should be about three-quarters of an inch in diameter. Four times in the worm stage (and twice in the chrysalis stage), or about once a week, they moult a skin, each time becoming whiter, till they are a light gray in the end. As they do not feed while moulting, they must be lifted from one tray to another, and care taken that they are not thrown out with the refuse. In from twenty-eight to thirty-five days from hatching out, they are full-grown, and are from two to three inches in length and about as thick as a man's little finger. Until now they will stay in the box lids, but at this stage they want a place to fasten the threads they spin to as the beginning of the cocoon, and they will wander around waving their heads (as in figure 1) till finally they have found it, as in figure 2. It is advisable to place them in a cone of paper, or, better still, in little square boxes of cardboard, say about an inch and a half square by about an inch deep, and place something over them to keep them in, as they will thus lose little of their silk in useless spinning. In the picture (figure 3) it appears that they spin out of their mouths, but under the microscope it is seen that the silk comes out of three little holes on three little shell-like cones, called spinnerets, on each side of the head, not far behind the mouth. When the cunning little spinner wants to, as it sometimes does in the first loose spinning, it sends out two separate three-stranded threads, but when it begins to spin the cocoon proper, it puts up its first pair of "hands" and brings the two together, forming a six-strand thread. The silk is of three colors, bottle green, lemon, and orange, and very early in the worm's life the color of its feet tells what will be the color of its cocoon. In three days from the beginning, the cocoon is finished and the worm hidden from sight, to undergo a most mysterious change. Eight days after the spinning is done, the cocoon is ripe and ready for gathering. If the cocoon is meant for reeling, the chrysalis inside is now killed by subjecting it to a temperature of about 194°, in an over, for a few minutes, and the cocoon is ready for the market. If the insect is wanted for its eggs, it is let alone, and in little more than a week the moth hatches out, as seen in figures 5 and 6. They do not fly, and will not leave the open box-lid, but will proceed to lay perhaps 500 eggs and then die. Such is the story of the life of a silkworm, and a marvellous one it is; and it only remains for this article to mention two great lessons that should be learned from it.

The first is taught by the fact that while the worm has neither eyes nor feelers, the moth has both, and what were the spinnerets, are, because they did their duty in that lowly sphere, promoted to the higher sphere of being eyes, and what were the jaws, are promoted to be feelers. The other is just the reverse. Sometimes a worm, instead of spinning its cocoon as good worms should, will scatter its silk about a little here and a little there, and when it has spun its all, it lies a naked thing, to dry up and die without attaining to anything higher. Thus, God's two books, Nature and the Bible, telling the same story, are seen to agree, and both inspire and warn us to be faithful to our duty.

The next article will deal with silk-raising as a future industry, and the prospects of making it a profitable one in Canada. W. M. FLEMING.

Essex Co., Ont., Nov. 21st, 1900.

Horticultural and Entomological Convention.

