RADIOCARBON DATINGS FROM THE ALMAQAH TEMPLE OF BAR'AN, MA'RIB, REPUBLIC OF YEMEN: APPROXIMATELY 800 CAL BC TO 600 CAL AD

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ABSTRACT. Ma'rib is the most famous archaeological site in Yemen. The economical importance of Ma'rib resulted from an ecosystem that was based on irrigation and existed already in the second half of the 3rd millennium BC. In the middle of the 8th century BC Ma'rib rose to the capital of Saba and became the economical and cultural center of southern Arabia. In 1975 the German Archaeological Institute began to investigate and document the antique oasis systematically. Radiocarbon datings were of great importance for clarification of the building's history. Dating series extend from the 10th century BC to the 12th century AD. The temple, of which four building phases could be observed up to now, was used from 9th century BC till the end of the 4th century AD.

INTRODUCTION

From 1988 to 1997 the Sanaa Branch of the German Institute of Archaeology excavated the Almaqah Temple of Bar'an in Marib, locally also known as Arsh Bilqis, ("Throne of the Queen of Sheba"). The monument is situated in the middle of the ancient southern oasis of Marib, outside any known ancient settlement (Figure 1). The monumental complex itself encompasses three major functional units, the temple podium with an attached forecourt, a massive protection wall with later added buttresses, and a large irrigation channel.

The architectural and stratigraphic evolution from a temple to a sacred compound covering at least some 1500 years is very complex, indeed, reflecting simultaneously both a horizontal and a vertical growth. The combination of its architectural history with the occupational stratigraphy of the monument permits to establish a periodization that can now be corroborated by 24 radiocarbon dates. Previously, absolute dates were suggested tentatively using paleographic criteria, the mentioning of Sabaean rulers and royal titles in the inscriptions found, ceramic comparisons, as well as the environmental history of the Marib oasis—chronological instruments which appear more reliable than previously expected (Schmidt 1998; Vogt 1998). See Table 1.

Through its entire use, the core of the complex was the temple proper. Raised on a solid platform of maximum 4 m high (almost 6.5 m including foundation plus about 9 m of superstructure) during Period II this podium encased the foundations and walls of the preceding Temples 1 and 2 of Period I.

METHODS

Chemical pretreatment of wood and charcoal samples was done by AAA treatment (Mook and Streurman 1983). The dating was performed with gas proportional counters of the Houtermans-Oeschger type using methane at 133.3 kPa pressure as filling gas. Measurement control and data processing were done using computers (Görsdorf 1990; Görsdorf and Bojadziev 1996). Since 1997 (Bln-4977), modern measurement electronics is used. The preamplifier, pulse amplifier, comparator, pulse shaper, and anti-coincidence units are located in a box (19 × 10 × 5 cm) that is directly connected to the counter. The detection of variation of the environmental radiation and the inspection of the long time stability of the electronic were required in order to reach the measurement accuracy

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(Görsdorf 2000). The $\delta^{13}C$-measurements were done at the Leibniz-Labor, University of Kiel, Germany and are reported in permil relative to PDB-standard.

Table 1 Periodization

Period I	Temples 1 and 2
Period II	Temples 3, 4, and forecourt
Period III	Re-occupation of forecourt, mudbrick *protection* wall, and external towers
Period IV	Irrigation channel

