Annotation of the graduate work of 6th-year student A.V. Buzmakov

Tomography of biological objects with submillimeter resolution using 0.7-2.2 Å wavelengths.

The progress in such areas as nanotechnology, polymeric technology, microbiology and medical diagnostics, is associated with development of nondestructive methods which allow to recognize objects internal structure, with higher resolution. The most convenient, and sometimes unique, way for such analysis remains the using of X-ray emission. In many cases scientists require 3-D model of density distribution (or X-ray absorption) of object. The computer tomography (CT) make it's possible.

In this graduate work the method of tomography experiment using 0.7-2.2 Å wavelengths was developed and improved. It was shown the opportunity of using X-ray diffractometers for this goal. Experimental sample of laboratory microtomograph was designed and developed. Using this device provide possibility to obtain resolution 10-20 mkm at field of vision about 10 mm.

The spatial pattern of 2 bioobjects was investigated by X-ray tomography technique with resolution about 0.2 mm. that is better then resolution of commercial medical tomographs. Internal structure of amphibian Salamandrella keyserlingii was reconstructed. A reconstruction of human's brain epiphysis in normal and morbid affection by Altsgamer and schizophrenia was obtained. For the first time fact of significant calcium salt content decreasing and absence of calcification regions connectedness in the presence of pathology was found.

For the first time reconstructions of 3-D structure of the bones of gecko Pachydactylus bibroni with typical size of details about 10 mkm was performed. All typical patterns of cannon-bones were obtained. Results of X-ray experiments and histological study don't allow making a conclusion about decalcification of these reptile's bones during space-flight.