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The Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology

Aegean Dendrochronology Project
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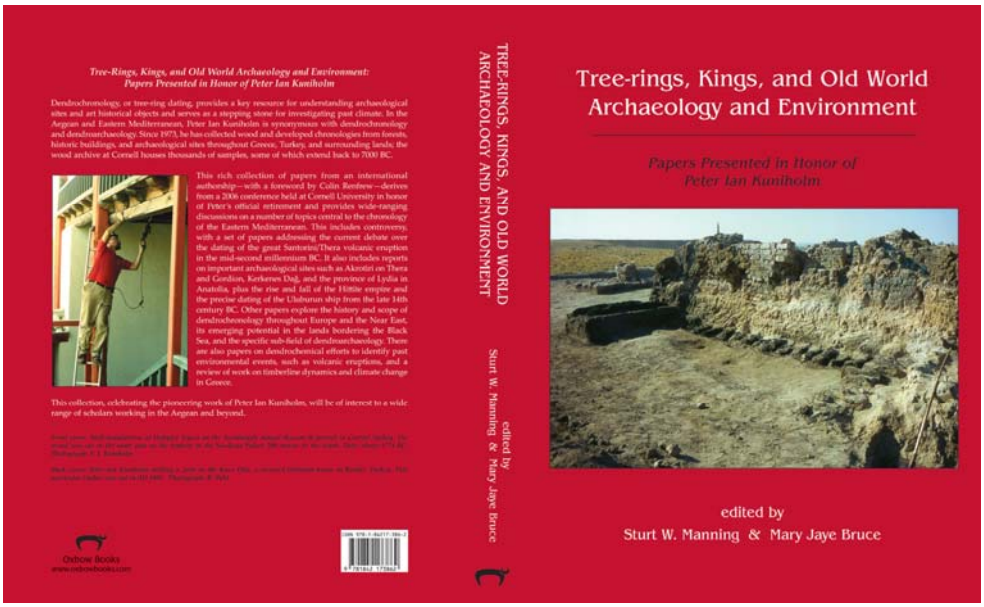
Aegean Dendrochronology Project: December 2009 Progress Report

A busy 2009 was dominated by one exciting event which had gestated over the time covered by a mere three tree-rings (but seemed much longer to all involved). At last, thanks to lots of hard work, especially by Mary Jaye Bruce: the book is published!



Tree-rings, Kings, and Old World Archaeology and Environment: Papers Presented in Honor of Peter Ian Kuniholm is no longer virtual, but very real. It is available now from Oxbow Books/The David Brown Book Company (In North America, see The David Brown Book Company; in Europe, the UK and the Rest of the World: Oxbow Books). Both houses use this common website: http://www.oxbowbooks.com/bookinfo.cfm/ID/87538

We of course hope that you will all want to get a copy, and will encourage any libraries you use to get one (or more!).

The first copy: The honorand, Peter Ian Kuniholm, with the editors, holds the first copy of the volume, presented to him in the lab over the traditional pizza lunch. The front and back cover survived a rapid proof-read with bated breath; and the editors really do not want to know about any other errors (although Peter's red pen has already pointed out a few…).

We thank all the authors for their contributions, hard work and patience; and we thank Peter Brewer especially for his LaTex wizardry which was critical to getting this project into the finished form.

So: what do you get in xxi + 332 pages inside two Cornell Red covers? The contents of this must-have volume are listed on the next page. And for the moment, David Brown Books (at the link above) has the price lower than Amazon!

