

whole discharge of water to pass in a shallow stream over the crest of the sand bar ; they undoubtedly occur in this river, but are confined to straight reaches of the stream, where the channel is broad and but poorly defined, and to seasons of high water ; while their action is slow and unimportant compared with the violent wash and scour on the curves or where the current is rapid. When the river cuts into a timbered part of the bottom land the destruction of the bank lets the trees fall into the water ; they usually remain for a short time, seldom as much as a day, at the spot where they fall, forming a temporary protection to the bank and causing local irregularities in the channel ; but they soon become free and float down the stream till caught by some obstruction in the bottom ; here they soon lose their leaves and smaller branches, and unless set free by the rising water or by the loosening of the obstruction which entangles them, they remain fast and form the snags which so greatly impede navigation. Besides the live trees washed into the river, every flood picks up a large quantity of loose timber and rubbish from the sand bars and low portions of the bottom land, the amount of drift which even a moderate flood brings down being very great.

When the width of the bottom land is not more than two or three miles, the usual course of the river is to follow along the base of one of the bluffs till deflected by some obstacle, then to cross the valley to the other bluff, follow that for a short distance, and then return to the former side, thus pursuing a serpentine course, and alternately impinging upon each bluff. The meanderings of the river are then more marked and regular than in other streams ; the vein of strongest current can generally be distinguished by a casual observer, it crosses the stream diagonally in the straight reach between the curves, and is always strongest on the outside of the curves ; the river constantly washes the lower bank as it crosses the bottom land, and thereby impinges on the opposite bluff at a lower point than hitherto, so that unless held by natural projections in the bluffs, or other protection, the pair of reversed curves, resembling a large letter S somewhat flattened, and corresponding to the points where the stream leaves one bluff and where it strikes the other, by cutting away the bottom land and forming fresh sand bars, are continually advancing down the valley. When the bottom land has a greater width than two or three miles, the river is liable to