NOTES ON THE HYBERNATION OF SOME LARVAE AND THE MOVEMENT OF BOREUS IN THE SNOW

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The statement is often made that Snow Fleas, as they are commonly called, come up through the snow. This statement has often struck me as strange and altogether improbable. How could an insect get through several layers of frozen snow, which represent the results of thawing and are generally described as crusts? But like our old friend Mark Twain, "I have watched him." The summary of results follows:

The actions of the snow insects form a reliable barometer, and as they become readily visible after the first snow has whitened the ground, their observation becomes easy.

It is well to enumerate the changes that occurred in the temperature in order that we may more readily understand the extreme changes that insects are subjected to in this locality.

On November 17th, 1916, the winter commenced with a slight fall of snow and sleet, followed the next night by a fall in the temperature to below zero. The temperature gradually rose for the next few days, and then it snowed about six inches. The following morning, when the temperature stood at freezing point, the snow was covered with insect life. **Boreus californicus** was very numerous, and I also observed five species of spiders, the most plentiful of which is a pale greenish stone colour, having two yellow stripes lengthwise of the abdomen. I may note, in passing, that these spiders have been fairly common on the snow all winter, but the most remarkable thing that came under my observation was the number of noctuid larvae that were out on the surface of the snow, and were in a lively condition. The natural conclusion was that they had been caught by the early snow and although they had managed to crawl upward through it, away from the frozen ground below, that they would eventually succumb to the cold and find a grave in the snow, but remarkable as it may seem, their appearance later demonstrates that they will live and thrive in the snow. We had a continuance of cold weather and snow up to Christmas. On the night of the 26th December the temperature again fell to below zero, moderating again in a few days, and then another heavy fall of snow (making a total fall to date of 24 inches) with a temperature of 30 degrees. Numerous larvae were again seen in an active condition. I procured some five or six and brought them into the house and fed them on cabbage leaves. The change from the cold snow to the warmth of a sunny window in the kitchen seemed to be to their liking, and they were thriving well until they turned cannibals. Only one was left when I discovered this and I consigned it to the stove. Cannibal larvae will not reach maturity, but generally die just as they reach the stage of pupation.

Next time I shall know that they have to be kept separate, just as the snow deals with them.

Now let me describe nature's winter barometer—Boreus. When the temperature is 30 degrees or over they may be seen hopping over the snow, and if there is a snowstorm pending they will be observed in greater numbers. A heavy snowstorm starts, then they may be observed jumping from point to point in an endeavour to maintain themselves at the highest level. They do not get snowed under, but keep out on top as long as the temperature does not fall below 28 degrees.

As I previously stated, the temperature fell on December 26th to below zero. This was followed by a fall of 26 inches of snow and continuous cold for a fortnight, when the temperature again rose to 34 degrees. Within three days Boreus was again to be seen on the surface.

On February 1st a heavy snowstorm started, when 26 inches of snow fell in the course of 36 hours, and as the temperature was low, all insect life was dormant and consequently was buried under this depth of snow. No larvae were seen after this fall, but within three days Boreus was again out on the surface. In this way they follow up the various snowfalls, always keeping as near the surface as the temperature will permit.

Boreus also seems to avoid the extreme heat of the bright March sun. When the sun is shining they may be observed buried under a thin coating of the surface ice for protection against the heat. None will be visible on the surface except on cloudy days, or where there is some shade.

The summary of results is that they do come up through the snow, but they do it gradually, following up each fall as it occurs. It is probable that some of the noctuid larvae also pass the winter in a much similar manner but, as I have stated before, none have been seen since the heavy snow of December 26th.

How the spiders manage to exist I am not prepared to offer any suggestion, but from the fact that they may be observed on the surface of the snow when the weather is mild seems to offer the suggestion that their habits may be similar to the Boreus, or they may attach themselves to a tree or other similar resting place, a condition which does seem applicable to the other two insects mentioned, as the majority of those observed have been on or near the roads or on cleared land where there is no vegetation near, and their slow progression dispells the supposition that they have travelled any considerable distance during the time that the climatic conditions were sufficiently favourable for them to move about.

At the last annual meeting mention was made of another snow insect that I had discovered that was active when the temperature was 25 degrees Ft. I was fortunate in securing another of these this winter, which I found actively walking on the snow, the temperature being at the time 29 degrees Ft. As it was taken close to the house, I was able to compare the temperature at once. This makes this a positively reliable record.