. In view of this fact, Prof. Cook's theory must be regarded as unsound, because "in case of tatal disagreement between theory and definite experimental facts, the theory must be abandoned provided the facts are incontestable."

Some of Prof. Cook's most important propositions are contradicted by the very highest authorities of the present day. For example, in regard to oxidation or combustion within the body, Prof. Gamgee, of Owens College, Manchester, Eng., says, "The act of living is an act of combustion." (Encyc. Brit., 9th ed., 1884, art, nutrition.)

Dr. Pavy says, "Physiologists refer the chief source of animal heat to the oxidation of carbon and hydrogen." (Food and dietetics, 2nd, ed., 1878, p. 64.)

Prof. Kuss, of the Univ. of Strasbourg, says, "It is now proved beyond all doubt that the combustion which takes place in the body is a source of animal heat." (Lectures on Physiologv, translated by Duval and Amory, 1876, p. 340

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