

soundings down to thirty fathoms, and the other slung so as to register down to forty-five fathoms. With the former about four and a half horse-power is absorbed at a speed of eight knots. It should be stated that the apparatus can be used for taking soundings at any depth within its limits of working, as well as to form a permanent indication of when the ship passed into water of less than a given depth. All that is required to do is to pay the kite out slowly, with a hand on the brake which is provided for checking the speed. When the gong sounds, a glance at the dial will show the vertical depth due to the length of wire paid out.

EXPERIMENTS WITH LEYDEN JARS.

At a meeting of the Physical Society, London, held June 12 (reported in *Engineering* of June 19), some experiments with Leyden jars were shown by Dr. Lodge. The first one was with resonant jars, in which the discharge of one jar precipitated the overflow of another when the lengths of the jar circuits were properly adjusted or tuned. The latter jar was entirely disconnected from the former, and was influenced merely by electro-magnetic waves emanating from the discharging circuit. Lengthening or shortening either circuit prevented the overflow. Correct tuning was, he said, of great importance in these experiments, for a dozen or more oscillations occurred before the discharge ceased. The effect could be shown over considerable distances. In connection with this subject Mr. Blakesley had called his attention to an observation made by Priestley many years ago, who noticed that when several jars were being charged from the same prime conductor, if one of them discharged, the others would sometimes also discharge, although they were not fully charged. This he, Dr. Lodge, thought might be due to the same kind of influence which he had just shown to exist. The word "resonance," he said, was often misunderstood by supposing it always had reference to sound, and as substitutes he thought that "symphoning" or "symphonic" might be allowable.

The next experiment was to show that wires might be tuned to respond to the oscillation of a jar-discharge, just as a string could be tuned to respond to a tuning-fork. A thin stretched wire was connected to the knob of a jar, and another parallel one to its outer coating, and, by varying the length of an independent discharging circuit, a glow was caused to appear along the remote halves of the stretched wires at each discharge. Each of the wires thus acted like a stopped organ pipe, the remote ends being the notes at which the variations of pressure are greatest. By using long wires he had observed a glow on portions of them with the intermediate parts dark: this corresponded with the first harmonic, and by measuring the distance between two nodes, he had determined the wave length of the oscillations. The length so found did not agree very closely with the calculated length, and the discrepancy he thought due to the specific inductive capacity of the glass not being the same for such rapidly alternating pressures as for steady ones. He also showed that the electric pulses passing along a wire could be caused (by tuning) to react on the jar to which it was connected, and cause it to overflow, even when the distance from the outside to the inside coating was about eight inches. During this experiment he pointed out that the noise of the spark was greatly reduced by increasing the length of the discharging circuit. The same fact was also illustrated by causing two jars to discharge into each other, spark gaps being put both between their inner and outer coatings, so as to obtain "A" sparks and "B" sparks. By putting on a long "alternative path" as a shunt to the B spark gap, and increasing that gap, the noise of the A spark was greatly reduced. He had reason to believe that the B spark was a quarter phase behind the A spark, but the experimental proof had not been completed.

He next described some experiments on the screening of electro-magnetic radiation, in which a Hertz resonator was surrounded by different materials. He had found no trace of opacity in insulators, but the thinnest film of metal procurable completely screened the resonator. Cardboard rubbed with plumbago also acted like a nearly perfect screen. In connection with resonators he exhibited what he called a graduated electric eye, or an electric harp, made by his assistant, Mr. Robinson, in which strips

of tinfoil of different lengths are attached to a glass plate, and have spark gaps at each end which separate them from other pieces of foil. One or other of the strips would respond according to the frequency of the electro-magnetic radiation falling upon it.

A GIFT TO THE UNIVERSITY OF CHICAGO.

THE executors of the estate of the late William B. Ogden, who was the first mayor of Chicago, have selected the University of Chicago as one of the beneficiaries under the terms of Mr. Ogden's will, — giving it a scientific school.

The conditions attached by the executors to the gift — which will amount to from three hundred thousand to half a million dollars — are, that the school shall be a separate department of the university, and bear the name of the Ogden Scientific School, its purpose being to furnish graduate students with the best facilities possible for scientific investigation by courses of lectures and laboratory practice. The income of the money appropriated is to be devoted to and used for the payment of salaries and fellowships, and the maintenance of laboratories in physics, chemistry, biology, geology, and astronomy, with the subdivisions of these departments. A large share of the time of the professors in the school is to be given to original investigation, and encouragement of various kinds is to be furnished them to publish the results of their investigations, a portion of the funds being set apart for the purpose of such publication. The school is to include all the graduate work of the university on the subjects mentioned, and further appropriations or donations which may be made toward these objects are to be added to the original foundation, and not to be devoted to new schools doing similar or parallel work. Some portion of the income of the foundation is to be set apart for the purchase of books to be placed in the special departmental and laboratory libraries of the proposed school.

