at a stated hour to receive books returned, and restore the receipts for them: until the card is returned to its signer, he is responsible for the book. This system of almost absolute freedom in taking books from the library is still on its trial: it has now been in practice for four months, and with the best results. Those who desire to take books home appreciate the trust reposed in them, and also the convenience to them of the present plan, and are anxious to secure its continuance.

The principle on which the library is managed, of inviting students to co-operate with the administrative officers in making it possible to allow the freest use of all books in it compatible with their safety, has been extended to the instruments in the various rooms for advanced work. On admission, each man has assigned to him a microscope, microtome, other histological appliances, and such chemical glassware as he is pretty certain to need. For these he signs a receipt, undertaking to restore the articles in good order on demand, or pay a specified sum for them. Glass slides and covers are purchased in quantity, and supplied by the janitor at cost. Other glassware, only occasionally needed, is supplied to any member of the laboratory on requisition, the recipient signing an agreement to return or pay for it. With these exceptions, free use of all instruments required for such work as he has been permitted to undertake is allowed to every student, on condition that upon removing any piece of apparatus from its drawer or cupboard he shall leave in its place a card bearing his name. The only alternative, of course, is to lock every case, and only issue apparatus on formal application to a special officer. The men are on their honor, and also know, that, if instruments cannot be traced, the present system must cease. Hitherto the endeavor to secure their aid in carrying out this plan of making all the apparatus accessible with the minimum of trouble or delay, has had most satisfactory results; largely, no doubt, owing to the fact that the majority of the students are graduates old enough to have a sense of responsibility, and to influence the younger men. Once a month one of the fellows, or graduate scholars, examines the instrument cupboards in each room, compares their contents with the inventory, notes what piece of apparatus has been taken and who has taken it. If any instrument is not accounted for, he posts a notice asking who has it. During the past four months the latter proceeding has been necessary only three or four times, when students had, in the hurry and excitement of an experiment, forgotten to write the required receipt: in every such case the delinquent has at once come to apologize and explain. What may be called the 'permanent' apparatus in the laboratory, as distinguished from glass tubing and other perishable 'current' apparatus renewed yearly, has cost more than ten thousand dollars: about fifteen hundred dollars are annually provided for repairing and adding to it. During the current year another five hundred dollars has been placed at the disposal of Dr. Stanley Hall for the purchase or construction of apparatus for psycho-physiological teaching and research. This stock of instruments is so valuable, and in many cases so easily injured, that a longer trial will, of course, be necessary, before it can be decided whether the present system of leaving every thing unlocked, and trusting students to leave an acknowledgment for such instruments as they take, can be continued without undue risk of loss or injury by carelessness for which no one can be found responsible.

The work for which the laboratory has been planned and built was stated in Professor Martin's lecture, published in our issues of Jan. 18 and 25. Briefly, it is the training of beginners in biology in the fundamental properties of living matter, and the structural and physiological characteristics of the chief groups of plants and animals; in co-operation with the seaside laboratory of the university, to afford opportunities for advanced study and research in animal morphology and embryology; and, ultimately, similar opportunities for advanced students of botany. In addition, very special attention has been given to providing facilities for class-instruction, advanced study and research in animal physiology and histology, and opportunity for such senior students as intend to become physicians to learn the methods of experimental pathological and therapeutical research, so far as they can be carried on in a laboratory. It is hoped that in this way the biological laboratory may prepare annually some students to enter special laboratories of pathological or pharmacological research more immediately connected with a medical school.

SOME PECULIARITIES OF PLANT-GROWTH.

