

Temperature ofthe Hive

Controversies about bees hibernating in the hive in winter arise from time to time. Bee-keepers occasionally meet with instances of bees wintering safely in snow banks—the skep or box surrounded by snow for four or five months—and the bee keeper thinks that the bees must have been hibernating. Many bee-keepers have doubts about bees wintering alive in snow and declare that bees do not hibernate. It is never safe to be too certain about anything, but I think we can safely declare that bees do hibernate. There never was a bee, either worker or queen, that continued active throughout the winter in a hive in a temperate climate unless there were inactive hibernating bees to protect it from the cold. The conditions of hibernating animals in winter, when in the dormant state, have been carefully observed and are as follows:—A low temperature; the temperature of the animals slightly above their surroundings; loss of irritability and motion; a greatly diminished respiration and a corresponding decrease of circulation. These are the conditions; and the bees on the outside of clusters in winter are, in every particular, in the same condition as animals hibernating from cold. A bee may be frozen in ice for weeks, and still not be dead, but the bee is not hibernating, while the bee at the freezing temperature in air for over a day, if not dead, must be hibernating. A portion of the bees in a colony must hibernate and remain motionless if the other portion are to continue active during the winter. In a colony,

the proportion of bees hibernating to the active bees varies with the climate and also with the size of the clusters. The larger the clusters the smaller, in proportion, will be the number of hibernating bees.

The Rev. Mr. Raynor noticed that colonies with bees raised late in the fall did not winter well, and several bee-keepers after him noticed some defect in bees raised late in the season. It is just possible, however, that young bees do not hibernate well (as a rule young animals do not), and that a preponderance of young bees in winter is a disadvantage, as a preponderance of old bees in spring is a disadvantage.

Bees are bad conductors of heat, but they are good absorbers and radiators of heat, and if they had no means of preventing radiation they could not keep their heat within their clusters. Tyndall discovered in his researches on heat, that air mixed with aqueous vapour intercepted the passage of heat rays to a marvellous extent. Air saturated with aqueous vapour is a hundred times more resistant to the passage of heat-rays than dry air. The active bees in the cluster give off aqueous vapour and carbonic acid gas freely, as products of respiration or combustion; the bees make use of these products to preserve their heat, and they condense the aqueous vapour to furnish them with water to raise brood.

The warm, moist air from the active bees rises to the top of the cluster, but the bees do not allow the aqueous vapour or heat to escape. The cold bees in the top of the cluster condense the aqueous vapour and get warmed by the condensation. A pound of water in vapour gives back its thousand units of heat when it returns to water. The wet bees carry back the condensed vapour into the cluster and the so-called latent heat of the vapour is absorbed by the bees. Langstroth