

## Paleodiet reconstruction of prehistoric humans in the Cape region of southern Baja California based on carbon and nitrogen isotope analysis

HARUMI FUJITA<sup>1</sup> AND MASAO MINAGAWA<sup>2</sup>

<sup>1</sup> Instituto Nacional de Antropología e Historia, B.C.S., Mexico (fharumi@prodigy.net.mx)

<sup>2</sup> Graduate School of Environmental Earth Sciences, Hokkaido University, Japan (mas@ees.hokudai.ac.jp)

The Cape Region is situated in the extreme tip of the peninsula of Baja California, surrounded by the Pacific Ocean and the Gulf of California, from La Paz to Cabo San Lucas, including the adjacent islands Cerralvo, Espíritu Santo, La Partida, San Fransquito and San José. The recent systematic survey and excavations done in the coastal Cape Region have revealed the importance of the littoral economy based principally on the exploitation of marine resources complemented by terrestrial resources, although local particularities have been observed in each site (Fujita 1985, 1995, 1999, 2002; Porcasi & Fujita 2000; Poyatos de Paz & Fujita 1998; Fujita & Poyatos 2000; Rosales & Fujita 2000; Fujita et al. 1996). To estimate the paleodiet of these individuals, C and N isotopic composition of bone gelatin from 19 human bone samples from Baja California Sur archaeological sites were geratinaized and analysed. Carbon and nitrogen isotope ratios human bones from the Cape Region of the peninsula of Baja California vary from - 9.2 ‰ to -15.4‰ (av.-10.7‰) in  $\delta^{13}\text{C}$  and from 13 ‰ to 24.7 ‰ (av. 20.0 ‰) in  $\delta^{15}\text{N}$  (N=28). In general the coastal sites have higher values in the carbon and nitrogen isotope ratios. Although marine resources should be potentially characterized by the high  $\delta^{15}\text{N}$  nitrogen originated from typical upwelling water along the east tropical Pacific water, the variation of  $\delta^{15}\text{N}$  more than  $\delta^{13}\text{C}$  shown in the coastal group suggests that relatively more varied food sources were utilized in each coastal sites. Among the three islands, Espíritu Santo, San José and Cerralvo, four samples from Espíritu Santo have the higher  $\delta^{15}\text{N}$  values, followed by one sample from San José, one from Espíritu Santo and the one from Cerralvo has the lowest value.

El Médano is the only coastal site that has lower values in the carbon and nitrogen isotope ratios, similar to the four inland samples pattern. The result of El Médano sample suggest that terrestrial CAM plants (cacti, agave and other succulent plants) have played an important role besides the marine food compared with other coastal sites. The archaeological contexts such as grinding stone also evidences this possibility (Poyatos de Paz y Fujita 1998) and. In case of inland located La Matancita samples, the values show the coastal group may permit that a certain extent of movility of the indians from mountain areas to coastal areas in the late prehistoric period.

## Insolubility of lead ion by molten slag with carbon dioxide

YUKIO FUJITA<sup>1</sup>, TAKAYUKI SHIMAOKA<sup>2</sup> AND SEIZOU KENMOKU<sup>3</sup>

<sup>1</sup>Graduate School of Engineering, Kyushu, University, Fukuoka, Japan(fujita@ies.kyushu-u.ac.jp)

<sup>2</sup>Graduate School of Engineering, Kyushu University, Fukuoka, Japan. (shimaoka@ies.kyushu-u.ac.jp )

<sup>3</sup>Tochigi Prefectural Ceramic Steering Office, Tochigi, Japan. (kenmokus02@pref.tochigi.jp)

### Research Object

In order to utilize the molten slag prepared by melting process for municipal solid waste incineration ash, we studied the removal and capture of lead ion in polluted water by molten slag.

### Experimental Method

A series of four experiments were conducted. First, crushed molten slag and lead solution were mixed by shaker machine. After shaking for 1hour, the mixture was filtrated and separated into solution and residues respectively. Lead concentration of the solution was analysed by ICP apparatus and chemical species of the residues by XRD and IR apparatuses. Secondly, lead acetate was added into the leachate which was made from 2%(w/v) molten slag solution and after 2days, the precipitation was separated and analysed as stated above. Thirdly, the precipitation was soaked in water for 3months, and separated and analysed as stated above. Fourthly, the precipitation which was soaked in water was aerated by carbon dioxide gas for 10hours, and separated and analysed as stated above.

### Results and Discussion

Consequently, about 10mg of lead per g-slag was removed and captured. The mechanism for the removal of lead was rather dependent on the precipitation reaction than the adsorption. XRD and IR analyses revealed that basic lead carbonate ( $2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$ ) was formed in the precipitations. Basic lead carbonate has been converted into lead carbonate ( $\text{PbCO}_3$ ) by carbon dioxide in water.

### Conclusions

Lead ion has been converted into insoluble basic lead carbonate and lead carbonate by the molten slag with carbon dioxide in water. It was confirmed that the molten slag could be useful for capturing of lead ion.

### References

H.Ecke, N.Menad and A.Lagerkvist., (2002), J.Mater. Cycles., Waste.Manag,4,117~126