Letters to the Editor.

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The Tidal Bore in the Trent.

THE accompanying photograph (Fig. 1) which was taken by me on Aug. 18 last at Knaith, five miles above Gainsborough, conveys an idea of the appearance of the tidal bore in the River Trent. Gainsborough is the most convenient stopping place for the visitor who desires to witness one of the most striking phenomena in the natural scenery of Great Britain. It is a sight which never palls, and at each high spring tide a group of residents gather on the bank at Gainsborough and at every village for twelve miles down the river. Visitors from distant parts of the country are, however, scarce, and this, I think, is largely owing to want of guidance as to dates when the display can be reckoned on with certainty.

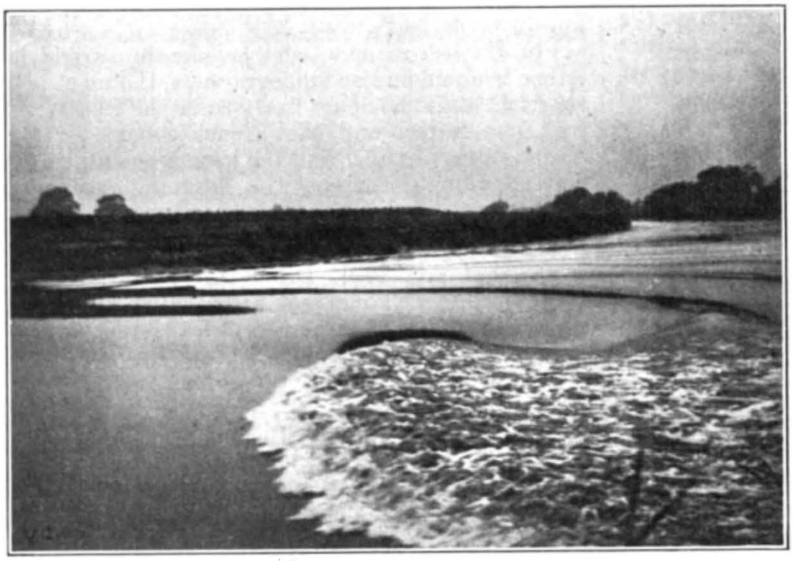

FIG. 1.—Tidal bore in the River Trent at Knaith.

Sufficient information can be gleaned from the table of the time of high water at certain ports which appears on the fourth page for each month in "Whitaker's Almanack." Days when very high tides are expected at London Bridge are marked with an asterisk, and on these days 'a good eagre' is expected in the Trent. The hour of high water at Hull is given on the same page, and this is the time when the visitor should take station on the riverside path below the end of Bowling Green Road, Gainsborough. It must be remembered that the time given in "Whitaker's Almanack" is G.M.T., so that one hour must be added for the months when Summer Time is in operation. The earliest and latest hours are approximately 6 A.M. and 9 P.M. G.M.T. From April to September inclusive there is enough light to see both morning and evening eagre. March and October are good for height of tide, but light is failing in the evening, and from November to February, both inclusive, conditions are unfavourable for the spectacle.

On the occasion of my latest visit to the Trent I arrived at Gainsborough on Aug. 16, the day after new moon, and saw the eagre on this and three following days. Morning and evening I met the eagre some miles below Gainsborough, and as soon as it had passed I motored to a point higher up the river and met it again, and so on as far as Torksey, ten miles above Gainsborough. The near view is splendid, from the fury of the waves lashing the bank, and the foaming 'whelps' which rear their crests above the shallows. The distant view, less easy to obtain in this flat country, is almost equally striking in a different way, the whole disturbance merging in one broad bright band extending from bank to bank which sweeps majestically up the river. The length of course run by the eagre is fully five-and-thirty miles from its beginning near the outfall into the Humber estuary, and all the way the coming of the tide is heralded by the warning cry 'ware eagre.'

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Absolute Magnitude Effects in Stellar Spectra.

IT is known from the fundamental work of Adams and Kohlschütter and their followers that certain pairs of lines in stellar spectra change in relative intensity with absolute luminosity, and this has formed the basis of the method of 'spectroscopic parallaxes.' The method has been hitherto empirical, stars of known luminosity being used as a basis to determine the luminosities of other stars from calibration curves. Saha's researches on high-temperature ionisation, whilst not removing the empirical basis, afforded a general qualitative explanation of many of the results observed. They showed that the lowered value of surface gravity g in giant stars as compared with dwarfs must cause reduced pressures in the atmospheres of giants with consequent increased ionisation and hence increased intensity of enhanced lines (Pannekoek, *B.A.N.*, **19**).

Certain anomalies, however, remained. The Balmer lines, for example, have been long known to increase in intensity in giant stars, whilst, originating as they do from neutral atoms, they should on the simple theory decrease. Again, the lines of Sr^+ always increase in intensity with increasing luminosity, whilst on the simple theory they should decrease at temperatures above the temperature-maximum in the stellar sequence. Lastly, Miss Payne (*Harvard Bulletin*, No. 307, 1927) has found that the lines of all neutral atoms increase in intensity with increasing luminosity, in opposition to the predictions of the simple theory.

In a paper recently communicated to the Royal Astronomical Society, I have developed a method for treating stellar absorption lines taking account of the optical depth at which they originate—more precisely, of the optical thickness τ_0 of the layer in which they originate. It is found possible to define a depth $\tau = \tau_0$ such that the behaviour of the N atoms between $\tau = 0$ and $\tau = \tau_0$ determines the behaviour of the corresponding spectral line. The value of τ_0 depends on the part of the line-contour concerned, being greater in the wings than in the centre, but it is quite determinate. The method lends itself to the discussion of absolute magnitude effects, and it is found possible to calculate dN/dg at constant temperature, keeping τ_0 constant.