THE MARVELS OF PLANT RETARDATION.*

BY S. LEONARD BASTIN.

Never before in the history of the world have such striking advances been made in the realm of horticulture as has been the case during the last twenty years. Step by step, patient investigation and skillful experiment have removed those difficulties and deficiencies of which the oldtime gardener was so painfully conscious. Probably few innovations have had such a revolutionary effect as the introduction of the system of plant retardation by cold, which was first practised in England about eight years ago.

The root idea of plant retardation is so simple that it is a wonder that nobody had thought of attempting something of the kind years before the scheme was put to a practical test. It is a fact well known to everyone that in the natural world the retarding of vegetation by low temperature is of common occurrence. During late winters, when the grip of the ice king sometimes extends well into the spring season, all kinds of plant life are often held in check for weeks. That this does not in any way cause injury is very evident from the fact that directly the warm weather comes, the buds on the plants split and the tender green leaves begin to develop, none the worse for the experience. All that has taken place has been a prolonging of the winter sleep, in which all plants indulge.

As has often been the case before, mankind has taken a leaf out of nature's book. The retardation of plants as practised by the twentieth-century gardener is merely an artificial lengthening of the dormant state, although carried much farther than is ever the case under natural conditions.

A Cold Storage Building in Which Plants Are Retarded. In This Building Five Million Lily-of-the-Valley Plants were Retarded in a Single Year.

It is curious that it is not known who was the discoverer of the method of plant retardation. The idea had not long been mooted, however, before an English firm of flower specialists decided to test the matter thoroughly in order to find out its commercial possibilities. It was felt that if certain plants could be kept from flowering at their natural time by means of a continuous low temperature and then blossomed quite out of their season, a most valuable addition would be made to the resources of the florist. This is what has actually been accomplished, with the result that in the case of some kinds of plants the gardener is quite independent of the seasons.

The first experiments were carried out in connection with lily of the valley. This plant is, of course, a naturally spring-flowering variety, and as it had shown itself amenable to forcing it was felt that it would be likely to prove a suitable subject for retardation. Some lily roots were placed in a refrigerator in the late autumn, and were kept there all through the winter, past the proper blooming time of the species, right until far into the summer. On a certain day the roots were properly thawed in a cool place, and then were brought out into the light and warmth. In a surprisingly short space of time the plants burst into a wealth of flower and foliage and for the first time in history lilies of the valley were on the London market in August.

As may be imagined it was not long before many other kinds of plants were tested as to their ability to stand the ordeal of retardation. It was found that nearly all the Japanese lilies, as well as such plants as azaleas, spiræas, syringas, etc., were very good subjects for the treatment and the list seems to be capable of a good deal of extension. It is strange that up to the present all attempts to retard hyacinth, tulip and narcissus bulbs have met with failure. Why this is so does not seem to be at all clear, for one would think that the plants would be more capable of standing the degree of cold than the Japanese lilies.

It is obvious that it is only hardy kinds of plants which could be retarded, and even with these the matter of the adjustment of the temperature is of supreme importance. Some varieties will bear only a degree of cold which is just at the point of freezing, while others do best with several degrees of frost. To find out all this requires a great deal of investigation, and the secret of the exact temperature which is most desirable for each plant is jealously guarded by firms who make a specialty of retardation.