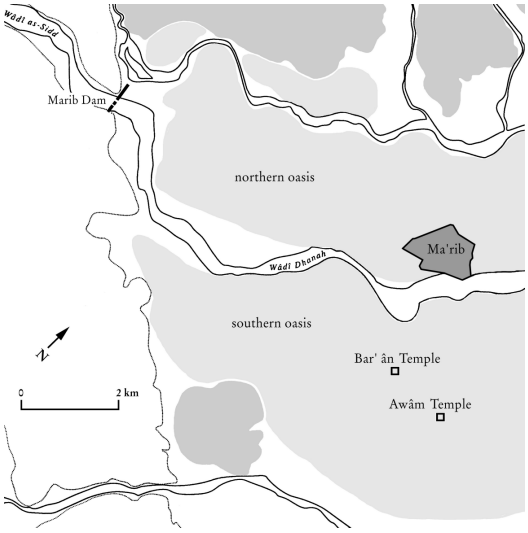

Figure 1 Map of the surroundings of Marib

RESULTS

The results are shown in Table 2 together with locations. We show the ^{14}C ages in BP, rounded off to the nearest 5. The datings are corrected for isotopic fractionation using the measured $\delta^{13}C$ values. The ^{14}C ages are calibrated using the program OxCal v3.5 (Ramsey 1995, 2000) and employing the decadal calibration curve (Stuiver et al. 1998) as a first approximation for all samples. The tree ring count of the charcoal and wood samples could not be determined. The calibration intervals were presented for a confidence of 68.2% and are rounded off to 10 years.

DISCUSSION

Period I

^{14}C sample Bln-4994 comes from the fill of Temple 2. A sounding about 15 m to the west and 4 m beneath the pavement of the later forecourt produced cultural layers sampled for ^{14}C analysis (Bln-4878, 4879, 4881, and 4882) and containing the same kind of pottery as that from Temple 2. It matches well with ceramics from the early occupation at Raybun in Hadramawt thus giving us a date during the early 1st millennium BC. The ^{14}C samples from the deep sounding and from Temple 2 should be contemporary.

Table 2 Dating results

Lab nr Material	Location	Per mil	Date
Bln-4994 Wood	Deepsounding, along the cella wall of temple 2	–25.7‰	**2660 ± 35 BP** 840–790 cal BC
Bln-4879 Charcoal	Deepsounding court, loc.528	–25.0‰	**2635 ± 35 BP** 830–790 cal BC
Bln-4878 Charcoal	Deepsounding court, loc.516	–24.5‰	**2620 ± 40 BP** 830–780 cal BC
Bln-4882 Charcoal	Deepsounding court, loc.517	–25.1‰	**2620 ± 35 BP** 830–790 cal BC
Bln-4881 Charcoal	Deepsounding court, loc. 527	–24.3‰	**2565 ± 35 BP** 810–760 cal BC 690–660 cal BC 620–590 cal BC 580–560 cal BC
Bln-4445 Charcoal	Locus 239, H. 1101,86–1101,70	–24.3‰	**2385 ± 40 BP** 520–390 cal BC
Bln-4446 Charcoal	Locus 239/139, H. 1101,65	–24.0‰	**2360 ± 40 BP** 520–380 cal BC
Bln-4444 Charcoal	Locus 239 A, H. 1101,80–1101,55	–24.7‰	**2265 ± 40 BP** 400–350 cal BC 290–230 cal BC 220–210 cal BC
Bln-4475 Charcoal	Locus 239 A, H. 1101,80–1101,55	–24.5‰	**2235 ± 40 BP** 380–350 cal BC 320–230 cal BC 220–200 cal BC
Bln-4474 Charcoal	Locus 239 A, H. 1101,80–1101,55	–24.2‰	**2215 ± 55 BP** 380–200 cal BC
Bln-4593 Charcoal	Mudbrick protection wall		**2060 ± 45 BP** 160–130 cal BC 120calBC–10calAD
Bln-4441 Charcoal	Locus 138, H. 1102,79	–24.2‰	**1950 ± 40 BP** 1–90 cal AD 100–130 cal AD
Bln-4594 Charcoal	Under temple kitchen inside protection wall	–24.1‰	**1950 ± 40 BP** 1–90 cal AD 130–130 cal AD
Bln-4442 Charcoal	Locus 138, H. 1102,79	–23.8‰	**1915 ± 40 BP** 20–40 cal AD 50–140 cal AD
Bln-4778 Wood	Early Islamic reoccupation pit	–23.7‰	**2410 ± 40 BP** 760–720 cal BC 540–400 cal BC

Table 2 Dating results(*Continued*)

