

A REVISED DENDROCHRONOLOGICAL DATE FOR
THE FORTRESS OF RUSA II AT AYANIS:
*RUSAḤINILI EIDURU-KAI**

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INTRODUCTION

In *Ayanis I* we reported a date for a 259-year *Pinus* sp. tree-ring chronology of 910–651 BC.¹ The date was derived by crossdating the Ayanis sequence against our long Bronze Age-Iron Age dendrochronology, which for the period of overlap is composed primarily of *Juniperus* sp. wood from a variety of contexts excavated from the Phrygian capital city of Gordion, some 800 km west of Ayanis. Research published in 2001 has resulted in a revision upwards by 22 years of the absolute dating of the Bronze Age-Iron Age dendrochronological sequence from Ayanis that is linked to that from Gordion.² We therefore must shift the date for the construction of the fortress at Ayanis upward by the same amount, offering a date for the latest felled tree of 673 +4/-7 BC.³

* This paper was presented at the Anatolian Iron Ages 5 meeting in Van in August 2001, but was inadvertently omitted from the publication by the BIAA edited by Dr. Gareth Darbyshire (appeared December, 2005). We appreciate Professor Sagona's offer of space in this volume for it, especially as the data are relevant to many of the papers that were the focus of this meeting. The data included from Ayanis are unchanged by any of those included in the forthcoming publication of *The Chronology of Early Phrygian Gordion*.

¹ Çilingiroğlu and Salvini 2001a.

² For the absolute dating of this chronology see Manning, *et al.* 2001, Kromer *et al.* 2001, and comments by Reimer in the same issue. The dates reported in these articles, based on more data, supersede those announced in 1996. The important change is an upward shift by 22 years of all dates previously reported as included in, or dated to, the Bronze Age-Iron Age dendrochronological sequence.

³ Interestingly, this date recalls the 673/672 BC date for Esarhaddon's campaign against the Šubrians, the description of which in his annals mentions that after the conquest the Assyrian king returned to Rusa all Urartian refugees. Professors Çilingiroğlu and Salvini allude to the possibility that Esarhaddon's report of the flight of certain members of his court, along with other Assyrians of less savory character, towards Šubria in the aftermath of a court intrigue against the king (this text undated), might

Comment on Absolute Dating

The tree-ring sequence from Ayanis is dated by its linkage to the Bronze Age-Iron Age tree-ring chronology: i.e., the latest dated timber at Ayanis was cut 67 years after the last dated timber from the Midas Mound Tumulus. They are dated securely relative to one another. However, the Bronze Age-Iron Age chronology is itself still 'floating'. That is, it is not securely attached to our absolutely dated tree-ring chronology for Anatolia and the whole of the eastern Mediterranean built by overlapping tree-ring sequences from living forest trees to ring sequences from wood in historical buildings. Currently, we have a tentative oak tree-ring chronology back to 518 BC. We are waiting for radiocarbon dates to corroborate some of the key fits. So, since the long Bronze Age-Iron Age dendrochronology is not yet absolutely dated (i.e., tied to the calendar scale), we have resorted to a combination of dendrochronological and radiocarbon dating techniques to find the best approximation of the absolute date of the sequence. In 1996 we reported a date for the cutting of timbers from the so-called Midas Mound Tumulus at Gordion in 718 BC.⁴ The pinning of this chronology to the year depended on what we had suggested in 1996 was the correlation of a dramatic anomaly in the tree-ring record from Porsuk-Ulukişla with a proposed date for the eruption of the volcanic Aegean island of Thera/Santorini in 1628 BC. This date, not uncontroversial, was based on anomalies in other absolutely dated tree-ring chronologies (frost rings in bristlecone pines and tree die-off in Irish bog oaks), and by acidity peaks in (less securely) dated ice cores. The 651 BC date reported in *Ayanis I* depended on this apparent synchronism.

However, ongoing research culminating in 2001 (but continuing through 2005 with no difference in reported calendar dates) has compelled us to revise our dating of the Bronze Age-Iron Age chronology. We do not withdraw our contention that the Porsuk anomaly could still be related to the eruption of Thera, but we acknowledge that such an upward adjustment would break the proposed links to other tree-ring anomalies on which the 1628 BC date had depended. The ice core correlations, along with revised radiocarbon dates from the island, may accommodate an upward revision, though this debate is ongoing.⁵ At the very least, the absence of a dendrochronological link of the Porsuk anomaly to the year 1628 BC compels us to quote the date

provide the context for correlating the Subrian campaign with the reference to foreign captives/workers (including Assyrians, but without specific mention of Subrians) on the Ayanis *Susi* temple inscription (Çilingiroğlu and Salvini 2001b, especially pp. 20–21.