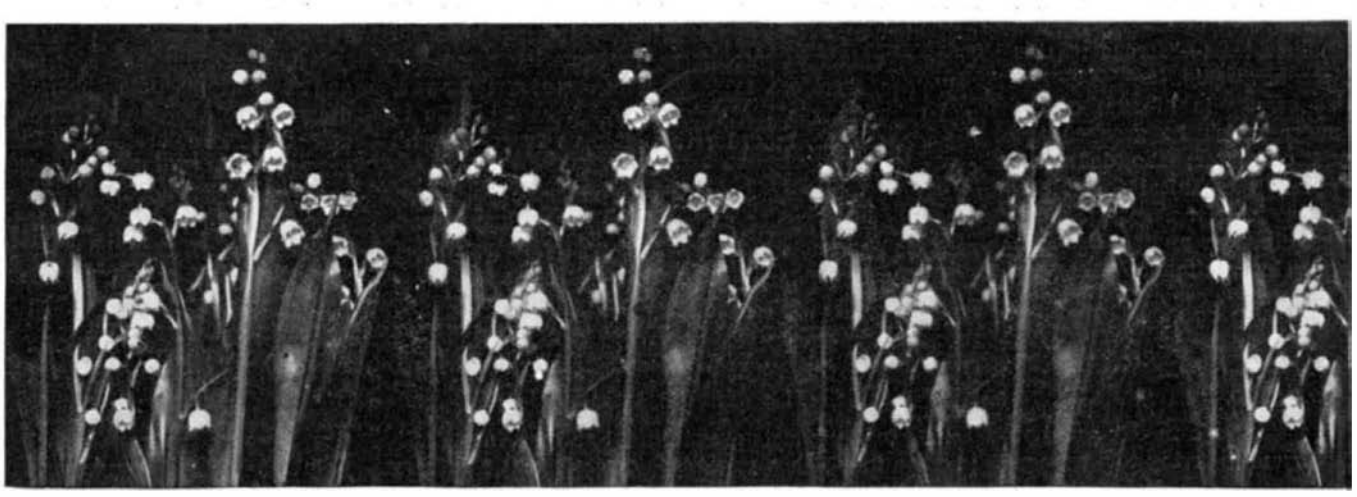
It is an interesting experience to visit a plant-retarding establishment. By far the most prominent feature is the huge cold storage building in which the plants are stowed away. Under the care of the guide one passes the portals. In a moment one steps from the warmth and light of a summer's day into the cold bitterness of a winter's night, the darkness of which is but feebly relieved by the flickering hand lanterns. The interior of the building is divided into various chambers, and each one of these is allotted to some particular kind of plant. This is full of lily of the valley roots, the next is packed with boxes containing lilium bulbs, while again a compartment is crammed with small potted plants of azalea and spiræa. Each and all of these varieties are in a dormant condition, sleeping away their time entirely unconscious of the changing seasons in the outside world. The walls of the chambers are thickly coated with a deposit of frost crystals, and millions of these flash like diamonds in response to the rays of light from the lamp. The degree of cold is usually obtained by means of a compressed air apparatus, and the freezing current is led into the different chambers through wooden channels. In course of time these passages get choked with hoar frost, and it becomes necessary for a man to enter them and clean the accumulation away. That this is a cold job may be realized from the fact that in places the temperature is as low as twenty degrees below zero. The costume of a workman engaged in this clearing-out operation consists of what is practically an Arctic outfit. Every part of the body with the exception of a small hole for eyes and mouth must be protected with thick wool. Otherwise serious frost bites would ensue.

Retarded plants may be kept in check for eight months, or at times as long as a year, and curiously enough they do not seem to be any the worse for the treatment. Indeed, the experience seems to make them grow all the faster when they are allowed to make a start. Some varieties grow at a tremendous rate when they are brought into heat, and this is particularly noticeable in the case of lilies of the valley. The writer as an experiment tested a batch of lily roots which had been retarded just to see how fast they would grow. These were planted on a certain day and in one week had made great progress, being six inches in height. More remarkable still, in another week the plants were fully out in a splendid display of leaf and fragrant bloom. The whole process only took fourteen days from start to finish. Of course, all this means an immense saving of time to the flower grower. All kinds of retarded plants are exceedingly easy to grow and do not require any great amount of forcing. The principal point to bear in mind in their culture is that all roots must be well thawed before they are placed in a warm situation, and that the growing plants should be shaded from strong sunshine.

A Splendid Specimen of Phyllocactus Albus Superbus.

The Man Who Works in the Channels that Lead Cold Air Into the Chambers Wears Arctic Dress.

There is no doubt that plant retardation has a great future before it. As the system extends, the gardener will be able to turn the seasons topsy-turvy and produce flowering plants at any time of the year. Were it possible to apply this method to fruit trees it is obvious that a tremendous step would have been taken. But in this direction there lies a great difficulty. It is quite likely that an apple tree, for instance, might be kept from starting into growth in the spring and held in a latent state all summer through. Then early in the autumn the tree might be placed in a glass house, when it would almost certainly burst into flower and leaf. With the diminished power of the



Lilies of the Valley Which Bloomed Weeks After They Were Out of Season.

