an acid solution is likely, not only to live a shorter life, but to suffer sooner and more severely from sulphating and other diseases.

E. P. HARRISON.
The Physical Laboratory, Presidency College,
Calcutta, February 2.

The Invention of the Slide Rule.

DR. ALEXANDER RUSSELL'S remarks on the invention of the slide rule (*NATURE*, January 13, p. 307) are of great interest, particularly his reference to Seth Partridge. There can be no doubt that Partridge deserves much credit for improving the rectilinear slide rule, but I see no escape from the conclusion that the real inventor of the rectilinear slide rule is the one who first made two Gunter's scales to slide together, for purposes of computation. The man who did this is Oughtred. In Mr. Sidney Lee's "Dic. of Nat. Biog.," article "Partridge, Seth," and in other publications, the incorrect statement is made that Partridge's book, "Description, &c., of the Double Scale of Proportion," first appeared in print in 1671 or 1672. I have a copy of the book bearing the date 1662. The manuscript was finished "Saturday night, August first 1657." In 1662 Partridge's rules were manufactured, not by Walter Hayes, but by "Anthony Thompson, living in Hosier-Lane near West Smithfield, in London."

There is another point of interest. The earliest account of the rectilinear slide rule, printed in Germany, is in Leupold's "Theatrum Arithmetico-Geometricum," Leipzig, 1727, p. 71. Leupold says that he had a manuscript of ten sheets, describing it, but that he did not know the name of the author or the inventor of the instrument. Leupold's description consists of translation, word for word, of extracts from Partridge's book. Thus a historic connection is established between the rectilinear slide rule in England and in Germany.

FLORIAN CAJORI.

Colorado Springs, Colorado, February 7.

Aged Tadpoles.

THE experience of your correspondent Mr. John Don (February 17, p. 458) is no new one. More than twenty years ago we had in a small aquarium in the Charterhouse Museum a tadpole two years of age. To the best of my recollection this veteran never acquired any legs, either hind or front, but the head and body were extraordinarily large. At the present moment I have in my laboratory seven living tadpoles reared from spawn deposited last spring. Of these, three only have developed hind legs. These appendages appeared rather suddenly in December, a few days after I had supplied, for the first time, some fragments of hard-boiled egg.

The secret of procuring these aged tadpoles is to keep the animals in a vessel with vertical sides, and to afford as little opportunity as possible for them to wriggle into shallow water. I maintain a depth of about 5 inches of water in the aquarium, and find that a subdued light favours the health of the tadpoles. Sexual maturity can hardly be expected until at least the normal period has elapsed, viz. in the third or even fourth year.

OSWALD H. LATTER.

Charterhouse, Godalming, February 18.

Title of the Natural History Museum.

IN *NATURE* of February 17 you say (p. 465):—"No one, so far as we know, has suggested a suitable and adequate title for the [museum] at South Kensington" (devoted to natural history). This is not a difficult question; I think "British Museum of Natural History" is both suitable and adequate.

BERNARD HOBSON.

Tapton Elms, Sheffield, February 18.

THE NEW CANALS OF MARS.

THE word "new" when applied to a celestial phenomenon may be used in either of two senses. It may mean new to earthly observation, i.e. one which has never been seen by human beings before, or, secondly, new in itself, that is, one which has had no previous existence. New canals on Mars in the first sense, though always interesting, and at

times highly important, are no novelty at this observatory, inasmuch as some four hundred have been discovered here in the last fifteen years. When Schiaparelli left his great work, he had mapped about 120 canals; with those detected here since, the number has now risen to between five and six hundred. Each of the four hundred thus added to the list, however rich an acquisition at the time it first came to be noticed, was not necessarily otherwise remarkable.

To observe, however, a canal new in the second meaning of the word, one, that is, that had never existed anteriorly, and to prove the fact, is an astronomical detection of far-reaching significance for the bearing it has upon the whole Martian question.

On September 30, 1909, when the region of the Syrtis Major came round again into view, after its periodic hiding of six weeks due to the unequal rotation periods of the earth and Mars, two striking canals were at once evident to the east of the Syrtis in places where no canals had ever previously been seen. Not only was their appearance unprecedented, but the canals themselves were the most conspicuous ones on that part of the disc. They ran one from the bottom of the Syrtis (lat. 20° N., long 285°), the other from a point part way up its eastern side (lat. 17° N., long 284°), and, curving slightly to the left as they proceeded south, converged to an oasis, itself new, on the Cocythus (lat. 5° N., long 265°), about two-thirds of the distance to where that canal meets the Amenthes. The Amenthes itself was not visible, except possibly as a suspicion. With the two main canals were associated several smaller ones, and at least two oases which had never been seen before, and from the interconnection of all of them these clearly made part of the new piece of Martian triangulation.

The phenomena were recorded in many independent drawings by Mr. E. C. Slipher and the director, and in the course of the next few days were photographed, appearing on the plates to the eye as the most conspicuous canals in the presentment of the planet. It is opportune that detailed photography of Mars in Mr. Lampland's skilful hands should have been so perfected as to make this possible; for the photographs taken by both Mr. E. C. Slipher and the director record these canals so that anyone may see them. There are thirty images, more or less, on each plate, and the canals appear on every image; on some more distinctly than on others, owing to the state of our air at the time, but recognisably on all; for each image had a pose of about two seconds and a half, and its definition varied according to the seeing at the time. Owing to the grain of the plate being much coarser than that of the eye, the two canals appear merged in one in the photographic images as a single line, its linear character, however, being quite distinct to one of good eyesight.

The photographs of this region taken in 1907 show no such feature.

No remembrance of ever having seen them before could be recalled by either observer, both being familiar with the planet, except that Mr. Slipher turned out to have drawn one of them the evening previous.

The record books were then examined, when it appeared that not a trace of them was to be found in the drawings of August, July, June, or May when this part of the planet was depicted. That they had not been observed in previous years was then conclusively ascertained by examination of the records of those years. The record of canals seen here is registered after each opposition in a fresh map of the planet's surface. This has been done since the beginning of the critical study of Mars at this observa-