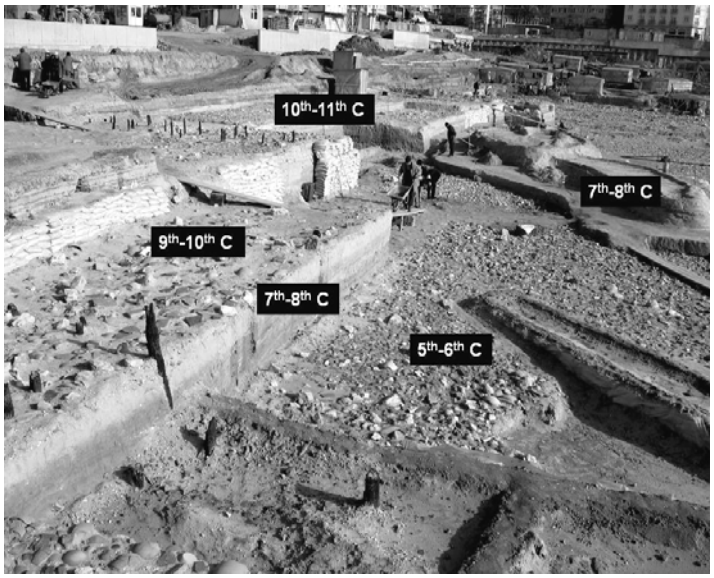
Contents:

Student Work in the Lab

Kirsten Sauer, dendro rookie, measuring wood fromYenikapı.

A unique feature of the Cornell Laboratory is that students (undergraduate and graduate) have always been key partners in the research mission. Most other laboratories do not engage students directly in the research—but we believe this provides students with a special chance to engage with key evidence. This fall semester was one of our busiest ever with 12 students (seven undergraduates and five graduate students) and two returning old timers (Kayla Altland and Ryan Hunter) all beavering away: indeed quite a lot of the time the lab has had no free microscopes or measuring platforms and the sanding area has never been so busy (or noisy). The new extraction arrangements designed by Peter Brewer and Charlotte Pearson have proved excellent and have come close to solving the long-term sawdust problem in the work room.

For the first time we also had a graduate dendro seminar on Wednesday evenings. Topics ranged from reading about and discussing the basis and security of the Gordion dendrochronology, to the use and problems of *t*-scores, to applications of dendroecology in dendroarchaeology, to dendroclimatology, to key Aegean-East Mediterranean dendroarchaeological case studies, and so on. The students' varied fields and backgrounds made these sessions particularly lively.



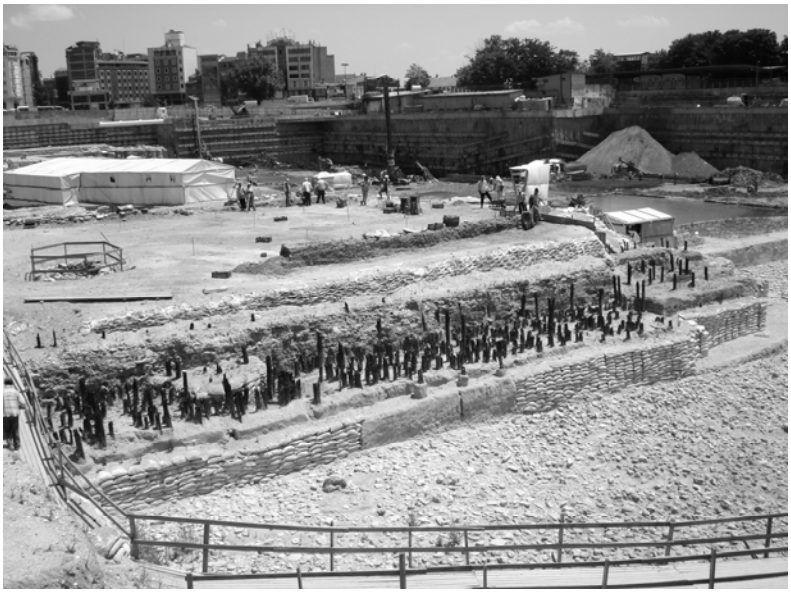
Wood from Yenikapı in Istanbul

Having introduced the rookies to the glamorous world of dendrochronology (from wood prep to measurement, etc.) we all got stuck in measuring slightly malodorous wet-wood samples from the Yenikapı harbor area in Istanbul.

On the left is a view of part of the enormous site— which runs in total from the Neolithic through the modern day. This image shows the stratigraphy as it rises from the 5th to 11th centuries AD.

This summer's field collection at this remarkable site, which has been excavated as part of a construction project to tunnel under the Bosphorus, resulted in 567 new samples to add to over 1500 samples currently in process at the lab.

