Logan Club Robinson Lecture Series

The great Triassic-Jurassic Cu-Au-Mo porphyries of the central Canadian Cordillera: Why there? Why then?

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The Canadian Cordillera has developed as an orogenic belt over 700 million years, beginning with a Neoproterozoic-Early Cambrian intracontinental rift that created the western margin of Laurentia. Its history as an active tectonic region continues today, though interactions with the Pacific Plate: earthquakes along the Queen Charlotte and Denali transform faults, and collision of the Yakutat block that is lofting the St. Elias Mountains and creating a zone of tectonic instability that extends over 1000 kilometres inland to the eastern front of the MacKenzie Mountains. Construction of the Cordilleran orogen was preceded by evolution and interaction of offshore and exotic terranes, which eventually accreted to the western Laurentian (North American) cratonal margin, primarily in Middle Jurassic to Cretaceous time. During a relatively short time interval prior to accretion (220-178 Ma), world-class belts of porphyry and related gold deposits – famous names like Highland Valley, Mt. Milligan, Afton, Copper Mountain, Red Chris and KSM-Brucejack – emerged in two of the offshore terranes, Quesnellia and Stikinia. This presentation attempts to explain how, in the larger context of Cordilleran evolution, Quesnellia and Stikinia became perfect porphyry hosts, and why Cu-Au-Mo porphyries flourished in the two separate terranes during the same brief period of time. To grasp the long-term processes that primed and prepared the lithosphere of these two multistage island arc terranes, and the profound tectono-magmatic events that triggered porphyry emplacement in them, is to understand that their full metallogenetic potential has yet to be realized. Major deposit discoveries in the last decade (Red Chris, KSM-Brucejack, Tatogga, Deep Afton) illustrate this optimistic view: that like the history of the Cordillera itself, the saga of exploration within it is set to continue into unknown future time.

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