NECTURUS MACULOSUS RAFINESQUE IN THE LOWER DELAWARE RIVER.

IN the *American Naturalist* for 1892, pp. 779 and 780, Mr. W. B. Marshall gives an account of 'Necturus maculatus in the Hudson River' in which he calls attention to the fact that no record is known to him of its inhabiting the Delaware River, though he presumes that it may probably be found there at some future time. I am very glad to justify his statements with the fact that I have received a mature living specimen for examination that was taken in Darby Creek, which is a tributary of the Delaware River and into which it empties several miles below Philadelphia. The precise locality was near Essington and the date of capture March 2d. When captured, being taken in a small cast net, it was said to have emitted a cry very much resembling that made occasionally by frogs when taken in the hand. The animal has now lived a week in captivity and has been feeding almost entirely on small fish and tadpoles. It seems particularly fond of the common Mud Minnow (*Umbra pygmæa*) and various small Sunfishes (Centrarchidæ), of which it has consumed about fifty or more. By the occurrence of this species in the lower Delaware, where, it would seem, it found its way from the Hudson River by means of the Delaware and Hudson canal, which connects the two rivers at Port Jervis and Kingston, it has enlarged its geographical distribution through the unintentional aid of man. Most likely the occurrence of other aquatic animals, indigenous to the western part of New York, that have or might be found in the Delaware basin, have reached the latter through the same means, as the Erie canal connects the Hudson with many of the streams of western New York.

HENRY W. FOWLER.

LAMPREYS IN CAPTIVITY.

VERY small (6 mm.–8mm.) Ammocœtes larvæ are quite delicate, and it was only by the exercise of the greatest care that they were kept alive, in aquaria, for a period of six weeks.

Older larvæ (10 cm.–15 cm. in length), on the other hand, are remarkably hardy, and may be kept alive indefinitely in small aquaria of running water. It is not even necessary to have a constant changing of water. Sand should be placed in the aquaria, in which the larvæ may bury themselves.

The adult lampreys are moderately hardy and may be kept in small tanks of running water without difficulty. By catching a number of the adults, in the spring, as they are passing up the rivers to the spawning grounds, and keeping them in captivity until sexual maturity is reached, it seems probable that artificial fertilization may easily be accomplished and embryological material thus obtained.

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*NOTES ON PHYSICS.*

THE RATIONALISM OF ELECTRICAL UNITS.

PRESENT electrical units are irrational in that the factor $4\pi$ does not appear in certain equations where it would be proper for it to appear, while in other equations this factor does appear improperly. The British Association Committee on Electrical Standards fixed for us the present definitions of the units of magnetism and of electric charge when they published in one of their reports the little treatise on units by Maxwell and Jenkin. In this treatise the factor $4\pi$ is suppressed for the sake of simplicity and the result is that we have an 'eruption of $4\pi$'s' in other quarters. This eruption is due, literally, as Heaviside puts it, to the wisdom of our ancestors, who, according to the same witty sage, were sufficiently wise in their generation.

Several proposals have recently been made looking to the rationalization of our electrical units. The complete solution of the difficulty, according to the wisdom of the present generation, is proposed by Heaviside. This proposal involves great changes in the magnitudes of all electric and magnetic units—a very serious matter.

Professor Fessenden proposes an ingenious solution of the difficulty which involves no important change in any of the units which are used by engineers. Professor Fessenden's solution does not, however, completely rid us of the irrational appearance of the $4\pi$ factor, and if this solution were to be adopted by us, our posterity might still suffer by our wisdom.

On the whole this erruption of $4\pi$'s is not a very serious matter, and it is not likely that an international congress will soon take steps to rid us of it.

On the other hand there are some points of advantage in our present definitions of *magnet pole* and *electric charge*. It is all very well to talk of defining electric current, as the curl of magnetic force and of magnetic current as the curl of electric force, indeed it is very simple to think in this way when one has once abstracted his knowledge of electrical things sufficiently to make the images of these things meet—but how about the beginner?

Such things as force, temperature and electric current are measured by their effects. For example force may be measured by its distorting effects on elastic bodies or by its effect in changing the state of motion of a body. One of the most evident effects of a magnet pole is its attraction for other poles and the present writer knows of no simpler way to establish a quantitative basis for the discussion of magnetism than to agree at once to measure a magnetic pole in terms of its attraction for a unit pole, the unit pole being that pole which repels an equal pole at unit distance with unit force. Then the force of attraction of any two poles is $F = \frac{m'm''}{d^2}$. Now it leads eventually to simpler equations to so define the unit pole that $F = \frac{m'm''}{4\pi d^2}$ but the present writer, for one, would have some hesitation in presenting the matter to a class in this initially more complicated way with no other excuse than that a certain remote advantage will come of it. Perhaps the present writer, who finds his greatest trials in teaching, is unreasonably timid.

The most valid objection, however, to the present recasting of our systems of electrical units—for we are at present burdened with two systems, not including the entirely useless practical system—is that we have no assurance that a new system would stand. For, in the first place, a new electrical relation must be discovered before we can settle upon *one* system of units; and in the second place we do not know even whether electric current and curl of magnetic field are identical or merely proportional, as has been pointed out by J. J. Thomson.

W. S. F.

## SCIENTIFIC NOTES AND NEWS.

On the occasion of the bi-centenary celebration of the Academy of Sciences at Berlin, Lord Kelvin and Professor Max Müller were elected foreign members. Professor Willard Gibbs, Professor H. A. Rowland, and Professor William James were among those elected Corresponding Members.

The marble statue of Huxley, which the Memorial Committee has given to the Natural History Museum at South Kensington, will be unveiled on April 28th. It is expected that Sir Joseph Hooker will make an address on Huxley, and that the statue will be received by the Prince of Wales on behalf of the trustees of the British Museum.

President Gilbert of the American Association for the Advancement of Science has authorized a meeting of the Council at the Assembly Hall of the Cosmos Club, Washington, D. C., at 4:30 p. m., on Thursday, April 19th.

Dr. Wm. Luther has been appointed director of the observatory at Düsseldorf, in succession to his father, Dr. Robert Luther, whose death we were recently compelled to record.

Professor S. W. Johnson has resigned the directorship of the Connecticut Agricultural Experiment Station after service of over twenty-two years, and is succeeded by Professor E. H. Jenkins, the vice-director.

Professor Silas W. Holman, emeritus professor of physics at the Massachusetts Institute of Technology, died on April 2d.

Professor St. George Mivart, the well-known writer on scientific subjects, died in London on April 1st, at the age of seventy-three years.

There died recently Major Fred. Mather, one of the most prominent of American fish-culturists. He was the author of many notable contributions to the Reports of the Fisheries of State and Government, long time an assistant of the U. S. Fish Commission, indeed