uppermost part of a sericite-bearing base- and precious-metal system (Beaty *et al.*, 1986). Buckskin-National and Bodie appear to be transitional from hot-spring to adularia-sericite environments (Vikre, 1985, 1986; Hedenquist, 1986; Silberman and Berger, 1985).

Recent significant publications on epithermal, volcanic-related, gold deposits include papers in Tooker (1985); Berger and Bethke (1985); Tingley and Bonham (1986); Henley, Hedenquist and Roberts (1986), and Johnson (1987).

PRECIOUS METAL BEARING HYDROTHERMAL SYSTEMS IN VOLCANIC CENTERS; MODELS FROM THE CANADIAN CORDILLERA

ANDREJS PANTELEYEV

British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Survey Branch, Parliament Building, Victoria, British Columbia, Canada V8V 1X4.

Gold has been mined in the Canadian Cordillera (British Columbia and Yukon) since 1852. Production in 1986 was 12,752 kg (396,630 ounces), approximately 12 percent of total Canadian gold output. In recent years, traditional exploration methods (Table 1) as well as new exploration methods based on conceptual geologic models have met with success.

TABLE 1. EXPLORATION TECHNIQUES UTILIZED IN THE SEARCH FOR PRECIOUS MOETALS IN THE CANADIAN CORDILLERA

1.	GEOLOGY	- Site selection - Regional, local
2.	EXPLORATION	
	a. Basic prospecting	- Especially along structural breaks
	b. Air photography	- Especially for structure and alteration zones utilizing: Black and white mosaics Colour Satelite imagery (*e.g.* Landsat)
	c. Geochemistry	- Mainly Au and Ag, other metals locally - Silts (conventional and heavy media separation) - Soils -including frost heaved talus (using a grid sampling) - Soil gas (unsuccessful due to climate) - On site Hg analyses
	d. Geophysics	- EM with resistivity attachment (e.g. line spacing 25 m with 12.5 m stations) - IP with 800 m reconnaissance type spacing - Multipole works well for large, low-grade targets - VLF mainly inconclusive, locally useful - Magnetometer for alteration zoning and skarn asociations
	e. Trenching	- Handblasting generally ineffective - Backhoe very effective to 5 m
	f. Drilling	- Diamond drilling with large diameter core and good recovery provides maximum geologic and economic data. Percussion/reserve circulation ore cost effective
	g. Underground	- Ore reserve definition and bulk sampling for metallurgical testing
3.	GEOLOGY	- Interpretation, Summary Reports
(4).	ENGINEERING / FEASIBILITY	

