searches. He and I are in agreement that the real origin of our magnetic disturbances is to be referred primarily to an outside electric system situated somewhere in our own atmospheric regions. I go one step further, and place in the same region the chief origin of the earth's own magnetisation.

In conclusion, it will be well to point out that the method used in my Table II. above to get the average rate of progression of sudden disturbances does not accentuate the actual time differences between distant stations, but tends rather to diminish them, as was the case with storms Nos. 24 and 29. In brief, as I have already hinted, the precise method of grouping of stations cannot be a fixed one, but must vary with the region in which the disturbance originated. When the data from the remaining parts of the globe have been received, this matter will become more evident.

L. A. B.

Washington, D.C., February 13.

Colliery Warnings.

MAY I say a word about colliery warnings to point out that it is not the high barometer that is of any importance, but the dryness of the air? It happens in our country that the high barometer and dry air generally come together.

Gas explosions in coal mines are trivial, and they occur on an average of more than one per day. It is when there is sufficient dust to make the explosion spread over a big area that an explosion is serious, almost without exception. Dry air is the danger, and should be the basis for "colliery warnings."

JOHN HARGER.

University Club, Liverpool, February 21.

In all collieries more than 600 or 700 feet in depth the air is always dry—somewhat drier in cold than in warm weather—and, consequently, coal-dust is always present in the workings provided there is no natural "seepage" of water into them. In these circumstances, the one essential element of a great explosion is always present.

Blasting shot, when fired under certain conditions, and comparatively small volumes of explosive gas when ignited, will always raise and ignite coal-dust the quality of which, as regards its contents in volatile matter and ash, lies between certain upper and lower limits. On the other hand, shots are always being fired, and larger or smaller accumulations of explosive gas are always being formed here and there in mines of this class, quite irrespective of weather conditions.

All that can be said as regards the influence of weather is that, other things being equal, a coal-dust explosion is more likely to occur in cold weather, when the mines are driest, than in warm weather, when they are not so dry, and with a falling rather than with a steady or rising barometer.

These subjects were fully discussed at the very inception of the coal-dust question, and Mr. Harger might do well to study what was then said about them.

As the issuer of "Colliery Warnings" so frequently advocates that special attention be paid to the condition of mines when the barometer is rising rather than when it is falling, I may perhaps be allowed, in this place, to correct a statement which lately appeared in a letter to NATURE, written by "The Author of the Warnings," to the effect that Mr. R. H. Scott and I were amazed (*sic*) to find that fire-damp was frequently reported to have been found in mines even when the barometer was steady and rising. We were not amazed, for we knew by the actual experience of one of us that, in consequence of falls of roof, damage to trap-doors, stoppings, brattices, and so on, which are amongst the commonest incidents in mining, the ventilation often becomes so stagnant at certain critical points that the air becomes explosive at or near these points before the defects can be rectified.

As a matter of fact, the principal province of the fire-men is to guard against this very contingency. Consequently, when we saw appearances of fire-damp reported time after time with a steady or rising barometer, we experienced no surprise, but, perhaps rather unfortunately,

considering the use the "Author of the Warnings" has made of the sentence in which we merely recorded a fact without further comment, we did not stop to explain what passed in our own minds at the time, but proceeded in the next following sentence to show that, when the records of a large number of mines were compared, the effect of these casual irregularities was practically eliminated altogether. It would have been fairer if the "Author of the Warnings" had quoted one more sentence (*Quarterly Journal of the Meteorological Society*, October, 1874).

W. GALLOWAY.

The Hydrogen Spectrum.

THE colour of the light which is emitted from the capillary of a vacuum tube containing pure hydrogen is the familiar vivid, deep pink, the prevailing tint being due to the predominating brilliancy of the red line ($H\alpha$). When the same capillary is viewed from one end, however, the colour is a very pale pink, indeed, nearly white.

This interesting effect appears to be due to the different relative intensities of the lines $H\alpha$ and $H\beta$ in the two cases, for while $H\beta$ (and probably each of the other lines in the primary series) has an intensity appropriate to the length of the column of gas in the capillary, $H\alpha$ appears to suffer reduction.

In the course of some observations on the secondary spectrum of hydrogen, during which I had occasion to use the tube when placed against the slit of the spectroscope in the usual way, and also end on, I was greatly interested in this apparent variation in the intensities of the lines mentioned. The explanation which suggests itself is that $H\alpha$ is weakened by absorption in traversing the column of gas (although this distance is only about 5 or 6 cm. in my tube), but it is difficult to understand why this absorption should be specially selective for $H\alpha$ and not equally effective in the case of $H\beta$, which is also a very brilliant line, and to which one would imagine the same argument would apply. There appears to be no reason for attributing the effect to polarisation.

I have seen no notice of this effect, but I imagine it must be quite familiar to spectroscopists, and perhaps one of them who has devoted special attention to the hydrogen spectrum may be able to throw some light on the matter.

CHARLES W. RAFFETY.

Beechcroft, 2 Park Hill Road, East Croydon,
Surrey, February 22.

Life and Habit.

ON p. 505 of NATURE for February 16, in a review of a new edition of one of Samuel Butler's books, these words appear—"therefore the apparently unpractised but perfect pecking of a newly-hatched chick proves that the chick has done it before," &c.

Now, I have tried many experiments with chicks hatched out singly and away from a hen, but never has any chick attempted to peck until shown how to or made to walk over food which tickled its toes, and my opinion is that a chick might die of starvation while surrounded by food unless taught what to do. They are quick to take a hint, and will imitate the motion and action at once if a bent finger be worked up and down like the head of a bird when pecking; and, if once they feel a bit of food within their beaks, they know what to do with it as well as a new-born babe knows how to suck when anything is placed in its mouth, though they have never done it before.

W. H. M.

February 20.

YOUR correspondent's remark is interesting, but, of course—as he himself indicates in connection with the babe—it does not invalidate Butler's argument. It can hardly be doubted that observation and imitation do not cover the ground, and that there is something calling for explanation in what is called "instinct"—a word which, it must be admitted, only disguises our ignorance of what it is. Butler's theory that "heredity is memory" is at least worth consideration.

THE REVIEWER.