

Aegean Dendrochronology Project December 1996 Progress Report

ROMAN HERCULANEUM AND POMPEII:

In all the years of our trying to build tree-ring chronologies for the Eastern Mediterranean, two of our biggest headaches have been the Roman and Hellenistic periods. Hundreds of buildings survive, many with beam-holes in them all of which are (usually) empty. Stroll around the Baths of Caracalla in Rome, for example, and you will see hundreds of places where beams once upon a time were. Now, at best, they are full of pigeon nests. Until this year, most of our Roman wood had come from pilings chainsawed from the River Kupa in Pannonia at Siscia (modern Sisak or Celtic Segestica).



In the summer of 1996 our Roman wood supply increased dramatically when we acquired 42 timbers from near the port at Herculaneum (first photo) with the kind help of Dr. Mario Pagano, the Deputy Soprintendente, and Jo Berry of the British School in Rome. In the vaulted Roman cellars was a carpenter's workshop stacked with timbers, some showing signs of use and re-use. When nearby Mount Vesuvius erupted in A.D. 79, they started to burn, but the burning was almost immediately extinguished by some 30 meters of ash and tephra which fell on the site, protecting it until the present day. The reducing atmosphere (lack of oxygen) was the equivalent of a charcoal kiln, and the beams, almost all of them pine, with occasional cypress and a bit of oak, were splendidly preserved. We now have a 202-year chronology with an end-date no later than A.D. 79.

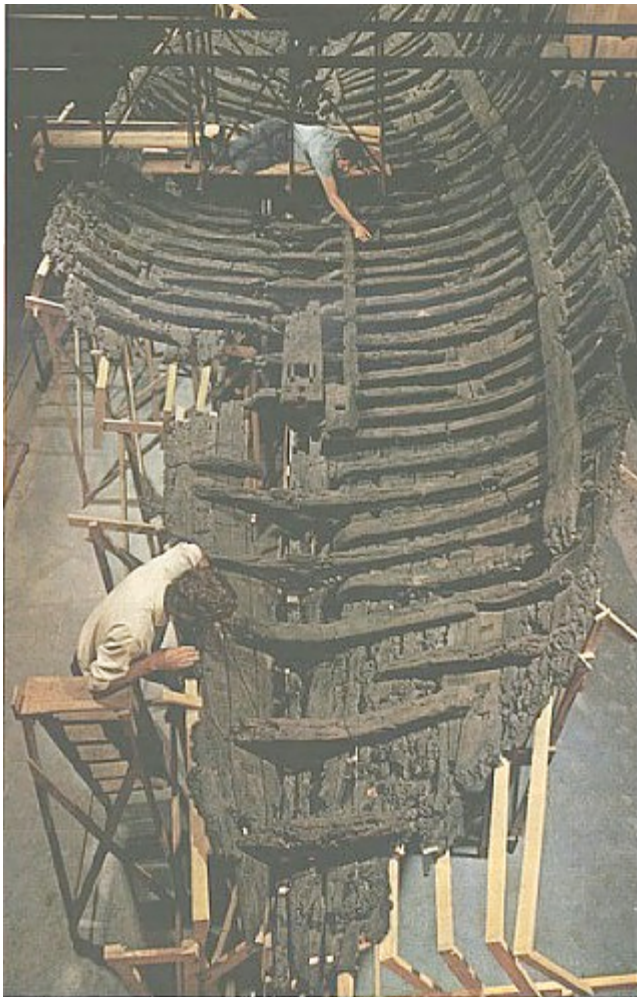
In the current Italian excavations (*Scavi Novi*) adjacent to the *Villa dei Papiri* a deep trench has revealed Roman buildings, preserved up to the roof, also buried under some 30 meters of lapilli, ash, and tephra. From one of these we collected another dozen large timbers which crossdate with the material from the carpenter's shop. The last existing ring in this trench is 18 years earlier than the last one in the workshop. Since the bark is missing in both cases, we do not have a difference in felling years between the one lot and the other, but this is a promising start, and we trust that future collection from the *Scavi Novi* and other locales will reinforce and extend our new Roman chronology. (In photo *Scavi Novi* foreman and front-end loader bring us another burned Roman timber, freshly unearthed.)



