LETTERS TO THE EDITOR.

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On the Antiquity of Mummification in Egypt—A Correction.

IN a recent article on the history of embalming, which was published in the *Cairo Scientific Journal*, I stated that a friend had told me there were two left hip-bones and no right in the remains of the so-called mummy of King Mykerinus in the British Museum.

I have just seen the skeleton, and I hasten to state that my information was not correct, and that there is no reason to suppose that all the bones did not belong to one individual.

At the same time, I must add that there is no conclusive evidence to show that the remains found by Colonel Vyse are either mummified or those of Mykerinus.

This question was raised by me in the course of a discussion on the antiquity of embalming. At the time of writing I had seen no genuine mummy earlier than those found at Sakkara in February, 1907, by Mr. J. E. Quibell. They were dated by him as belonging to the period of the tenth dynasty. Since then Prof. Flinders Petrie has directed my attention to a mummy which he found at Medum in 1892. It is assigned by him to the date of Sneferu, the last king of the third dynasty. Prof. Keith, the conservator of the Museum of the Royal College of Surgeons, where this body is now lodged, has allowed me to examine it. The body is certainly a properly embalmed mummy, and if Prof. Petrie's estimation of its age is correct—and it would be presumptuous of me to doubt it—then this specimen shifts back the date when mummification is known (*by positive evidence*) to have been practised in Egypt by nearly a thousand years.

August 7. G. ELLIOT SMITH.

The Mechanics of the Inner Ear.

I AM much indebted to Prof. McKendrick for his exceedingly fair review of my monograph on the mechanics of the inner ear (NATURE, June 4, p. 114). One point, however, seems to require a reply on my part. Prof. McKendrick suggests that I should make "a huge model" of the cochlea. I believe that it is of some general interest to state why I did not do this long ago.

One of the most important facts which the engineer has to keep constantly in mind is this, that one can but rarely increase or reduce the size of a machine by making all parts geometrically similar to the original. In most (especially hydraulic) machines a part of the function depends on volumes, a part on areas, and a part on lines. A linear increase in size of a hundred would involve an increase of all areas by ten thousand, and of all volumes by a million!

This principle applies, not only to engineering, but also to biology. Suppose I claimed to have made an artificial amœba. Prof. McKendrick surely would not deny my claim on the sole ground of my having failed to make one as large as a frog or a fish, if in all other respects it should be a perfect amœba. Unicellular organisms obviously cannot attain large sizes, because soon their surface functions become insufficient for their volume functions, and they have to obtain special organs for the former (*e.g.* gills).

In the present case, however, the principle is of a purely mechanical nature. The cochlea is a very tiny hydraulic machine, so tiny that its functional elements are microscopical. At the same time, its complexity exceeds that of any machine built by human hand. Any model would have to be a relatively huge model indeed. There are three reasons why I did not make any model:—(1) it is so improbable that in making a model I should hit upon proportions which enable the model to function that I would most certainly waste my time and energy; (2) if the huge model should (by a kind of miracle) happen to function in accordance with my theory, this would not prove that the cochlea functions likewise; (3) as soon as it would be known that the model did not function, some would undoubtedly conclude that therefore the cochlea cannot function thus either, although this conclusion is quite unjustifiable.

Only when, as the result of painstaking experimental, anatomical, and mathematical work, the theory has been greatly perfected will there be any hope of designing and then constructing a huge model which can be expected to function like the inner ear. MAX MEYER.

University of Missouri, Columbia, Mo., July 23.

I QUITE appreciate the force of Prof. Max Meyer's remarks. The point, however, is that while it would be impossible to make a model of a cochlea that would in all respects work like a cochlea, it would be interesting and instructive to make a large model on the principles so clearly set forth in Prof. Max Meyer's monograph, with the view of ascertaining whether a stroke of a piston (imitating the base of the stapes) would act on the whole length of a membrane (imitating the basilar membrane) or only on a portion of it.

A good many years ago I constructed a working model of the cochlea, founded on some suggestions by Prof. Crum Brown. This is described in Schäfer's "Text-book of Physiology," vol. ii., p. 1182, and the model is in the physiological laboratory of the University of Glasgow. It illustrated a possible method of analysis, but obvious objections may be urged against its mechanism. Prof. Crum Brown and I have often thought of making a larger and simpler model, and possibly in the leisure we now enjoy we may return to the subject. I would still recommend Prof. Max Meyer to try his hand on a model and put his views to an experimental test. JOHN G. MCKENDRICK.

Elementary Organic Chemistry?

MAY I be permitted to direct attention to a question asked in a recent examination in organic chemistry for medical students, the syllabus for which states that "the whole subject is to be treated in an elementary manner"?

The question was:—"On analysis an acid whose melting point was 190° C. gave the following results, 0·2159 gram gave 0·3595 CO_2 and 0·1209 H_2O.

"On titrating with ammonia (1 c.c. = 0·00334 NH_3), 0·4859 gram of the acid required 37·52 c.c.

"From these data calculate the molecular formula of the acid."

Assuming that by the term molecular formula structural formula is meant—else why is the melting point given?—and assuming that the acid does not contain nitrogen, the empirical formula $C_5H_8O_4$ agrees well with the data given.

Of the many dibasic acids of this formula, no one melts at 190°, the nearest being dimethylmalonic acid, which melts at 192°.

But apart from any slight error of this kind, is it to be expected that candidates, in a subject which is to be treated in an elementary manner (or, so far as that goes, in any manner whatever) and who may not consult books of reference during the examination, should be required to know the melting points of all the dibasic acids?

J. F. THORPE.

The University, Manchester, July 29.

Space and Number.

IN relation to the ideas of Mr. Leonard J. Russell (NATURE, July 30, p. 305), it may perhaps be interesting to some of your readers to know that Leibnitz entertained analogous opinions upon the same subject. I quote from Baumann, "Die Lehren von Raum, Zeit und Mathematik," Berlin, Reimer, 1869, ii., p. 79:—

"Die Aufdehnung vorstellen wie ein Absolutes, entspringt daraus als seiner Quelle, dass wir den Raum vorstellen nach Art einer Substanz, obgleich er ebensowenig eine Substanz ist wie die Zeit. Darum haben die Scholastiker einst mit Recht den Raum ohne Dinge imaginär genannt, wie die Zahl ist ohne gezähltes Ding." See my book, "Spazio e tempo," Torino, Bocca, 1908, p. 177. OTTAVIO ZANOTTI BIANCO.

Via della Rocca 28, Torino, August 3.