of Mesozoic rocks. Feldspathic-quartzose sediments were transported from the east by river systems draining granitic terrains perhaps as far away as the Idaho Batholith. Local volcanism within the drainage system, along the coastal plain, and on volcanic islands to the west, added variable amounts of volcanic rock fragments to the feldspathic-quartzose sediments.

Chronostratigraphic correlations suggest that the arkosic sandstones were deposited along the margins of the depositional system during the early Eocene, prograded westward during the middle Eocene, and then regressed during the latest Eocene and Oligocene simultaneously with the influx of abundant pyroclastic debris. The pyroclastic material was derived from ancestral Cascade Mountain Range volcanism. Onset of Cascade volcanism, and volcanic-lithic grain dilution of the feldspathic-quartzose sandstones, began in the south during the early middle Eocene and extended northward reaching Washington in the early late Eocene.

The Eocene tectonic history of western Oregon and Washington provides a framework for understanding the occurrence of the feldspathic-quartzose rocks in a dominantly "graywacke" fore-arc provinence.

During the early Eocene, a northwest-southeast seamount chain was extruded on the Farallon and Kula plates west of an eastward-dipping subduction zone. Subduction of the oceanic plates moved the seamount chain obliquely toward the subduction zone.

In middle Eocene time—49 to 40 m.y.b.p.—the seamount chain reached the subduction zone creating instability in the subduction system and resulting in the westward jump of the underthrust boundary between the Farallon-Kula and North American plates. The westward jump of the underthrust boundary resulted in both the accretion of the seamount chain as part of a newly formed fore-arc accretionary prism, and a decrease in magnetic arc volcanism. The relative decrease in arc volcanism occurred during the interval after the consumption of the detached eastern subduction plate and the onset of magma generation from the newly formed western subduction zone.

Coincident with and continuing after the subduction zone jump and seamount accretion, eastwardly derived arkosic sediments prograded across Oregon and Washington spilling into the new fore-arc basin and enveloping the seamounts. Basaltic intrusion within the fore-arc basin occurred along tensional fault systems within the accretionary prism.

As the western subduction zone developed, a new, more western magmatic arc formed along the axis of the modern Cascade Mountains. Beginning in the late Eocene, the fore-arc basin subsided and the sea transgressed eastward depositing fine-grained arc-derived tuffaceous sediment over the entire basin.

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K/Ar Dating of Illitic Clays in Jurassic Nugget Sandstone and Timing of Petroleum Migration in Wyoming Overthrust Belt

Authigenic illite is a prominent pore-fill in the Nugget Sandstone, the main reservoir rock of most fields in the southwest Wyoming Overthrust belt. Illite, a good K/Ar clock, was dated from several well samples, all from the Absaroka thrust sheet. This includes a producing well in the Clear Creek field where seven samples traverse the gas, oil, and water zones. The ages of the Clear Creek suite are virtually concordant at 110 ± 2 m.y. Assuming hydrocarbon emplacement would have arrested authigenesis in the oil and gas zones, the similarity of ages from the hydrocarbon zones with the water zone indicates hydrocarbon emplacement was post 110 m.y. ago (middle Cretaceous). Ages obtained from the other Absaroka sheet Nugget samples fall in the narrow range of 102 to 120 m.y.b.p. This indicates illite authigenesis was a relatively short-lived "event" for the Nugget in the Absaroka sheet.

The Wyoming-Idaho-Utah overthrust belt involves several thrust sheets each of which was emplaced over its foreland sequentially from west to east over a time spanning tens of millions of years. We attribute the mid-Cretaceous illite growth in the Absaroka sheet to burial conditions established when that part of the Nugget was thrust upon by the Crawford sheet. The burial was accomplished both tectonically and by synorogenically derived sediment. If true, our illite dates imply a somewhat older age for the Crawford sheet than previously interpreted. We attribute the post-illite hydrocarbon emplacement in the Absaroka Nugget as a result of thrusting of the Absaroka sheet on top of its foreland containing middle Cretaceous petroleum source-bed shales. These beds were thermally matured when buried by the emplacement of the Absaroka sheet and its derived sediment in the Late Cretaceous.

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Yellow Cat Revisited: A Review of Helen Cannon's Selenium Indicator Plants

In the late 1940s, Helen Cannon of the USGS conducted her famous studies on the association of plants to selenium. She used this association for detection of sedimentary uranium deposits on the Colorado plateau. Cannon demonstrated that locoweeds (*Astragalus*) from the Yellow Cat area of the Thompson district in eastern Utah did reflect the presence of selenium-rich uranium deposits by their colonization of the soils over the deposits.

During the subsequent 30 years, Cannon's work has repeatedly been cited as a classic example of the use of indicator geobotany in mineral exploration. During the same 30-year period, geobotanical techniques have not found wide utilization as an exploration tool. Further, Cannon's work has not been demonstrated elsewhere to any extent.

In 1980, the author returned to Yellow Cat to see what changes, if any, may have transpired at the site. We also wanted to gather insight into why geobotanical methods have not gained wider acceptance and perhaps determine why subsequent work is so rare.

Results of this study support Cannon's basic work. The results also suggest that the methods are ecologically sound and have applicability to modern mineral exploration programs. Limitations to the method are also discussed, along with some speculation as to why geobotanical methods have not seen wider application.

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Depositional Environments of the Mississippian Chappel Bioherms, Hardeman County, Texas

Numerous crinoid-fenestrate bryozoan banks are developed within the Mississippian Chappel Formation, located in the Hardeman basin, Hardeman and Wilbarger Counties, Texas. The banks are oval in shape and range in size from 2 to 12 mi (3 to 19 km) in diameter. Stratigraphic, hydrocarbon entrapment in the banks has resulted in cumulative production exceeding 6 million bbl of oil plus 13 bcf of gas.

The Chappel Formation is a shallow-water limestone, over-