



THE RADIOACTIVE ELEMENTS OF PLANTS

A.L. KOVALEVSKII

ID 017 Geological Institute, Siberian Branch of the Russian Academy of Sciences,
Ulan-Ude, Russia
koval@gin.bsc.buryatia.ru

ABSTRACT

There are all natural radioactive elements and artificial radioactive isotopes in plants. The author studied the root entering of U, Ra, Th, K in plants and aerosol pollution of them by radioactive isotopes (Kovalevskii, 1962, 1966, 1972, 1979, 1987, 1991). Their main result was the revealing of non-barrier and direct proportional to the concentration in the environment accumulation of radium by all 139 investigated species of plants and their parts, and mainly barrier, to some limit for each bioobject, – the accumulation of U, Th, and K by the overground bioobjects. The table of grouping by 80 bioobjects of Siberia according to their quantitative barrier characteristics and informativity for U in the rootinhabited zone was published (Kovalevskii, 1991).

According to the investigations the scientific fundamentals have been worked out and the examples of highlyeffective biogeochemical prospecting of uranic ores for radii in plants determined with the help of alpha-analyse of plants ashes have been received. According to the received information due to root systems, the depth of which is usually 2-10 m and in the zone od arid climate it reaches 30-70 m. Plants can be bioindicators of deeply occurred uranic and thorium ores or buring of radioactive elements. Finding radioactive elements in underground waters in the soluted state the depth can reach 100-200 and even 1.000 m at the expense to rising migration with pressure artesian waters or under the influence of electric current according to the hydrobiogeochemical model (Kovalevskii, 1979, 1987, 1991). The accumulation of radon by plants can happen according to the atmobiogeochemical and hydrobiogeochemical models. The conclusion was made that the main physiological influence of U on plants is connected with its chemical but not radioactive properties and as for radioactivity alpha-radiation of Ra and the products of its decomposition has the greatest significance (Kovalevskii, 1966).

For aerosole pollution of Siberian plants by the products of nuclear explosions the regularities connected with the mechanisms of aerosole sediment have been established. According to them the greatest radioactivity has been observed in moss and lichen. As for wood plants the surface of rougher bark of larch (*Larix dahurica* Turcz.) had the greatest pollution. The wood (timber) and roots of all trees were practically clean from pollution. Large “hot” particles of radioactive falls resemling dross are of the greatest danger for man and animals. Their size according to our information reached 3x2x0,5 mm, and radioactivity considerably exceeded 100% of the equivalent equilibrium uranium. It was quickly decreasing during some days and weeks and in 3-6 months it was almost

imperceptible. At radiographs of plant ashes 3 types of pollution have been recorded: 1) the even blackening of X-ray film at the Ra concentrations reaching 0,1-0,3% equivalent U exceeding the local background (0,000n%) to 200-2000 times; 2) the small points of blackening with the size to 1 mm connected to aerosols with the size to 0,1 mm; 3) the rare large spots with the size to 1 sm connected with particles with the size 0,3-3 mm.

Key words: plants, radioactive elements, nonbarrier, barrier, accumulation, pollution, ores, Siberia.