Radiocarbon Dating of the Temple of Monkey – The Next Step Towards Comprehensive Absolute Chronology of Pachacamac, Peru

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Pachacamac, one of the largest and most important archaeological sites in Peru, is located 50km south of Lima and about half km from the Pacific Ocean (Fig. 1). It was an urban centre permanently inhabited from probably the 1st century AD until the Spanish Conquest in 1535 AD. A special development of the site took on after the Intermediate Period (900 – 1470 AD), when Pachacamac was the religious centre and the seat of rulers. During this period a number of pyramids with ramps were constructed.

Extensive research of Pachacamac has been carried out since 1959 as part of the Ychsma Project by the team led by Peter Eeckhout. The project has been designed to answer questions about function, development and influence of Pachacamac during the Late PreHispanic Period. In 2000 the absolute chronology of Pyramid III in Pachacamac was constructed and discussed (Michczyński, Eeckhout, Pazdur, 2003). The study was based on the radiocarbon dating of the main structure of the Complex of Pyramid III – Pyramid IIIB and IIIB (Figs 2 and 3). Comparison of the results for Pyramid II and Pyramid III confirm the hypothesis of successive occupation and abandonment of the buildings.

The results presented here are the next step towards comprehensive chronology of Pachacamac. The new study includes dating Pyramid III-C and the base of Pyramid IIIA, at the lower part of the site, and the base of Pyramid II in Fig. 4). During the excavations it was found, that there is no direct access of transit between part C and the rest of the monumental complex. It showed, that Pyramid III-C had no structural relationship to the rest of the Complex. Moreover numerous traces of offerings and ritual activities were found, what suggested that the structure was used in a different way than the other pyramids. This implied a ceremonial nature of the structure, which may be classified as a temple. Because a mumified monkey burial had been discovered there, the building was called “Temple of Monkey”.

Samples included in the analysis (see Table 1) were taken from constructional elements of the Temple of the Monkey from the bundle of the E20 mummy of about 35 years old woman. It could have been a secondary burial, i.e. the bundle was buried at the moment of death and then taken out from his original tomb to be put in the Temple of the Monkey where we found it. All samples were dated in the Glacial Radiocarbon Laboratory of the University of Colorado with use of the liquid scintillation technique. The dates were calibrated using OxCal v3.10 calibration program and IntCal04 calibration curve (Hedges et al., 2004). We did not use the DeConv calibration curve (Ivanov et al., 2004), because our site is located close to the Intertropical Convergence Zone, while this curve is constructed based on the results of calibration for marine 55-3200 BP. The results of calibration are shown in Fig. 5.

In order to estimate more precisely the calendar dates of studied objects and events we used the OxCal calibration program to combine radiocarbon dates and other chronological information. We constructed chronological model, which allows for the following historical and archaeological prior data:

1. All calibrated dates should be older than the date of forced abandonment of the site during the Spanish Conquest, which is known to be 1535 through historical sources.
2. Two group of dates may be marked out from the set of all dates – the first group - connected with foundation and the first period of occupation of the temple (Gds-304, Gds-298, Gds-291, Gds-297) and the second group – connected with the E20 Mummy (Gds-307, Gds-305). Two dates (Gds-295, Gds-289) can be assigned to none of these groups. There is no prior relation between the first and the second group as well as between the groups and the unassigned dates.
3. The dates belonging to the first group may be divided into two subgroups, which corresponds to two succeeding phases of the chronology of the Temple – the foundation of the Temple (Gds-304, Gds-298) and the first period of occupation (Gds-291, Gds-297). We added to our model boundaries of whole group and used them to find estimates of the beginning of the construction of the Temple and the end of the first period of occupation.
4. The date of sample taken from the internal part of the mummy bundle (Gds-307, the first burial) should be older than the date of sample taken from external part (Gds-298, the second burial).
5. The model of the structure and the posterior probability distributions of calibrated dates are presented in Fig. 6. The prior agreement index of the model as well as the agreement indices for every calendar date have values above the threshold (see values in Fig. 6), what proves that there is good concordance between the radiocarbon dates and the other data of our model.

Comparison of the results of radiocarbon dating for the foundation and the first period of occupation of the Temple of the Monkey (see Fig. 6) and the results for Pyramid IIA and IIB (Fig. 7), clearly shows that the Temple of the Monkey is older than Pyramid IIA and IIB. The age of its construction is similar to the age of occupation of Pyramid II, but it is also possible that the Temple is even older than the Pyramid II. Moreover the results obtained for many E20 suggest that the Temple was used also during occupation of Pyramid IIIA.

The probability distribution of calibrated age of sample PAC 50a-1 (Gds-298) is flat and wide (see Fig. 5) as the calibration curve is rather flat after the period 1450-1500 AD, according to the model described above (see Fig. 6). This indicates that the real age of sample PAC 50a-1 is about the construction of Pyramid IIIA. However archaeological evidence shows that the first date should be older because it dates a sample from inside of the mummy bundle (the first burial), while the second date concerns the external wrapping and gives information about the second burial.

This prior information included in our model allow to estimate more precisely the age of the first and second burial of the mummy and the time span between burials. The posterior probabilities of calibrated dates of the first and second burial and the probability distribution of possible time span between burials are presented in Fig. 8. The results show that the first burial took place in the period 1425 – 1445 (both probability equal to 68.2%), while the second burial – in the period 1450 – 1475 (both probability equal to 68.2%). The time span between two burials has a value smaller than 50 years with probability equal to 68.2%.

This result supports the hypothesis, that the Temple of the Monkey was built during the time span of Pyramid IIA and IIB and it was occupied probably longer than neighboring Pyramids III and IV. It confirms hypothesis, that this structure was separated and used for other purposes than the rest of the Complex of Pyramid III.

References:
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Photos, map of geographical situation of Pachacamac and plan of Pyramid III Complex come from www site of Ychsma Project: http://www.ulb.ac.be/philo/ychsma/