⁴ Kuniholm *et al.* 1996 and comment by Renfrew, same volume.

⁵ Cf. Manning *et al.* 2002, Hammer 2000, and Hammer *et al.* 2003. From the perspective of tree rings, P. I. Kuniholm initiated a dendrochemistry project using neutron activation analysis in 1998 with the intent to test for a chemical signal in tree rings that might correlate with increased soil acidity that can be linked to volcanic activity. This work is ongoing.

of the Bronze Age-Iron Age tree-ring chronology, and by extension the date for the felling of trees used in the construction of the fortress at Ayanis, with its associated calibrated calendar date error (+4/-7 calendar years).

Ongoing Dendrochronological Work at Ayanis

As excavations progress at Ayanis, we continue to date excavated samples. The sequence is already very robust (representing as many as 131 different trees),⁶ but we shall look for any evidence of repair or extensions in the form of later dated samples or wood re-use in the form of earlier dated samples. On current evidence, there are no such indications.⁷ We do have one sample (AYA-201) that extends the sequence on the early end of the chronology, so we may now report a 347-year *Pinus* sp. sequence that dates *ca.* 1019-673 +4/-7 BC. A bar graph illustrating the years covered by each sample, separated by context (Fig. 1), shows that all of the contexts excavated thus far at Ayanis were constructed at the same time (all but one trench include samples with bark in *ca.* 675-673 +4/-7 BC). Only the cella of the *Susi* temple and the fortifications in Trench I have yet to produce a sample with bark preserved, though the last preserved ring from the cella ends only 8 years before the felling dates of other timbers in Trench VI, and the last preserved ring in Trench I is only 14 years before the cutting dates of timbers from the Trench V fortifications. We thus believe these timbers were contemporary with others on the mound, and that the temple, in particular, was built at the same time as the rest of the *Susi* complex in Trench VI.

Of possibly greater interest, and as Professor Salvini pointed out at the V. Anatolian Iron Ages Symposium in Van in August 2001, is the potential for establishing relative dates between Urartian sites and buildings, especially the many foundations of Rusa II. There is still ongoing debate from epigraphic evidence about the order of Rusa II's major foundations.⁸ While much wood was excavated at Karmir Blur and Bastam, the samples available for analysis in our laboratory have been insufficient, both in number of rings preserved and number of crossdatable samples available, to establish a chronology robust enough to be connected to the Ayanis sequence. We have, however, demonstrated from modern forest wood that conifers from as far east as Kakhetia in the southern Caucasus mountains in Georgia do crossdate with wood

⁶ This number may be an overestimate. It is likely that carpentry techniques produced building timbers from the same tree whose ring series do not overlap (see on Fig. 1 the sequences that begin around the same time as the last preserved rings of other samples. Note that none of these latter sequences preserve bark. In many cases these may be from the same tree).

⁷ The suggestion that there were two conflagrations on the mound at Ayanis, reported in *Ayanis I*, was not based on dendrochronological evidence. Further examination of the burned mudbrick walls and burned plaster that provide the basis for the two-fire hypothesis was to be undertaken in 2002 (A. Çilingiroğlu, personal communication).

⁸ Çilingiroğlu and Salvini 2001b.

