

have convinced me that bees can live upon what they gather, store and seal, if they are properly protected. They will even tolerate stores of so called honey dew of the most nauseous character but will show the effect of such a diet in the spring, as they are less active than ordinarily, breed more slowly or not at all and rapidly dwindle in numbers unless supplied with other pure honey or sugar syrups. We may infer the cause and apply the remedy against winter losses by considering the following facts which experience has furnished or will teach us.

1st. Bees winter in good condition generally if they have sufficient food and can take cleansing flights every three or four weeks.

2nd. They do well in very severe winters if the period of greatest cold is experienced in November and December and January, but if the coldest weather is in January and February and March disease is almost sure to be indicated unless the hives are well protected.

3rd. A severe winter following a season that gave no fall flow of honey is usually fatal to the inhabitants of an unprotected hive.

4th. A normal colony of bees hived in a large box or gum and allowed to keep all honey gathered, say to the amount of 60 to 80 pounds will live and keep healthy no matter how severe or how prolonged the winter may be. Instances are on record where bees have occupied such hives from 10 to 15 years.

5th. A colony of fair strength as to number will endure the severe cold of our winters no matter how prolonged until a part or all of the cluster have eaten the honey stored directly above, if the cold continues after this there is danger ahead. By considering one or two of these propositions and ignoring others, one may assume any disturbing element to be the cause of winter losses, but to reach the true cause all facts and phenomena with which we are acquainted must be carefully considered. In northern climates all animal subject to man require virtually the same conditions to endure the cold and there are quietude a warm abode, and sufficient food of the proper kind to supply the nutritive functions of the body. Bees are no exception to the rule. though they are physically different from the vertebræ. They gather the food suited to their organism and when left to themselves will store it in such a position as to be available at all times. They are enabled to enjoy a reasonable degree of warmth by their mode of living at the ceiling of their dwelling instead of on the floor, thus en-

joying an atmosphere made temperate by heat evolved from the clustered colony.

In order to meet the requirements of a healthy bee hive in outdoor wintering, I would briefly suggest the following: 1st, a sufficient quantity of honey to meet the needs of the colony until the bloom of the following spring. This honey store should be so distributed that the combs upon which the bees are clustered will contain enough honey to feed the colony during cold weather reserving the side stores for breeding in the spring. Never put empty comb in the centre of the hive after the honey season has closed. 2nd, The cover of the hive should be a solid board sealed tight by the bees, and this covered to the depth of ten or twelve inches with some heat retaining substance in order that the top of the hive may be kept warm, protection to the other parts of the hive is also absolutely necessary, at least in the north western states. I have followed the discussion in "Gleanings" concerning sealed covers with considerable interest, and am not surprised that success has not attended some of those who have tried them. The reason is quite plain to my mind. Too much emphasis has been placed on one part of the method, that is the sealed cover, ignoring to a great degree the deep covering above, a most essential adjunct. In some regions as Central Ohio, Indiana, Pennsylvania, etc., the depth of covering indicated may not be necessary, but in colder climates the sealed cover will be a failure without it. Space does not permit of my explaining in full all the details of my method of wintering. In my work "The Winter Problem in Bee-keeping" I have stated these at length. Nor do I consider that all bee-keepers should understand what conditions are necessary and then provide for these in any manner convenient to his or her situation and surroundings. Since publishing "The Winter Problem" I have found by testing that an empty space below the hive is a valuable adjunct in wintering out of doors, not to let the foul air settle at the bottom as was first claimed but for the following reasons, 1st. It is an absolute safeguard against the entrance of the hive becoming choked when covered with snow. 2nd. The bottom of the hive is in winter the coldest part, this space lifts the cluster above the cold boards. 3rd. Bees are not apt to fly out on cold sunny days if the lower edge of the comb is three or more inches from the bottom board. The strength of the colony is thus conserved and early breeding encouraged.

In conclusion let me say that winter losses are not caused by poor honey, by fruit juice, by pollen, or by bacteria, it is simply