Since excavations began in 2004, the site has earned the accolade of "the greatest nautical archaeological site of all time" (Rose and Aydıngün, p.34 in *Archaeology* July/August 2007). Discoveries to date include the earliest known city wall of Constantinople, approximately 33 shipwrecks, Late Neolithic wattle-and-daub structures, and thousands of other artifacts from Byzantine times. There is also somewhat controversial evidence for a 6th century tsunami in the form of a destruction level which buried the contemporary docks, including intermixed fresh broken pottery sherds, gravel, wood fragments, shells, bones and the complete skeletons of 5 horses and a camel. It is speculated that the possible tsunami may be related to a known earthquake AD 553.



On the left the sampling group of R to L: Tuncay, Rachel, Tomasz, Feliz, and Sturt next to some posts about to be cut (those with the tape). To the right are views of two of the harbor facility elements at Yenikapı which were sampled during the summer 2009 fieldwork.

Dendrochronology has a major role to play in the further investigation of this ancient harbor, and we hope to provide new insight into establishment and renovation dates of the various docks and associated stratigraphic layers, in addition to the exciting prospect of finding material at Yenikapı which may help to fill our "Roman gap" where dendrochronological samples have up until now proven exceedingly thin on or in the ground. The students were very excited to work on material from such a site and rose fantastically to the challenge of preparing and making careful measurements of these often difficult samples. Collectively over the semester they measured over 26750 tree rings—a fantastic achievement. The result of their work was the construction of a chronology from a single wharf location, which overlaps convincingly with chronologies built from samples collected in 2007 and 2008, to produce a very well covered chronology spanning over 200 years.

Lab Visits, Departures:

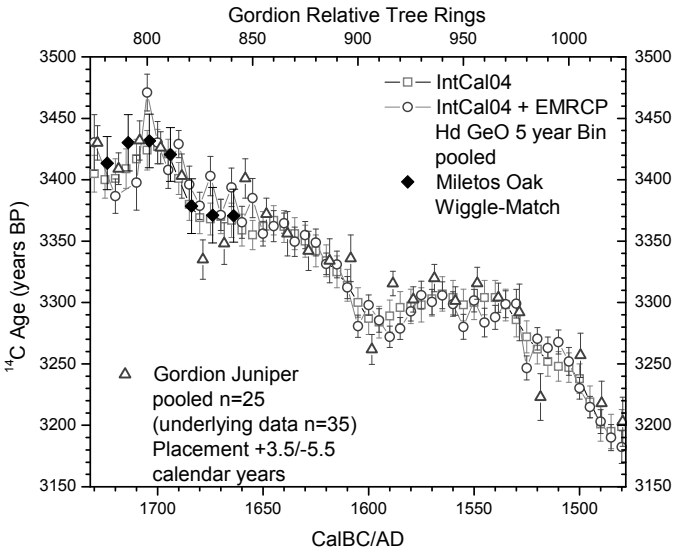
This last June three very special visitors ventured down the staircase into the basement of Goldwin Smith Hall to visit The Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology: Carolyn (center), Kate (at the microscope) and Elizabeth Wiener in photo to left. It was a great pleasure to be able to show them some of the work of the laboratory. And, of course, this was an opportunity to encourage Kate and Elizabeth to look for wood and charcoal when they work on archaeological sites in the Aegean.

Sara Rich who is doing graduate work in Belgium, spent 6 weeks in the lab working on Cypriot cedar. Sara helped collect these samples with Sturt in Cyprus this last summer. The hope is to learn more about where cedar comes from when found at archaeological sites in the east Mediterranean region.

Meanwhile, after many years working at the lab, Dr. Jennifer Watkins and Jessica Herlich both moved on to exciting new things: Jen to starting her teaching/faculty career, Jess to starting graduate work at the College of William & Mary.