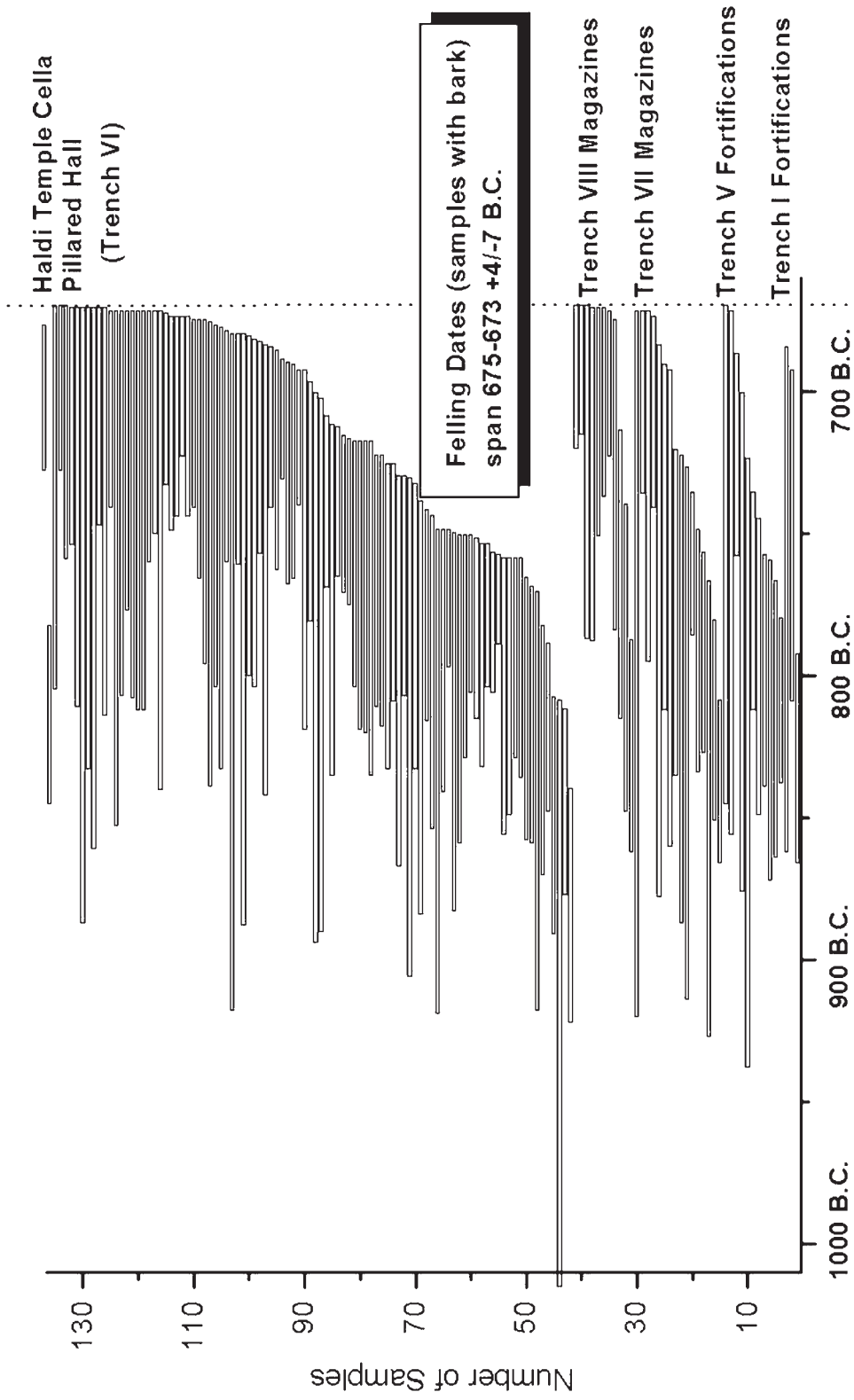


Fig. 1: Dendrochronological samples from Ayaniis

from central and eastern Turkey.⁹ We thus expect crossdating between Urartian sites in Armenia, Georgia, Azerbaijan, and north-west Iran, in addition to those sites in the Van Gölü catchment basin. There is some evidence that wood from the Elburz Mountains in northern and eastern Iran does not in fact crossdate with wood from Turkey and farther north in Azerbaijan, but belongs rather to another climate regime that extends east to the Karakoram Mountains of Afghanistan and Pakistan.¹⁰ This eastern climate regime does not include the boundaries of historical Urartu.

As reported at the Van symposium, we do have a few dendrochronological links between sites within the Van region, though in both cases the links are based on single samples with an unknown number of rings missing from the exterior. They can provide no more secure chronological information than *termini post quo*. The first is a 127-year *Pinus* sequence from room 6 of the pillared hall complex at Adilcevaz-Kefkalesi, another of Rusa II's foundations. The sample was kindly provided by Professor Baki Ögün, and dates to 902–776 +4/-7 BC. The other sample, a 128-year *Pinus* sp. sequence from a burned piece of wood in one of the rooms in the Haldi temple complex at Yukarı Anzaf, generously provided for analysis by Professor Oktay Belli, dates to 934–807 +4/-7 BC. Since this building is attributed to the late ninth - early eighth century Urartian King Minua, and since, furthermore, the excavator cites the lack of any mention in the temple text to Minua's known successful military operations as evidence that the fortress and temple likely date to the early part of Minua's reign,¹¹ we might presume that not too many rings are missing from the end of this sample. Since the excavations at Yukarı Anzaf are ongoing, we hope that additional samples will become available to date securely the temple complex's construction.