Lab nr Material	Location	Per mil	Date
Bln-4447 Charcoal	Locus 258, H. 1100,67	–23.9‰	**1920 ± 40 BP** 20–40 cal AD 50–130 cal AD
Bln-4448 Charcoal	Locus 258, H. 1100,67	–24.3‰	**1865 ± 40 BP** 80–110 cal AD 120–220 cal AD
Bln-4449 Charcoal	Locus 240, H. 1100,90–1100,80	–23.1‰	**1715 ± 40 BP** 250–390 cal AD
Bln-4459 Charcoal	Locus 243 B, H. 1100,80	–24.6‰	**1695 ± 40 BP** 260–280 cal AD 320–410 cal AD
Bln-4460 Charcoal	Locus 243 B, H. 1100,80	–22.7‰	**1670 ± 40 BP** 260–280 cal AD 340–430 cal AD
Bln-4476 Charcoal	Locus 240, H. 1100,90–1100,80		**1660 ± 45 BP** 260–280 cal AD 330–440 cal AD
Bln-4995 Charcoal	Pit outside cella of temple 4, upper fill	–24.9‰	**1685 ± 35 BP** 260–280 cal AD 330–420 cal AD
Bln-4595 Charcoal	Irrigation channel, sediment fill		**1590 ± 45 BP** 420–540 cal AD
Bln-4443 Charcoal	Locus 244, H. 1101,21		**1450 ± 40 BP** 560–650 cal AD

Period II

During this period the monument witnesses dramatic transformation. Associated with Period II are the ^{14}C samples Bln-4445, Bln-4446 (both from Loc. 239), Bln-4444, 4474, and 4475 (all from the pit Loc. 239A). Their context is that of extra-mural cultural layers piled up against the northeastern forecourt wall. They altogether provide a *terminus ante quem* for the construction of the forecourt.

Period III

A massive mudbrick wall—in places preserved to a height of more than 3 m—was erected parallel to the western and northern façades of the forecourt and its northeastern corner (samples Bln-4441, 4442, 4593, 4594, 4778).

Constructions within the forecourt were restricted to a square platform that served as a fire altar and the transformation of the pillared court galleries into closed rooms (samples Bln-4449, 4459, 4460, 4476). In front of one of these a workshop for the manufacture of bronze offerings was established (samples Bln-4447, 4448).

From the archaeological point of view, the end of Period III by the end of the 4th century AD is purely hypothetical. It is widely accepted that according to many South Arabic inscriptions from all over Yemen by about 380 AD the rulers of Southwest Arabia turned from polytheistic religion to

Christianity and Judaism. Traditional ritual practices were stopped and the sanctuaries were abandoned. At the Almaqah Temple of Bar'an in Marib no artefact was found that can readily be attributed to a period later than the 4th century AD.

Period IV

A later use of the premises and thus the existence of a Period IV is suggested by the discovery of a big irrigation channel immediately south and outside the forecourt (see sample Bln-4595). The channel's stratigraphically late position is beyond doubt; the channel must have ceased to operate not later than the final destruction of the great dam of Marib sometime between 570 and 600 AD. From the archaeological point of view, the conventional interpretation that Marib's southern oasis was irrigated only until 300 AD can already be rejected.

The 24 calibrated ^{14}C dates from the Almaqah Temple of Bar'an confirm by and large the above described architectural and stratigraphic findings. Four major and two minor clusters of datings correspond with the periodization.

The occupation of the basalt Temple 2 of Period I and the bottom layers of the deep sounding in the forecourt with reminiscent of ceramic productions from early 1st millennium BC Hadramawt are now reliably dated to end during the terminal 9th century BC. The date of Temple 1 remains unclear but needs to antedate Temple 2.

