

ing a just balance between all side boughs.

The idea to keep in view is to give the leader the preference when cutting out; that is, if a shoot from the centre is crowding a shoot from a side bough it is the latter that must give way.

Should the shaping have been neglected in the earlier years, or should an injury have happened to the leading shoot it is often found that one of the side branches has come ahead of the leader and is competing with the leader for supremacy. There are three things that may be done, and one of them must be done, if a well shaped tree is to result.

(1) The side branch may be cut off.

(2) The tree may be cut off immediately above the side branch and thus the latter becomes the leader.

(Where the side branch has grown practically as large as the rest of the tree above it, one of these two things must be done).

(3) Check the side branch back hard by cutting it off immediately above one

sary to have clear and definite ideas on the subject.

With a clear mental picture of what is needed in regards to shaping a tree the pruning of young trees is a rapid and sure operation. The tree is pruned and shaped mentally as the operator walks towards it. A few deft cuts with a sharp pair of shears and it is done.

The Life-Story of the Puss-Moth

By John J. Ward in the Strand Magazine.

THE two main factors in the struggle for existence are, necessarily, to eat and to avoid being eaten. The Puss Moth, in the course of its evolution, has had to resort to some most extraordinary devices to escape the latter contingency. Its colors, its habits, and its anatomy, throughout all its stages, clearly indicate that it has had to fight per-

parts also turn black. Therefore the black larvae feeding on them are not conspicuous.

Later on, when they begin to develop to a conspicuous size, they moult their skins and change color, gradually becoming green assimilating then with the leaves of the food plants; their upper surface, however, retains a brown hue speckled with grey.

At this stage, when about a month old, a curious change takes place. The caterpillar again moults its skin, and it appears in still more brilliant greens, while its dorsal parts have developed more grey color, giving its body a shaded effect. Also two white wavy bands run from its face to the hump at the back of its head, and from there down the sides of its body to its forked tail. What strikes the observer most, however, is its face, for there has developed here a most remarkable mask of a rose-red color, shaded with greyish-blue, and bearing what look like two staring black eyes.

The change after moulting the skin is so extraordinary that one can scarcely believe it is the same caterpillar. Now, in the place of the two ear-like organs which were so conspicuous when the caterpillar emerged from the egg, have developed the eye-spots that give to the caterpillar such a striking and terrifying aspect.

When the caterpillar again moults its skin and reaches its full growth (generally during August or September) its extraordinary mask is still more conspicuous, and its colors are brighter than ever; indeed, the full-grown caterpillar, when seen isolated from its surroundings, presents a most startling appearance, both in color and form.

Such, then are the various changes which the caterpillar undergoes during the six weeks of its life, and one naturally asks the meaning of these curious metamorphoses and the object of this extraordinary mask. I use the word "mask" advisedly, since it is not the caterpillar's real face that is exposed to view. Its flat head is withdrawn into the first ring of the body, and it is this ring, so curiously colored and bearing conspicuous spots appropriately placed for eyes, that produces the startling caricature of a face. It remains, then, to ascertain what is the object of this singular pretence.

I have mentioned that, when isolated from its surroundings, the caterpillar is



SWEDISH BUILDING, A-Y-P. EXPOSITION.

of its own side shoots. The stronger it is the lower down must it be cut.

This latter will be best where such cutting is likely to be efficacious in putting the side branch in its place; it will, however, in any case, have to be watched the next season.

Always the side branches must be headed in this way if they show signs of coming ahead of the leader until they are finally induced to take a subordinate position.

It will likely now be found that there are too many branches and that they are crowding each other; no matter, it gives a choice and if any have to be sacrificed their existence will not have been wasted, they will have assisted to thicken and strengthen the main stem.

It is not claimed that there is anything new in this paper, it is simply an attempt to state in clear and concise language a definite system which at any rate has the merit of producing surely, and without waste of time, energy in plant growth, the results aimed at. The attempt seems to be justified because this part of the orchardist's art has not often been stated either clearly, concisely or completely and it is very neces-

sistently against the attacks of formidable foes, and that only by extreme defensive methods has it been saved from extermination. The history of this insect is, indeed, a most wonderful chapter in insect evolution.

This moth may be found from May to July. It deposits its eggs on the leaves of poplar and willow trees, and after about nine days the little caterpillar emerges, often taking eight or ten hours to bite its way through the strong egg-shell. When the head, which is the largest part of its anatomy, is through, the rest emerges quickly. It is of a velvety-black color, and on its head are two curious, ear-like structures which disappear as it gets older; while at its tail-end it possesses a forked appendage from which, when it is irritated, issue two delicate pink threads, the function of which will be considered later.

The young larvae make no attempt to hide themselves, but feed boldly on the surface of the leaf. And now we observe what is probably the first selective device for their protection—viz., their black color, for the little holes in willow and poplar leaves have a resemblance to black spots and markings, while bruised