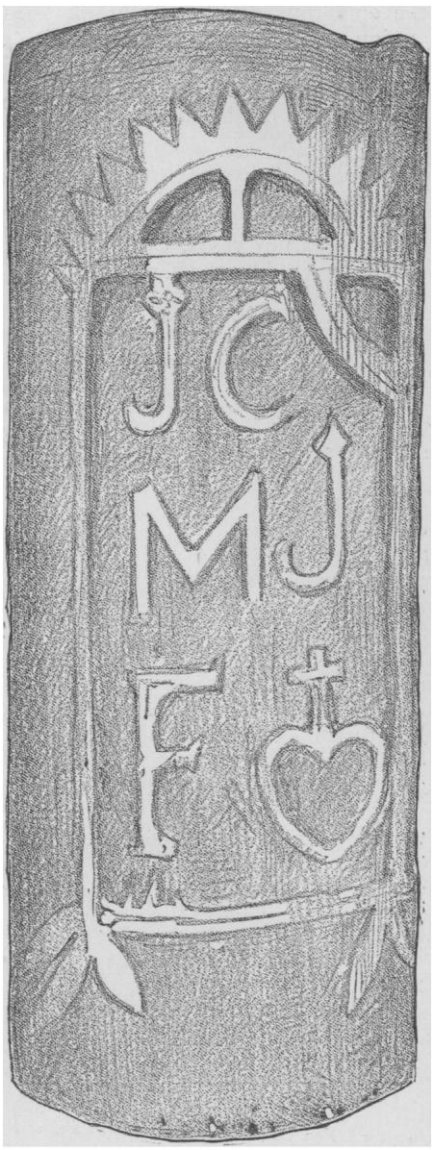
THE following cases are here placed on record as affording interesting instances, not only of the ability of plant-tissues to repair injury, but of the enormous power exerted by vegetable structure during the process of development.

In the summer of 1873 I discovered a very interesting case of the lifting-power exerted by roots during growth, and in 1875 called the attention of my friend, Col. W. S. Clark, to the fact. He made measurements of the various parts, and noted the case in the *Scientific farmer* of Oct. 1, 1875. I cannot do better than reproduce his description, as follows: —

"On a ledge of coarse granite in the town of York, Me., stands a black birch (Betula lenta) which is about forty feet high, with a trunk two feet in diameter. The seed from which it sprang germinated in a narrow seam of the rock at a point eight feet from the ground in a perpendicular direction, and some fifteen feet along the line of the seam, which descended at an angle of forty-five degrees. The first rootlets of the young plant penetrated the seam until they reached the earth, from which supplies were to be drawn for the nourishment of the future tree. The mass of rock above the roots was more than fifteen feet long, from five to ten feet wide, and from one to three feet thick." Its weight was thus very nearly twenty tons. "Only two slender rootlets undertook the task of lifting and carrying this enormous load. One passed down nearly under the centre of the rock; and the other, two or three feet from the first, and so near the edge that at one point it has been forced out from under the rock, forming a sheet eighteen inches in width. The base of the trunk where it enters the seam now measures four feet in width and one foot in thickness. The mass of rock has been elevated twelve inches, and carried sideways eight inches by the expansive power of these two roots, which have not only borne this immense burden, but have supplied the crude sap for the development of the tree. It is but trifling to add the fact that they have not only raised the rock, but also the entire tree, from an eighth to a quarter of an inch every year."

The man on whose land this was found said he well remembered the time when it was impossible to insert his finger in the widest part of the seam. This is only one of the many similar cases which occur naturally, and is not more striking or suggestive than the force exerted by the mammoth squash in lifting a five-ton weight.[1]

In 1875, when carrying on some experiments with the squash-vine, it became necessary to remove the young squashes. This was accomplished by passing a knife through the stem of the squash, leaving the latter in position for future collection. One squash, though cut from the vine, was overlooked in the first collection; and, when the final harvest was made, it was discovered firmly united to the stem, and of a very good size. Upon careful examination, both outwardly and under the microscope, it appeared that (1) when the cut was made,



A BLAZE WHICH HAD BEEN COVERED BY MANY YEARS' GROWTH.

the squash was not displaced, and the cut surfaces immediately came together again; (2) as determined by a 'fault' in a crack of the epidermis, the squash rotated in position as the cut was made, thus accomplishing a displace-

[1] Clark, Phenomena of plant-life.

ment of nearly one-fourth of an inch on the surface of the stem; (3) the healing was complete in the interior, but the line of section was plainly visible under the microscope; (4) there was a displacement of the vascular bundles corresponding with the surface displacement; (5) the epidermis dried and shrank away before union could be completed, and there was thus left a V-shaped groove which extended completely round the stem, and demonstrated the completeness of the section in the first instance.

