Aegean Dendrochronology Project December 1999 Progress Report

SUMMER TRAVELS:

In 1999 we picked up our new diesel Volkswagen bus and in it traveled 13,748 kms. or 8,593 miles. The old bus pinched in Rome in 1998 has never reappeared. We brought back or received in the mail more than 353 kgs. of wood and charcoal (although 778 lbs. sounds heavier), between 421 and 1000 samples (if one counts all the fragments) from 50 sites in 9 countries: Italy, Greece, Turkey, Georgia, Armenia, Syria, Lebanon, Jordan, and Egypt. The field crew consisted of Mary Jaye Bruce, Isabel Tovar, Annie Koehne, and me. During our two months in Turkey we were accompanied by Turkish government representatives Levent Vardar and Aliye Usta who made our lives easier by helping with all the hard work. Much of where we went and what we did is reported only in travelogue form since much of the wood is still being measured and dated.

Any one of the following items in last summer's collecting spree would have made the summer a "success": the Eski Saray (EBA) at Kültepe, more Early Bronze Age posts from Lavagnone, Hittite charcoal from Kusakli, Late Helladic charcoal from Mycenae, Bronze Age charcoal from Lecce, Roman wood from Ravenna and Classe, Byzantine wood from Bozburun, and the Cedars of Lebanon. We came home with them all! Here are a few of the highlights, starting with what is done, or pretty much done, of another good year.

KUBADABAD SARAYI, KIZ KALESI:

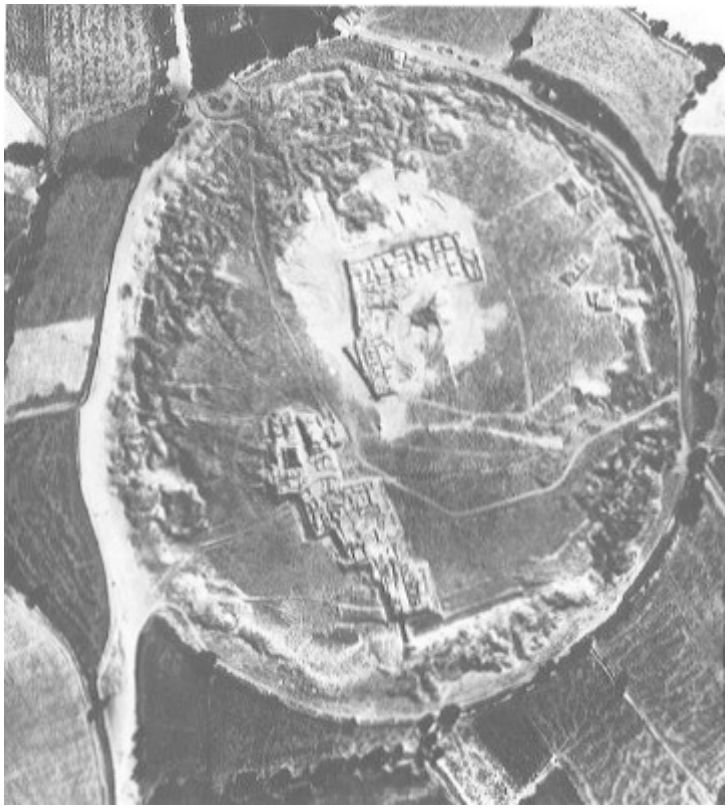
On Beysehir Lake near the Kubadabad Sarayi of Seljuk Sultan Alaettin Keykubad (dendrochronological date 1235) is a small fortified island called (as they all seem to be) the Kiz Kalesi or Maiden's Castle, first investigated by Katharina Otto-Dorn, then by Mehmet Önder, and most recently by Rüçhan Arik of Ankara University. The consensus is that it is Late Byzantine/Early Seljuk. Prof. Arik informed us that there was wood in the walls, and we indeed found two juniper stretchers, both untrimmed. One from the east end of the island has a last preserved ring at 1156, and one from the west has a last preserved ring at 1155. Although there is no evident sapwood, the dates are so close to one another that we feel not much exterior wood has been lost to erosion unless it eroded at an extraordinarily uniform rate. Old-timer Amanda Erwin gets full credit for this one. A date of 1155/1156 can be either Late Byzantine or Early Seljuk, depending on one's outlook, so we will refer this to the excavator and let her decide what she wants to call it.

Fig. 1: Isabel Tovar and Annie Koehne scramble for wood at Kiz Kalesi on Beysehir Gölü.

