

areas were determined not mainly by fluvial action, nor by a great submergence, but by the topography of the Continental border as it existed immediately after the Appalachian upturning.

It is plain that some of the areas were marsh regions along the courses of streams and lakes; and two or more may have been estuaries, like the Chesapeake or Delaware Bay, receiving the tides during part or all of their history. But it is also proved by the deposits that the broad streams sometimes were great streams, making conglomerates where the water had great velocity, sandstones in gentler currents, shales in the sluggish waters, and beds of vegetable debris, for a coal-bed, where the conditions were those of a great marsh. As in other fluvial regions, conglomerate-beds, sand-beds, and mud-beds may have been forming simultaneously at the same horizon in different portions of an area. Moreover, under fluvial action, different kinds of deposits in flowing waters would be lengthened out in the direction of the flow, making unlike formations, longitudinal with the stream, of parallel position and history, looking, to one traversing the surface, or studying the exposed beds, like consecutive formations. If a region were slowly subsiding so that the beds could thicken, there would probably be, in a portion having like velocity throughout, four or five rather prominent kinds of deposits, — one made along the bed of the stream; two others along the banks; two others beyond the banks on either side; and each of these would have their local belts. These and other sources of diversity existed in the Triassic areas.

Where were the sources, and what the directions, of the rivers over the higher lands from New York to North Carolina, which supplied so generally granitic sediments instead of quartzose sands and fine clays, are questions not easily answered.

The recently made Appalachian Mountains stood along the western side of the Archæan protaxis, and these Triassic formations on the east side. It would seem to be a necessary consequence that the Appalachians should have sent off streams eastward to the Atlantic and loaded the waters with Appalachian sands and other detritus. But it is proved, by the prevailing granitic character of the material of the sandstones, that little if any of these sediments reached the Triassic troughs, either from the Appalachian Mountains of Virginia and Pennsylvania, or from the plateau region of Pennsylvania and the Catskills — the present sources of the mud, sand, and water of the Delaware, Chesapeake, and other streams; that the Archæan protaxis was so high and continuous as to wholly prevent drainage from the west and northwest; that this range of crystalline rocks and the ridges of more or less crystalline Cambro-Silurian, of the region in the vicinity, supplied the streams with sediments for transportation to the Triassic areas. The drainage from the Appalachian Mountains must have flowed westward or southwestward.

The river or waters of the time flowing southward just west of the site of New York City — where now flows the Hudson — were 25 miles wide, as the breadth of the Triassic of the region shows; and they had sources evidently