

Microbioliths Of Platinum Group Elements (Pge) In Plants

ALEXANDER KOVALEVSKII¹ OLESYA KOVALEVSKAYA¹
AND SERGEI PROKOPCHUK²

¹ Geological Institute Siberian Branch of Russian
Academy of Sciences, Ulan-Ude, Russia.
koval@gin.bsc.buryatia.ru

² Institute of Geochemistry named after A.P. Vinogradov,
Siberian Branch of Russian Academy of Sciences, Irkutsk,
Russia. psi@igc.irk.ru

We consider the formation of bioliths and microbioliths in certain tissues of plants and living organisms to be one of usual physiological mechanisms of the system of nonbarrier-barrier accumulation of chemical elements by them at high, redundant concentrations in environment. The result of activity of these mechanisms is transformation of redundant quantity of physiologically active ionic and colloid forms of chemical elements into physiologically non-active forms of the solid phase providing vital-activity of organisms at redundant concentrations of elements in environment.

For the first time the data about “small” mineral particles of micron and submicron sizes – possible microbioliths of all six of platinum group elements (PGE): Pt, Pd, Ir, Ph, Os, Ru in plants ash are given. They are revealed and studied with the help of original scintillation emission spectral analysis (SESA), which allows to determine the quantity and sizes of particles of the analyzed chemical elements in the studied powdery samples. The microbioliths of the studied PGE are characteristic for the “old” parts of arboreal plants – bark of trunks, twigs, roots and also for the wood of old including pine rotten stumps (*Pinus silvestris* L.), larch (*Larix dahurica* Turcz.) and birch (*Betula platyphylla* Sukacz.).

The greatest number of particles of PGE is found in external suberous bark layers, i.e. in trees trunks bark (pine, larch and birch). These bioobjects are nonbarrier, quantitatively-informative in relation with their gross and mineral forms at high concentrations on the nutrition horizon of the studied plants species.

The maximal size of rather rare single mineral particles (microbioliths) of PGE in plants ash according to determinations of standard SESA reach 20-30 mkm and they can be determined by mineralogical methods. Presence or absence of such and, probably, more “large” particles in the analyzed samples explains the observed sometimes non-reproduction of repeated emission chemico-spectral and instrumental neutron-activation analyses of the plants ash samples with the weight 1-10 g.

The minimal size of microbioliths, which is registered with the help of standard SESA is equal to 2-3 mkm for Pd, 3-4 mkm for Pt, Os, and Rh and 4 mkm for Ru, 3-4 mkm for Ir. With the help of special methodics tested for Au, Pt, and Ir, the minimal sizes of the registered microbioliths can be decreased till 0,3-1 mkm. This allows to decrease the limit of their detection in 30-100 times. But the received results are less reliable as spectra of other elements impose on minimal registered impulses of the analyzed chemical elements.