earth's atmosphere. This I concluded could not be the case for the following reasons:

(1) None of the masses shows the thin jet-black skin on smooth rounded surfaces characteristic of freshly fallen meteoric irons.

(2) None of the polished and etched sections shows an exterior heating zone (with granulation, due to the transformation of α-iron to γ-iron at about 850° C.)—proving that the masses are weathered remnants.

(3) Some of the masses show various stages of breaking up, from the penetration of iron oxides along cracks to the detachment of flakes.

(4) Iron-shale of various types is found in large amount in close association with the meteoric irons, and has evidently been formed by the weathering of the masses.

(5) Each crater must have been formed by the fall of a single large mass of iron, which became broken up by the force of the gaseous explosion. If the meteorites had fallen as a shower of individuals of the sizes now found, they would have met with a relatively greater air resistance, and no crater would have been formed. (Large meteoric stones are broken up in the air and fall as a shower without the formation of a crater.)

The curious striæ and other markings on the surface of the 'slugs', commented on by Mr. Bedford, may perhaps be explained by the weathering of strained and twisted metal. These 'slugs' show a contortion of the lamellar crystalline structure, and they were evidently torn from the main mass by the force of the explosion.

L. J. SPENCER.

British Museum (Natural History),
South Kensington,
London, S.W.7.
Feb. 15.

The British Coal-Tar Colour Industry

WHILST the original discovery of a coal-tar dye was made by an Englishman, W. H. Perkin, in 1856, and the early industrial development of the dyestuff industry took place in Great Britain, the rapidly growing industry soon found better conditions for its development in Germany. The consequent decline of the British coal-tar colour industry was already well marked in 1875, and in 1886 had proceeded so far that 90 per cent of the dyes then used in Britain were of foreign manufacture. This condition of things persisted and, in the decade prior to the War, German domination of the industry was nearly complete.

It is not an overstatement to say that the development of this highly scientific and extremely profitable industry in Germany instead of in Great Britain had enormous, if not decisive, political and economic effects both before and during the War. It has also been an important factor in shaping the world conditions of the present day. An immediate effect was that, in the very early days of the War, one of our great industries, that of the manufacture of textiles, which was of vast importance both on the military and civil fronts, was threatened with strangulation. With the view of affording information regarding the origin and uses of dyestuffs, I published in 1915 a compilation of important addresses given on the subject: papers published between Perkin's original discovery in 1856 and 1914 and papers published during the War period[1]. On the publication of this book a letter was received from Sir John Brunner which contains a statement of his opinion that, with sufficient financial backing, the colour-manufacturing industry might have been developed here instead of in Germany.

In view of the remarkable success of the firm of Brunner, Mond and Co., the considered opinion of Sir John Brunner on this point is of great historical interest and importance.

The letter, which is published with the approval of Sir Felix Brunner, Bt., the grandson of Sir John, is subjoined:

WALTER M. GARDNER.

Lawnhurst,
Didsbury,
Manchester.

Silverlands,
Chertsey.
Nov. 7th, 15.

Dear Mr. Gardner,

I am greatly interested to read the advertisement of your new book on "The British Coal Tar Industry".

When my brother Henry returned in 1857 from his studies at the Polytecknikum at Zurich he entered the service of F. Crace Calvert, who was then the public analyst of Manchester.

He used to come home to my father's house at Everton every Saturday, and show us, from 1858 to the beginning of 1861, skeins of silk treated with aniline dyes that he had himself prepared.

We were in our 'teens' and we never got any farther than enjoying the colours.

I have many a time reflected that if he and I had had the command of money, which came to us in later life, that the Coal Tar Industry would never have gone to Germany.

Yours faithfully,
John Brunner.

W. M. Gardner, Esq., M.Sc., F.I.C.

[1] "The British Coal-Tar Colour Industry; its Origin, Development and Decline". By Walter M. Gardner. Pp. 437. London, 1915. Williams and Norgate.

Technique of Height Measurement of the Ionosphere by the Pulse Method

IT has been shown[1] that in the pulse method of Breit and Tuve for the measurement of the heights of the regions in the upper atmosphere from which wireless waves are reflected, the quantity to be measured is the equivalent path $c\int ds/U$, where U is the group velocity along an element of path ds and c is the velocity of light. The group velocity U is, by definition, the velocity of the crest of the disturbance. Now the crest is by no means an obvious point in the photographic registration, and it has been usual therefore to refer measurements to the beginning of the pulse. A great deal of ingenuity has been called forth in making this point readily recognisable, by shortening the pulse, increasing the rate of build-up, etc., so that errors due to variation in amplitude may be reduced to a minimum. Errors due to dispersion have been ignored or accepted as inevitable.

Since the crest is the point of greatest importance it must be *made* obvious. Consider the pulse shown in Fig. 1 (*a*); there is no point on the curve that is obviously defined. But if we differentiate it we obtain the curve of Fig. 1 (*b*) and we see that three