THE ASSYRIAN COLONY PERIOD AND THE ESKI SARAY AT KÜLTEPE:

At Kültepe-Kanis, just north of modern-day Kayseri in the middle of Turkey, Assyrian traders about 4000 years ago did a prosperous business for several centuries, bringing in textiles from Assur and tin from Afghanistan (maybe) and returning to Assur with large donkey-caravans of precious metals (i.e., gold and silver). [**Please note** that this is a change in what I had in the printed report, in which I stated that the Assyrian traders returned to Assur with tin-bronze.] They settled in a karum, a semi-circle of hundreds of small mudbrick houses around the big mound (thus our term of [merchant] "colony") and did a brisk business for generations. Their archives of thousands of cuneiform tablets--letters, contracts, bills of sale, etc.,--are being published by an international team of specialists. Oddly, if it were not for the presence of the tablet archives attesting to the fact that the occupants of the houses were Assyrian traders, one might have a hard time distinguishing their houses from local Anatolian mudbrick houses. Even more oddly, back at Assur, the other half of this correspondence has never been found. So much for the vagaries of the archaeological record.

Above the Karum on the enormous mound (diameter about 800 meters) at Kültepe-Kanis are a number of palaces or palace-sized buildings in which lived the local rulers of Kanis with whom the Assyrian traders came to do their business. Five of these large buildings, opened over the years since 1948 when Professor Tahsin Özgüç of Ankara University commenced regular excavations at the site, have now been published: (Tahsin Özgüç, *The Palaces and Temples of Kültepe-Kanis/Nesa*, Türk Tarih Kurumu Basimevi, Ankara, 1999).



Aerial view of the huge city mound at Kültepe during excavation. The Warsama Saray is in the center and the Eski Saray to the lower left. (Photo courtesty Prof. Tahsin Özgüç).

Kültepe had a number of periods of activity, the two most important being the Karum Ib period (approximately 18th century B.C.) and the Karum II period (perhaps a century or so earlier). Most of the cuneiform tablets come from the Karum II period, and the difference between periods II and Ib is hotly disputed. The length of the Karum II period has been measured by *limu*-names, a *limu* being the magistrate (or *archon* in Greek terminology) for the year. About 70 or so *limu*-names are known, although I understand a remarkable new tablet is about to be published (forthcoming from Prof. Klaas Veenhof in Leiden) which lists something like 130 or 135 *limu*-names (plus some kings) according to Professor Özgüç. This ought to just about double the length of the Karum II period. However this may play out, we can now provide dendrochronological dates to supplement those that the cuneiform

specialists are deriving from the tablets. A second reason why assigning an absolute date to the karum period is of interest--aside from helping with the internal chronology of Kültepe--is that this will also serve as a marker for when the Hittites appear and when the Late Bronze Age properly begins in Anatolia. A third reason is the multiple links between Kültepe and southeast Anatolia and Syria.

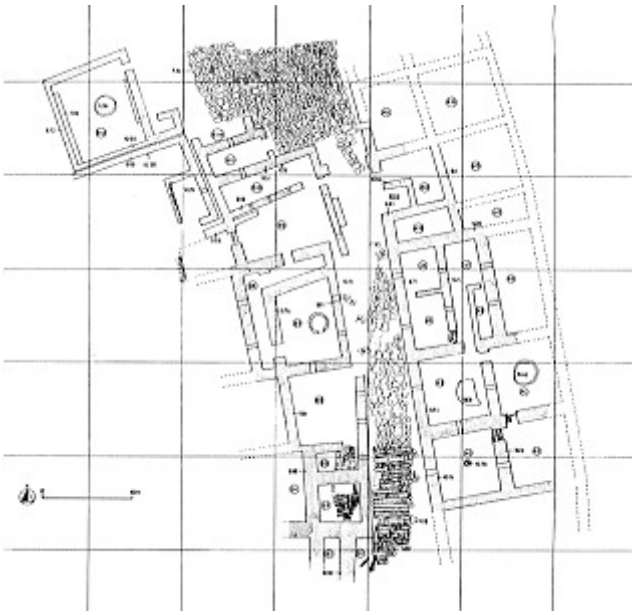


Fig. 2: Plan of the Eski Saray at Kültepe. Note the timber road at lower center. (Plan courtesy Prof. Tahsin Özgüç).

Some years ago we reported a date for the Warsama Palace on the big mound at Kültepe (=Karum Ib period) of 1810 B.C. This was derived from a number of carbonized beams, all of which had the bark present, and all of which were cut in the same year. The building burned at an unspecified time thereafter. We think that the building had a life-span of at least 61 years based on the dates provided by a couple of timbers which were apparent repairs to the structure. Since neither of these timbers had the bark present, the life-span of the building must have been longer, but we cannot currently quantify that. The Warsama Palace is now published in the new book by Professor Özgüç.

