

## Geological evolution and metallogeny of western North America

*Richard Goldfarb, China University of Geosciences Beijing, Boulder, USA[vs United States?]*

Laurentia, the cratonic core of ancestral North America, was part of the Proterozoic Rodinian supercontinent. Rifting within the supercontinent created a passive western North American continental margin by 650 Ma. Pre-existing Proterozoic ores within western Laurentia included the hematitic Wernicke breccias, Sullivan Ag-Pb-Zn clastic-dominated (CD) ores, Homestake orogenic gold, and Jerome VMS bodies; similar deposits of similar age exist in correlative rocks in the core of the Australian continent. Isolated anoxic extensional basins developed diachronously along the northern rifted margin throughout the Paleozoic. Associated replacement of sub-seafloor strata by large-scale brine migration formed giant Ag-Pb-Zn CD deposits in the Selwyn basin, Kechika trough, and Red Dog basin. Simultaneously, and particularly in Late Devonian-early Carboniferous, polymetallic VMS deposits formed in rifting basins west of the North American margin; these were accreted to the margin in Early Triassic from northern California (Shasta) to central Alaska (Bonnifield). Subduction below the Stikine and Quesnellia terranes, as they were accreting to the continental margin, included development of widespread calc-alkaline Cu-Mo and alkalic Cu-Au porphyry belts at ca. 210-180 Ma in British Columbia (Highland Valley, Kemess, Mt. Milligan, KSM). Also, in Late Triassic and distal to North America, VMS deposits (Greens Creek, Windy Craggy) formed in the Wrangellia oceanic arc, which docked with the northern Cordillera margin in mid-Cretaceous; syn-accretionary tectonism formed the Kennecott copper deposits. The shift from Wrangellia subduction to dextral transpression along the edge of the continent included emplacement of a 1,000 km-long belt of mid-Cretaceous Cu±Au±Mo porphyries on the seaward margin of the closing flysch basin (Pebble). Metamorphism of the accreted oceanic sedimentary rocks was associated with orogenic gold formation between 180 and 50 Ma in many of the allochthonous Cordilleran terranes. From north to south, major districts included Fairbanks (90 Ma), Willow Creek (60 Ma), Juneau (55 Ma), Bridge River (65 Ma), Grass Valley (160 Ma), and Mother Lode (125 Ma). World-class placer districts are associated with numerous small orogenic gold deposits in the Nome (110 Ma) and Klondike (160 Ma) districts. Further inboard of the Cordilleran terranes, Laramide subduction was associated with Cretaceous silver-rich veins in Coeur d'Alene and isolated porphyry ores (Resolution, Butte), and mid-Tertiary magmatism led to development of the giant Bingham Cu±Au-Mo porphyry and the unique Carlin gold deposits. Gold- and silver-rich epithermal ores in the Basin and Range (Round Mountain, Tonopah, Comstock) formed during late Tertiary transtensional faulting and Basin and Range extension.

Richard J. Goldfarb