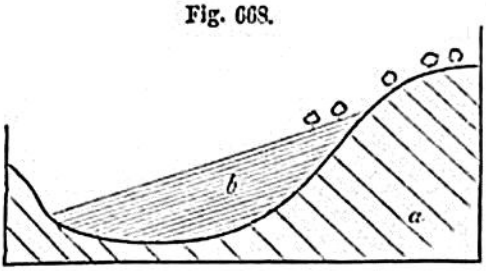
of the ejections composing the cones in these two regions. In the Eifel, the quantity of pieces of sandstone and shale thrown out from the vents is often so immense as far to exceed in volume the scoriæ, pumice, and lava; but I sought in vain in the cones near Olot for a single fragment of any extraneous rock; and Don Francisco Bolos, an eminet botanist of Olot, informed me that he had never been able to detect any. Volcanic sand and ashes are not confined to the cones, but have been sometimes scattered by the wind over the country, and drifted into narrow valleys, as is seen between Olot and Cellent, where the annexed section (fig. 668) is exposed. The light cindery volcanic matter rests in thin regular layers, just as it alighted on the slope formed by the solid conglomerate. No flood could have passed through the valley since the scoriæ fell, or these would have been for the most part removed.

Fig. 668.



a. Secondary conglomerate.
b. Thin seams of volcanic sand and scoriæ.

The currents of lava in Catalonia, like those of Auvergne, the Vivarais, Iceland, and all mountainous countries, are of considerable depth in narrow defiles, but spread out into comparatively thin sheets in places where the valleys widen. If a river has flowed on nearly level ground, as in the great plain near Olot, the water has only excavated a channel of slight depth; but where the declivity is great, the stream has cut a deep section, sometimes by penetrating directly through the central part of a lava-current, but more frequently by passing between the lava and the secondary or tertiary rock which bounds the valley. Thus, in the accompanying section, fig. 669, at the bridge of Cellent, six miles east of Olot, we see the lava on one side of the small stream; while the inclined stratified rocks constitute the channel and opposite bank. The upper part of the lava at that place, as is usual in the currents of Etna and Vesuvius, is scoriaceous; farther down it becomes less porous, and assumes a spheroidal structure; still lower it divides in horizontal plates, each about 2 inches in thickness, and is more compact. Lastly, at the bottom is a mass of prismatic basalt about five feet thick. The vertical columns often rest immediately on the subjacent stratified rocks; but there is sometimes an intervention of sand and scoriæ such as cover the country during volcanic eruptions, and which, unless protected, as here, by superincumbent lava, is washed away from the surface of the land. Sometimes, the bed *d* contains a few pebbles and angular fragments of rock; in other places fine earth, which may have constituted an ancient vegetable soil.

In several localities, beds of sand and ashes are interposed between the lava and subjacent stratified rock, as may be seen if we follow the course of the lava-current which descends from Las Planas towards Amer, and stops two miles short of that town. The river there has often cut through the lava, and through 18 feet of underlying limestone. Occasionally an alluvium, several feet thick, is interposed between the