this concern, exhibit a δS^{34} spread between +5.6 and +0.2 permil which strongly suggests a magmatic hydrothermal origin of the sulfur. The dovetailing of these relationships suggests that detrital sulfides in the banket were transported from a magmatic igneous highland without oxidation because of a reducing atmosphere (2,300 m.y.). Gold, of course, and even uranium minerals, both present in the banket, could have the same origin with the reducing atmosphere needed for the latter.

O'okiep Copper provided 34 sulfides from four mines that exhibit δS^{34} values between +3.6 and −1.1 permil, again suggestive of sulfur of magmatic hydrothermal origin. Mobilization of syngenetic sulfur from the juxtaposed rocks during metamorphism might have provided the sulfur and metals and homegenized the variable biogenic (?) δS^{34} values, but if so, it would be fortuitous to result in the near-zero permil average.

δS^{34} analyses on 550 sulfides collected by Dr. Dechow from Central African deposits are not indicative of a magmatic hydrothermal origin for the Copperbelt. The δS^{34} spread is 11.2 permil for Roan Antelope, 16.0 permil for Roan Extension, 21.4 permil for Mufulira, but only 1.4 permil for the "A" ore body. Sulfides in gabbros vary from +1.0 to +15.7 permil, and in Gray's Quarry, granite varies from +3.0 to +13.0 permil. Presumably, biogenic sulfur exists in the stratabound deposits, but metamorphism may have influenced the amount and δS^{34} values of Copperbelt sulfur.

A GEOCHEMICAL STUDY OF SOIL PROFILES FROM THE BATHURST N.B. AREA [1]

E. W. PRESANT,* W. M. TUPPER, AND R. W. BOYLE

Ontario Agricultural College, Guelph, Ontario, Canada; Carleton University, Ottawa, Ontario, Canada; Geological Survey of Canada, Ottawa, Canada

ABSTRACT

This study was undertaken to determine the amounts, vertical distribution, and nature of iron, manganese, lead, copper, zinc, arsenic, antimony, silver, tin, and cadmium in Podzol soil profiles from the Bathurst region of northeastern New Brunswick. About one quarter of the profiles examined were from soils overlying sulfide deposits in the area.

Total amounts of these elements were determined in the soil horizons of the profiles. Ph, organic carbon, cation exchange capacity, and free iron were also determined for the horizons of some profiles. Statistical correlation studies showed the relationship of the elements to pH and total iron in the different soil horizons.

Amounts and distribution of trace elements in profiles overlying sulfide deposits differed from the other profiles and appeared to be strongly influenced by the underlying deposits. In the profiles not overlying sulfide deposits, podzolization processes strongly influenced the vertical distribution and amounts of trace elements in the soil profiles. Lead and silver were associated with high organic accumulation in the surface horizons; intense leaching in the A_2 horizons effectively removed all elements except tin and antimony; increase of free iron in the B horizon was accompanied by increased amounts of associated arsenic and lead; the relative lack of weathering in the C horizons was indicated by higher values for some of the more mobile elements such as zinc, copper, and manganese.

[1] Contribution from Department of Geology, Carleton University, Ottawa, Ontario, Canada.