

GEOLOGY OF GREAT FALLS, MARYLAND
National Capital Parks-National Park Service
By Dr. Arthur R. Barwick, Guest Leader

The Great Falls of the Potomac River is an outstanding scenic feature of geological interest in the region of the Nation's Capital. It lies in the 'fall-line region' of the Piedmont Plateau which is overlapped to the southeast by the Coastal Plain Province and on the northwest by the rejuvenated remnants of the original Appalachian Mountains which attained peneplanation by the end of the Cretaceous. The present falls have receded in a northwesterly direction, by river erosion, in the highly metamorphosed rocks of the Piedmont from Little Falls, near Chain Bridge, for a distance of about 9 miles. Between Little Falls and Great Falls there are several zones of rapids as at Cabin John and near Turkey Island which is only 3-1/2 miles southeast of Great Falls. This entire area is dangerous for canoeing.

The present river is cut into an erosion-platform about half a mile wide which indicates that the uplift occurred in two successive stages. The valley of the Potomac varies from about 100 feet to 1600 feet wide in this region. The recession of the fall-line has occurred since the latter part of the Pleistocene Ice Age which could involve a time range between 20,000 to 500,000 years. In the absence of precise measurements an estimate of 25,000 years appears to be a reasonable guess for the recession of the inner gorge, considering the factors involved.

The Great Falls of the Potomac descends into its chasm over an escarpment half a mile wide in two cascades whose aggregate height is about 70 feet. The schists and gneisses which constitute the regional rocks are parts of the eroded mountain-bases of the "Oldlands of Appalachia" which were elevated in the early Paleozoic more than 600 million years ago. As a result of successive peneplanations sediments were delivered to the Appalachian Geosyncline to the westward. This area subsequently buckled up by lateral strains within the earth's crust into the original "Paleozoic Alps" some 200,000,000 years ago at the close of the Permian Period. Throughout the entire Mesozoic Era these mountains were cut down by erosion so that, by its close, less than a hundred million years ago, the SCHOOLEY PENEPLAIN was formed. This peneplaned surface was then gently tilted to the southeast from Ohio to the present Atlantic Seaboard. Across it the older rivers, such as the Susquehanna, Potomac and James, meandered southeastward to the Atlantic Ocean. As re-elevation increased progressively to the westward, the present Appalachians were etched out of the older folded Paleozoic sediments - the roots of the Paleozoic Alps - to form the various watergaps such as those at Harrisburg, Pa., and Harpers Ferry, W. Va. The sediments thus transported were deposited on the subsiding coastal portion of the tilted block to form the present unconsolidated Coastal Plain. Here the lowest sedimentary layers are of Cretaceous age, and these are progressively overlapped by the Eocene, Miocene and Pleistocene cappings exposed to the southeast of the Fall-line over a span of over 100,000,000 years.

The schists, gneisses and phyllites now exposed in the Great Falls region originally formed the roots of the older Precambrian uplands of the "Oldlands of Appalachia." That these, in turn, were derived from still older sedimentaries is evident from their structure showing remnants of contorted quartzitic fissure veins and pebbles that have been greatly distorted and partially digested by the terrific dynamic forces to which they had been subjected. These rocks represent some of the oldest sedimentary facies re-exposed on the earth's surface today. In quite recent times the present canyon has been etched into metamorphic blocks of the Piedmont and, along the canyon walls, can be traced a great system of parallel faults that contributed to the areal uplift.

Although the view of the Great Falls of the Potomac River from the Olmsted Island(Md.) side is not quite as spectacular as that from the Virginia side, it has many added attractions. It is approached from the old Great Falls Tavern where a museum is now located. The locks and the earthworks of this later Chesapeake and Ohio Canal have been maintained in a better state of preservation than those on the Virginia side, originally built by George Washington.

A little to the north, across the canal, lies the diversion dam built by the Army Corps of Engineers. This dam stores water, by-passed from the head of the Falls, for the use of the District of Columbia. It is piped to the nearby stone storage-house from which it is diverted, via Conduit Road and MacArthur Boulevard, to the Dalecarlia and Georgetown reservoirs. There it is purified and then transferred across town to the Macmillan Filtration Plant near Howard University.

The stroll from the C & O tow-path to the Falls has great scenic appeal. A foot-bridge across the discharge stream, coming from the diversion dam, connects the mainland to Olmsted Island. The pathway is rocky but picturesque and the rock exposures along it consist of highly metamorphosed schists and gneisses of the Piedmont Plateau region. These rocks contain laminated admixtures of micas, feldspars and quartz, criss-crossed with cracks and badly-mashed quartzitic veins, and occasional pebbles distorted and partly attenuated by extreme pressures. Many pot-holes may be seen along the board-walk pathway. The botanic backdrop is both pleasant to behold and of scientific interest to naturalists. The roar of the falls at high water is audible at a considerable distance away. Do not go outside of the guard rails of the viewing terrace as the drop is sheer and the rocks are jagged. There have been many casualties.

The National Park Service spends much time and effort in developing this scenic area for the enjoyment of local citizens and tourists. Please do not throw stones nor roam in dangerous area. Visitors are asked not to disturb vegetation without permission.

Your guest leader will point out to you many spots of interest during the progress of your visit. At the end of the trip he will return to the Tavern where mementos of the old canal days are exhibited. Nearby rest rooms are available.