

ents. Many favor the latter because they believe the foul air is in this way carried off while the heat is retained. I have not made any experiments to find out how fast air passes through cushions and quilts, but I fear the impurities may not be carried off as fast as they are produced, and think it safer to combine with the ventilation through top packing the lower ventilation already described. I have ascertained beyond any doubt that a solid board on top of a hive will conduct away the heat of the bees faster than will a quilt containing say a pound and a half of wool.

The theoretical objection usually urged against direct upward ventilation is that the warm air is carried off too rapidly, and in consequence the bees suffer. But many of the most experienced bee-keepers have obtained the very best results by slipping the honey boards forward a quarter of an inch, or by raising them one eighth of an inch, when placing this hive in the cellar. In such cases the air enters through the flyhole and escapes through these small openings at the top. I am personally acquainted with a clergyman, an old Lindsay boy, who uses direct upward ventilation, and has not lost a stock in wintering for the last seven years, he has now 66 stocks in the cellar, last year he had 55, the year before 46, and 36 the year previous. He regulates the size of the entrance according to the strength of the stock, an important matter in any system, but generally his entrances are reduced so as to be equal in area to one square inch. His hives are of the Richardson pattern, having hollow walls rising 3 inches above the brood nest. In his honey boards there is a one and a quarter inch feed hole covered with wire cloth. I have here a piece of tin having the edges bent at right angles one eighth of an inch high, forming three sides of a rectangular tube, one and a quarter inches wide, by one eighth deep. Three inches from one end the edges are notched and at this point you see the tube is bent at a right angle. He places this tin, with its open side down, over the feed hole, and covers up the whole top with the sawdust cushion. The three inches of the tube bent at right angles fits snugly against the wall of the hive, forming a continuous air passage from the feed hole to the outer air. The area of this passage is only a trifle over three eighths of a square inch, but, when we consider the probable speed of the current, started as it is from the feed hole directly over the cluster, the tube is probably large enough. I now place the tube in position and you see the smoke issuing from it pretty freely. I close the inlet at the bottom and you see the current is stopped even at the top of the hive. I open

the inlet again and test with the smoking velvet, and you see the smoke is drawn in with the incoming current. This method has been so satisfactory with him and agrees in principle with methods so successfully practised by others that I feel no hesitation in saying bees may be safely wintered by admitting air through a small entrance and allowing it to escape through a small outlet at the top.

I have here a straw hive in which I place the hot water and roll of burning cotton as I did in the Langstroth, you see the smoke comes out all over. There is ventilation here in all directions except through the bottom board. If this is such a "sieve of a hive" is it not probable that the bees would suffer from cold? I made three separate tests to determine this question, starting with equal weights of hot water in the straw hive and in this Langstroth hive. I found in each case that the water in the Langstroth hive cooled quicker, although the extent of cooling surface and cubic capacity of the straw hive is much greater.

In these experiments I have presented ocular evidence as to the way in which changes of air take place when hives are well ventilated, and I have shown the causes which prevent a free interchange of air when they are badly ventilated. I trust that there may be enough of novelty in this method of treatment to arouse interest in the question, and that the facts brought out may furnish food for thought, and lead to further investigations resulting in something more being added to the general store of information relating to the wintering problem..

S. CORNELL.

January 7th, 1889.

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