

d32 The Appalachian and Ouachita Mountains < Davis >

The Appalachian and Ouachita (pronounced: *wóshi tàw*) landscapes have a topographic relief that is a small fraction of the amplitude of the folds and faults in their rocks. Remarkable of the scenery is an accordance of summits and ridge crests and a discordance of drainage with structure. Pioneer geomorphologist **William Morris Davis** (1850-1934) was the first to explain how such could arise.¹



Davis saw that the Appalachian and Ouachita landscapes allow the mind's eye to see the accordant summits and ridge crests as remnants of a plain at their elevation. This plain, as it truncates the strongly folded sediments of greatly different resistances to erosion, he proposed was the result of prolonged beveling-erosion. In his conceived cycle of landscape evolution, scenic "old age" is a peneplain (literally: *almost a plain*) graded to sealevel. Scenic "youth" is a raised peneplain before it has been much dissected by erosion. Scenic "middle age" is when the landscape is mostly of hillslopes.

The summit-elevation peneplain in the Appalachians and Ouachitas, Davis named the Schooley peneplain and, by virtue of its horizontal truncation of underling rocks of different erosional competence, it is the type peneplain recognized by him. Uplift of this peneplain by broad epeirogenic uparching increased the gradients of the perennial streams of the Appalachians and Ouachitas. Down cutting and headward erosion by these "rejuvenated" insequent rivers and by the subsequent tributaries to them, has brought into being the present "middle age" scenery characterized by ridges of resistant sandstone, quartzite and greenstone, and valleys of mechanically-weak shales and slates and chemically easily-dissolved limestones and marbles.² The erosionally etched grain of the Appalachian mountains trends northeast. The erosionally etched grain of the Ouachita mountains trends east-west. To account for the degree of dissection, most of the mountain elevation had been gained early in the Pliocene. To account for details of the dissection Davis came to reason that these regions were raised episodically during the Neogene. Before, the Schooley peneplain for the duration of the Paleogene had not accumulated sediments. Erosion had then worked to grade a nearly level plain (peneplain) upon which rivers meandered in their courses independent of the underling geology.

Note: Scenery that Davis classified as "old age" in its erosion cycle are also the buried major angular unconformities in the rock record.

Physiographic sub-provinces of the Appalachians

Note: Bedrock geology distinguishes the Piedmont, Triassic Lowland, Reading Prong upland, Great Valley, Valley and Ridge belt, and the Allegheny plateau physiographic sub-provinces.

In the Valley and Ridge sub-province of the Appalachians, antecedent rivers, as the Delaware, Susquehanna, and Potomac, cut down as fast as the Schooley peneplain was raised and today pass through mountain ridges (the tops of which records the Schooley peneplain) in water gaps (where the Appalachian Trail must descend from ridge crests to cross at river level) and between which subsequent streams carve trellised drainage patterns. The mature Appalachian landscape contains a secondary erosion surface called the *Harrisburg peneplain* that can be reconstructed from accordant summits of hill tops in its wide shale-and-limestone floored Great Valley. Floodplains of major rivers incised below the Harrisburg peneplain, are called collectively the *Somerville peneplain*. Rapids on the courses of some of these rivers could be traveling nick points indicative of a forth (most recent and so lowest in elevation) cycle of erosion. These features are well described in the now classic textbook *Geomorphology*, 1939, by Armin Kohl Lobeck (1886-1958).³ □