g17 Laramide and Sevier orogenies

< cratonal uplifts, thin-skinned thrust tectonics >

> ... mountains were thought of ... as punishments dealt to Earth by a Creator disappointed at the misbehavior of its inhabitants. This "catastrophist" view affected ... 18th and early 19th centuries, well-born ladies making the Grand Tour in Europe would pull down their window shades to avoid viewing the Alps. —Donald Kennedy.[1]

The fold-thrust belt of the northern Rocky Mountains is a back-arc east of the Cascade volcanic-mountains and sediment-filled trench of the eastward subducting Juan da Fuca oceanic plate. The central Rocky Mountains is earthquake-active. Its scenery is of a maturely dissected broad-uparch that in erosional section and by exhumation exposes features of the once Laramide mountain chain. The Wyoming Basin and southern Rocky Mountains is a region of reactivated Laramide cratonal uplifts. To the west of the southern Rocky Mountains and Colorado Plateau is the Basin and Range physiographic province. Its graben and horst scenery results from ongoing extension that has doubled the width of the region since the middle Cenozoic. Created are large displacements on listric faults that at their surfacing ends are imbricate normal faulted. This mimics in reverse the geometry produced by a former compressive orogeny called the *Sevier*.[2]

Laramide orogeny (Paleocene climax, near the end of the Cretaceous inception.)

Laramide refers to ore-producing intrusions (as Boulder batholith, Montana), eastward-shed foreland-basin sediments as the E-K boundary containing undeformed Arapahoe Conglomerate fm and the folded Cretaceous Mesa Verde fm, Colorado.[3] These strata are disconformable on Late Cretaceous Interior Seaway Laramic fm that is nonconformable on a Precambrian basement complex Laramide folds and faults resulted from block faulting and thrust faulting of this underlying craton.

Sevier orogeny (Late Cretaceous climax)

The Late Cretaceous orogeny is named the Sevier orogeny. Its expression was compressional. In its operation, it transmitted eastward directed thrusts that sheared continental shelf and slope strata from the underlying Precambrian basement complex (craton) and, at the same time, shortened these strata by numerous thrust (low-angle-reverse) faults (through Nevada and Utah, the shortening measures 100 km). Also, these "dêcollement" (thrust sheets) terminate in anticlinal fold crumplings. Associated volcanism indicates the Sevier orogeny was the result of subduction of the Farallon plate beneath the continent. In Nevada and Idaho, the volcanic and plutonic activity dates Early Cenozoic and Late Cretaceous. In the plate-tectonics interpretation, the subducting Farallon plate traveled far east beneath the continent before reaching its melting depth. In the same interpretation, low-angle subduction had progressively substituted for high-angle subduction as, from the beginning of the Late Cretaceous, related volcanism migrated eastward.

Columbian orogeny (Late Cretaceous climax)

The Sevier orogeny in the northern Rockies and Canadian Cordillera (where it is called the *Columbian* orogeny) is recorded by extensive, eastward-traveled, dêcollement that terminate in thrust faults and folds. The Lewis Overthrust with over 80 km eastward displacement in Waterton, British Columbia and Glacier Park, Montana, initiated 170 million years ago, pushed a slab, several kilometers thick and several hundred kilometers wide, of 1,600 million years old Proterozoic rocks over Cretaceous age sediments that had been accumulating east of its advancing front. Chief Mountain is an erosionally isolated remnant (klippen) of the eastern edge of this overthrust. The explanation for the Sevier-Columbian orogeny, when also the Franciscan fm developed in California, is the collision of terranes (variously of oceanic materials, oceanic arcs, ocean plateaus, seamounts, and continental fragments) with the west coast of the North American continent. ❑