In the Redpath museum of McGill college there is a most interesting case of an old blaze on a beech-tree, which, in the course of a few years, came to be completely covered by the new growth. The specimen came originally from Belle Rivière, county of Two Mountains, and was discovered when cutting up the tree for firewood. It was exhibited before the Montreal natural history society, at its meeting in April, 1882; but no special description of it was published.[1] It is therefore thought desirable to figure and describe it here (see preceding page).

The figure, as blazed, is shown in the accompanying drawing; and its general character shows that it was probably made by one of the early Catholic missionaries, who little dreamed that it would be so effectually preserved. An examination of the stump showed by actual count at least one hundred and sixty rings of annual growth external to the blaze; and the size of the original tree is still clearly defined, showing that it was four inches and a half in diameter.

Two impressions are to be observed, — one representing the original marking; and the other, a cast from it, made by the overgrowing wood; both being very clearly defined. We have to note the following: —

1. That the figure was cut with a knife, as shown by occasional incised lines; though the outer cast, being in black, at first leads one to the belief that a hot iron was employed. Upon closer examination, however, it seems more probable that the black or carbonized portion was the result of slight decay, the decayed portion being subsequently covered up, and thus producing the appearance described.

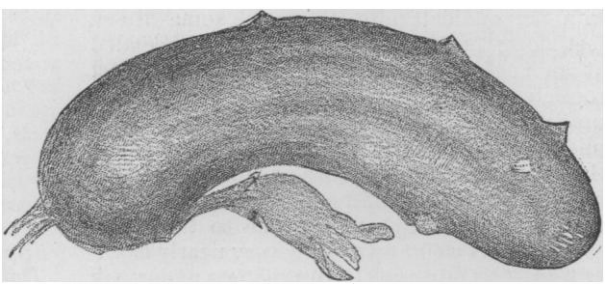
2. That the destruction of the bark and cambium was strictly confined to the lines of the figure, the intermediate portions still retaining their vitality and power of growth.

3. As now seen, the figures of the original blaze are defined by a stronger localization of coloring-matter in the wood, along the entire outlines, as shown in the drawing.

4. This offers a very good illustration of the tendency of active vegetable tissues to heal over abraded surfaces, and repair injury, the degree of reparation depending upon (*a*) the special vigor of the plant, and (*b*) upon the extent of the surface injured.

[1] Canadian nat., new ser., vol. x. no. 4, p. 238.

In 1879 I discovered a very interesting case of adhesion in a cucumber growing in the plant-house. My attention was not called to it until in an advanced stage of development,



FLOWER GROWING UPON A CUCUMBER.

as represented in the drawing, which is of full size. As is here seen, the monstrosity literally consisted of a flower growing upon a well-developed cucumber. As shown in the figure, the abortive flower was borne on a conspicuous peduncle, which became merged at its base with the base of the cucumber. The entire relation of parts would seem to indicate that there must have been two axillary flowers which became united in the early formation of the buds; one of them subsequently developing normally, while the growth of the other was largely arrested.

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THE NATAL OBSERVATORY.

Mr. Edmund Neison, the government astronomer at Natal, submitted to the colonial secretary, in June last, his report on the Natal observatory, whose establishment has been mainly due to the active exertion of Mr. Escombe. It was decided to found the observatory in time to obtain observations of the then approaching transit of Venus of 1882; and, on being applied to, Mr. Gill, the astronomer royal at the Cape, furnished an estimate of the cost of a suitable establishment. A generous sum was secured at first by private subscription; and in June, 1882, the sum of three hundred and fifty pounds was voted by the corporation of Durban toward the expense of founding the observatory, and the next month this was supplemented by a special vote of