The beginning of Period II is still unknown and so is the date of construction of the limestone Temple 3 that marks the introduction of a new groundplan laid out on a podium. From this developed the topmost Temple 4. Due to the quarrying and the systematic cleansing, from Temple 4 itself no stratified samples could be collected. Its dating is therefore related to that of the attached and simultaneously built forecourt. Epigraphic evidence suggests an attribution of the forecourt (and thus Temple 4) to the *mukarrib* period of the kingdom of Saba or with some more precision, although tentatively, to the second quarter of the 5th century BC. As to the ^{14}C dates, the respective samples from outside the courtyard were taken about 1.5 m above the top of the courtyard's foundation and the level of the court pavement. Some time is to be accounted for the accumulation of these deposits. The close stratigraphic (and altitudinal) proximity of the younger pit Loc. 239A (Bln-4444, 4474, 4475) to Loc. 239 makes a calibrated late 5th century BC date for samples Bln-4445 and 4446 more likely and may thus support the chronological implications of the above epigraphic evidence. Alternatively, assuming a maximum overlapping of the two samples Bln-4445 and 4446 during the early 5th century will markedly reduce the period of accumulation of Loc. 239, ruling out proposed by von Wissmann early 5th century BC dating of the rulers *Yada'il, Yita'amar and Karibil* (Wissmann 1964) and attribute the construction of the forecourt close to the late 6th century BC. Both alternative datings permit sufficient time for the construction and use of Temple 3.

Clearly evident is a break within the distribution of ^{14}C dates towards the end of the 1st millennium BC. This can be explained with the destruction of Temple 4 and its forecourt and its temporary abandonment. Shortly afterwards, a resumption of building activities and repair works can be recorded. The respective samples (Bln-4441, 4442, 4593 and 4593) are all coming from different sectors of the massive mudbrick retaining wall. After 1σ-calibration they fall into two groups—the 1st century BC sample Bln-4593, and the remaining group most consistent in the mid 1st century AD. The 2σ-calibration provides a maximum time overlap for all four samples just around the turn of the Christian era.

One short remark needs to be made with regard to sample Bln-4778, a wooden plank used for the ceiling in a small guard room next to the gate of the mudbrick protection wall. Compared to the other

samples from the mudbrick wall the calibrated age of the plank is far too old by at least 400 years. Quite obviously, it is a re-used timber—a custom not unusual even today.

For quite some time the restored temple—now dedicated to Almaqah, Lord of Maskat and Bar'an—was well looked after, but then fell increasingly into neglect. Sediments started to accumulate in the forecourt and as indicated by samples Bln-4448 and 4449 a metal workshop was established in the northeastern corner just before the middle of the 2nd century AD. A later squatter occupation is attested for almost all court galleries; samples from the northeastern gallery (Bln-4449, 4459, 4460, and 4476) date to the 4th century AD simultaneously marking the end of the use of the temple as a sacred place. This coincides extremely well with the epigraphically suggested shift from polytheistic to monotheistic religions and the immanent abandonment of South Arabian temples.

This interpretation is somehow corroborated by sample Bln-4995, the second wood sample within the series. It is coming from the very bottom of a deep disturbance within the temple podium. The reason for the disturbance is unknown, but its date during the 4th century AD indicates that the temple was not in use anymore. The wood may originate from a big tree growing next to the cella or from a thick wooden column.

Period IV is represented only by sample Bln-4595 which is coming from sediments carried into the fields from the large irrigation channel just south of the precinct. It dates to the 5th or 6th century AD but well before the destruction of the great dam and proves that the southern oasis of Marib was still irrigated.

Bln-4443 from Loc. 244 in the northeastern corner of the forecourt. Collected from the deposits, it may reflect a limited re-occupation not at all related to the temple. Corresponding with its 7th century AD date is a thin scatter of glazed Islamic pottery that was indeed found in the same context.

With the 7th century AD the site was completely abandoned, irrigation stopped with the destruction of the great dam, sand dunes covered the ruin, and the area was neglected until modern times when quarrying started to provide nicely dressed limestone ashlars for the construction of the Governor's palace in New Marib.

CONCLUSIONS

The ^{14}C dates from the Almaqah Temple of Bar'an contribute significantly to our understanding of Sabaean chronology in general and the history of the Marib oasis in particular. Changes in the temple rites that were clear from the archaeological and architectural record can now be dated more precisely. The beginning of ritual practices is now evidenced for a period prior to the late 9th century BC. The major destruction of the temple around the turn of the Christian era and its successive reconstruction are more likely to be associated with the intervention of a Roman army by 26/25 BC. The abandonment of the site as a sacred place can now be reliably linked to the introduction of monotheistic religions in Southwest Arabia during the late 4th century AD, while irrigation in the immediate surroundings seems to have continued until the final destruction of the Marib Great Dam around 600 AD.

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