others in the American Museum in Lane Co., Kansas.

It measured fourteen feet in length and was eight inches in diameter at its proximal end where it was broken from the upper jaw. Dr. Matthews assures me that it is the largest specimen so far recorded, I regret to say that it was not saved owing to its friable nature.

CHARLES H. STERNBERG

CONCERNING STENO

TO THE EDITOR OF SCIENCE: It happens to all of us to fancy that what is new to us must be new to the world; and if we fail to look in the right places we do not become disenchanted.

The recent reference in SCIENCE (May 10) to Steno's noted work on crystallography and a newly-discovered English translation of it, led me to wonder if all the great bibliographers had overlooked the latter. The four authorities that came to hand first were Brunet, the British Museum Catalogue, Watts's 'Bibliotheca Britannica' and Poggendorff's 'Biog.-lit.-Worterbuch'; all of these include H. O.'s translation of Steno, except Brunet, who has few scientific titles and does not include this in any language. The translation is also cited in the 'Catalogue' appended to Young's 'Natural Philosophy,' about 1805.

The guess and conclusion that H. O. was Henry Oldenburg is confirmed by the article about him in the 'Dictionary of National Biography.'

This incident will strengthen the views of those who think that a prerequisite to any advanced degree should be a short course in bibliography; for, whatever Pope meant by his lines, they are increasingly true to-day:

* * * Index-learning turns no student pale,
Yet holds the eel of science by the tail.

C. K. W.

WASHINGTON, D. C.,
June 4, 1907

SPECIAL ARTICLES

ON SUN SPOTS

APROPOS of certain recent discussions on solar activity to which I listened with pleasure in Philadelphia, I have wondered whether a possible analogy between geyser-like action and periodic solar disturbance has been suggested. For instance, let the line *td* in the diagram represent the distribution of temperature and depth below the solar surface, or, from some points of view, the distribution of temperature relative to pressure. Let the line *tp* represent the condition of transition, referred to temperature and depth, from an atomic form *A* to an atomic form *B*. Below the *tp* line the element *B* is stable, above it *A* is stable. At depths corresponding to *c* or *c'*, therefore, neither form is persistently stable, but as the spherical shells are thin there need be no marked consequences. To make the engine work, two points of intersection, *c*, should occur.

I shall assume that the transition of *A* into *B* takes place along a doubly inflected intrinsic isotherm for the system *AB*, after the manner explained by James Thomson and Van der Waals. It therefore requires a certain amount of 'supersaturation,' or an excess of heating, to affect the transfer from *A* to *B*, in the absence of special external interferences. I shall also assume that the transfer *A* to *B* is accompanied by an evolution of heat, *B* to *A* by an absorption of heat, and that the *A* matter is eliminated from the whole active region by gravitational convection. Finally different atomic forms are arranged between concentric spherical shells, according to their density.

Suppose, therefore, as a first alternative, that after a sun-spot period, the *td* line has been depressed by the sudden cooling of all active strata to the position *t'd'* in Fig. 1. The points *c* have been displaced towards each other and have quite vanished from the curve. *B* matter only is present. In the lapse of time, however, the line *t'd'* again rises to reach *td*, due to heat arriving from below, within the depths bracketed in the now unstable state *A*. It is agreed that the *td* position will have to be very closely approached, or a considerable 'supersaturation' will be required, before another eruption occurs, which drops the *td* line to *t'd'* in turn. Whereas the depression of this line is relatively sudden, its gradual rise together with the prop-