Comment on Urartian Wood-Working

The most notable construction technique employed by the Urartian carpenters (or Assyrian or other captured foreigners, if the Ayanis temple inscription is any guide¹²) is mortise- and-tenon joinery¹³ (Figs 2; 3: 1). The technique is known from wooden ship and furniture examples as early as Old Kingdom Egypt.¹⁴ The best known Iron Age examples are from the furniture in the so-called Midas Mound

⁹ A 455-year *Taxus baccata* sequence from the Batsara forest crossdates very well with *Pinus silvestris* from the Sarıkamış Ormanı, near Kars, and *Pinus nigra* from Çatacık Ormanı, near Eskişehir. Crossdating extends across Anatolia, and as far west as Greece.

¹⁰ Pourtahmasi and ParsaPajouh 2001. The researchers further note that this climate region may extend to the Altai and Tien Shan ranges of western China.

¹¹ Belli 1999.

¹² Salvini 2001.

¹³ For a bibliographic overview of carpentry techniques in the Near East, see Kuniholm, 1997.

¹⁴ See Killen 1996 and Wachsman 1998 pp. 215- 243.



Fig. 2: 1. Mortise cut into a pine plank from the pillared hall of the *Susi* temple complex;
2. Tenon, cut from elm, from the pillared hall of the *Susi* temple complex.

Tumulus at Gordion.¹⁵ Although the conservator of the Gordion furniture, Elizabeth Simpson, notes parallels in the mortise-and-tenon technique of joinery of the legs of tables to table tops between Phrygian examples and Urartian examples from Adilcevaz, she also notes similarities to techniques used in furniture from the Middle Bronze Age tombs at Jericho and the *ca.* fourth century BC Scythian tombs at Pazyryk. It is probably best to imagine, then, that the use of the technique in roof and/or balcony/portico construction at Ayanis indicates not any specific direction of influence, but rather merely that Urartian builders were fully aware of, and made use of, standard carpentry techniques long employed across the eastern Mediterranean. It is the quality of preservation at Ayanis that makes the architectural use of the technique unique. We also note that the examples from Ayanis suggest plain mortise-and-tenon joinery, without the addition of pegs or dowels for reinforcement, as has sometimes been observed in Egyptian shipbuilding and other traditions of furniture manufacture.¹⁶

Another interesting aspect of the wood examples from Ayanis is that the exposed surfaces were apparently painted (Fig. 3: 2). Although we have only a few examples, traces of both blue and red paint are preserved on charcoal fragments. Most of the paint should have been expected to flake off in the major conflagration that destroyed the temple and fortress, but that it clings to a few fragments, as it does to the plastered mud brick walls of the temple courtyard, suggests that painting of the exposed timber framing was a part of the elaborate decorative scheme of the entire courtyard, pillared hall, and *Susi* temple complex.

With respect to a reconstruction of the superstructure of this complex, we have undertaken a reexamination of all the timbers analyzed by us from Ayanis, but especially those from the pillared hall. We group these samples into roughly approximated standard sizes, as follows:¹⁷

Large beams, both squared half sections and full tangential sections:

Average dimensions in cross-section: 29.5 cm. × 10.6 cm. 10 timbers

Full sections, some squared:

Average diameter: 10.5 cm. 5 timbers

Quarter sections, some squared:

Average dimensions in cross-section: 12.2 cm. × 9.75 cm. 20 timbers

¹⁵ See Simpson in Herrmann 1996, and Simpson, Spirydowicz, and Dorge 1999.

¹⁶ There were, however, both decorated and undecorated iron nails and daggers excavated from among the collapsed debris. The architectural use of the nails, if any, is undetermined. Note, however, that the excavators have interpreted these nails, especially those decorated with mushroom or eagle heads, as, essentially, hooks, for affixing dedicatory weaponry to the walls of the pillared hall. See Çilingiroğlu, 2001, especially pp. 45–46.

¹⁷ The numbers of samples and average measurements differ somewhat from those reported in *Ayanis I*.

