

ing important changes even in rocks that show no signs of alteration. This subject will be dwelt upon more in detail in our Section on Metamorphism.

Detritus, or Debris of Ledges.—It is chiefly by the action of frost and gravity, that those extensive accumulations of angular fragments of rocks are made that often form a *talus*, or slope, at the foot of naked ledges, and even high up their faces. In some cases, though not generally, this detritus has reached the top of the ledge, and no further additions are made to the fragments, which usually slope at an angle not far from 40° . Examples of this detritus are usually most striking along the mural faces of ledges, especially where the upper layers are the hardest.

Fig. 73.

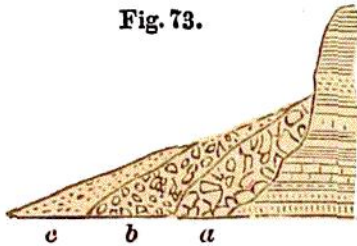


Fig. 73 represents a cliff, at the base of which there is produced a talus of large angular blocks, *a*. These are further acted upon at *b*, and *c*, until the rains or tides remove the finer portions in the form of mud.

These slopes of *debris* show that the earth can not have existed in its present state an immense period of time; because the process of disintegration is not yet complete. Had these agencies been at work upon the earth in its present form from eternity, the earth would have become a vast plain, and the land have been all swallowed up and covered by the ocean.

Dunes or Downs.—The sand which is driven upon the shore by the waves is often carried so far inland as to be beyond the reach of the returning wave; and thus an accumulation takes place, which is the origin of most of those moving sand hills, known by the names of *dunes* or *downs*. When the sand becomes dry, the sea breezes drive it further and further inward, the land breezes not having equal power to force it back; and at length it becomes a formidable enemy, by overwhelming the fertile fields, filling up rivers and burying villages. Sometimes these dunes occur in the interior of a country.

Every one is familiar with the history of these dunes in Egypt. The westerly winds have brought in the sands from the Lybian desert, and all the west side of the Nile, with the exception of a few sheltered spots, has been converted into an arid waste. In Upper Egypt especially, the remains of ancient temples, palaces, cities, and villages, are numerous among the drifting sands. In Europe, around the Bay of Biscay, a similar destructive process is going on. A great number of villages have been entirely destroyed; and no less than ten are now imminently threatened by sand hills, which advance at the