

(1) **General distribution.** — The material carried down by a river is only to a very small extent gathered by the main stream from its head sources. The upper contributions are nearly all left high up the valley, and only little of the lighter sediment received usually continues far down the main trunk. A river has many contributors along its course, each pouring in coarser or finer sediment from cobble-stones to silt, according to its pitch, velocity, and resources; and what each, in succession, contributes, the trunk stream distributes and deposits about and below the place where received, dropping it near by if it is coarse, carrying it on for awhile if fine. Thus from the successive depositions of the material of the successive tributaries, the trunk stream produces its "fluvial formations." Such a formation may therefore be continuous through the whole length of the river-portion of the stream, but be exceedingly varied in constitution. In addition to all this, the river has often, in its course, steep rocky shallows and deep lake-like portions, if not true lakes; and thereby the waters may have all grades of velocity to the gentlest. These different styles of flow will be continued to some extent through ordinary floods, notwithstanding the generally quickened movement; and this is another source of diversity in the fluvial depositions, since deposition is dependent on rate of flow, and the slow lake-like waters deposit fine material over their flood-grounds as well as along their banks and bottom. No pebbles or stones above a region of sleepy waters could get across to join a pebbly region made below by a tributary; they must be ground up for transportation and then take their chance with other fine sediment.

Depositions are made along broad channels when the flow is not rapid enough throughout the breadth to sweep all the transported material down stream. The chief current (or currents) makes its own deep, often stony, passage-way; but either side the detritus drops because of the slower flow, and raises the bottom more or less, or to the surface, according to the degree of slowness, the eddying currents, and the supply and fineness of detritus. The trend of the shores, pitch of the bottom, and other causes, locate the swifter currents in the channel, and thereby tend to locate the banks or reefs. A stranded log may change the course of the former, and thereby the positions of the latter. The lodging of drift-wood on a sand-bar may serve to increase the accumulation over it, and so change the bar into a wooded island. But high floods rob the bars at the same time that they add to them, or they may sweep them away, even if already an island, to form other bars and islands. They push along the movable detritus of the river's bottom, and also drop more to keep it generally at the old level. Thus all is movement and change along a river's channel, and deposits of all degrees of fineness or coarseness may be of simultaneous origin.

When two rivers unite, one often makes a shoal in the other, by throwing a bar across the channel through the descending detritus of flood-waters. The waters of the upper Mississippi are pushed to the opposite shore by the contributions of a tributary, and a deep, still-water, navigable area is made above the junction, and rapids below it. Further, the tributary, if not in