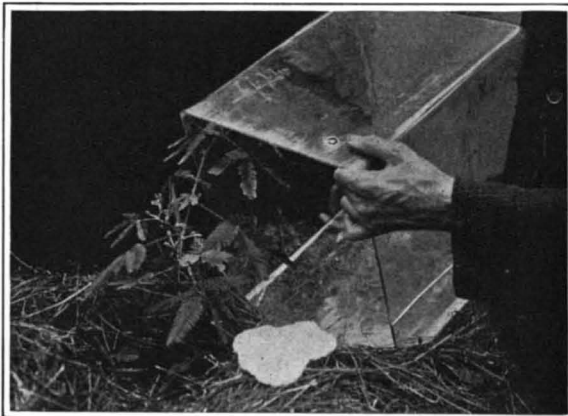


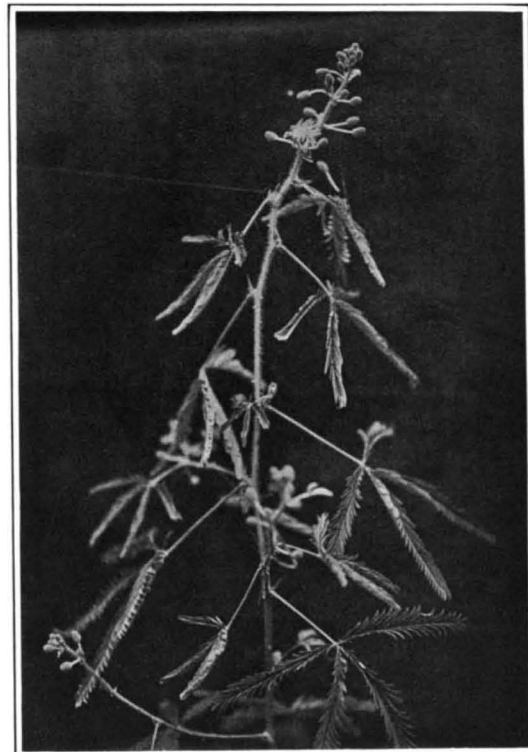
Normal condition of sensitive plant before being chloroformed.



When the saturated cotton wool is in position the glass shade is placed over the plant, and the whole is imbedded in hay.

## Can a Plant Feel Pain?

By S. Leonard Bastin



Same specimen after chloroforming shows no sign of feeling a flame.

IT is now generally recognized that there is no essential difference between the evidences of life in the plant and in the animal; there has never yet been any satisfactory chemical distinction which clearly separates the protoplasm of the two types. One can offer no reason why the vital matter in the plant should not be capable of performing that which it is seen to accomplish in the animal. Small wonder then that Dr. Francis Darwin and others should discuss the question of plant consciousness and seek for signs of memory in the vegetable being. Certainly the so-called "sleep movements" in the bean, in connection with which some elaborate experiments have been carried out, appear to show that the plant has, to an extent the ability to remember. In this case it would appear that the falling of the light in the evening gives the signal for the drooping of the leaflets; it is found however that a bean plant which has been kept in the dark for a few days will continue to expand and close its leaflets at about the hours of sunset and sunrise. As Dr. Darwin had pointed out, we can certainly feel that the plant, or perhaps one ought to say the protoplasm in the cells, remembers that movements are carried out at certain times and these proceed even though the original stimulus is wanting.

Another very interesting problem in connection with vegetable life is embodied in the question: Can a plant feel pain? Now, although pain is a word with a definite meaning to human beings, it probably has a very wide application. An injury which would cause a man the most acute agony will bring only a small discomfort to a jelly fish; in the same way the word pain, when used in connection with a plant, can scarcely involve suffering in the sense in which the term is generally employed. Nevertheless, there is small doubt that plants do feel pain to the extent of making them show real signs of discomfort. A few months ago the writer had the opportunity of witnessing some very interesting experiments with a sensitive plant to demonstrate the extent to which the specimen might be said to feel pain.

The example chosen was a young and vigorous plant of *Mimosa pudica*. Of course the degree of sensitive-



Leaves of a vigorous sensitive plant spread in normal condition before the application of a flame which touched for a portion of a second the tip of one of the leaflets.