In the summer of 1999 Professor Özgüç kindly reopened for us the Eski Saray (Old Palace) from the Karum II period (also on the mound and also in his new book). The principal reason we wanted to work there was an entranceway of carbonized logs each about .34m. in diameter which he had conserved for thirty years after the original excavation by burying them under plastic sheeting and a meter or more of earth. The logs turned out to be oak, the first ever found at Kültepe. (Professor Özgüç says Kültepe is always full of surprises.) The oak chronology from 20 timbers is 251 years long and as of today fits with nothing else at the site. I have no doubt that Maryanne Newton who is currently finishing off the last three bags of fragments from this group of timbers will sooner or later be able to report a fit.

Fig. 3: Entranceway to the Eski Saray at the time of excavation. Oak timbers center, and juniper floorplanks left. (Photo courtesy Prof. Tahsin Özgüç).

In a room adjoining the entranceway of the Eski Saray was a floor planking of juniper boards (in Figs. 2 and 3, look for the black spots just to the west of the timber entryway) which we collected the next day, almost as an afterthought. These have a total of 520 rings preserved and would have had more if the planks had not been squared when they were cut and put into place. This juniper chronology fits spectacularly (with a 395-year overlap) with a 503-year juniper sequence in the Northwest Trench at Acemhöyük, put together years ago by Mac North and already wiggle-matched by Dr. Kromer, making a 627-year continuous chronology for the Early Bronze Age/Middle Bronze Age extending from 2660 to 2033 B.C. plus or minus about four years for the last existing ring on the floorboards at Kültepe. Annie Koehne gets full credit for overseeing this work. Next summer we need to re-examine these rooms to see if any additional small scraps can extend the chronology downward. Moral #1: Afterthoughts are sometimes Good Things. Moral #2: Any site with almost a millennium of tree-rings is by definition a Good Site.

The junipers from the Eski Saray ought to overlap the junipers from the Warsama Palace by about 191 years, but I think we have as many as six missing rings on the earliest part of the latter chronology which consists of fragments from only one 435-year-old tree. When we have sorted this out, we expect to have a single tree-ring chronology about 2031 years long, running from around 2660 to 627 B.C., (including all the Bronze and Iron Age chronologies we have reported so far), that is to say from the Early Bronze Age well into the Iron Age. Stay tuned.

If we convert all of the above into a chart, the phasing at Kültepe looks something like this:

Eski Saray (=Karum Level II)	floor planks cut some time after 2033 B.C.
Eski Saray (=Karum Level II)	lifespan unknown until destruction by fire.
Eski Saray Entranceway	date not yet known.
Warsama Saray (=Karum Level Ib)	constructed in 1810 B.C.
Warsama Saray (=Karum Level Ib)	had a lifespan at least until 1749 B.C.

THE CEDARS OF LEBANON AT BCHARRÉ:

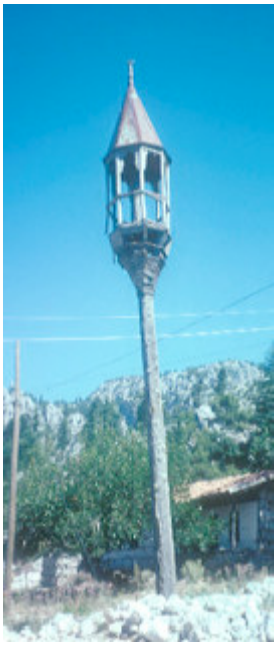
We made a dash (leaving the bus at the Syrian frontier in the care of the Lebanese army) to Bcharré, Lebanon, where some twenty of the famous cedars had fallen down in a series of windstorms. The locals were cutting them into little blocks to make bibelots to sell to tourists when Les Amis des Cédres intervened and forbade all further cutting. The Friends allowed us, however, to chainsaw sections, and Carol Griggs is finishing the work on them, identifying the missing rings which the rookies had not been able to find (not their fault--the wood turned out to be horrendously difficult).

Fig. 4: Discussing "la dendrochronologie" with Père George Rahme and his flock in the Lebanese National Grove at Bcharré.