The university in accepting this gift is required to pledge itself to erect the contemplated school, under the suggested name, on the receipt of \$300,000, whether or not the wish and expectations of the trustees be realized in the final receipt from the fund of a much larger sum. In the event, however, of any unforeseen circumstances preventing the money designated from reaching the sum of \$300,000, the money which may be received shall be used for the endowing of one or more professorships in the university to be severally known as the Ogden Professorships.

It is further desired that at least one of the board of trustees of the university shall be the nominee of the executors and trustees of Mr. Ogden's estate, in order that in the formation and development of the scientific school proposed, the wishes of the trustees may be voiced by at least one member of the governing board of the university. And finally it is required that it shall be distinctly understood that there shall be absolute freedom in respect to the admission to the proposed school of students and professors alike, without reference to their particular religious beliefs.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The Dissipation of Energy.

IN passing through a grove of scattered timber after a recent thunder-storm, I came to a tree that had been struck by lightning, a honey-locust (*Gelditschia*), about two feet in diameter.

At the bifurcation of the topmost limbs the bark and sap-wood were torn off for two or three inches in width, increasing as it passed down, until within ten feet of the ground, where it seemed to pass in and explode from the centre, splintering the tree on one side for a foot or two, then tearing the bark and sap-wood for a little ways down, and then leaving the rest without a mark on it for two or three feet above the roots. The splinters were scattered in a half circle twenty feet from the tree. The tree appeared to be perfectly sound and free from defect.

Some years ago I saw something similar in an eastern State. A hemlock tree, two feet in diameter, had a small streak of bark taken off one side from the top down for ten or twelve feet, and then the whole body of the tree was shattered, and as much as six feet of it scattered in every direction, and the top was left standing erect on the stump. There were no marks on the tree below the splintered part.

In both cases there seemed to be no evidence of cracks or defects previous to the explosion.

P. J. FARNSWORTH.

Clinton, Iowa, June 28.

The Relations of the Eastern Sandstone of Keweenaw Point to the Lower Silurian Limestones.

ONE of the assistants (Mr. W. L. Honnold) of the Michigan Geological Survey has been engaged in the study of the relations of the limestone west of L'Anse to the eastern or supposed Potsdam sandstone of the copper-bearing range. This locality is described in Jackson's Report (1849, pp. 399, 452), Foster and Whitney's Report (part 1., 1850, pp. 117-119), and in Rommger's Report (1873, I. part 3, pp. 69-71); and the limestone considered from its fossils to be Trenton or some adjacent Lower Silurian strata. It was inferred by Jackson that the limestone underlies the sandstone, but by the other observers that it overlies it, although no direct contact was seen.

Excavations made by Mr. Honnold's party and reported by him have developed the contact of the two formations, and show that the two form a synclinal or oblong basin-shaped fold, with the limestone overlying, and in direct contact with the sandstone. The existence of this fold in the sandstone, as well as in the limestone, removes the difficulty previous observers have had in reconciling the obviously tilted limestone with the supposed horizontal sandstone, and proves that the eastern sandstone exposed here is of Lower Silurian age, and older than this limestone.

At the point of contact of the two formations, exposed by excavation, the sandstone and limestone appear to be conformable, and they are seen to constantly agree in dip and strike. The contact between the two formations is abrupt, without any beds of passage, although the upper layers of the sandstone contain considerable carbonate of lime and magnesia, and the lower layers of the limestone much silica.

These observations are considered to be confirmatory of the commonly received view of the Potsdam age of the eastern sandstone; while the contorted state of the sandstone, extending at least a mile and a half west from the limestone locality, may have weight in deciding the relative age of the eastern sandstone and the copper-bearing rocks.

A careful study of the fossils will be made and additional field work done, when the results will be published in detail.

M. E. WADSWORTH.

Michigan Mining School, Houghton, July 3.

AMONG THE PUBLISHERS.