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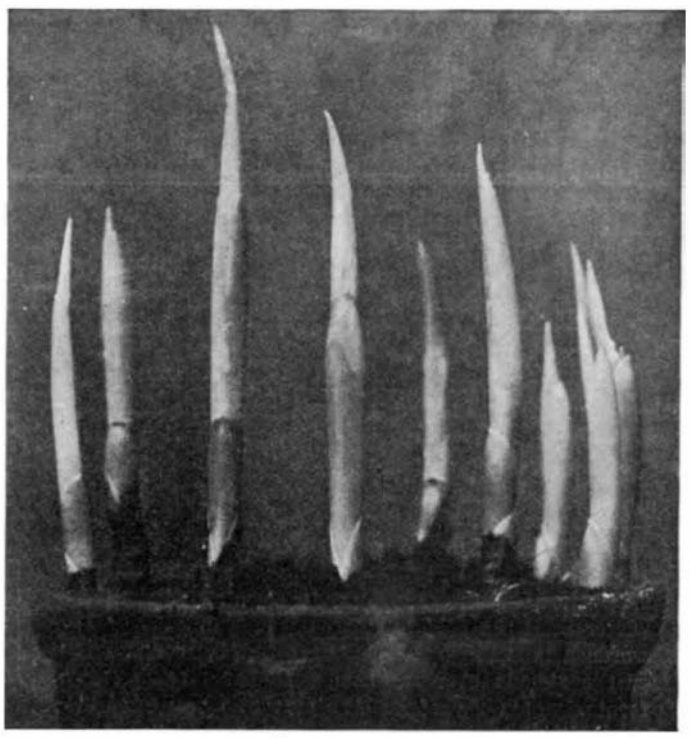
sun which is characteristic of the winter months, however, the development of fruit would be an impossibility. No amount of artificial heat would take the place of the rays from the solar orb. This applies to all fruit-bearing plants.

At the present time experiments are being actively pursued on both sides of the Atlantic to see whether it is not possible to discover some light which would have the same effect on vegetation as has the sun. Science is familiar with the composition of the solar rays to a large extent and it does not seem an unreasonable thing to seek for an artificial substitute. As a matter of fact, the rays from an acetylene lamp have been found to approximate very closely to sunlight. So much is this so that fairly well developed plants have been produced which have never known the daylight, the whole course of their existence having been spent under the influence of acetylene light. Still up to the present the experiments tend to show that there is something in sunlight which has not as yet been demonstrated by analysis; some magical influence of which human beings are conscious but cannot explain. The secret is worth finding out, for artificial sunshine in combination with plant retardation would place the gardener in a wonderful position.

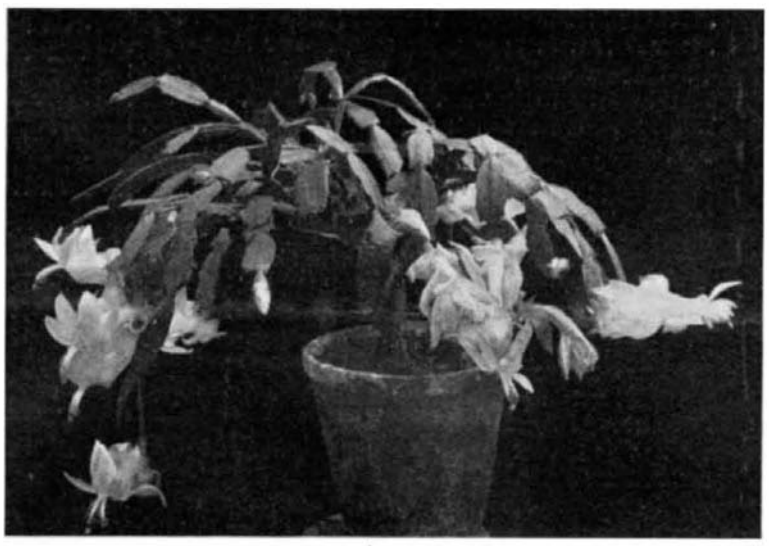


Lilies of the Valley After Retardation, Showing Their Appearance on the Seventh Day of Their Exposure to Heat.

A Revival of "Animal Magnetism"?

In 1841 Braid is held to have scientifically overthrown the claims of "animal magnetism," over which at the end of the eighteenth and beginning of the nineteenth century the civilized world was so greatly excited. He showed that the effects obtained by Mesmer and his followers (people put asleep or paralyzed, thrown into convulsions or dreams, their senses deceived, the well made sick, the ill cured, etc.) are produced, instead of by any force flowing from one human body to another, by the influence of mind upon mind—not by magnetism, but by hypnotism. Though thus scientifically discredited, however, the idea of "magnetism" has persisted in all classes of society up to the highest and most cultivated. The "magnetic" healer, claiming to be a person peculiarly "sensitive" and to have been born gifted with a mysterious power over others similar to that of the magnet over metals, has continued to flourish. Indeed, from Mesmer's time some persons have asserted that by holding their finger close to it they could deflect the magnetic needle. Even the eminent physicist Fechner claimed to have done this once, though he never could repeat the feat. But recently a well-known German university professor has apparently scientifically proved that this power really is possessed by some persons; whence the inference that, not impossibly, the ability also to influence other people by it exists. In an article on "Human Magnetism" in Ueber Land und Meer, Dr. Otto Neustätter, of Munich, says:

