the quartzo-dolomitic series the amount of metamorphism, though the materials are not favourable for its production, is considerable; and the rock has a general resemblance to some of the impure calcareous bands which are incorporated with true schists in the Alps.

Further, although our knowledge does not at present enable us to speak dogmatically on this point, the weight of evidence is, in my opinion, strongly against the probability of the Newer Gneiss series being altered Silurian rock. I would even go so far as to say that it is such as to throw the *onus probandi* on those who assert its (comparatively) modern date. For five or six years I have been working—I trust without prejudice—at the question of the age of metamorphic rocks, during which time I have visited typical districts in Cornwall, Wales, Scotland, and the Alps; and in every case have been driven to the same conclusion, namely, that wherever extensive regional metamorphism exists, the antiquity of the rocks is very great, so that they are probably anterior to the Cambrian period. I fully expect that when the Durness region is closely scrutinised, it will be found that this fossiliferous limestone is faulted down against the metamorphic series, exactly (for instance) as the so-called Devonian rocks of the Lizard are faulted against the "hornblende schists" of that district, and are a remnant, thus preserved, of a more modern and wide-spread series. Any geologist who would settle this point for us would be entitled to our gratitude, but to do it will require no ordinary conjunction of qualifications; for he must be a practised microscopist, a skilled worker in the field, and a man who cares for truth more than for the traditions of an office, or even his own preconceived opinions.

23, Denning Road, Hampstead T. G. BONNEY

WITH regard to Mr. Hudleston's letter on the above subject, published in NATURE (vol. xxv. p. 582), I am glad to say that I am still alive, and able to give a part, at least, of the desired evidence for connecting the Durness limestone with the rocks of Assynt and Erribol.

In the year 1858 I accompanied Sir Roderick Murchison, while on a geological tour in Sutherland. During our stay at Inchnadamff, one of our excursions led us together up the River Traligill. Opposite the place where the springs issue from the miniature limestone caverns, about two miles above the bridge, I espied the fossils in dispute—"orthoceratites"—partially weathered out of the dolomitic limestone from which the stream issues. So overjoyed was I, that I called Sir Roderick to my side by shouting "Eureka," as I was a little in advance of him, pointed out the fossils *in situ*, and after hammering them out of their bed, handed them to him. The circumstances of the achievement are indelibly impressed on my memory. As I only saw these fossils in the field, I am not able to tell to what species they belonged; but there can be no doubt of their nature, as in my attempt to hammer them out of the rock, one of them was broken in such a manner as to expose the septa and the siphuncle.

On a subsequent visit which I made to Sutherland, I had the good fortune to see the specimen of *Orthoceras* (*Cameroceras*) *Brongniartii* alluded to by Mr. Hudleston as "having been found in the upper quartz-rock of Erribol." It was in the possession of the finder, the late Mr. Clark, of Erribol House, who kindly allowed me to examine it. Mr. Clark accompanied me to the place, and pointed out the exact spot where he got the specimen—a little to the north-east of Erribol House.

CHAS. W. PEACH

30, Haddington Place, Edinburgh, April 24

The Magnetic Storms

THE magnetographs at the Kew Observatory were a little disturbed from about 11 p.m. of the 13th inst. to 7 p.m. of the 14th inst. During the 15th they were quiet, and remained so up to 11.45 p.m. of the 16th, when the disturbance began by an increase of the declination, an augmentation of the horizontal force, and a diminution of the vertical force. The movements of the declinometer became gradually more rapid after 2 a.m. on the 17th, whilst its oscillations extended farther and farther from its normal position principally in the direction of increased westerly declination.

From 4.30 to 9 a.m. the horizontal force had diminished so much that the trace frequently passed off the paper and the register was lost for a while. At this time the force must have been more than 05 mm.mgrs. below its average value.

The minimum of vertical force occurred at 5.55 a.m., when it was about 0·07 units too low.

From 10 a.m. to noon of the 17th the motion of the declinometer was small, whilst the components of magnetic force were rapidly increasing in intensity, until at 0.15 p.m. both traces left the photographic sheet in the direction of augmented force; at this time the declination needle merely oscillated rapidly about its ordinary position.

The horizontal force instrument recommenced to record about 2 p.m., and the vertical force about 2.45 p.m.; afterwards the movements of all three gradually diminished, and at about 8 p.m. the disturbance had died out.

During the 18th and 19th the magnets remained unaffected, but at 3.45 a.m. of the 20th a second disturbance set in, commencing with a rapid increase of declination, the first swing of the magnet carrying it nearly a degree to the westward, whence it returned at 4.30 a.m. Its mean position was reached at 6 a.m., and then its oscillations became very rapid, and continued so until 2 p.m, after which hour they became less; but the effect of one disturbance lasted until 7.30 a.m. of the 21st.

Both forces were also simultaneously disturbed, but their movements were much more limited than on Monday, the extremes being in the horizontal ·04 mm.mgrs., and in the vertical 0·3 mm.mgrs. only. G. M. WHIPPLE

Kew Observatory, April 24

Colour Perception

WHILE working at dry-plate photography in a ruby light, I noticed that when any light-coloured article, such as the hand, was rapidly moved, it appeared of a brilliant greenish-blue, in which blue predominated, while, when slowly moved, it appeared of the same colour as the other objects in the room. Seeking for an explanation, led me to recognise a new fact about colour perception which may be of interest to your readers. The reason of the hand appearing blue when in rapid motion was because the continual use of the red light had fatigued that part of the retina responsive to it, and the light reflected from the hand impinging for a very short time on the retina, was not strong enough to excite the sensation of red, but was quite sufficient for blue, the nerves responding to this colour having been rendered acutely sensitive by complete rest. To test this hypothesis, I obtained some dark blue glass and applied it to the window of the dark room, removing the red. On repeating the experiment, the eye with its blue sense exhausted, saw rapidly-moving objects reddish. Now from this it is clear that it takes a longer time to cause a sensation in an exhausted than in a fresh organ. It also gives a direct proof of Helmholtz's suggestion, "that actual coloured light does not produce sensations of absolutely pure colour; that red, for instance, even when completely freed from all admixture of white light, still does not excite those nervous fibres alone which are sensitive to impressions of red, but also to a very slight degree those which are sensitive to green, and perhaps to a still smaller extent those which are sensitive to violet rays" ("Popular Scientific Lectures," first series, p. 223). These observations have led me to an explanation of a very curious phenomenon brought under my notice by my friend, Mr. Napier Smith. When discs of paper on which black spaces have been marked, so that on rotation the eye receives impressions of black and white too rapidly to notice the pattern, but too slowly to combine into a neutral gray, the rotating card appears to be distinctly coloured, especially when it is looked at without keen attention, or as we may say passively. All colours may be seen, but red and blue were the most distinct to me. I at first thought that the colour might arise out of the paper and ink, the former being perhaps tinted with blue to whiten it in manufacture, and the latter probably a dark brown; but on looking several times at the rotating discs, and acquiring the power of looking passively the intensity of the colours could not be so accounted for. The true explanation is found, I believe, in the fact that the different colour organs require longer or shorter periods of excitation before responding to the stimulus, and that those which require the longest periods also retain the sensation longest. I have only made very rough trials, but they point to the fact that the eye responds quickest to red, so that the most rapid alternation will appear reddish, a little slower green will come in, and cause some indescribable colours, such as are seen in the polariscope, and lastly, when green and red are about equal, and producing white, blue will be seen. The blue is best seen with a slow