Very interesting meetings were held in London during the three days beginning with Tuesday, Nov. 13th. By a happy arrangement, the members of the London Horticultural Society joined with those of the Entomological Society of Ontario in a meeting at the Normal School, on the Tuesday evening. The chair was taken by Prof. James, Deputy Minister of Agriculture, who delivered the opening address. He began by explaining the intimate relation that naturally exists between these two societies, for we could have no fruits or flowers if there were no insects, and there would be no insects if there were no vegetation for them to feed upon. Insects are most useful to flowers and fruits; very many kinds entirely depend upon them for fertilization, and yet at the same time, insects cause more destruction to these things than anything else. We cannot, therefore, grow fruit and flowers satisfactorily, nor can we protect them from varied forms of injury, unless we know something about insects. He then spoke of the various aspects of horticulture. In the first place, there is the labor aspect; no results whatever can be obtained without toil; in the sweat of the brow must we cultivate our ground. But it is not mere barren labor; there is a financial aspect also. It must evidently pay, or there would not be so many in it. These are the lower aspects; is there anything higher — anything intellectual, anything moral — in horticulture? In the early days of this country, the farmers devoted themselves entirely to the raising of grain; it was their sole object, and any surplus obtained, after providing for their own needs, was used in exchange for other necessaries. Gradually they added to this the care of cattle and pigs, and so in time there grew up the great live-stock industry of the present day. But something more was found to be needed: the farm was not complete unless some acres were devoted to the orchard. This was found to be not only of great benefit in affording variety to the food of the family, but was also a source of profit as well. Other fruits besides apples were grown, and now we see this Province taking the lead in its lucrative fruit-growing industry. This, however, is not the highest point to be reached: the addition of flowers for the adornment of the home and its surroundings is required. When we find a combination of all these things, we may consider that the highest stage has been attained, that an ideal mode of life has been gained, and this has not been achieved without the exercise of a higher intellectual standard and the development of superior mental powers. Prof. James then proceeded to show that highly intellectual people are usually much inclined to horticulture, and related many instances of well-known authors, in confirmation of his statements. Blackmore, the novelist, whose works are of the highest character, thought more of the perfection of his fruits and flowers than he did of the fame of his books. Rider Haggard has retired to an estate in England, and now prefers to be known as a farmer and gardener rather than as an author. Charles Dudley Warner lived quietly in Hartford for ten years before he became popular as a writer, and then it was due to his papers, as an amateur gardener, published in the Hartford *Courier*, and afterwards gathered into a volume, under the title of "My Summer in a Garden," that he became famous. The most remarkable instance is that of Dr. Francis Parkman, the renowned historian of Canada. Few men have had to labor under such difficulties as he—almost blind, crippled with rheumatism, prostrated with nervousness, without a well day for twenty-five years, yet he produced the most charming and admirable works on the early history of this country that can be found in any language. When his health was undermined from the privations he endured in exploring "The Oregon Trail," he made horticulture his exclusive occupation for some years. He applied himself to the growth of roses and lilies, and with such success that at one time he had over a thousand varieties of roses, besides numerous hybrids of lilies and other flowers. At the flower shows of the Massachusetts Society he obtained no less than 326 awards. His talents in this field were recognized by the University of Harvard, which made him Professor of Horticulture; this position he actually held for a year. Such instances, among others quoted, serve to show how congenial is gardening to men of the highest intellectual gifts. Horticulture is an education in itself, if broadly carried out. It develops the powers of observation and induction, and demands a high degree of intelligence for its successful pursuit. Lastly, the speaker referred to the moral aspect of horticulture. He took the case of a boy (or man) who has a love for fruit and flowers, for insects, birds, and other living creatures, and said that such an one could not be an immoral person. His devotion to these objects and his study of nature's works led him on to higher things, and could not fail to develop and improve his moral character. Hence it is that nature study in our schools is of so much value. The child is led by them in the right direction, and the cultivation of its instinctive love of nature must lead on to the formation of a sound character, that will be a blessing to its possessor and a benefit to the community.

Mr. W. E. Saunders, of London, was the next speaker, and he delivered a stirring address on "The Planting, Care and Pruning of the Trees in the Streets and Parks." He pleaded strongly for the proper care of the trees, which form the chief beauty of the "Forest City," and severely criticised the way in which they have been mutilated in the Victoria Park, at the Collegiate Institute, and on many of the streets. At the close of the meeting, a resolution was unanimously adopted, calling upon the City Council to appoint skilled and competent persons to take charge of these matters.

Dr. Fletcher, of Ottawa, the Dominion Entomologist and Botanist, gave a highly interesting address, illustrated with beautiful lantern pictures, first, on trees and their cultivation, and secondly, on the insects that have to be contended with by the cultivator of fruits and flowers.

The morning of the second day was taken up with business matters by the council. In the afternoon, the various reports of the directors, officers, branches and sections, were read, and then followed one of the most important features of the proceedings—a consideration of the work of the San José scale in Ontario, and the measures that are being taken for its suppression. Mr. George E. Fisher, Provincial Inspector, gave a by no means cheering account of the distribution and spread of the scale in the affected districts of the Province. It has increased very much during the past season, and is now a more serious menace than ever to the fruit-growing industry. Whale-oil soap was widely distributed among those whose trees required treatment, but the results were not satisfactory, because the people would not take the trouble to carry out the instructions given. Instead of using two pounds to the gallon of water, some would use only one, while others sprayed only one side of their trees. The season had been peculiarly favorable to the increase of the scale, and it was found that where they had been almost exterminated by treatment, the survivors soon multiplied and recovered their former numbers. Experiments had been tried with kerosene and crude petroleum, and also with these substances combined with whale-oil soap. Many details were given, showing success in some cases and serious injury to trees in others.

