word "speed." If in any passage ambiguity has thus been occasioned—or, as I would rather say, if anything I have thus said can be mistaken—I shall be glad to hear of it and set it right.

I must have failed, however, to make my meaning clear to P. G. T. in pp. 194 and 240. If at least he rightly understands me, I must leave him to settle with observed facts in one case and with the recognised authorities in the other.

My account of the earlier experiments of Professors Andrews and Tait was taken, as stated, from a paper by Prof. Heaton. P. G. T. ought to know the facts, and I accept his correction. When my article was written, several years ago, the "now received idea" was not yet received. I did not err in calling that theory "beautiful" and "ingeniously conceived" which is now generally accepted. But if I had, it is a less serious mistake to describe a sound theory as still open to doubt, than to describe a doubtful theory as demonstrated. This the author of the sea-bird theory of comets might remember with advantage.

RICHARD A. PROCTOR

Graphic Granite

I HAVE been spending some time of late in the examination of the rocks of this district, and was pleasantly surprised, a few weeks back, at finding some well-marked specimens of graphic granite among the waste material raised from Huel Agar Mine. It very closely resembles that found at Portsoy, N.B., but the felspar is grey instead of red. As I am not aware that this interesting rock is known to exist in any other locality in England, the observation may be worthy of record.

W. End, Redruth, December 2 FRANK JOHNSON

The Phonograph and Vowel Sounds

IN the interesting paper on "The Phonograph and Vowel Sounds" (vol. xviii. p. 340, *et seq.*), the authors remark that although the general results are the same as I have inferred from my own researches, the special numbers expressing the distribution of total intensity of vowel sounds among the partial tones are very different. Perhaps you will have the kindness to communicate to your readers the following reasons explaining, as I believe, the differences mentioned above.

1. The tables given by the authors, which contain the distribution not of intensity but of amplitudes, must be altered in a manner readily seen in order to be comparable with my tables.

2. The marks impressed by the phonograph contain certain peculiarities which, although without influence on the tones spoken from the instrument, remain effective in modifying the form of the curves obtained by mechanically transferring them.

3. The objective intensity (kinetic energy) determined by the authors is nearly, but not quite, proportional to the subjective intensity (quantity of sensation) which I have measured with the aid of resonators.

4. As I have observed, the differences of English and German pronunciation cause remarkable differences in the distribution of total intensity of vowel sounds among the partial tones.

Taking the above points into consideration it will be seen that the differences mentioned by Messrs. Jenkin and Ewing appear much smaller.

Besides I am pleased to notice that the authors, like myself, consider the flexibility of mouth cavity as important in explaining, where it exists, the characteristic pitch and other properties of vowel sounds. F. AUERBACH

Local Colour-Variation in Lizards

THIS subject has recently been very fully discussed by my friend, Dr. Max Braun, assistant in the zoological laboratory of the University of Würzburg. His paper, which has especial reference to the lizards of Minorca and of some of the smaller islets of the Balearic group which lie round that island, is entitled "*Lacerta Lilfordi* und *Lacerta muralis*," and will be found in Part I. of the fourth volume of Prof. Semper's "Arbeiten aus dem zoologisch-zootomischen Institut in Würzburg," published in May, 1877.

Braun refers constantly in this paper to a memoir by J. von Beidraga, entitled "Die Faraglione-Eidechse und die Entstehung der Farben bei Eidechsen," which was published at Heidelberg in 1876. P. HERBERT CARPENTER

Eton College, December 9

The Range of the Mammoth

ON November 6 Prof. Boyd Dawkins read a paper before the Geological Society on "The Range of the Mammoth in Space and Time." As the professor and several other recent writers have taken it to be proved that *Elephas primigenius* occurs in pre-glacial beds, it will, perhaps, be as well at once to review the evidence.

Geologists often speak of "pre-glacial beds" when they only mean beds beneath some one boulder clay, perhaps No. 6, or even later in the list given below. The succession is roughly as follows :—

6. Hessel Boulder Clay	Upper, Middle, and Lower of the North of England (?)
Hessel Gravel	
5. Purple Boulder Clay	
Bridlington Crag	Upper, Middle, and Lower of Lincolnshire, &c. (?)
4. Chalky Boulder Clay	
Mid-glacial[1]	Upper, Middle, and Lower of East Anglia.
3. Contorted Drift[1]	
Sands[1]	
2. Second Till[1]	Lower Boulder Clay of the Norfolk Coast.
Intermediate Beds[1]	
1. First Till[1]	
Arctic Freshwater Beds.[1]	
Temperate Freshwater Beds.[1] (Land surface.)	Pliocene.
Weybourn Beds, estuarine, including the "Forest Bed."[1]	

As the *lower* boulder clay of Northwich, in Cheshire, appears to be No. 5 or No. 6, and consequently newer than the *upper* boulder clay of East Anglia, the molar of *E. primigenius* found beneath it need not be pre-glacial. The Hertfordshire boulder clay, beneath which Prof. Prestwich found a tooth is, I believe, No. 4.

In East Anglia I have seen two molars of *E. primigenius* from the contorted drift, No 3 in the list, but it has not yet been found lower. All the specimens said to come from the forest bed have been dredged or picked up on the beach, and are of no value as evidence. At Bacton, on the Norfolk coast, I dug out a jaw and three teeth of the mammoth from a post-glacial deposit; if the denudation of the cliffs had proceeded these teeth would have been found on the beach mixed with those of *E. meridionalis*. There appears to be one specimen, and one only, found *in situ* in the Forest Bed which can with any probability be referred to *E. primigenius;* this was found some years ago by Mr. Savin, of Cromer, it has not yet been satisfactorily determined, but from its peculiarity and the difference of opinion about it, it appears certainly not to be the ordinary form. CLEMENT REID

Egton Bridge, Yarm, Yorks

The Bunsen Flame a Sensitive Flame

IT is not generally known, *if* it has ever been noticed before, that the Bunsen lamp gives a flame sensitive to sounds. A lamp should be chosen which has a tendency to "burn below;" this may usually be secured by opening the air passages to the utmost and lessening the supply of gas. The flame should burn quietly. My most sensitive flame is four inches high; the gas at about one inch pressure of water. A smart tap with a penholder on a glass cylinder a yard from the flame causes the characteristic "ducking," which is sometimes so energetic as to extinguish the flame or to cause it to burn below. The acute sound of rattling bottles, of a glass rod against a beaker, and many such familiar sounds of the laboratory, are the most effective. This may explain burning below without obvious cause. A tap on a mortar with the pestle twenty feet distant from a well-adjusted flame causes it, and so, often unintentionally, we may have the same result. W. W. HALDARE GEE

Preston, December 3

OUR ASTRONOMICAL COLUMN

JEAN DOMINIQUE CASSINI.—In the course of his examination of the older archives of the Paris Observatory, which had been placed at his disposal with unrestricted permission to make extracts for use in his lunar re-

[1] These will be described in the Geological Survey Memoir on the Cromer Cliffs

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