

wrapping paper and cord to secure this trophy of the past, and draw from it its inmost secrets. The grinding is simply friction with emery and water till the first face is prepared, and polished on the chamois skin with *dry emery slime*. This should be as perfectly done as possible. The specimen may be considered as finished at this stage, if no *complete* examination of *structures* is intended, no tracing of homologies in various genera and species. If this exact study is to be prosecuted, on one of the small glass pieces, polished surface down, imbed the specimen in balsam, just hard enough and deep enough to securely hold it, but not so hard as to crack off, as the grinding of the second surface advances. Care must be taken to hold the glass *horizontally*, lest the specimen be of unequal thickness at the close. When *nearly translucent*, great care must be taken by grinding *lightly* and more and more lightly, till the work is complete and the polishing done. Warm the balsam which still holds it to the glass, and delicately slide the well-earned treasure to a new microscopic slide, 1x3 inches, on which is a drop of hot balsam. This successfully done, remove any air bubbles and lay on the cover glass, removing bubbles again. Clamp it with a clothes pin till dry and cold, then remove all surplus balsam with turpentine, taking care that it does not also run under the cover glass. It is now ready for study. When several specimens of different species or genera of *Rugosa*, for instance, have been made, fine lessons may be drawn in homologies, especially of mural, septal and tabular systems.

As the large majority of students will not carry their scientific studies, as such, farther than the requirements of the college curriculum, it is eminently important that their attention be called all along to certain prominent things as prominent, as the great questions to be sought out. In giving these special points of the field in general, the teacher or professor will naturally present in a more extended way that special field which has most attracted his or her own attention or investigation. For reference and for present benefit the pupils should each, under the eye of the teacher, make a geological map of the United States; one of his own state on a larger scale, and of his own section on a still larger one. He should also number carefully and permanently his specimens, using a tiny circle of paper and glue unaffected by ordinary moisture, these numbers corresponding to those on labels bearing name of formation, group, genera and species, with the date and locality.

In preparing this paper I have been painfully conscious of its inadequacy and its great imperfections, yet from experience and observation I hope to have measured an arc in the circle of scientific and geologic education in our schools whose circumference may be eventually completed.

LETTERS TO THE EDITOR.

* * * Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

AN INSTRUCTIVE ILLUSION.

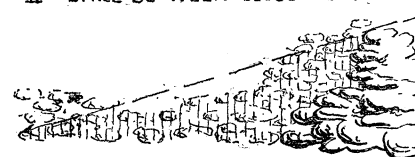
On Thursday evening, May 18th, occurred at York one of those smart thunder-showers which followed the break-up over the greater part of England of the sunniest, warmest and driest spring within the memory of most. Hail had fallen, and five minutes later, at 6.50, clear sky appeared among the storm-clouds. Not quite clear, however, for it was flecked with those very delicate, filmy, white clouds which one usually assigns to a very lofty altitude. The sun

being within an hour of setting, its slanting rays illuminated these strongly. It was therefore with surprise that I saw shoot athwart these sharply-defined, intensely dark bars of shadow. These evidently came from a portion of cumulus-like thunder-cloud, which topped the main mass just below and to the right of the new moon. Some of the rays sprang direct from its edge, but others at a distance of 2° to 10°. In the shadow the filmy clouds were absolutely invisible, the sky seemingly being of a clear blue, although the shifting of the bars of shadow indicated their actual presence everywhere.

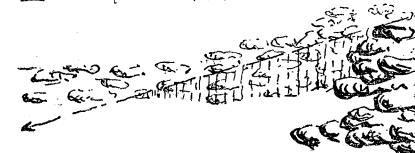
I. SHADOW IN CONTACT WITH CLOUD.



II. SPACE BETWEEN CLOUD & SHADOW.



III. NO SHADOW PERCEPTIBLE.



THE STRAIGHT LINE PARTS SUNSHINE & SHADOW.

But the strange question arises, what was the real height of the film-clouds? Must they not, obviously, have been at a lower level than this portion of the thunder-cloud, though higher than the main mass? And yet portions must have been piled higher against the thunder-cloud. Else there could not have been the illuminated space dividing the shadow from the cloud. In some cases the dark bars merged into sheets of shadow, which stretched away 20° or more from the cloud. Apparently, if seen in section, the effect must have been as in the appended sketches.

It is difficult to conceive any other explanation than the above. Hence, either such film-clouds form at lower levels than is generally supposed, or the summits of thunder-clouds penetrate higher than has been supposed.

J. EDMUND CLARK.

WHY NOT THE COLLECTIONS OF SEEDS?

In these days of stamp, coin, shell, mineral, plant and insect collectors, the writer has often wondered why it is that so few have turned their attention to making collections of seeds. The field, as it appears to me, is one of exceptional interest; exceptional not merely because of the work of real merit that may be done therein, but because it is practically inexhaustible; because the materials are very largely of such a nature as to be cared for with a minimum amount of labor, and require but little space; and because in many instances seeds are themselves objects of great beauty. There are few pursuits in which greater latitude may be allowed, or greater opportunity is given for display of individual energy and mental scope. The amateur, whether man or woman, boy or girl, business man or teacher, cripple or invalid, may each and all collect and find ample room for so much or so little study as he or she may choose to devote to it. One may collect only such seeds as have in