Professor Webster, of Ohio; Dr. Fletcher, Prof. Lochhead, Mr. Dearness, and others, took part in the discussion. The general feeling was that the use of kerosene and petroleum could not be recommended, though it was advisable that careful experiments with both should be repeated, and that whale-oil soap is the most satisfactory remedy known at present. It does not always kill all the scales, but it clears the tree of aphis and a large number of insects that affect the buds and foliage, and is beneficial also as a fertilizer. All were agreed that the San José scale is by far the most dangerous insect that fruit-growers have to contend with, and that no pains were too great to be taken for its subjugation. It will be an up-hill fight for some time, but the battle must be fought strenuously and continuously if men wish to save their trees from utter destruction. As one speaker said, if this insect is not kept within bounds now, some of us will live to tell our grandchildren of the good old days when it was possible to grow apples in Ontario. This is no doubt a gloomy view to take, but it serves to show how tremendously important the matter is, and how necessary it is that every fruit-grower should take warning and do all that is possible on his own domain to prevent the incursion of this minute insect, and if it does arrive, to fight for its extermination.

At the public meeting in the evening, Dr. Fyles read his presidental address, illustrated with beautiful diagrams of his own production, on "Insects as Agents in the Cross-fertilization of Flowers." Prof. Lochhead pleaded for some systematic methods to be adopted in the preservation of our forests from the ravages of insects.

An interesting paper was read by Prof. Lochhead on "The Silk Worm in Canada," the points advanced being based on investigations conducted in the County of Essex, Ont. It was shown that the climatic conditions of that county are almost identical with those of France, where silk production is one of the chief industries. The discussion which followed was taken part in by scientists from either side the "line," who pretty generally agreed that the cost of labor in the western hemisphere would stand seriously in the way of competing successfully with the cheap labor of France and Asia, where the raw silk is obtained.

A large number of other interesting and valuable papers were read and discussed during the evening and at the morning and afternoon sessions on Thursday. These will be published in full in the annual report of the Society. The meetings were among the most successful ever held, and were greatly enjoyed by all who took part in them.

GARDEN AND ORCHARD.

Ontario Fruit Growers' Meeting.

On invitation of the Board of Trade and the Brant County Farmers' Institute, the Ontario Fruit-growers' Association is to meet in Brantford, on December 19th and 20th, at 9 o'clock a. m. Mr. S. D. Willard, of Geneva, N. Y.; Vice-President Westen, New York Horticultural Society; Prof. H. E. Vandeman, ex-U. S. Pomologist; Dr. Saunders, of the Dominion Experimental Farms; the Hon. John Dryden, and many others, have been invited to be present and take part in the discussions, and topics of extreme interest will be discussed. Our readers may secure programmes from the Secretary, Mr. L. Woolverton, Grimsby, Ont.

The Balance of Nature.

A curious illustration of the way that nature keeps one class of plants or animals from encroaching on another may be seen in the history of the mongoose in the island of Jamaica. The sugar plantations of that country became so badly infested with snakes and rats that heroic measures had to be employed in getting rid of the pests, and it was decided that the mongoose, a kind of ferret, should be introduced into that country. It was not long until there was scarcely a snake in the island nor a rat in the cane fields. The rats, however, took refuge in the cocoanut trees, and ate the nuts so badly that it is scarcely possible to grow cocoanuts ever since. When the snakes were all eaten up and the rats had taken to tall timber, the mongoose took after the ground-laying birds, destroying both birds and eggs. These birds had been invaluable because they kept down the ticks which gave so much annoyance to men and cattle.

When the birds disappeared, the ticks increased enormously, so that life in Jamaica was a burden, and there was not a yellow-legged chicken left for the preacher. Now we learn that the tick is getting after the mongoose and killing them off, the birds are coming back, and the Jamaicans can now keep cattle. In other words, they have gone around once, and are getting back to where they were when they started.

It is well that Secretary Wilson, of the Department of Agriculture, has absolutely prohibited the importation of mongoose. If he had not, some fool who had rats in his corn crib would have imported it, and then we should have no end of trouble, such as we have with the English sparrow and are likely to have with the Belgian hare when the fad has played itself out and these pesky diggers and bark peelers take to the woods. Ninety-eight out of a hundred will die, but those, like the original rabbit, may survive and plague our children and grandchildren to the last syllable of recorded time. —*Wallace Farmer.*