

producing photographic effects always appear to produce strong fluorescent effects on platino-cyanide of barium, so that the fluorescence of this affords an indication of the photographic efficiency of the radiations emitted from the tube.

RALPH R. LAWRENCE.

Massachusetts Institute of Technology,  
Boston, February 26.

Is it quite correct, as Prof. Lodge puts it, to call the X-rays *anodic* because they start from a point (surface of glass, or of metal foil, &c.) opposite the kathode? It may be true that a surface upon which the cathodic discharges are being directed acquires thereby some properties common to the anode: but it is not an actual anode. Further, I think that so far there is no proof that these rays start from an anode unless that anode is itself in the line of the cathodic discharge. Hence I submit that *anti-kathodic* would be a more correct term to use in describing them. They can certainly be made to start from a portion of the kathode itself by shaping it so as to concentrate the cathodic discharges (or "radiant matter") upon a prolongation of itself.

Whilst dealing with this point, might I mention that a phosphorescent enamel, made by incorporating calcium sulphide in a very fusible enamel-glass, appears to form an excellent anti-kathodic surface for generating X-rays.

SILVANUS P. THOMPSON.

Finsbury Technical College, March 9.

We enclose a print of a "Röntgen" photograph taken by us some time ago, which shows very clearly that it is to the mineral constituents that bone owes its opacity to the "X-rays." Two human finger-bones were obtained as nearly alike as possible. One was decalcified by treatment with dilute hydrochloric acid for some days, the other being soaked in water for the same period. The calcium phosphate, carbonate, &c., dissolved by the hydrochloric acid, were precipitated by ammonia and ammonium carbonate, and the precipitate, after washing, was spread on paper, so as to cover an area about equal to that which would be covered by the original bone. This precipitate, together with the bone which had merely been soaked in water, and the "decalcified" bone (which had shrunk during treatment with the acid), were then placed upon a photographic plate and exposed in a cardboard box to the radiations from a Crookes' tube excited by a small "Tesla" apparatus.

The picture thus obtained, shows clearly that while the decalcified bone is almost without action on the "X-rays," the mineral matter is practically as opaque as the bone before treatment with acid.

The print shows, however, that both the original bone and the calcium phosphate are only relatively opaque, but that they do allow some "rays" to pass, for the photograph shows half-tones, and not merely an outline.

J. D. CORMACK.

HERBERT INGLE.

The Yorkshire College, Leeds, March 4.

REMEMBERING that scientific men are pledged, beyond all others, to accuracy and observance of rule, I am emboldened to protest against the use of two words which are sometimes employed to describe the pictures produced through the agency of Röntgen's rays. I mean "shadowgram" and "radiogram."

Both of these offend against a primary rule for the formation of new compound words, which requires that all of the component parts of any word shall be derived from one and the same language.

If a word be desired which shall signify a picture produced by rays, let us go to the Greek language only, and form the word "actinogram"; or to the Latin language only, and form the word "radioscript"; or else let us be content with some purely English compound, such as "ray-sketch." G. H. P.

#### The Aurora at Waterford.

AFTER a boisterous day and a barometer that went down to 28.85, we were favoured last (Wednesday) night with an auroral display. It was first seen here at 8 o'clock, when it appeared in a cloudless, starlit sky as a sheaf of light springing from the western point of the horizon, and stretching along an arc of 30° up towards the Pleiades.

Its colour, at first silvery white, gradually faded away,

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reappearing in thin streaks and irregular patches of yellowish light in various parts of the sky between north and west.

At 10.30, it was round in the north. At one time, six well-distanced streaks were counted. They seemed to converge slightly towards the zenith. The light was mainly yellowish, but tinged here and there with pulsating reddish rays. The flickering, or fluctuation in colour and brightness, was distinctly noticeable.

The phenomenon was not observed after 11.30.

As auroræ are essentially electrical in character, having some analogies with the brush discharge, it would be interesting to know whether, like the brush discharge from induction coils and influence machines, *shadowgraphs* might be taken by means of these weird rays. Opportunities for testing their photographic qualities occur very frequently in higher latitudes than ours, and even nightly in circumpolar regions, the home of this interesting phenomenon.

M. F. O'REILLY.

De La Salle Training College, Waterford, March 5.

#### An Unusual Meteor.

AT 8.31 on Sunday evening, March 1, when half a mile north of York Minster, I caught sight of a meteor slowly falling vertically almost due east. It was then passing over the two small stars  $\nu$  and  $\xi$  Ursæ Majoris, which at the time were at an altitude of 43°, azimuth 5° north of east. Seeing that it meant to last awhile, I proceeded to repeat the alphabet in the orthodox manner (once through, each letter quickly but distinctly enunciated, requiring 4 seconds). Having gone over it twice, I must confess that my amazement at the meteor's duration made me pause. But it kept on, so I continued, getting through it twice more. Then, after a second involuntary but very unscientific pause, I finished the alphabet a fifth time before the phenomenon came to a close. In all, I must have watched it at least 25 seconds. After some 10 seconds, when about the same altitude as  $\beta$  Leonis (24°), a smaller meteor (fourth magnitude) appeared 1° to the left, at an angle of about 40°, and, proceeding at the same speed of under 2° per second, lasted 3 or 4 seconds. The original, of which this was doubtless a fragment, was between first and second magnitude, but with a distinct disc, and was followed by a train of sparks, reddish like itself, which was never more than 2° or 3° long, or lasting only 1 or 2 seconds. The fragment had also a slight train. The main mass seemed to pause slightly about this spot, perhaps because of this explosion. From the first it moved slower and slower, doubtless an effect of perspective, and finally disappeared almost due east (within 5° north of east), only 5° or so above the horizon, in the unusually clear sky just above the rising moon.

Whilst making notes, a gentleman came by, who said that he had seen it earlier, when as high as, and very near  $\tau$  and  $\mu$  Ursæ Majoris (the hind paw), or about an altitude of 58°, 5° north of east. Thus its angular path was 53°. As the additional distance was nearly half that observed by myself, it must have been visible for at least 7 seconds before I saw it, or 32 seconds in all. This makes due allowance for its apparently quicker motion at first. But the gentleman himself thought that he had not seen the actual commencement.

It is to be hoped that some other reports will be received, for its path must have been of extraordinary length, even if it was only travelling at ten miles per second, which is the almost irreducible minimum for a meteor.

A third observer saw it from indoors, appearing from above the window and falling vertically down the panes. It is a reasonable assumption, for a meteor of so great duration, that it first appeared at a height of 100 miles and reached within 30 miles of the earth. If so, its approximate path would be from above 25 miles off Bridlington to the coast of Denmark, north-east of Heligoland. The flight would be 360 miles, or rather over 10 miles per second.

Bootham, York.

J. EDMUND CLARK.

#### RECENT WORK OF THE GEOLOGICAL SURVEY OF THE UNITED STATES.

##### I.

OWING to the fact that much of the sphere of operations of this Survey lies in a new country, it is compelled to undertake a great deal of work of a class which does not usually fall to the lot of a body of geologists; chief amongst this stands topographical