

Jordan's remarks apply to the species resembling *P. bolcanus*. C. R. EASTMAN.

HARVARD UNIVERSITY,
CAMBRIDGE, MASS.

THE ASCENT OF WATER.

TO THE EDITOR OF SCIENCE: The identity between leaves and roots of trees which is signalized by the criticism in your last issue probably signifies that they have the same sort of resemblance as the entrance and exit of a building. But the critic can not be entirely ignorant of the recent researches which establish their antithetical relation so far as the contention of my paper is concerned. Near the leaves the ducts have an extreme vacuum, so long as transpiration from the leaf-surface continues; this vacuum diminishes downwards towards the base of the stem, as in a suction pump; and the inward current of water at the base is still dependent (when root-pressure is inactive) on a difference between the atmospheric pressure and the tension within the ducts. The results and authorities are summarized in Pfeffer's 'Physiology,' also in E. B. Copeland's paper in *Botanical Gazette* (October 19, 1902), and in Livingston's valuable book on 'The Rôle of Diffusion.' Whilst using these results my paper added nothing to them. Its only aim was to remove a stumbling block which was caused by the tortious assumption that atmospheric pressure can not lift water more than 1033 centimeters high. As the mixture of air and water within the ducts appears to be in the condition of foam, such pressure probably suffices to elevate it to the top of the loftiest trees. This is the part that ought to be criticized.

I am much obliged to the editor of SCIENCE for permitting me to submit the facts to his great constituency. And now I wish to withdraw from the case, and to leave its further consideration to others. G. MACLOSKE.

PRINCETON UNIVERSITY,
August 8, 1904.

ANALYSIS OF A COMPLEX MUSICAL TONE.

THE analysis of a musical tone by means of Helmholtz's resonators makes a good lecture experiment when so carried out as to be heard

by a large audience. Whether this has been accomplished by others I do not know, but I have succeeded as follows: A telephone receiver is connected to alternating current lighting mains (frequency 133 cycles per second) through a resistance sufficient to reduce the current to about $\frac{1}{2}$ ampere. The telephone then emits a tone having a fundamental pitch of 266 vibrations per second, and of which the overtones are prominent.

An adjusted resonator held over the mouth of the telephone strengthens the overtone to which it is tuned so as to make the overtone easily audible throughout a large room.

I have had no difficulty in demonstrating eight successive overtones in this way.

W. S. FRANKLIN.

SPECIAL ARTICLES.

THE EFFECT OF RADIUM RAYS ON THE COLON BACILLUS, THE DIPHTHERIA BACILLUS AND YEAST.

THE discovery that rays emitted from salts of radium may be used therapeutically in the treatment of some diseases, has opened an interesting field for conjecture as to the manner in which these rays act, and naturally suggests experiments concerning their effect on bacteria in general, and especially on specific micro-organisms.

A few investigators have already published results of such experiments. Pfeiffer and Friedberger,* for example, found that typhoid fever bacilli were destroyed by exposure to the action of radium rays for forty-eight hours at a distance of about 1 cm., but not at 5 cm. distance. They found further that the bacteria only were affected, and that the culture medium remained unchanged. Anthrax spores dried on silk threads were destroyed after exposure for three periods of twenty-four hours each, but not after two twenty-four-hour exposures. G. Bohn† has also reported that 'lower organisms' are quickly destroyed by the action of radium rays.

* Pfeiffer, R., and Friedberger, E., 'Ueber die bakterientötende Wirkung der Radium-Strahlen,' *Berl. klin. Wochenschrift*, 1903, No. 28.

† Bohn, G., 'A propos de l'action toxique de l'emanation du radium,' *Soc. Biol.*, 55, p. 1655.