"Prof. Harnack, of Halle, last year demonstrated that he is able to deflect the magnetic needle by stroking quite lightly with his finger-nail the glass lid of a well-constructed compass. In many experiments he found, on the one hand, great differences in himself according to the time of day, whether he had previously rested or worked, talked or taken food. When the stomach was empty or when he had talked much, for instance, the experiment did not succeed; if he had eaten and drunk, it usually went very well. On the other hand, among many persons he found only very few who like him could perform the experiment. But these experiments were not free from objection, because they might be connected with the friction. Now, however, he has the proof that the same effect is to be reached even without friction, and that there are other proofs also of the 'magnetic' quality of certain persons. He himself could occasionally bring the needle to a deflection by simply touching the compass lid. He discovered also that the keys which he had carried for some time in his pocket, and also his key-ring, had become decidedly magnetic. Further, that in his pocket-knife the blade which he regularly used (viz., the nail-file), as well as pins that he frequently stuck into his coat, had taken on the same property. At the house of a lady, he could certify that her scissors had become so magnetic that needles clung to them in clusters.



A Fine Epiphyllum in Full Bloom.

The twenty-six scissors of her house-mates, on the other hand, were unmagnetic. One lady could deflect the magnetic needle by approaching her upper body to it. As it proved, the steel fastenings of her corset had become decidedly magnetic by wearing. Finally, he found a lady, too, who declared that she had repeatedly succeeded in attracting the magnetic needle simply by approaching her fingers. He made the experiment with this lady and a compass-needle ten centimeters long, every possible precaution being taken to exclude self-deception. The fingers, for periods of five and ten minutes, were kept approaching and withdrawing from the needle, without the anxiously expected result following. Then suddenly the fingers of the lady became cold, and at that moment the point of the needle moved toward her fingers. By further movement, they finally succeeded in deflecting the needle 20 to 25 deg. A second time, the experiment suceeded when the fingers grew cold. A third time, however, it failed."

Prof. Harnack himself declares that persons possessing magnetic qualities can produce no special effect upon others; but that, on the other hand, all the phenomena of "magnetizing," i. e., of the peculiar influencing of others' will, ideas, and health, are produced also by those who do not exhibit magnetic qualities.

As to the origin of this magnetic quality, Dr. Neustätter goes on to say that recently the physicist, Prof. Heydenweiler, of Münster, "at the instigation and with the co-operation of the nerve-physician, Dr. Adler, made experiments with the self-electrifying of the human being. In them it appeared that a fine electrometer gave a distinct indication at the moment when the person experimented upon (whose hand was in anelectric communication with it) mounted an insulator. The hand thereby showed itself to be charged with negative electricity. That, however, would have been merely a confirmation of Harnack's and others' observations; for instance, of those of Pfabb, who already in the first third of the last century had discovered that human beings are charged with electricity; or of Loewenfeld, who recently observed a gentleman and his son, from the points of whose hair and beard, and from whose finger-nails and feet, electric sparks sprang. But Heydenweiler succeeded in even finding the source of this electricity. To wit, when the person in question made muscular exertions (for example, did the knee-exercise), then the current was reversed: the hand became positively electrical. By this was proved that the charge is connected with the muscular activity. This was more clearly shown by the charge agreeing exactly with the direction of the electrical muscular currents, whose course we have exactly known since Du Bois-Reymond. Thus all at once the entire material of observation here in question is removed from the 'mysterious' sphere. For the muscle and nerve currents are something thoroughly familiar to us. Not that we know what here causes the living cells to develop electrical powers. Nor do we know what causes the saliva-cells to secrete saliva, or the liver-cells bile. But we stand here upon a field that no one will refer to the realm of the mysterious, any more than he will regard the secretion of gastric juice as a supernatural thing. To be sure, much here still remains to be investigated. It is above all very interesting that electrical currents can turn in the body into static electricity (for of that, and not of 'magnetism,' what is here insisted on is a question, though both are related to each other); that the body, which has hitherto been regarded as a good electrical conductor, can store up the electricities separately, so that the negative accumulates in the hand, the positive in the foot; that many persons have much greater ability (perhaps on account of drier or thicker skin) respectively to retain or part with this electricity, etc. But hereby this phenomenon is saved from the bewildering mazes of mysticism. And, under these circumstances, it may quite willingly be conceded that there is one or another 'magnetopath' who possesses magnetic powers. The nimbus that hitherto he has been able thereby to create for himself will be forever gone. It rests perhaps wholly merely upon a certain 'thick-skinnedness'; at all events, not upon superior soul-power — upon no special grace."

Lilium Auratum After Retardation.

Azaleas Are Good Subjects for Retardation.

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