The longest ring-sequence is in excess of 588 years, rather shorter than what we had been hoping for, but these missing ring problems (up to 28 rings per piece) are causing her work to go very slowly. It is important that we get this right, because the living cedars are what will eventually anchor the long cedar chronologies for the Eastern Mediterranean which we are developing for the purpose of dating ancient Egypt. We have 3920 years' worth of cedar rings on file as of December 1999. We expect this ring-count to grow substantially as more Egyptian wood is collected.

OTHER CEDARS:

While still on the subject: we also sampled long-lived cedars at Salamut Yaylasi in the Taurus Mountains near Akseki north and east of Antalya. Although measurement of these pieces will not take place until January and February 2000, my suspicion is that they will be considerably longer-lived than the Bcharré wood. At the nearby village of Güzelsu we sampled both the forest and the remains of the old ruined mosque and minaret of utterly unknown date, the latter a single cedar pole which we drilled from one side to the other. We have not yet worked out the terminology for this structure: a minimalist minaret? a post-modern minaret? a pre-modern post minaret?



ROMAN WOOD:

Roman wood, as I have said before, is a pain in the neck, usually because there is hardly ever enough of it. A chance encounter with an old colleague, Professor Maurizio Tosi, put us in contact with a number of new Italian colleagues, all of whom had wood for us. Ravenna alone had six groups of likely timbers totalling 49 pieces, mostly fir and larch. Their dates are thought to be Augustan, second century, and "unknown Roman." Annie Koehne is supervising the work of the rookies on this material. She has, so far, chronologies of 119 years and 217 years, and a single piece with 359 rings. That the Ravenna wood does not seem to fit with any of the Alpine ring-sequences or the ones from Herculaneum and Pompeii (most of which are Alpine imports) gives us hope that it may be from elsewhere in the Adriatic or Mediterranean and therefore of greater relevance to us because we can look forward to achieving crossdating with Aegean sites. On the down side: this wood did not come to us without some pain. We spent an entire day cleaning out a storeroom at Classe, examining hundreds of pounds of carefully saved poplar poles from the Roman Lido, not one of which had more than twenty rings and all quite odoriferous.

MISCELLANEOUS:

At Mycenae we collected 51 lumps of charcoal from the British excavations of almost half a century ago, including the Citadel House, House of the Sphinxes, House of the Shields (also known as North House), and House of the Oil Merchant, the ceramic sequences from which are well-known. We have 24 timbers from the Hittite site of Kusakli near Sivas, three large boxes of wood from Acemhöyük, and Egyptian wood from the Metropolitan Museum in New York. Some 20 pieces of wood from the Byzantine shipwreck at Bozburun near Marmaris will be be interesting because they are "backwards." Normally one expects oak frames and pine planks on a ship. This ship has pine frames and oak planks. We have material from EBA Lavagnone, from LBA Roca near Lecce, and from the Church of St. Paul in Tarsus. A potentially interesting set of timbers came from a first millennium B.C. grave at Verucchio, west of Rimini.

Fig. 7: Üç Ayak Kilise. All but one timber were short-lived.

In some places there was almost no wood: a hot two-day hike through a dozen Late Roman/Early Byzantine cities in Cilicia yielded precisely two samples which were probably not part of the original build. Üç Ayak Kilise (Three-Footed Church), a once-fine Byzantine building near Kirsehir, yielded only one useful sample, as did the basilica at Torcello in the lagoon of Venice. When we get dates, we will report them to you.

Fig. 8: Sawing an early oak piling from the island of Torcello in the Venetian lagoon.

MEANWHILE BACK IN THE LABORATORY:

This is the unromantic segment of our work that hardly ever gets proper recognition even though it is the most important. We finished off two more modern chronologies from the Republic of Georgia: *Fagus orientalis* from Akhmeta and *Abies* sp. from Xaisi. Isabel Tovar has reworked a tricky *Quercus* chronology from Chalkidiki, Koutri Chorafi (near Arnaia, Barbara, Greece) and submitted it to the International Tree-Ring Data Bank (ITRDB) in Boulder, Colorado, where it is already available to researchers world-wide. She also cleaned up and submitted similar data sets from Istanbul's Belgrade Forest (Quercus spp.) and Scotida, near Mt. Grammos, West of Grevena, Greece (*Abies cephalonica* and *Pinus nigra*). A dozen more chronologies are to follow for posting on the ITRDB in the next two months.

