been made: John Zahorsky, M.D. (Missouri Medical College), professor of children's diseases; Paul M. Carrington, M.D. (College of Physicians and Surgeons, Baltimore), of the Marine Hospital Service, professor of hygiene; Joseph Grindon, M.D. (St. Louis Medical College), professor of dermatology; George Ives, M.D. (Johns Hopkins University), assistant professor of bacteriology; A. M. Brown (Washington University), instructor in biology.

The School of Botany of the University of Texas announces the following changes and promotions: Dr. F. D. Heald, professor of botany, resigned to become pathologist to the Chestnut Tree Blight Commission of Pennsylvania; Dr. I. M. Lewis, promoted from instructor to adjunct professor; Dr. Frederick McAllister, instructor in botany, Cornell University, appointed instructor; Mr. Charles H. Winkler appointed by the board of regents to act as chairman of the school faculty for the term of two years.

DISCUSSION AND CORRESPONDENCE

AN ELECTROMOTIVE FORCE DUE TO MECHANICAL ACCELERATION

To the Editor of Science: From well-known mechanical principles it follows that when a solid body is given an accelerated motion each particle of the body is acted upon by a force having a direction opposite to that of the acceleration. In magnitude this force is equal to the product of the acceleration and the mass of the particle.

Applying this to the modern conception of "free electrons" in metals, it is clear that when a piece of metal is given an accelerated motion each electron within it should experience a force tending to move it and this force will be equivalent to an electromotive force. The magnitude of the latter is easily calculated.

The equivalent electromotive force in volts per cm. is

$$V = \frac{300a}{\left(\frac{e}{m}\right)},$$

where V = volts per cm.

e = charge of an electron in electrostatic units.

m = mass of electron.

a = the acceleration given to the metal.

That this equivalent electromotive force is not too small to be detected with appropriate apparatus can readily be shown. If a coil of wire is caused to oscillate rapidly about its own axis, for instance, the electromotive force of each turn is added to that of the next and thus the effect can be enormously magnified over what it would be in the case of one turn. An alternating electromotive force should be generated which when commutated would be within the range of a good galvanometer.

Whether the result of such an experiment were positive or negative it would be of great interest for modern theory, for in case it were positive it would give *directly* the *value* of e/m for the electrons within a metal, and if it were negative it would clearly indicate the falsity of some part of the modern theory.

The apparatus for such an experiment has been for some time in process of construction and I hope before long to report on the results.

D. E. Comstock
Massachusetts Institute of Technology,
September 25, 1912

REVERSION OF AMBLYSTOMA

To the Editor of Science: The following note on the reversion of adult *Amblystoma,* to the larval axolotl stage, may be of interest to students of amphibia.

A number of years ago, when the writer was a boy residing at Colorado Springs, he confined some "water-dogs" (*Amblystoma*), for a period of four or six weeks, in an artificial pool of water of small diameter. The pool was so fenced that the animals were unable to escape, though they repeatedly endeavored to do so. This enforced residence in the water seemed to effect in them a distinct transformation; the color became duller, the tail broader, the head assumed a more triangular form, and back of the head on each side of the neck, there appeared small, bluish knobs. These

increased in size and became soft, slender, conical protuberances of bluish color, and about five eighths of an inch in length. These became the framework of a growth of a moss-like gill structure, that covered them completely. When these changes were complete, the "water-dog" had assumed the form familiar to the writer, and known to be the axolotl. This animal he had regarded as distinct from the "water-dog," and the apparent identity of the two animals impressed him greatly. Later he secured a publication concerning this, to him, amazing transformation; but the transformation therein described was of the reverse order, or from the axolotl form to that of the "water-dog." As the writer shortly after removed to the east, he had no opportunity of repeating the experiment, and finally dismissed the matter from his mind. If the facts here detailed have not been hitherto recorded, it would be interesting if some one would repeat this experiment, which is a too distant memory to be submitted as a scientific demonstration.

R. D. O. JOHNSON

NOTE ON THE LIFE HISTORIES OF THE FERN RUSTS OF THE GENUS UREDINOPSIS

UNDER *Peridermium balsameum* Peck the writer[1] described experiments and observations which indicated that the fern rusts belonging to the genus *Uredinopsis* are heteroecious, having their æcial stage on *Abies balsamea* (L.) Mill. Artificial infection experiments carried on during the present season by the writer have established the conclusions there stated. These experiments have shown that *Uredinopsis Osmundæ* Magn., *U. Struthiopteridis* Störmer, *U. Phegopteridis* Arthur, *U. mirabilis* (Peck) Arthur, and *U. Atkinsonii* Magn. have their æcial stages on *Abies balsamea* (L.) Mill. The æcia are the white spored forms that have passed as *Peridermium balsameum* Peck. A detailed description of the experiments will be published soon.

W. P. FRASER

MACDONALD COLLEGE,
QUEBEC

[1] *Mycol.*, 4: 189, 1912.

"PAWLOW"

I NOTE with interest Professor Halsted's protest[1] against the spelling of Lobachevski's name with a "w," a sort of scientific Wellerism which Teutonic influence has foisted upon the English language. Is it too much to hope that some day we may find American physiologists referring to Pavloff instead of to Pawlow, or is it true that in such mixed crosses, as the heredity experts would say, German pedantry is prepotent over common sense?

J. F. ABBOTT

SCIENTIFIC BOOKS

Non-Euclidean Geometry. A critical and historical study of its development. By ROBERTO BONOLA. Translated by H. S. CARSLAW. Chicago, The Open Court Publishing Co. 1912.

To Dr. Paul Carus the world is greatly indebted for making this book accessible in the universal language, English.

There are two ways of envisaging the coming of non-euclidean geometry; either as a gradual development or as a saltation. The first attitude is taken in my article, "The non-euclidean geometry inevitable";[1] the second in the introductions to my translations of Lobachevski and Bolyai, where I say Lobachevski was the first man ever to publish a non-euclidean geometry, though Bolyai's marvel of genius went perfect to the printer in the same year, 1829, the most extraordinary two dozen pages in the whole history of thought.

Bonola's book takes the developmental viewpoint, and the first 83 pages give a just and adequate account of the forerunners of non-euclidean geometry, with whom belong Schweikart, Gauss and Taurinus, though far greatest of whom was Saccheri.

The inadequacy of the book is in the 30 pages, out of 268, devoted to the real founders of non-euclidean geometry, John Bolyai and Lobachevski, whose very names Carslaw has

[1] SCIENCE, May 10, 1912, p. 736.

[1] Monist, 4, 483–493.