At nearby Pompeii we were able to collect burned wood from the House of the Chaste Lovers (*Casa dei Casti Amanti*). This was not as long-lived as the Herculaneum wood, but it, too, is pre-A.D.79. We will have to wait for more wood to appear at Pompeii. What is most exciting about the work at Herculaneum and Pompeii is that, although the destruction date is well known, it is sometimes difficult to determine when any given building was built. We hope to be able to provide answers to these and other questions as collection and measurement continue at these two sites. It was particularly gratifying to see that every scrap of evidence at Herculaneum was being saved for future reference. Now that our Italian colleagues know what we need, there is every hope that we will be able to add to the 1996 work.



THE HELLENISTIC KYRENIA SHIPWRECK:



Over thirty-five years ago Michael Katzev excavated the 'oldest Greek ship,' a Hellenistic merchant vessel which sank off the north coast of Cyprus near Kyrenia sometime between 310 and 300 B.C. (This image is used with permission from and thanks to the National Geographic Society.) Dr. Katzev estimates that the ship was about 70-80 years old when she went down. Some planks are from the original ship; others are from patches, or from patches to the patches. Last summer, after three years of accumulating the appropriate permissions, we were able to bring back pieces of 32 planks from the Kyrenia wreck. They were all soaked in PEG (polyethylene glycol), so we had to dissolve at least the surface layer so that we can see the rings.

Work on the Kyrenia wood is going on as I write. Two of the planks measured this week had 131 and 124 rings, and I thought I spotted another at the time of collection with 150 rings, so there is hope that a useful chronology will emerge.

We now have (from Herculaneum and Kyrenia) over 330 years of information from the 1st-4th centuries in two long sequences where before this summer we had only bits and pieces. You may wonder why I sound so excited about this, but until now we have had 100 times as much Bronze Age wood as we had Roman or Hellenistic. This is **REAL PROGRESS!**

SOS TEPE: MEDIEVAL AND HELLENISTIC AND IRON AGE AND EARLY BRONZE AGE:

Few sites are able to produce dendrochronological material from periods as widely separated in time as

Medieval and Early Bronze. Sos Tepe, a remarkably well-stratified mound about 30 kms. east of Erzurum, currently being investigated by Dr. Antonio Sagona and his team from the University of Melbourne, is just such a gold-mine. We have finished assembling long chronologies from both the Iron Age and Hellenistic periods, and the assumption is that sooner or later we are going to be able to put the whole chronological sequence from Iron Age to Hellenistic to Roman to Late Antique together. The significance of this kind of collection, aside from providing absolute dates for the periods in question, is that we will then have the link to earlier periods that will give us absolute dates on purely dendrochronological grounds.

THE LONG BRONZE-AGE/IRON-AGE CHRONOLOGY:

Patrons of the Project should have received this last autumn offprints of an article published in *Nature* and co-authored by Bernd Kromer of the University of Heidelberg, Sturt Manning of the University of Reading, Maryanne Newton, Christine Latini, Mary Jaye Bruce, and me, on a chronology which we think extends from 2220 B.C. to 718 B.C. (Our Patrons tend to move all over the place, and mail can often go astray. If you did not get your copy, let us know, and we will do something about it.)

Many Patrons sent in newspaper clippings with some of the stories generated by the *Nature* article, including the *Los Angeles Times* (dutifully repeated in both its Japanese and Korean versions) which got it backward, saying that we had micro-rings in 1628 B.C. and following rather than some of the biggest rings we have ever measured. [Porsuk, by the way, now has 54 trees showing this growth spike rather than the 36 reported in *Nature*.] The best post-publication story was a testy letter to the editor of the Daily Telegraph in England (spotted by the ever-alert Sturt Manning) from the editor of the Guinness Book of Records, saying that he had already published 1628 as the date of the eruption of Santorini/Thera and why were we wasting our time? Moral of story: never get interviewed.