East Mediterranean Radiocarbon (Inter-)Comparison Project

For a number of years we have been working with Bernd Kromer at Heidelberg on the investigation and testing of atmospheric radiocarbon levels relevant for the Aegean and east Mediterranean, and thence to archaeological samples from this region. We have measured new German Oak (GeO) samples to test and to better define the international radio-carbon calibration curve (currently called 'IntCal04'—a new IntCal09 is in press at present, but it does not change any of the tree-ring-based data for the Holocene, that is the last 12,000 years), and we have especially measured the radio-carbon ages of Aegean-region wood samples. The close match of time-series from the Gordion juniper record both allows us to date the Gordion tree-ring chronology within very narrow margins (at present, AD2009, +3.5/-5.5 years at 95.4% probability), and to show that this chronology closely follows the northern hemisphere record for most of its length (and that the tree-ring chronology must therefore be more or less correct). The very close match of the Gordion radio-carbon ages, and those from the 72-year oak tree-ring sample from Miletus (coastal western Turkey) (see Figure above), with the northern hemisphere record (derived from oaks from Germany and Ireland), also demonstrates nicely that Aegean-region radiocarbon ages are approximately correct in the mid-second millennium BC, contrary various claims that there might be something wrong, for example because of supposed up-welling of radiocarbon-depleted deep water in the Mediterranean.



Fieldwork Summer 2009

We carried out another extensive program of collecting this last summer. Tomasz Wazny and Rachel Kulick (who finished her undergrad studies at Cornell this year with a senior thesis on Cypriot dendrochronology and is spending this year studying at Cambridge in the UK) set out from Switzerland and worked in Bosnia with our collaborator Aleksander Durman and colleagues, before a long drive to meet Sturt Manning for work in northern Greece. The dendro van then went to Turkey where we linked up with Ünal Akkemik and Nesibe Köse. After our work at Yenikapı in Istanbul (see above), Tomasz then went north into SE Europe for more dendro work before a short trip to Crete to continue work started there, while Sturt went to Cyprus to collect samples from several areas.

Among the many highlights was the work at Orašje in Bosnia on subfossil oaks. These oak trees were originally retrieved from the river beds of the Sava, Bosnia, Oštra Luka, Vrbas, Drina and Krapina. The ages of the trees vary from 1000 to 9000 years ago. The trees were discovered and extracted by Hrvoje Benkovič of ABONOS in Orašje. The firm is an enterprise that exploits sand, and as a sideline, the subfossil oaks have become an important commodity in the production of

Left: Rachel Kulick in front of one of the many and extraordinary sub-fossil oaks recovered around Orašje, Bosnia.

furniture and so on with certificates of the radiocarbon age of the material used for production. We took 132 samples from 87 elements. More will be collected in the future.

*To left: the stunning view high in the Mavrovouni Forest area, north Greece where we collected Bosnian pine (*Pinus heldreichii) *samples. To right: the eternal question – how many dendrochronologists does it take to change a tire? Below right: part of the Kıbrıscık şefliği Cimercik mevkii (CIM) site in Turkey where we sampled* Pinus sylvestris *at approximately 1800-2000m elevation. Carol Griggs has been working on the cores from these trees this fall, along with an interesting set of* Pinus brutia *cores from Cyprus.*

Meanwhile, lab PhD student Brita Lorentzen and grad student William Guerra sampled extensively from the Israeli pine forests. Brita has now sampled from 9 forests in Israel in broad north-south and west-east transects that will allow her to examine variability in the tree-ring record among sites with differing ecological and climatic conditions. Brita will be presenting the first preliminary results from this project at the Annual Meeting of the Association of American Geographers this April.

Brita samples Pinus halepensis *(and braves the thorny Mediterranean smilax) in the forest at Rosh HaNiqra in northern Israel.*

In total 1,311lb (595kg) of wood samples from over 25 different sites were collected and exported back to Cornell. In each place we received wonderful help from many collaborators and colleagues. And, while all this was going on, at Cornell Charlotte Pearson, Peter Brewer, and Carol and Katie Griggs literally transformed the laboratory in a major re-organization and data curation effort. Charlotte's work as lab manager since the summer has been nothing short of amazing.

Meanwhile, thanks to the support of our patrons, the ADP continues to hold its own as a vibrant teaching-research lab. Six papers in *the* book (see above pp.1-2) are by or with current lab authors to give just a small taste of the research over the last couple of years and some of the exciting debates. Please read.

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