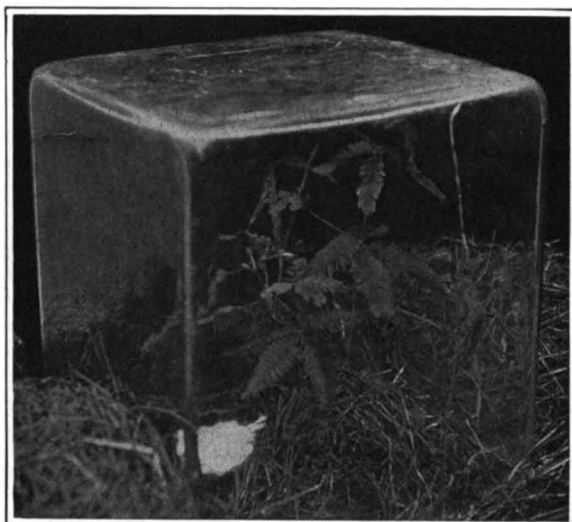
In the operation of chloroforming the sensitive plant, the liquid is poured on a piece of cotton wool, which is placed near the stalk.

ness is at its height when the leaves are in the most actively growing condition. The foliage was extremely responsive to cold air and the slightest touch, closing its leaflets and dropping its stalks with great promptitude. It was decided to try the influence of a flame upon the sensitive leaf. A piece of wadding saturated with spirit was set alight, and the flame was passed rapidly under a well-developed leaf. The organ could not have received more than a whiff of hot air, yet it gave very clear signs by the movements of its leaflets that a sensation, which we may call discomfort, had been produced. In the next experiment the flame was allowed for a fraction of a second to touch the tip of one of the leaflets. The outcome was astonishing; the whole leaf shrank as if it had experienced the most acute pain.

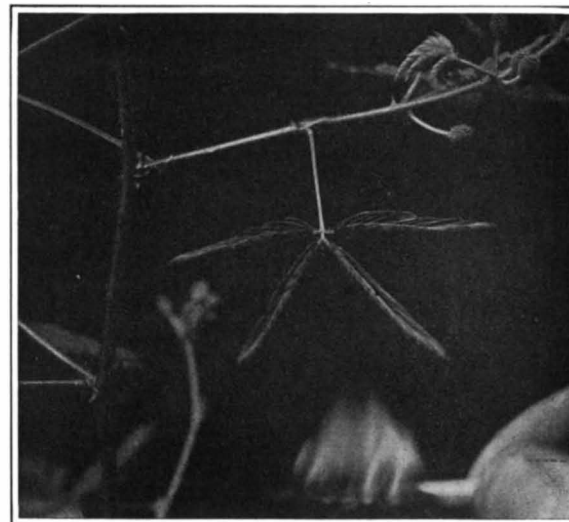
It was now decided to administer an anæsthetic to the sensitive plant. For a long time it has been known that the mimosas are markedly affected by the vapors of chloroform and ether. The method of administering the anæsthetic is on the following lines. The pot in

which the plant is growing is buried in hay or some such substance. A large glass shade is then procured, which can be placed over the specimen. A good-sized piece of wadding is well soaked with the chloroform, or whatever the anæsthetic may be; this is placed by the plant, and the whole is enveloped in the shade. After an interval of half an hour it is to be noticed that the foliage of the sensitive plant begins to droop. The leaflets gradually close together, and finally the whole plant passes into a sleeping condition, even more profound than that which normally occurs when the light begins to fall. That the sensitive plant is "unconscious" there is the very best reason for believing, seeing that it quite fails to respond to any touch. A more severe test still was the placing of the lighted wadding under one of the leaves. Here again it was evident that the ability to feel was quite in a state of suspension, just as completely as when an individual is under the influence of an anæsthetic.

There is little doubt that, before long, we shall have yet further to revise our views concerning the sensations of plants. Of course for some time it has been recognized, for instance, that vegetable tissue is capable of a response to the stimuli of light and heat. It has always been argued that plants could not feel pain or discomfort because they have no nerves. The modern physiologist asks himself the question, what are nerves? To this there is only one answer—modified and highly specialized protoplasm. We have seen that the life basis is practically the same in both plant and animal, and there is no reason why the protoplasm in the plant should not be able to act as a rudimentary nervous system. As we now know the protoplasm is not confined to the cells of the plant; tiny strands of the living matter are able to pass through the walls, and thus keep up some sort of communication throughout the entire plant. These threads of protoplasm have often been spoken of as the nerves of the plant. This they are most decidedly, not in the ordinary sense of the word. There is strong reason for believing that in some ways they carry out the functions which are usually performed by a nervous system.



The sensitive plant undergoing the chloroform treatment.



A piece of cotton-wool soaked in methylated spirit is ignited and held for a second under the leaf of the sensitive plant. The leaf at once closes.