MASAT HÖYÜK, KAS/ULUBURUN:

Additions to this long chronology include the upper Hittite level at Masat, the wood from which was collected years ago from Prof. Tahsin Özgüç of Ankara University. It dates to 1353 B.C. (no bark present, however, so the cutting date could be slightly later). This is of interest not only to scholars of Hittite history but also to scholars of Mycenaean history and archaeology because the building in question has imported Late Helladic IIIA/B stirrup jars, a well-known class of pottery. In the photo is a Hittite room at Masat with Hittite and Mycenaean (LHIIIB) pottery. Dendro date is 1353 B.C. (no bark). Note imprint of roof post on rear wall.



LHIIIB pottery is also to be found on the Kas/Uluburun shipwreck excavated by Cemal Pulak of Texas A&M University. The last ring at Uluburun is 1315 B.C. [*Note: please see the 1997 report for an emendation to this date.*] I do not think we are missing many rings on the exterior. Since the shipwreck is a time-capsule, a date for the wood dunnage on board helps date all the rather more glamorous cargo items from half a dozen civilizations and cultures.

KUSAKLI HÖYÜK



Another dated building is the Hittite temple at Kusakli excavated by Dr. Andreas Müller-Karpe of the University of Regensburg. Photographed from the air, the temple has a last preserved ring (no bark, though) of 1384 B.C. (photo credit, Prof. Müller-Karpe). A cuneiform text fragment is thought on palaeographic grounds to be from the 13th century B.C. which would mean that the building was either rather long-lived or a number of rings have burned off the exterior of the wood. We expect to be getting more examples from Kusakli later this year. It will be interesting to see whether they bring the construction date down significantly from 1384. [See: A. Müller-Karpe, *Antike Welt* 1996 fascicle 4, 305-312 for further details and more stunning photographs.]

IRON AGE:

To our long Bronze Age/Iron Age chronology we can now add the pine sequence from Ayanis, the Urartian citadel and palace on the east shore of Lake Van, built by King Rusa II. The last ring (with the bark) was formed in 651 B.C. Since Rusa reigned from ca. 685-645, this means the place was built shortly before his death. The building inscription on a single block of basalt, published by Altan Çilingiroglu and Mirjo Salvini, listing Rusa's accomplishments, leaves one-and-a-half lines in mid-text blank. Apparently, Rusa was planning to do other things at Ayanis but never got around to them. [See: Çilingiroglu and Salvini, "Rusahinili in Front of Mount Eiduru": The Urartian Fortress of Ayanis (7th Century B.C.)" *Studi Micenei ed Egeo-Anatolici* 35 (1995) 111-124.]

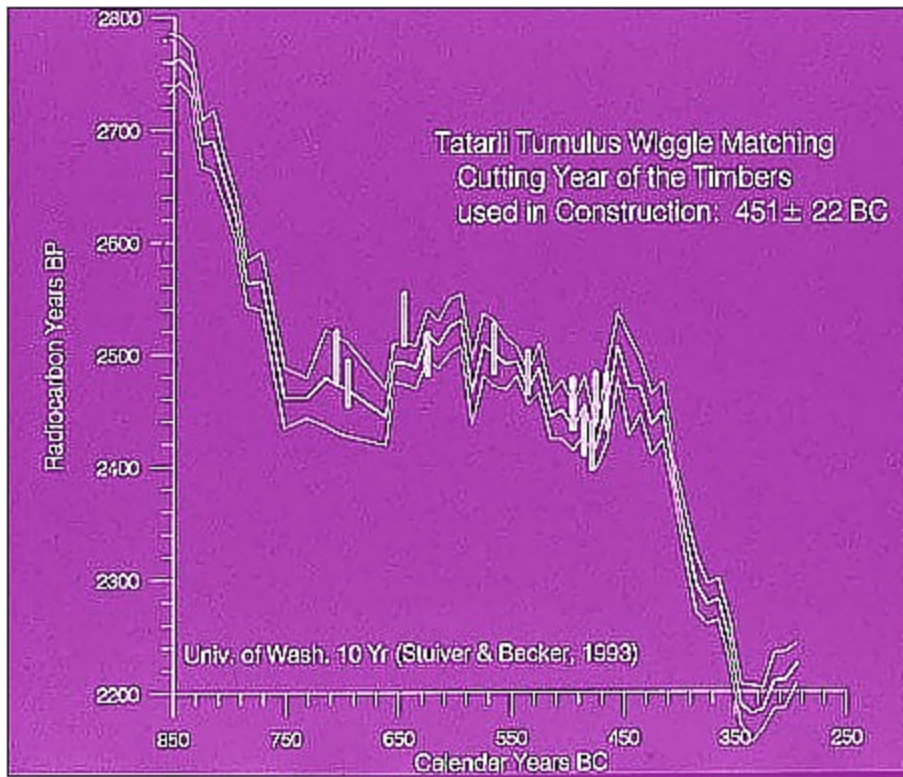


IRON-AGE TATARLI (A CAUTIONARY TALE):

