# An attempt on $^{14}C$ dating and reconstruction of diet for cremated remains of Jokei, a Buddhist monk

H. MUKUMOTO[1]*, M. MINAMI[2] AND T. NAKAMURA[2]

[1] Graduate School of Environmental Studies, Nagoya University, Nagoya 464-8601, Japan
[2] Institute for Space-Earth Environmental Research, Nagoya University, Chikusa, Nagoya 464-8601, Japan
(* correspondence: mukumoto.hikari@j.mbox.nagoya-u.ac.jp)

Carbonate hydroxyapatite (CHa) in bone, which is a bone inorganic component, is considered to provide accurate $^{14}C$ dates on cremated bones, because bones suffering from heat at the temperature more than 600°C have high crystalline of apatite and are not easily contaminated by exogenous contaminants. Thus cremated bones are also expected to preserve the other chemical characteristics, such as Sr/Ca, Ba/Sr, and $^{87}Sr/^{86}Sr$. The purpose of this study is to examine whether the CHa in cremated bones can provide accurate $^{14}C$ dates and reliable informations of migration and diet.

The sample used was cremated bone fragments in an urn at the Jishoin Temple located in Nara Prefecture, Japan. It is thought that the bones are remains of Jokei, a Buddhist monk (AD 1155–1213). The CHa in six fragments showed $^{14}C$ date of 1155–1280 cal AD (±2σ), which is similar with the supposed age. The $^{87}Sr/^{86}Sr$ (0.7092) of the cremated bones was different from the $^{87}Sr/^{86}Sr$ (0.7098) of soil in the urn, indicating that the bones could have been less susceptible to diagenesis. The Sr/Ca value obtained from the bone CHa was 0.0018, which is similar with that of herbivores (0.001–0.005 [1]). The result is agreement with Jokei's dietary habit that he did not eat meat. Moreover, the bone CHa exhibited low log(Ba/Sr) value of –1.9 to –1.4, reflecting marine diet (marine product: log(Ba/Sr) = –2.437 to –2.350; terrestrial product: log(Ba/Sr) = –0.281 to –0.105 [2]). The results indicate the effectiveness of use of CHa in the cremated bones for their $^{14}C$ dating and dietary studies. However, Sr/Ca and Ba/Sr generally depend on geological resource, and therefore the ratios could not be used for animals living in different regions. We will present the results of comparison between the $^{87}Sr/^{86}Sr$ of the region where Jokei lived in the last years of life and the $^{87}Sr/^{86}Sr$ of the bone CHa, and also examine the dietary reconstruction using $\delta^{88/86}Sr$ in addition to Sr/Ca and Ba/Sr values.

[1] Sillen (1992) *J. Human Evolution* 23, 495-516.
[2] Burton and Price (1990) *J. Arch. Sci.* 17, 547-557.