

## OUR BOOK SHELF.

*Annals of the Astronomical Observatory of Harvard College.* Edward C. Pickering, Director. Vol. xvii. (Cambridge: John Wilson and Son, 1887.)

THIS volume of the *Annals of the Harvard College Observatory* contains the description and theory of the instrument invented by Mr. S. C. Chandler, and called by him the almucantar, as well as the reduction and discussion of a series of observations made with it at the Observatory in 1884 and 1885. The instrument consists of a telescope mounted upon a base that floats in mercury, and the observation consists in noting the time of transit of a star across an almucantaral (or horizontal) circle, the particular horizontal circle which the inventor has found most convenient being that passing through the Pole, which he has called the "co-latitude" circle. If, therefore, the telescope be clamped at the given altitude, "the sight-line will mark accurately in the heavens a horizontal circle: and the transits of stars, as they rise or fall over this circle in different azimuths, will furnish the means of determining instrumental and clock corrections, the latitude, or right ascensions and declinations." Mr. Chandler believes that an instrument on the almucantar principle is capable of giving results more free from both accidental and systematic errors than those obtained from a meridian circle, and certainly the discussion of his observations contained in the volume before us goes far to justify such a belief. The probable accidental error of a single observation in zenith distance is  $\pm 0''.404$ , whilst for stars north of  $60^\circ$  declination it is as small as  $\pm 0''.379$ ; the probable accidental errors of the clock corrections from a complete transit (including the residuals for Polar stars) are  $\pm 0''.0475$  and  $\pm 0''.0435$  for two observers. And these results have been obtained, it must be remembered, with a telescope of only 4 inches aperture and less than 44 inches focus. The chief advantage of the system is, however, that it gives measurements of both co-ordinates of a star which are absolutely free from the effects of flexure, and also of refraction as far as it depends on zenith distance. The almucantar certainly appears to be a valuable addition to our means of attacking difficult problems of practical astronomy.

*The Distribution of Rain over the British Isles during the Year 1886.* Compiled by G. J. Symons, F.R.S. (London: E. Stanford, 1887.)

MR. SYMONS explains that the delay in the appearance of this volume is due chiefly to the exceptional character of many of the phenomena of the year 1886, and partly to some observers not having had sufficient health, or courage, or interest in their records, to induce them to face the snowstorms of March 1 and December 26. The volume contains, besides articles upon various branches of rainfall work, the results of observations made at nearly 2500 stations in Great Britain and Ireland. In the various sections the compiler has brought together an immense mass of information, and he has taken great pains to present his facts clearly. There are several illustrations, in one of which he shows the fluctuations of annual rainfall from the year 1726 to 1886.

## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

## Slate Ripples on Skiddaw High Man.

THE slate ripples on Skiddaw are not, so far as I am aware, mentioned by writers on the Lake District, geological or other-

wise. Their peculiar character puzzled me so much, after noticing them on Saturday, July 23, that I visited the spot again on the 30th to see whether the origin which suggested itself to me was probable.

Following the pathway from Keswick, you pass through a small gate a little way up the final ascent, from the dip between Skiddaw Low Man and High Man. Turning to the left along the wire fence, one comes, where it ends, to the best-developed of these peculiar ripple marks; but they extend upwards from here on the left (south) side of the pathway until you are more than half-way up to the first cairn. On the right (north) side the ripples begin later, extend higher, but are less distinct. They cease, apparently, simply from want of the clay foundation, which is an essential feature in their development.

The rippled areas are patches of bare clay or soil, from a few yards to half an acre or so in extent, coated with a thin layer of the slates, which elsewhere form the cap of Skiddaw High Man. The slate fragments, however, instead of being confused, form more or less regular lines, generally running north-west and south-east, but varying towards north and south or east and west, when the patches are small and longest in these directions. The greater the slope the greater appears to be the average size of the slates. The larger fragments average a foot by four or five inches, always lying lengthwise along the lines, which are seven or eight inches apart. The clay is washed out beneath the stones, which therefore do not rise above the general level. The clayey intervals have numerous smaller bits of slate, and are scored at right angles to the lines by the action of rain and wind on these. Of course there are always loose fragments not on the chief lines.

Obviously the slates are arranged by the wind, apparently without much aid from water, as the slopes would not let it collect. But it would be very interesting to have a complete explanation of the lines.

A suggestion, largely confirmed by my second visit, may at any rate help to solve the point, even if it is inadequate by itself. The hurricane force of Skiddaw storms, mostly from the south-west, no doubt drives before it the loose slates, sliding over the surface of the slates below. On reaching a bare patch, the front edges of the slates are stopped by the clay. Finally a sudden gust tilts them over. Thus a first line is formed. More slates slide, or are tilted over, upon the first layer, which have meanwhile worked down to the general level by rain action. The second set slide over the first set and are in their turn tilted over on reaching the far side. Thus a second line is formed, and the rest follow in the same way. On slopes larger fragments are moved than on the level; hence such are there found in the lines. In small areas, with their long axes not perpendicular to the prevailing winds, the general direction is modified by the natural position (according to the explanation here suggested) of the first line.

There was a moderate gale on my first visit, and only a stiff breeze on my second, neither enough to move stones. But on the latter occasion, hearing a strange hissing noise, I looked up and saw a violent, eddy, 20 or 30 yards across, whirling small slates 20 to 40 feet into the air. This advanced from the south-west at the rate of 8 or 10 miles an hour, coming so close that some of the fragments fell around and on me.

Probably the lines are stationary, although the stones may pass from one to another. To test this, if possible, I took up on the second occasion seven small Permian sandstone pebbles from the shore and placed them a foot or less apart on the windward edge of a conspicuous line, sheltering each behind a narrow slate, hammered firmly into the ground. I am not likely to be up again, but should any of your readers be on the spot a few months hence they might find the line in question by ascending the path until the line of the Helvellyn range is above Skiddaw Low Man by about the breadth of a pencil held at arm's length. The line lies twenty-seven paces to the left of the path.

I might mention that the thermometer was at  $45^\circ$  on the top about half-past one or two, when the sun was clouded. Soon after four, at Crosthwaite, the same thermometer was at  $63^\circ$  in the shade.

J. EDMUND CLARK.

August 2.

## Dr. Klein and "Photography of Bacteria."

ALTHOUGH I feel indebted to Dr. Klein for his appreciation of my work as expressed in his review in *NATURE* of August 4 (p. 317), still I must ask him to allow me to correct a state-