You can't win 'em all (or at least I can't). I reported cheerfully in two previous newsletters that I thought we had the Tatarli Tumulus near Dinar (near Afyon) nailed down to the sixth century B.C., although the

overlaps with other chronologies were short. I did hedge a bit in 1995 by saying that I preferred to leave the date tentative until we have more Iron Age wood to corroborate the so-called 'fit'. Well, my optimism has turned out to be unjustified, and caution was the correct note.

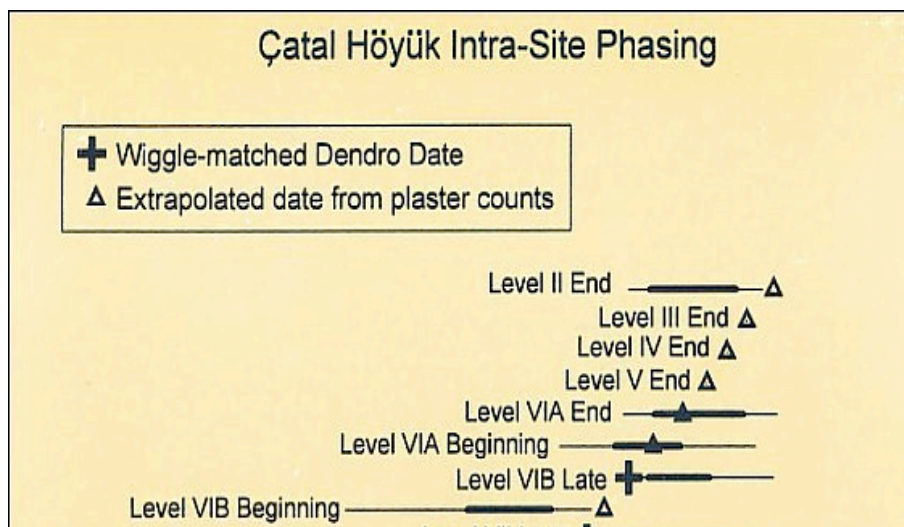
Dr. Bernd Kromer in Heidelberg has just completed a long exercise in radiocarbon wiggle-matching. The wood at Tatarli (with the bark present) was cut in 451 ± 5 years B.C. It was then painted with what look like Archaic figures on Attic pottery of the 6th century (see newsletter of December 1991 for the sketches but ignore the date given there). Note how flat the radiocarbon curve is for these centuries (7th-4th B.C.). Without wiggle-matching, ^{14}C dating is a fruitless exercise for the Late Geometric through Classical periods.



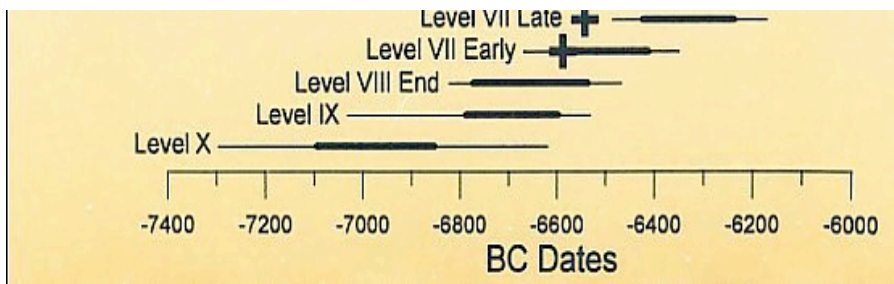
A question which nobody as far as I know has been able to document (other than guess) is: how long does it take a style/fashion to percolate from an urban center (say, Athens or New York City) to the remote provinces (say, Afyon or Ithaca, N.Y.)? Here at Afyon/Dinar/Tatarli we seem to have a painting style that was popular in Athens a half or three quarters of a century earlier.

