

Preliminary report on magnesium phosphate minerals found from a medico-historical sample

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Introduction

There are two pebble-like materials found in vomited matter of a patient in a medico-historical collection of Inoue Kanryu (1740-1812), who was a town doctor and a strategist, at the Tokyo Metropolitan Edo-Tokyo Museum, Japan. According to the note of Inoue, one of them was found from a wife of a townsman lived in Edo around 1776, and another was from a wife of a carpenter lived in a village near Edo in 1783. NRIPS and Juntendo Univ. School of Medicine started research on the material, because the collection of Inoue, predominantly documents, is expected to provide information on medical context of town doctors of the time. The result of preliminary examinations on the substance that it is estimated as a mixture of phosphate minerals will be reported in the presentation.

Material and analyses

The substance is an oval spherical, grayish pale brown color with luster, porous and layered. Qualitative elemental analyses were performed by micro X-ray fluorescence analysis (XRF; ORBIS, AMETEK) under the atmospheric condition, and energy dispersive X-ray analyzer attached to a scanning electron microscope (SEM/EDX; JSM-6600LV, JEOL and INCA Energy, Oxford Instruments) using high vacuum mode and the sample was coated by carbon. Identification of the material was examined by X-ray diffraction (XRD; SmartLab, Rigaku), and Fourier transformed infrared spectroscopy (FT-IR; JASCO FT/IR6100). XRF and XRD were performed without any pretreatment or collection of subsample from the material. A very small portion of the surface was collected for SEM/EDX and FT-IR analyses. As the results, phosphor, sulphur, and calcium were detected by XRF, and phosphor and magnesium were detected by SEM/EDX. Peaks of elements are very sharp with low background that indicates the sample is an inorganic substance. It is estimated as a phosphate mineral. The result of XRD indicates existence of newberyite and struvite, which are magnesium phosphate minerals. A spectrum of magnesium phosphate trihydrate was obtained by FT-IR, which supports the existence of newberyite. It is considered that primary component is newberyite with minor amount of struvite.

Discussion

Newberyite is a rare mineral found in cave guano (e.g. Karkanis et al. 2002), and in urolith of mammals including human (e.g. Gibson 1974, Ohmura et al. 1959) associating with struvite, apatite and other minerals. The sample is hardly considered as a urolith of the patient because it was included in her vomited matter. However, sediments containing large amount of newberyite is not known in Japan, and its occurrence according to the studies of foreign countries is fine crystals in most cases.

Analytical results in this report were obtained from the surface of the material and the origin of calcium detected by XRF is unknown yet. It is expected the origin of calcium will suggest what the material is derived from.

Reference

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Karkanis et al. (2002) Journal of Archaeological Science, 29, 721-732.
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