while, at the point of growth in the root, only leucoplastides are to be seen. Moreover, in following the plastides farther back, he found them present in the seed itself; and this he conjoins with the well-known fact, that chlorophyll-granules are to be found ready formed in certain seeds.

The destiny of the plastide depends upon the tissue which is to be developed from the meristem. Some of them remain colorless, that is, as leucoplastides, and serve to produce starch-grains at the expense of assimilated matters; others become chloroplastides to produce assimilated matter; while still others are to furnish colors to flowers and fruits. This simplest of all organs is therefore capable of wide metamorphosis, by which it becomes fitted for its diverse functions.

Nor is this all. The same plastide can become at different stages of its life a leuco-, a chloro-, and a chromo-plastide. But which of these is the primal form? To this the author answers unequivocally, the chloroplastide; and he believes that the others have all been derived therefrom. Reserving some of the other features of this suggestive paper for another notice, it may be said that the terms proposed by Schimper are quite equivalent to those given by Van Tieghem in his Botany, now in course of publication, as *leucites* and *chloroleucites*, and, in part, to his *xantho-leucites;* but, so far as their development is concerned, the latter author follows the accepted view of Gris. G. L. GOODALE.

LETTERS TO THE EDITOR.

Molluscan rock-boring.

IN giving lectures upon building-stones my attention has been often called to the action upon them of boring mollusks, echini, annelids, sponges, etc., when used in submarine constructions.

In Albany Hancock's paper on the above subject (*Ann. mag. nat. hist.*, (2), ii. 225, pl. viii.), are figured numerous siliceous grains, found about the foot and mantel, which he regarded as secreted by the mollusk, and employed in excavating the burrow. While Hancock's conclusions are generally denied, I have not seen any explanation of the observed particles. The forms figured by him, especially in fig. 6, resemble the grains (principally quartz) observed in the microscopic study of mud and other earthy deposits. Such grains would naturally be the result and not the cause of the rock excavation; and it is difficult to see how the animal could be in the position in which it is found, without their presence about it.

Perhaps some zoölogist can state if this explanation has been given before, and whether it be correct or not. M. E. WADSWORTH.

Cambridge, Mass., April 30, 1883.

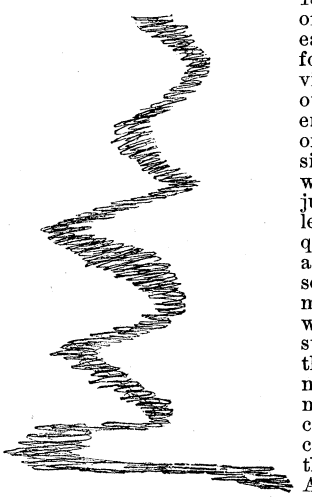
The Lake Superior rocks.

Prof. N. H. Winchell is evidently right in saying, in SCIENCE, No. 12, that, in my letter in No. 5, I misrepresented his position on the unconformity in the St. Croix valley. I had said that he had strenuously denied this unconformity, because my recollection of a conversation on the subject, held with him in 1880, was to that effect. But, on turning to the reference he gives in his First annual report of the geological survey of Minnesota, I see that he had announced such an unconformity as long ago as 1872, which, of course, I should have known before; so that I must have misunderstood him.

As to the other matter, — viz., the relation of the 'St. Croix' or Potsdam sandstone of the Mississippi valley to the 'eastern sandstone' of Lake Superior, — I certainly have understood from his various reports, that he regarded them as distinct. But I am very glad to be set right on these points, though regretting very much having misunderstood Professor Winchell; for it narrows down the question at issue between us very materially. R. D. IRVING.

Track of meteor.

In your first number, Feb. 9, 1883, I saw an account of a meteor witnessed by Capt. Belknap of the U. S. S. Alaska, Dec. 15, 1882, and reference to a similar phenomenon seen at Lake Winnipeg June 29, 1860. On the evening of June 17, 1873, in early twilight, and before any stars were visible, upon coming out of my hotel in Vienna, I found a crowd of persons watching a similar phenomenon, which appeared to be just north of the Kahlenberg. Upon inquiry, I learned that a meteor had been seen to fall a few moments before, but without noise; and a subsequent watch of the daily papers gave no account of any meteorite, which could hardly have escaped observation in this settled section of Austria. It would appear, therefore, that this meteor must have been entirely dissipated in vapor before reaching the earth.



When I first saw the luminous track, I at once supposed it, from appearance and color, to be the flame from a distant zinc-furnace; but it was gradually changed from its straight course to a curved line closely resembling fig. 3 in SCIENCE, No. 1, p. 5, and appeared to be borne to and fro by the gentle currents of air. It extended fully 30° from the horizon, and was distinctly visible for half an hour after my attention was first called to it. From a letter sent by me the next day to a friend in this country, the above facts are taken, in which letter I roughly sketched the appearance of the luminous cloud, after a few minutes from the fall of the meteor, as shown by the accompanying cut. PETER COLLIER.

AUGUSTUS DE MORGAN.

Memoir of Augustus de Morgan; with selections from his letters. By his wife, SOPHIA ELIZABETH DE MORGAN. London, *Longmans, Green, & Co.*, 1882. 10, 422 p., portr. 8°.

IF the degree of interest which attaches to the life of a hard-working mathematician is, from the nature of the case, less than strong; if the biography of De Morgan is in this respect in marked contrast to that of a man whose life is a picture of his time, and who has had himself a distinct effect upon his time, — to the life, say, of Harriet Martineau, which was included within nearly the same years as the life before us, — it is none the less true