THE J. B. Lippincott Company announce as in press, "Harmony of Ancient History," by Malcolm Macdonald; "Chambers's Encyclopædia," Vol. VIII. (entirely new edition, revised and rewritten); "The Chemical Analysis of Iron," by Andrew Alexander Blair (new edition); and "A Hand-Book of Industrial Organic Chemistry," by S. C. Sadtler.

—"Whatever else we may think of this Russian censorship," says a writer in the *Pall Mall Budget*, "it must at least be admitted that its officials do their work conscientiously. A few copies of Miss Hawker's 'Mademoiselle Ixe' were recently posted to various addresses in Russia. They are now coming back to the senders with the word *Défendu* stamped on their covers. One of these returned copies now lies before me. Its leaves are cut from end to end, and evidently the book has been handled and read. Moreover, on turning over the pages, I find red pencil marks placed at various passages in the earlier part of the story. After a time they stop. The censor saw, I suppose, that it was a clear case for prohibition, and did not trouble to score the obnoxious sentiments any further. It is a compliment, however, to the

authoress that he read the story to the end—as I judge by marks of another kind."

—Dr. Paul Carus has issued, through the Open Court Publishing Co., a new edition of his "Fundamental Problems." The body of the work is not altered much; but an appendix of a hundred pages is added, in which the author enters into a quite extended discussion of some of the questions that the book raises, and replies to some of his critics. Those who agree with his general views on philosophy he treats with respect, though stoutly maintaining his own views in opposition to others; but those who have attacked his fundamental principles he treats testily and with scant courtesy. His doctrine is in no respect modified in the new edition, but remains the same rank materialism as before—a materialism not in the least disguised by calling it "monism." It is stated, too, in the same dogmatic language, in the new edition as in the old, thus: "It is undeniable that immaterial realities can not exist. The thing exists by its being material" (p. 86). Dr. Carus's book will doubtless please those of his way of thinking; but it will do nothing towards converting any one who holds opposite views.

—Leach, Shewell, & Sanborn, of New York and Boston, have just published "The Number-System of Algebra," by Professor Henry B. Fine of Princeton. The theoretical part of the book is an elementary exposition of the nature of the number-concept, of the positive integer, and of the "four artificial forms of number which, with the positive integer, constitute the 'number-system' of algebra, viz., the negative, the fraction, the irrational, and the imaginary." The point of view of the author is the one first suggested by Peacock and Gregory, that algebra is completely defined formally by the laws of combination to which its fundamental operations are subject: that, speaking generally, these laws alone define the operations; and that the operations define the various artificial numbers, as their formal or symbolic results. The historical part of the volume contains a review of the history of the most important parts of elementary arithmetic and algebra.

—No. 38 of the Scovill Photographic Series, just published, is "Photographic Reproduction Processes," by P. C. Duchochois (New York, Scovill & Adams Co., \$1.) It makes a neat octavo volume of 121 pages, and is a practical treatise on photo-impressions without silver salts, for the use of photographers, architects, engineers, draughtsmen, and wood and metal engravers. The author describes, in language readily understood by both amateur and professional, all the processes employed to reproduce plans, designs, engravings, *clichés* on paper, wood, glass, and metal plates; besides giving a complete description of the urantotype, aniline, platinotype, and improved carbon processes. The authors quoted are almost "legion," but the quotations are judiciously made; and as the point in view is to show results, as well as how to achieve them in the most direct way, the quotations are of immediate benefit to the reader without detracting in the slightest from the credit due the person quoted from, due credit being given in each instance.

—A recent issue of the Johns Hopkins Press is a pamphlet on the "Public Lands and Agrarian Laws of the Roman Republic," by Andrew Stephenson. It begins with a brief account of the land belonging to early Rome, the *Ager Romanus* and the *Ager Publicus*, followed by a general description of the Roman colonies, whose history is inseparably bound up with that of the land. The author then proceeds to describe in considerable detail the various agrarian laws, from the Lex Cassia to the establishment of the empire. To give a thoroughly satisfactory account of the Roman land laws apart from the general history of the republic is hardly possible; but, allowance being made for that drawback, Mr. Stephenson's work is worthy of praise. It is somewhat dry in style, but it gives evidence not only of a careful study of the facts but of a good deal of thinking about the facts. We like in particular the care with which the author expounds the character and meaning of the various laws under review, the circumstances which led to their enactment, and the actual effect they had. Mr. Stephenson informs us in his preface that this monograph is intended, not merely as a study in Roman history, but also as the precursor of a book on agrarian movements in recent times and in nations nearer home.