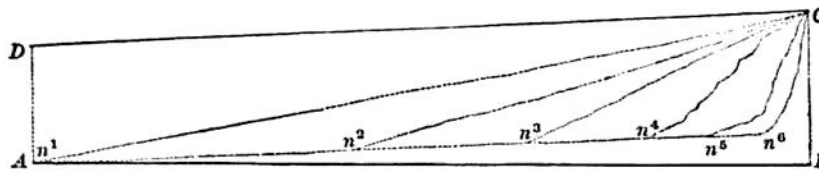


remove the obstructions and reduce the stream throughout, or far toward its source, to a base-level condition.

In New South Wales, Australia, where a friable Triassic sandstone 2000 to 4000 feet thick is the prevailing rock over large regions, the river-portion of some streams is continued from the coast, between nearly vertical walls of the sandstone, almost to the mountains, and there ends abruptly in the cascade portion of the source. The following figure illustrates the steps of progress: first, the cut of a torrent-channel to Cn^1 ; and then the retreat of the *torrent* portion by the continued wear, and the lengthening of a *river*-portion from n^1 to n^2 and so on to n^4 , n^5 , n^6 , when the torrent-portion is reduced to a series of waterfalls. Over the wetter interior portion of the

164.



Ideal section illustrating progressing erosion of a stream. D. '49.

country the valleys have often great breadth, and at the head widen into cirques, owing to the many streams descending the steep sides; but toward the coast, where the climate is relatively dry, the breadth does not much exceed that of the inclosed stream.

A model of a system of erosion is often admirably worked out in the earthy slopes along a roadside, — the little rill having its cascade-head, then its torrent-channel, and, below, its flat alluvial plain, intersected by the little winding water-channel; some of the ridgelets worn away in their upper parts, until two or more little valleys coalesce; then, at times, the head of the coalesced valleys widened into an amphitheater, and the walls fluted into a series of alcoves and buttresses.

The process of raising the bed and flood-grounds of a river is often promoted by the embankments made along the lower part of their course to prevent extensive flooding, and to increase the depth by scouring. On some Japan rivers, the beds, owing to the silting and the consequent making of artificial embankments, are now 40 feet above the plains over which they flow. In all improvements, it has to be remembered that the amount of water discharged by a flooded Mississippi cannot be lessened by choking it. It must and will have room to flow in, however desirable it may be to rob it for storehouses and dwellings.

The flood-grounds of some large rivers extend scores of miles from the low-water channel. On the Mississippi, abreast of Tennessee, they are in some parts over 50 miles wide; on the Amazon (up which the tides go 400 miles), over 100 miles; and on the Paraguay there are lagoons 300 miles in length.

4. *Bends*. — Where the pitch of the stream is very small, any obstruction, or inequality of bottom, that throws the flow of maximum velocity to one side