

Medical aspects of geology and environment geochemistry in Uzbekistan

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The great medieval oriental scientist Avicenna advised to cure a great number of diseases using minerals. At present a lot of investigations on the medical use of mineral raw materials are being carried out throughout the world. Geomedicine is a new branch of science, which was formed as a result of amalgamation of geology, geochemistry, environment geochemistry, and medicine. Its aims are to search for new methods of medical treatment and to restore old unconventional ones, which used various natural minerals and rocks with healing properties.

Taking into account the importance of the problem, the State Committee of Geology of the Republic of Uzbekistan since 1990 has been carrying out investigations, the aim of which is to determine the possible ways of practical use of mineral raw material for medical needs, as well as for pharmaceutical industry. The study of litho-medicinal raw materials made by a number of scientific and medical institutions, resulted in revealing of healing properties in certain groups of minerals and rocks, and their possible use in medicine.

The following items indicate the ways in which natural litho-medicinal raw materials can be used in medicine:

- They can be taken as they are;
- As fillers for drugs;
- For various medical and other treatments;
- For physical therapy;
- For contact-free cure.

In basically, an investigation has been carrying out for two last groups.

The studies of clays having different composition and located in a number of deposits revealed high efficiency of kaolin from Angren deposit as a good remedy for such diseases as arthritis, polyarthritis, lung diseases etc. Kaolin improves microcirculation, morphological showings. Clinical tests revealed high efficiency of kaolin for treatment for dermal and alimentary canal diseases. There is also a raw material base in Uzbekistan that is sufficient for natural hydrotherapy and mud cure.

A beneficial effect on thyroid gland problems, chronic bronchitis, high blood pressure and cancer, has been obtained using minerals of silicon group (such as quartz, and volcanic glass etc).

Ultrastructure of the magnetite crystal chains in *Magnetospirillum magnetotacticum* (MS-1): Evidence from TEM tomography for cytoskeletal supporting structures

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In living magnetotactic bacteria, it is known that individual magnetite crystals are formed within a string of vesicles, each of which is composed of a proper lipid-bilayer membrane. At present, the biological process that forms these structures is completely unknown. Biophysical arguments indicate that supporting structures are necessary to prevent the chains from collapsing into a disordered clump of particles. As the newly-sequenced genome of *M. magnetotacticum* (MS-1) contains highly conserved analogues of the cytoskeletal proteins actin and tubulin, these may be involved in the organization of the chains. Our recent TEM tomography studies show clearly the presence of a condensed, intracellular organic layer that spatially follows the chain of magnetosomes in 3-dimensions, forming a 'magnetosome sheath'. These structures may explain the persistence of magnetosome chain structures in the fossil record, perhaps including the putative magnetosome chain structures in the ALH84001 Martian carbonate blebs.