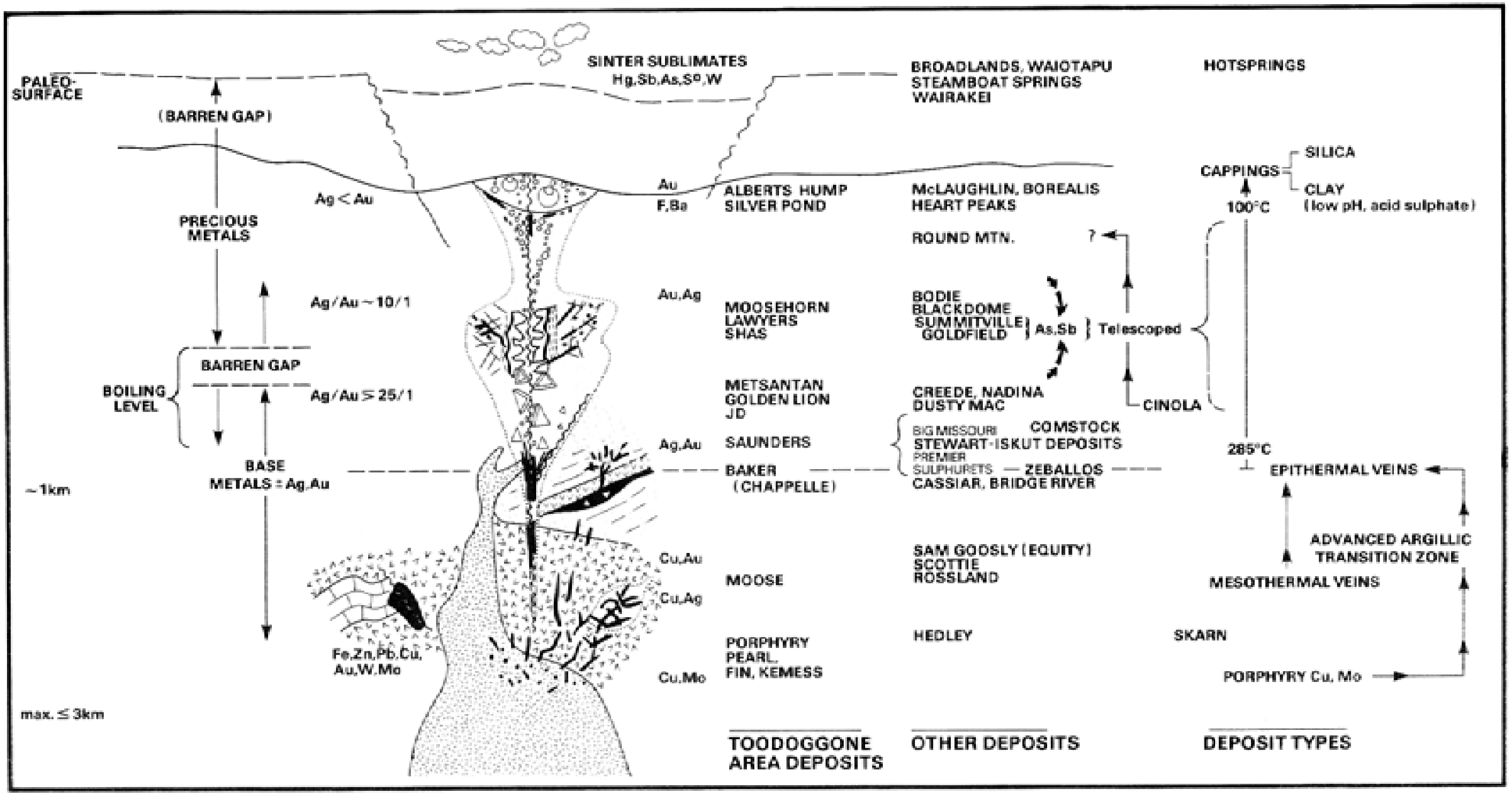

FIG. 1. British Columbia epithermal model. (Modified from Panteleyev and Schroeter, 1985.)

The western, eugeoclinal part of the Canadian Cordillera is a collage of allochthonous, predominantly island-arc and oceanic terranes, accreted to the North American miogeocline and craton along a convergent or transform plate margin. A variety of environments for precious metal mineralization are present in the various volcanic and related plutonic arcs and their overlapping continental volcanic rocks. The deep dissection and erosion of the region, with maximum relief of over 6,000 m, requires consideration of depth zoning models (Fig. 1). These describe the various mineralizing environments from surface hot springs to epizonal, transitional, and mesozonal sites. Future regional exploration will increasingly rely on the application of depth-zoning geologic models.

The primary focus for recent exploration in the Canadian Cordilleras has been on epithermal precious-metal deposits, mainly small, high-grade veins or breccia-related deposits in subaerial volcanic rocks and regions with subvolcanic plutons. A few deposits are large, low-grade occurrences in volcanic or sedimentary rocks that are amenable to open-pit mining. Most of the epithermal deposits resemble the "Tertiary-type" or bonanza-vein deposits of volcanic or fossil hot-spring association in the southwestern United States. A notable difference is that many deposits in the Canadian Cordillera are not Tertiary in age, some of the major deposits such as those in the newly discovered Toodogonne area and the historic Stewart mining camp are of Mesozoic age. Host rocks for these deposits are calc-alkaline to alkaline andesitic volcanic rocks in back-arc or accreted island-arc terranes. Other precious-metal deposits in the volcanic and plutonic arcs of the Canadian Cordilleras are epizonal porphyry-related breccias and quartz-carbonate replacement (manto) and detachment-type deposits. Deeper settings, transitional between epizonal and mesozonal, have gold and silver vein and replacement deposits and gold-bearing skarn and propylite deposits.

TECTONIC AND MAGMATIC EVOLUTION OF THE SOUTHERN CHILEAN CENTRAL ANDES

JOHN DAVIDSON Servicio Nacional de Geología y Minería, Avda. Santa María 0104, Casilla 10465, Santiago, Chile.

Over most of its length, the Central Andean region consists of a magmatic arc built over a Paleozoic and Precambrian basement. This arc was flanked to the west by a trench and to the east by a thrust-faulted and folded foreland basin. The Andes are primarily a longitudinal chain of mountains formed at a subduction system that has been active at least since Paleozoic time. However, their complex history is the result of changes in the dynamics of lithospheric plates throughout Phanerozoic time. In the southern Central Andes, variations in the development of hydrothermal systems and ore deposits correlate with changes in tectonic settings and associated igneous activity along the western margin of the South American plate (Fig. 1). Successive scenarios for this convergent margin include compressional tectonics and associated arc igneous activity, and transitional basaltic or bimodal basalt-rhyolite igneous activity, associated with intra- and back-arc extensional tectonics.

The Late Paleozoic Andes correspond to a 4,000 km long magmatic arc bounded oceanwards by an accretionary prism and towards the Gondwana continent by sedimentary foreland basins (Coira *et al.*, 1982; Forsythe, 1982). The magmatic arc was built over a collage of autochthonous and allochthonous terranes, the latter accreted to the South American magin from Late Ordovician to Triassic time. The accretionary prism that developed south of Taltal (25°S) (Bell, 1982) includes basins and subducted complexes (Davidson *et al.*, 1987) associated with paired metamorphic belts (Hervé, 1977, Hervé *et al.*,1984), fragments of ocean floor, and deep sea turbidites. Calc-alkaline, mantle-derived igneous rocks that are well exposed in the Andes north of 31°S consist of "I" and "S" type granitoids and related comagmatic volcanic rocks (Mpo-