In the summer of 1999 Maryanne Newton spent a great deal of time on a number of carbonized *Quercus* sections from Assiros in North Greece which had spent years on the excavation storehouse shelf and had consequently deteriorated. She has a 94-year sequence from the Early Iron Age (Assiros Phases 2 and 3), an 84-year sequence from Assiros Phase 6 found with (mid)LHIIIC pottery, and a miserable 56-year sequence from Assiros Phase 9 found with LHIIIA/B pottery. She has as yet no secure crossdates. The shortness of the sequences does not begin to indicate the difficulty of the measurement and analysis of these very frustrating pieces. Carol Griggs found some new internal crossdates for Sisak/Siscia/Segestica. We await wiggle-matching results from Dr. Kromer.

Old-Timer Kenneth Harris and Programmer Muhammad Arif have been re-working and fine-tuning the CORINA (Cornell Ring-Analysis) program written by Mecki Pohl which all of us use to keep daily track of all our data. Old-Timers Laurel Freas, Shannon Wolf, and Andrew Capetta worked overtime on both Kültepe and Bcharré and acted as support-in-reserve for whatever work needed to be done.

Christine Groneman did the preliminary work on Roca.

PUBLICATIONS, OUR WEB-SITE, AND PUBLIC PRESENTATIONS:

Out only last week is an article by Maryanne and me on Çatal Höyük which appeared in *Meletemata: Studies in Aegean Archaeology Presented to Malcolm H. Wiener* (also *Aegaeum 20*), Université de Liège and UT-PASP. Patrons of the Project will get reprints as soon as these can be produced. Other publications are in press (some have been dawdling along for over five years), and offprints of them will be forthcoming as well. Patience.

Our Web-Site http://www.arts.cornell.edu/dendro put up and maintained by Mary Jaye Bruce has been receiving 120 hits a day since January 1st of this year. That adds up to almost 44,000 hits a year from 51 countries. Thus, when I get a panicked request like "My name is Sally, and I am in the 8th grade, and I have a paper due on Monday. Would you please tell me everything you know about dendrochronology?" I can refer poor Sally to the web-site. Mary Jaye is currently reorganizing the site (for quicker downloading, she tells me) and is adding illustrations (small ones) when she gets around to it.

The Archaeological Institute of America has invited me to be its Joukowsky Lecturer next autumn, and in an unguarded moment I accepted. If you would like to see results of any of this work in color, please come. The lectures will be announced in Archaeology Magazine every two months, starting in Summer 2000 (or you can just e-mail us).

ENDNOTE:

I have been asked over the years what the chief accomplishments of this project have been. My standard reply is that we have taught more people than anybody else how to spell the words "Aegean" and "Dendrochronology." Regular readers of these reports also know that we often conclude with a bit of frivolity. As we end this 99-year century, the shortest on record, let us continue in this vein.

THE 'AUGEAN' DENDROCHRONOLOGY PROJECT:

Remember Herakles and how one of his labors was to clean out the Augean stables? Well, last summer a man on a farm about 30 miles to the west of Ithaca, N.Y., thought it would be nice to have a minnow-trap dug into his farm pond. He hired a backhoe to excavate a little hole for it, and lo and behold underneath the glacial clay: a Mastodon. Volunteer crews from Cornell, including members of this lab, headed by John Chiment dug out what seems to have been a mastodon wallow and recovered about 95% of his bones which is some sort of record.

Fig. 9: Ellie Kuniholm sizes up one big femur.

The critter was an arthritic 36-year-old male, with tusks measuring eight feet (2.44m.) around the outer curve and seems to have stood about ten feet high (3.05m.) at the shoulder. Also in the muck (much of it a mastodon dung-pile over half a meter deep) were the ribs of a juvenile mastodon, and bits of what might possibly be a third, the teeth of something called a stag-moose (considerably larger than today's moose), and a variety of trees (which is where we came in), both in the dung with the bones and directly above them. Species include *Quercus* (with over 300 rings), *Pinus, Populus* (with beaver tooth-marks), *Abies balsamea, Tsuga canadensis, Picea, Ulmus, Betula,* and *Alnus,* among others. Many inch-long twigs were mixed in with the dung,...apparently twig-tips were the diet of choice for mastodons, but the twigs did not digest all that well either the first or the second or the third time through the mastodon's digestive system. Carol Griggs has been doing the species identifications, and Joan Ramage has been helping out with the measurements.

Fig. 10: Our mastodon's lower jaw, complete with teeth and tongue- slot.

Trying to dendro-date an event about 11,600 years ago when the longest available tree-ring chronologies from New York State are hardly 300 years long, and the bristlecone pines are all the way across the continent in California, is a bit of a non-starter, so selected slices have been sent to Dr. Bernd Kromer at the radiocarbon laboratory in Heidelberg for wiggle-matching. We'll let you know next time exactly how old all this turned out to be.

Peter Ian Kuniholm

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