



## DEEP ATMIOBIOGEOCHEMICAL ANOMALIES AND HALOES OF MERCURY

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### ABSTRACT

Our researches of Hg biogeochemistry, which were begun in 1966, have established that it forms highlycontrast mercury anomalies in plants at low or inconsiderably increased contents in soils and soil-forming rocks. Their comparison with soil-geochemical and blasthole gaso-mercury data allowed to come to the conclusion that the main source of mercury for plants is its gaseous (mainly vaporous) forms in underground air of the rootinhabited zone. So, it was established that the observed biogeochemical anomalies are often atmobiogeochemical ones stipulated by rather intensive absorption of mercury gaseous forms by roots according to the non-barrier type. Plant-gaseous coefficient (PGC) of mercury, which is equal to ratio of its contents in plants nonbarrier bioobjects and in underground (PGC<sub>r</sub>) or overground (PGC<sub>nr</sub>) atmosphere also as for other chemical elements is equal to in average 15.000 at a rate of the dry substance and 300.000 at a rate of ash of plants samples with correction of its significant 90-95% loss while burning samples (Kovalevskii, 1993-1999).

The important result of our researches is establishment of possibility to determine Hg in plants and animals ash burnt at the temperature 400-800°C. Developed original methodics of Hg determination in plants ash was approved in Buryatia and Canada. It made possible the study of Hg biogeochemistry using plants ash having been prepared for analysis for revealing the majority of chemical elements. Special researches showed that low-temperature analytical forms of Hg going out the ash at 700-800°C are stable during more than 10 years in comparison with fresh, dried and crushed out plants samples, from which mercury volatilizes in considerable quantities (up to 80-95% and more) during several years (Kovalevskii, 1970, 1975, 1991).

In Buryatia more than 160.000 samples of plants ash were analyzed for Hg and the following features of its absorption by plants were established: 1) Biogeochemical anomalies and Hg haloes in plants non-barrier bioobjects accompany all studied species and geochemical types of ore deposits and Hg, Sb, As shows of ore, polymetals, rare metals, precious metals, rare-earth elements – TR, Sr, Ba, Fe. 2) When there is no ore mineralization these Hg anomalies are usually connected with the zones of jointing, crushing and tectonics dislocations. 3) Increase of thickness of covering loose formations including sands of aeolian origin doesn't essentially influence on intensity of biogeochemical anomalies in connection with a significant ascending migration of Hg

vaporous, which causes large deepness of mercury-biogeochemical information. According to the data of gaso-mercury survey the deepness of mercury-biogeochemical data can reach hundreds meters and even 1-2 km. 4) Owing to ascending migration of Hg vapors, formation of sorptional mercury anomalies in humic soils horizons is possible, which is often in our opinion, wrong, is explained by its fallout with atmosphere sediments. High contents of Hg in soils humic horizons in comparison with underhumic ones having an evident deep origin was observed in almost all our researches. 5) Due to ascending Hg migration from interior part of the earth including upper parts of its mantle the pollution of plants, underground waters, springs, boreholes, open basins is possible. That is such origin that pollutes, in our opinion, significantly Baikal waters and drinking wells in the sector Severobaikals-Nizhneangarsk, which exceeds Limit of permissible concentrations (LPC) in to 100-130 times (Kovalevskii, 1997). It is characteristic for similar seismic regions, where during the earthquakes short impulses of ascending vaporous can be observed. 6) Owing to distant rising migration of Hg gaseous forms the biogeochemical method using plants nonbarrier bioobjects can be used while prospecting deep occurrences deposits of the different minerals including oil and gas (Kovalevskii, 1983-1993).

Biogeochemistry problems, which are analogue the ones having considered for Hg, also take place for S, Se, F, Cl, Br, I, Rn and other gaseous migrants.

**Key words:** biogeochemical anomalies and haloes, mercury, plants nonbarrier bioobjects, adsorption, coefficient.