which emit the 2.8 and 4.4μ bands may be converted by collision with the water molecules into kinetic energy. It is difficult to decide between the two possibilities, but in view of the high transparency of flames to their own radiation, the collision mechanism would appear to be the more probable of the two explanations.

Ethyl iodide and ethyl nitrate are still more powerful catalysts for the carbon monoxide and oxygen explosions than water, and the addition of a few per cent. of these substances reduces the intensity of emission of 2.8 and 4.4μ bands to about one per cent. of that emitted by the pure dry mixture. Here again the absorption in front of the wave is insufficient to account for the results.

W. E. GARNER.

C. H. JOHNSON.

S. W. SAUNDERS.

University College, London, April 29.

A Very Rare Halo.

On Sunday, May 16, at 16.25 I noticed a double halo round the sun. There was much cumulus and fracto-cumulus at the time, but this cleared off later, and at about 17.30 the sky was clear except for some clouds near the horizon; at this time both halos were well seen, each extending to well over a semicircle. Except for the cumulus near the horizon the sky seemed at first sight to be absolutely blue and cloudless, but by looking carefully in the neighbourhood of the halos very faint strands of cirro stratus were seen. Both halos had a tinge of red on the side nearest the sun, but otherwise were white; they were equal in brightness except for a short time when the inner halo brightened on the right-hand side of the sun for some 30° or so, the colour at the same time becoming rather more marked. Before sunset both halos faded, the inner one disappearing first. The radius of the inner halo to the middle of the band was from $18^\circ 30'$ to $18^\circ 40'$ as measured with a sextant. Better measurements, perhaps, were obtained from a photograph taken on a panchromatic plate through a Wratten A (deep red) filter; this gave the radii for the inner halo of $17\frac{1}{2}^\circ$ to the inner edge and 21° to the outer edge, for the outer halo $22\frac{1}{2}^\circ$ and $26\frac{1}{2}^\circ$ respectively. The photograph was taken with a wide angle lens, and allowance was made for distortion away from the centre of the plate in making the above measurements.

Three halos are known inside the halo of 22° ; the first has a radius of $7\frac{1}{2}^\circ$ to 10° , the second 17° to 18° , the third $18\frac{1}{2}^\circ$ to 20° . The halo seen here was obviously the second, or Rankin's halo. Besson (*Comptes rendus*, 1920, 170, 334) mentions this halo as having been recorded six times. There is some uncertainty as to the exact radius, and the matter is of some importance in connexion with the theory of these abnormal halos (see Besson and Humphreys, *Monthly Weather Review*, 1923, pp. 254, 255); for this reason, and also because Rankin's halo is excessively rare, I have gone into the matter rather fully. Halos are difficult to measure accurately, and the above measurement of $17\frac{1}{2}^\circ$ is probably as accurate as any previously made; on several occasions when this halo has been observed the measurements were admittedly not very accurate. So far as I know it has never been photographed before.

On May 16 the two halos were seen over a wide area, reports having come from the counties of Suffolk, Essex, Kent, London, Surrey, Sussex, and Hampshire. As seen here in a nearly clear sky, they formed the most striking meteorological phenomenon that it has ever been my good fortune to witness.

C. J. P. CAVE.

Stoner Hill, Petersfield, May 23.

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The Transmission of Signals from a Horizontal Antenna.

IN the course of a mathematical investigation of the propagation round the earth of electromagnetic waves from a horizontal antenna, the result has emerged that, when the earth is regarded as a perfect conductor, the components of electric and magnetic force are zero both when the earth is regarded as surrounded by a conducting Heaviside layer and when no layer is present. Finite conductivity of the earth must thus be assumed in order to account for the propagation, and it is then found that the resulting forces are a small vertical electric force and a much larger horizontal magnetic one. The electric force is due to the 'space waves,' the magnetic force to the 'surface waves' described by Sommerfeld (*Annalen der Physik*, vol. 28 (1909), p. 665); the result of the analysis is in remarkable agreement with the conclusions he there expresses. The magnetic force may be analysed into perpendicular components, each of which consists of two simple harmonic oscillations differing in amplitude and phase, results of the same general type being obtained both with and without the Heaviside layer.

Numerical investigations of the magnitudes of the forces and their variation with distance from the source are in progress.

MARY TAYLOR.

Mathematical Institute,
The University, Göttingen,
March 31.

Rustless Steel and Flexible Glass 5000 Years Ago?

WHILST looking up the literature connected with ancient glass, in which I am interested, I came across a book by M. A. Wallace-Dunlop, published in 1883, entitled "Glass in the Old World."

An account is there given of the alleged opening of the first and second pyramids of Gizeh.

As these pyramids are known with tolerable certainty to have been built between 3969 and 3845 B.C., we may conclude that the things found in them when first opened must have been made at least five thousand years ago.

It is stated, on the authority of one Ben-Abd-er-Rahman, that in the year A.D. 829 El-Mamoum, son of Haroun-al-Rasched, was the first who succeeded in penetrating the tomb of Cheops, and found there the mummy of the king, and that he also entered the west pyramid (second pyramid?), and that there was found "thirty treasures filled with store of riches, and utensils, and with signatures made of precious stones (signet rings?) and instruments of iron and vessels of earth, and with *arms which rust not*, and with *glass that might be bended and not broken*." The italics are mine.

Those ancients have a most exasperating way of anticipating our new ideas.

JAMES H. GARDINER.

Harrow.

Transmission of Stimuli in Plants: A Correction.

IN a communication dated May 22, Prof. Ricca asks me to point out that there is an error in his letter as printed in *NATURE* of May 8, p. 655. There it is stated that the closing of the pinnules from base to apex of a pinna indicated times of transmission of the stimulating substance from the base to the apex of the pinna of 5, 4, $3\frac{1}{2}$, $2\frac{1}{2}$, 2 min. This of course should read, 5, 4, $3\frac{1}{2}$, $2\frac{1}{2}$, 2 sec.

HENRY H. DIXON.

Trinity College, Dublin,
May 28.