# Geochemical and synchrotron study of Barberton Greenstone Belt cherts (3.5-3.2 By), South Africa

M. LEDEVIN[1]*, A. SIMIONOVICI[1], N. ARNDT[1] AND F. WESTALL[2]

[1]ISTerre, BP53, 38041, Grenoble Cedex 9, France (*correspondence: morgane.ledevin@ujf-grenoble.fr)
[2]Centre de Biophysique Molléculaire, CNRS, rue Charles Sadron, 45071, Cedex 2, Orléans, France

To understand the formation of Archean cherts and the information they provide about conditions at the sea floor, we studied samples from four sites in the Barberton Greenstone Belt (3.5-3.2 By), South Africa. We identified cherts with three different origins: direct precipitation from seawater, precipitation in fractures from silica-rich hydrothermal fluids, and replacement of preexisting rocks at or near the surface.

Petrological criteria allow us to define specific chemical markers: rocks preserving sedimentary structures (e.g. laminations) have trace element patterns with high HREE and low LILE contents, and a strong negative Sr anomaly. In comparison, cherts precipitated in fractures have lower HREE and higher LILE contents, with a strong positive Ba anomaly. In one sample, the laminated portion has the chemical characteristics of the first type and a white fracture-filling chert has the features of the second type.

Another part of our study focused on petrology and rheology of Barberton cherts: both macro- and micro-structural observations are used to understand early physical behavior of chert, silica precipitation, and silicification processes. Field observations revealed complex rheological behavior, from ductile to brittle deformation, sometimes both in the same chert layer, with extremely fast diagenetic and induration processes, and some evidence of an early colloidal silica phase. Close correlation between micro-scale element repartition and microstructure by high-resolution analyses (RAMAN, X-Ray microfluorescence, cathodoluminescence, synchrotron) are currently underway.

In parallel, a petrological-geochemical study on siliceous chemical precipitates in modern volcanic lakes is being undertaken. The geochemical signatures of both Archean and modern cherts will then be used to infer physico-chemical conditions at the Archean sea floor and fractionation processes during silica transfer from fluids to rocks.

# Determining the geographical origin of ginseng using strontium isotopes, multielements, and metabolite analysis

A.R. LEE[1], G. MUKESH[1], W.J. SHIN[1], M.S. CHOI[2], Y.S. BONG[1] AND K.S. LEE[1]*

[1]Korea Basic Science Institute, Ochang Center, Chungbuk 363-883, Korea (*correspondence: kslee@kbsi.re.kr)
[2]Chungnam National Univ. Daejeon 305-764, Korea (mschoi@cnu.ac.kr)

Asian ginseng (*Panax ginseng* C.A. Meyer) is widely used as an Oriental medicine in East Asian regions, particularly Korea and China. To develop a method to distinguish ginsengs cultivated in Korea with those cultivated in China, we analyzed multielements, strontium isotope ratios ($^{87}Sr/^{86}Sr$), and metabolite profiles in 35 ginseng samples collected from Korea and China. A multivariate statistical approach was performed to analyze the multiple elements and the $^{1}H$ nuclear magnetic resonance (NMR) data. Discriminating between the ginsengs from the two countries was generally successful when both the $^{87}Sr/^{86}Sr$ ratios and rare earth element contents were used together. Moreover, principal components analysis derived from the $^{1}H$ NMR data revealed a significant separation between the ginsengs originating from the two countries. The major metabolites responsible for differentiation were sugars such as glucose, xylose, and sucrose. The results suggest that this multi-platform approach offers a comprehensive method to distinguish the origin of ginsengs.

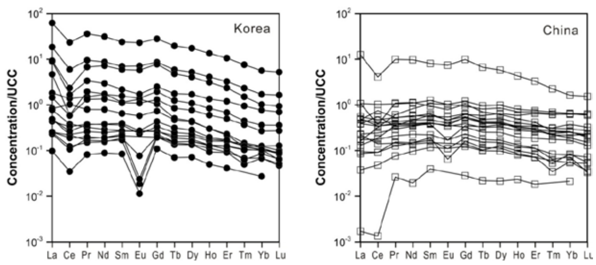


**Figure 1:** Upper continental crust (UCC)-normalized rare earth element (REE) patterns for the Korean (a) and Chinese (b) ginsengs.