

therefore, varies from 9 days 12 hours to 13 days 2 hours, though the average (10 days 8 hours) is represented by the minimum more nearly than by the maximum.

Larval Life.—The newly-hatched larva does not make a meal of the deserted egg-shell, though in eating its way out it may devour the entire top. More frequently, however, it is satisfied to make a hole only large enough to crawl through, usually in the top, thus destroying a part of the micropyle.

The little caterpillars are stronger and more vigorous than those of the related species, and crawl about at a speed that argues well for their future good health. Making their way among the tough hairs (?) which bind together the sheaths containing the needle clusters, they fasten upon the side of a sheath and bore through it a minute hole, enabling them to reach the tender tissue of the needles upon which they feed (fig. 2). Into this hole the head is thrust, and the larva excavates as much of the interior as it can reach without getting its body inside.* It makes a new puncture whenever necessary, and by these the presence of the caterpillar may often be detected. The excrement is usually in the form of pellets, which occasionally lodge among the scale leaves, and so serve to indicate that a larva is at work. Sometimes the excrement is in strings, and if these lodge on the shoots one may find the caterpillar without difficulty.

When first born the caterpillar is yellowish-green or gray-green, but soon becomes brown, marked with a creamy white line on the latero-dorsal ridge. This is an excellent protection at this time while the larva is feeding on the brown needle bundles, and the same colour marks it with very little change until after the second moult. When the needles begin to thrust their tips beyond the sheath the caterpillar ascends to the lowest visible green tissue, and bores into it in a manner which causes the tip to drop away. This wastefulness possibly protects the insect from enemies other than the entomologist, but for him is a good guide in the search for caterpillars. (Fig. 3.)

Soon after the second moult the larva becomes green, with pronounced white stripes, and at the same time alters its method of feeding. Ascending to the tip of a young needle, it begins to devour this, and

*With the first larvæ raised in the laboratory I experienced some difficulty. Several of them insisted on boring into the exposed stem, and were promptly drowned in the sap which flowed from the wound. Dr. Jas. Fletcher writes me that he has lost young caterpillars from the same cause. This can hardly be regarded as a natural point of attack, as it is invariably fatal.