

Metallogeny of Gold in the Precambrian of Northern Europe

KRISTER SUNDBLAD[†]

Department of Geology, FIN-20014 Turku University, Finland

Abstract

Fennoscandian gold deposits have been successfully explored in a wide range of Precambrian geological environments in Sweden and Finland during the last two decades. Under-explored areas still exist at other sites in the Fennoscandian Shield, particularly in Russia and Norway, and there is a high potential for future new discoveries of economic gold in northern Europe. Careful geological documentation of a number of previously productive gold deposits, such as Haveri and Saattopora (Finland), Boliden, Adelfors, and Enåsen (Sweden), and Eidsvoll and Bidjovagge (Norway), is now available in the literature. Kutemajärvi, Pahtavaara, and Surikuusikko (Finland), and Björkdal, Åkerberg, Hamäs, and Pahtohavare (Sweden) represent a new generation of gold mines, and recent research on these enables an improved base for formulating regional and local metallogenic models. Younging trends from northeast to southwest characterize both the crust- and ore-forming regional patterns in the Fennoscandian Shield. Orogenic (or mesothermal) gold deposits are found in a wide range of host rocks and are closely linked to either the Paleoproterozoic Svecokarelian or the Neoproterozoic Sveconorwegian orogeny. Unlike these shear zone-related deposits, significant amounts of gold were concentrated in volcanogenic massive sulfide (VMS) deposits by magmatic-hydrothermal processes in conjunction with formation of Paleoproterozoic Svecofennian juvenile crust. Hundreds of gold deposits of a variety of ages and genetic styles are, therefore, now known in the Precambrian of northern Europe, of which some are economic, others subeconomic, and still others only of scientific interest. One hundred representative deposits in Sweden, Norway, Finland, and Russia are discussed in this review. Literature references are provided for each of them, and detailed maps show the location of each deposit or prospect. Listed data on tonnage and grades for the most recent exploration targets, as well as the economically and historically most significant deposits, show that they were formed during the entire Precambrian. Yield of gold in the Fennoscandian Shield is, so far, confined to Proterozoic deposits, but the potential to find economically viable gold deposits in the Russian parts of the Archean greenstone belts should not be underestimated.

[†] E-mail, Krister.Sundblad@utu.fi