It is true that one may see flints emerging from arctic glaciers unscratched and unrounded, while softer rocks are reduced to strongly striated boulders; but Dr. Irving seems to conceive the Boulder Clay as something distinct from the ice-sheet in which it originated, and as merely pressed on by superincumbent ice. It cannot be too strongly urged that the lower portions of glaciers of the continental or ice-sheet type consist largely of stones and mud and abrading sand-grains, and that these materials are held in the grip of the ice and are moved against one another as it flows. The ice-sheet is, in fact, a conglomerate with an ice cement; the Boulder Clay is an essential part of it, and remains as its representative when the portion that can melt has yielded before climatic change. GRENVILLE A. J. COLE.

Royal College of Science, Dublin, September 6.

Boulder Clay in Essex.

YOUR correspondent Dr. Irving, in his letter entitled "Boulder Clay in Essex" (NATURE, August 22), states that he has made a keen but futile search for a human artefact in the Boulder Clay, and, I presume, infers that these relics do not occur therein.

I have had no opportunity of carefully examining the Boulder Clay of Essex, but for the last six years I have been able to search that of Suffolk, and know that the occurrence of humanly flaked flints in this latter deposit is capable of unassailable demonstration. As until the notification of a human skeleton having been found beneath the Boulder Clay no search had been made in the clay for worked flints, and as that notification was made only a few months ago, I think that perhaps further and more prolonged search in the Essex deposits will reveal some of the type of implements which are found in Suffolk.

But even if this is not so, it cannot be brought as an argument against man's presence here before the deposition of the Boulder Clay. It would be as foolish to argue that because palæolithic implements are not found in a certain section of river-gravel, they do not occur in any other portion of the same deposit.

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12 St. Edmund's Road, Ipswich.

The "Titanic."

YOUR article (NATURE, August 29, 1912) on the report of the Advisory Committee having emphasised the contention from the first of some of us (students of science and old naval commanders) as to the insanity of high speed "at night in the known vicinity of ice," it behoves surely men of science to ask the question whether we have not reached the imperative limits of that false security which the "practical man" is wont to feel in his contempt for scientific "theory"; and, further, whether the time has not therefore come for legislation requiring commanders of the largest ocean-going steamers to hold a diploma, guaranteeing such a systematic course of study (say in a class at Greenwich or Kensington) in marine physiography and the elementary laws of mechanics as would quicken their imagination as to the uncertainty and the magnitude of the risks to be run in an abnormally ice-drifted sea. Lord Mersey's report may whitewash the facts, but the facts *en évidence* remain; and the chain of cause and effect in the lamentable and tragic loss of the *Titanic* leads us in the last resort to the notorious contempt for scientific acquaintance with the facts and laws of nature on the part of the "practical man." A. IRVING.

Hockerill, Bishop's Stortford, September 2.

STUDIES OF AURORA.[1]

ONE or two photographs of aurora seem to have been taken before, but Prof. Störmer is the first to meet with marked success. In the earlier of the volumes before us he describes with full detail the apparatus and methods employed in photographing aurora during a stay of some months at Bossekop, in the extreme north of Norway, early in 1910. Photographs were taken by Störmer and an assistant from the two ends of a base of about $4\frac{1}{4}$ kilometres, simultaneity of exposure being secured by telephonic signal. Using special plates, satisfactory photographs were obtained with a few seconds' exposure. One or more prominent stars were always included in the photograph, and the time was carefully noted. From the known co-ordinates of the stars, it was thus possible to fix the position of the aurora. The base was long enough in general to give a parallax which could be measured with sufficient accuracy to determine the approximate position and height of selected prominent points. The heights calculated for the different auroras varied from 36 to 461 kilometres. Fig. 1 shows a photograph—from the original

FIG. 1.—Reproduction of a photograph of an aurora: original size.

negative—taken with 3 seconds' exposure; Fig. 2 is an enlargement, the original of which had a 5 seconds' exposure.

The second of the two volumes referred to below repeats some of the information given in the first, but is mainly theoretical. Störmer was apparently first attracted to the subject of aurora and magnetic storms by the work of his well-known colleague at Christiania, Prof. Kr. Birkeland, but the views he now holds are independent.

An electrified particle projected in a uniform magnetic field H describes with uniform velocity a helix about the lines of magnetic force. If projected perpendicular to the lines of force, it describes a circle of radius ρ. If m be the mass, e the charge, v the velocity of the particle, and V the velocity of light, then, according to Störmer, $H\rho = (m/e)v(1 - v^2/V^2)^{-\frac{1}{2}}$. This differs from the usual formula in English books unless $(v/V)^2$ be

[1] "Bericht über eine Expedition nach Bossekop zwecks photographischer Aufnahmen und Höhenmessungen von Nordlichtern. By Carl Störmer. (Utgit for Fridtjof Nansens Fond.) Pp. 112+88 plates. (Kristiania: Jacob Dybwad, 1911.) Extract from Videnskap. Skrift. Mat. Natur. Klasse, 1912.

"Sur les Trajectoires des Corpuscles électrisés dans l'espace sous l'action du Magnétisme Terrestre avec application aux Aurores boréales (second Mémoire). By Carl Störmer. Pp. 163+10 plates. Extrait des Archives des Sciences physiques et naturelles, Geneva, 1912.