THE NEOLITHIC:

Maryanne Newton finished her M.A. thesis on the dendrochronology of Neolithic Çatal Höyük. The sequence as we currently have it wiggle-matched (ten accelerator determinations done at the University of Arizona) runs from ca. 7024 B.C. to ca. 6449 B.C., not much different from the provisional results (based on only two determinations) reported last year. The bargraph below shows how the sequencing works from Çatal Höyük Level X to Level II End.



A summary report on the Çatal results will appear in Dr. Ian Hodder's *On the Surface*, published by the McDonald Institute and the British Institute of Archaeology at Ankara, currently in press at Cambridge and due out any day now.



MORE ON THE 'CAN'T WIN 'EM ALL' THEME:

We spent a week on Santorini/Thera in 1996 exploring old mining quarries for evidence of organic material at the 'contact surface' between the volcanic tephra and the Minoan soil. Joan Ramage (Cornell geology) had spent a week with Professor Floyd McCoy (Hawaii) on a surface survey of the island, and Dr. Sturt Manning (Reading) joined us for several very hot days of reconnaissance. We found imprints of now-deteriorated vegetal material, but nothing substantial. We did find nuggets or nodules of what appears to be highly-concentrated sulphur. Chemical analysis of these might help show us exactly how sulphurous the Theran explosion actually was.

MEANWHILE, BACK AT THE RANCH...

In the laboratory, Mecki Pohl has now finished Version 20 of his CORINA (Cornell Ring Analysis) Program as part of his "Diplom" thesis at the University of Berlin, and Jennifer Fine and Laura Steele have finished converting an enormous amount of tree-ring data to it. The working copy of their latest Bronze Age/Iron Age Chronology is 1598 years long, composed of 446 data sets with 55,132 rings, each one of which was measured at least twice. The number of intervals (between years) with four or more samples (even as many as 108) per year is 1375. Of these, 591 intervals or 43% have trends where 75% or more of the ring-widths for a given year increase or decrease together (= "signature" years = German Weiserjähre). For instance, 1081 B.C. was not a good year for Eastern Mediterranean trees: 1 tree has a larger ring than in 1082 B.C.; 66 trees have smaller rings. Presumably the wheat farmers had much to complain about in 1081.

For readers who remember the Rhys Carpenter thesis about a climatic contribution to the end of the Late Bronze Age, 21 of the 35 years following 1159 B.C. (the presumed date of the eruption of Hekla III) are starred "signature" years, with ratios of increase/decrease in any year ranging from 30/0 to 0/37. (English translation: in one year 30 trees put on larger rings and 0 did not; in the other year no trees put on larger rings and 37 put on smaller rings.) Something really interesting climatologically is going on when 100% of a tree-population scattered over many kilometers of terrain is responding in an identical manner. More on this later when we finish figuring out what the patterns mean.

Jennifer and Laura have also continued to supervise the activities of fifteen people in the lab. Laura's thesis on Neolithic architecture (much of it written last year while she was in the hospital) earned her a *summa cum laude*. She is now working for us full-time. Mary Jaye Bruce continues to produce quantities of readable text and figures as well as keep orderly accounts in six currencies in five languages. She also was a stalwart of last summer's collection trip from which we returned with almost a quarter of a ton of samples from some thirty sites in five countries. Maryanne Newton and Christopher Roosevelt (who is almost finished with his M.A. thesis on the Amuq pottery excavated by Prof. Robert Braidwood about sixty years ago) won PhD Fellowships from the Graduate School at Cornell, so we expect to see them around for some while to come. Miles McCredie is our systems analyst/programmer/trouble-shooter when Mecki is out of the country. See our World Wide Web site at: <http://www.arts.cornell.edu/dendro/> for more information.

END NOTES...

Summer menu improbabilities: **CHICKEN SPIT** and **HAT WOTHER**

Most unlikely form of transportation: **ALBATROS AIR**

And don't miss: **VERTIGO BEACH** with its **CLUB POLLEN.....**

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