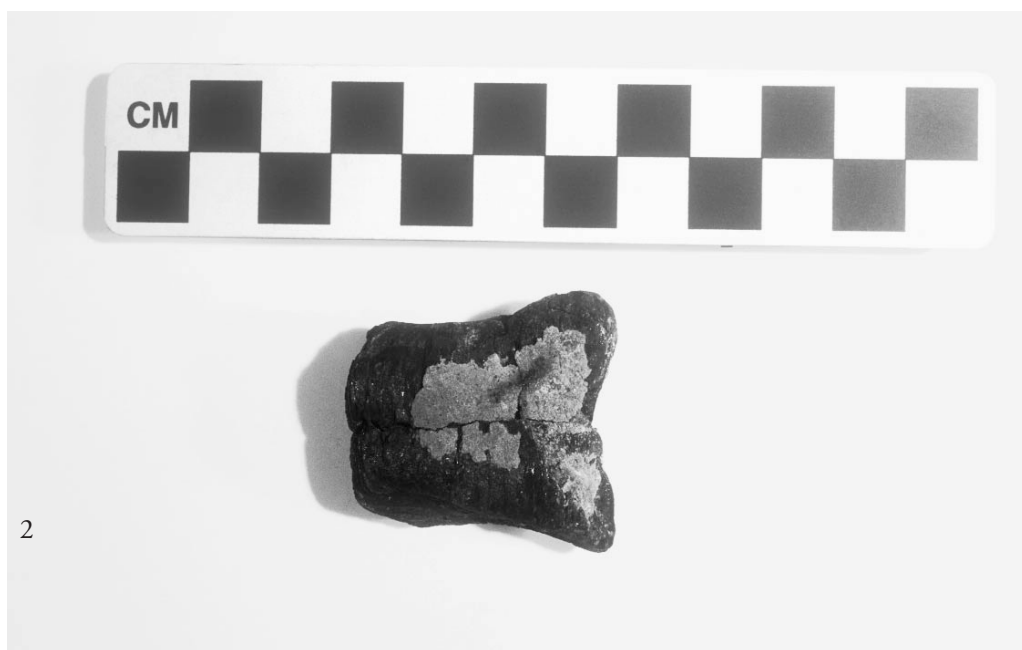


Fig. 3: 1. Profile of engaged mortise and tenon, from the pillared hall of the *Susi* temple complex; 2. Wood charcoal with coating of blue paint preserved from the pillared hall of the *Susi* temple complex.

Radial and tangential sections:

Average dimensions in cross-section: 11.00 cm. × 6.5 cm. 54 timbers

Small timbers, in some cases tenons:

Average dimensions in cross-section: 4.5 cm × 2.5 cm. 16 timbers

No complete analysis will be possible until our observations can be combined with those of Professor Çilingiroğlu and his site architects. But a few comments are in order. All large beams were excavated from the *Susi* temple complex, between and among the basalt and mud-brick piers in the hall. Of the small dimension timbers, only two are clearly tenons, and these were also found only in the pillared hall, in association with the large beams, which in some cases preserve the cut-out mortises (see Fig. 2). Measurements of the depths of preserved mortises are consistent with the average lengths of preserved tenons, 8.5 cm. We have nine examples of the use of elm (*Ulmus* sp.) at Ayanis; the two that are tenons were found in the temple complex, one from the cella of the *Susi* temple. Interestingly, this latter piece measures in cross-section only 2.7 by 2.5 cm, suggesting that it may have been part of a piece of furniture rather than having an architectural use comparable to the examples in the pillared hall. The other tenons from the temple complex were cut from pine. All clear examples of architectural mortise-and-tenon joinery from the hall were found in collapsed debris in which was also preserved bits of carbonized rope. We suggest the possibility that the joined timbers might have been further lashed together for structural support.¹⁸

Other species of wood found at Ayanis include *Quercus*, *Populus*, and a single undated sample of *Juniperus*. While oak and elm were found as small dimension timbers in the *Susi* temple complex, and elm furthermore as tenons, the elm and poplar found in trenches VII and VIII were larger dimension timbers. We suggest that the architectural superstructures of the storage magazines in these trenches were restricted to the flat roofs typical of Anatolian architecture, and that a variety of wood species more easily available was employed in their construction. As yet, no examples of intricate carpentry have been excavated from these contexts.¹⁹ The mortise-and-tenon joinery must then have been employed for architectural uses in the still not fully understood superstructure that surrounded the temple and courtyard. We look forward to an architectural reconstruction that will include analysis of the abundance of well-preserved charcoal.

¹⁸ In one case, if the timber was not in fact a tenon, it was suggested at the time of excavation by Dr. Haluk Sağlamtimur that the timber and rope, found on the beaten clay floor, may have been a stool. Against this idea is the absence of any metal fittings that may more typically have accompanied Urartian furniture manufacture (cf. Seidl 1996).

¹⁹ It is of course also possible that the absence of a dense superstructure in these storerooms meant that the fires there burned in a more oxidizing atmosphere, contributing to more complete combustion of all organic material, and thus fewer preserved timbers. We note also the presence of fragments of painted plaster in these trenches.

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