

# AEGEAN DENDROCHRONOLOGY PROJECT

## 1992 ANNUAL PROGRESS REPORT

### ÇATAL HÜYÜK

The Neolithic settlement of Çatal Hüyük (circa 7th millennium B.C.) on the great Konya plain of Turkey continues to provide pleasant, even if unexpected, surprises long after its first excavation thirty years ago by James Mellaart. The sophisticated architecture (Fig.1), the unexpected and sensational wall-paintings, the bizarre religious practices, the wealth of pottery and small finds are now standard ingredients of what we know about the Neolithic. An important question then, as now, concerned chronology. In the early 1960's the radiocarbon method was only a decade old, and Mellaart's 27 radiocarbon determinations were the first serious and systematic attempt to work out a temporal sequence for the evolution of the Anatolian Neolithic, so well represented at Çatal Hüyük by the twelve superimposed towns in nineteen or more meters of accumulated debris and spanning some eight centuries. Previous work in the Neolithic had relied largely on seat-of-the-pants estimates of the dates, and the table of dates shown in Fig.2 left was a real breakthrough. Note that all was not entirely straightforward. Level IV (see especially House 4 in Fig.3 from which the charcoal came) has a date that is too high (=too old) by perhaps as much as 400 years, and Mellaart in the caption to the chronological table put this in brackets, observing that there was a problem with it.

In the published report in Radiocarbon Mellaart's explanation was cited by the physicists as: "Charcoal from center of post in upper floor of House E.IV.4....expected to date construction of Level IV, but is probably somewhat older since sample was taken from center of a large beam which, additionally, may have been a reused beam." Since archaeologists know that each ring of a tree contains the radioactive carbon that it absorbed while it was photosynthesizing or growing, they also know (or should know) that an interior ring will therefore yield an older date than an exterior ring. Some of Mellaart's radiocarbon dates were from short-lived material such as seeds and grains or an entire human brain [perhaps the shortest-lived sample possible!] but a four century glitch did seem excessive. Was the charcoal in Level IV a reused piece from Level X? Ian Todd in his Çatal Hüyük in Perspective concluded: "In summary, we can state that, while the chronology of the site as a whole can be established within reasonable limits, precise dating of individual levels remains uncertain."

Last summer Jimmy Mellaart gave us the entire lot of carbonized material from Çatal Hüyük, Hacilar, and Beycesultan, left over from the Pennsylvania radiocarbon laboratory's work, still in their original sealed boxes, about 40 kilograms in all. Maryanne Newton, who has rejoined us as an archaeology M.A. candidate and who is working on this early material for her thesis, aided by Seçil Tabli and Jeff Malsam, started in September on the top of the box, and as luck would have it the first pieces were the very bracketed lumps of charcoal from Level IV, House 4 mentioned above.

Maryanne has already found the answer to the problem. The post from the Level IV house (Fig.3 above), some 32 fragments of which have been measured and fitted together, was a long-lived juniper with at least 542 annual rings still preserved as of this writing plus an additional 94 years from a lump which is from near the center of the tree but which does not appear to overlap with the longer sequence. This means that our juniper was at least 630 years old when it was cut down some 9000 years ago. A typical Çatal Hüyük charcoal lump is about the size of half a golf ball and has anywhere from 150 to 250 rings. Some flecks no larger than Maryanne's little fingernail had 60+ rings. Average ring size is only 21/100 of a millimeter, meaning that the tree grew only about an inch radially every century (for a total diameter of 26.5cm.) rather less than the 600 to 800 year old junipers from the Midas Mound Tumulus at Gordion. One wonders what prehistoric agricultural conditions in the Great Konya Plain

were like. A juniper this size in modern-day Anatolia would be only 90 to 100 years old, not 630.

Since we do not know which rings were used for the original radiocarbon determination [one imagines that they must have been from an inner lump], it will be instructive to send a set of fragments whose ring-numbers we know to the high-precision radiocarbon laboratories to pin down this long sequence. Once that is done, the dendrochronological backbone for a Çatal Hüyük chronology will be in place. A glance back at the sketch and table on page 1 should remind the reader of what lies in store for Maryanne, Seçil, and Jeff as the year goes on. They are now at work on bags of charcoal from Level VI, a number of which have well-preserved ring-sequences and which sooner or later ought to crossdate with the Level IV sequence shown schematically as a vertical bar on the right of Mellaart's chart in Fig.2. [Interruption as this newsletter goes to press: they have just finished with Level V, House 4, Area E, and its last preserved ring is 66 years earlier than the last preserved ring from Level E.IV.4. See Fig.4 below which shows how well the curves from the two levels match each other.]

There is now no question that the radiocarbon determination done on E.IV.4 was from an interior fragment which to the naked eye is indistinguishable from an exterior fragment. Now that we have gotten around to looking at Çatal Hüyük in dendrochronological perspective, we think we will soon be able to help dispel some of Ian Todd's pessimism. And once *that* is accomplished: what about some crossdates with Asikli Höyük, Çayönü, and Hallan Çemi? Come on, all you Neolithic excavators! We have a 4,000 year gap to fill....

## **ADDITIONS TO THE BRONZE AGE/IRON AGE MASTER CHRONOLOGY: 23rd-5th CENT.B.C.**

1. Wood from the lining of a well at Relje/Zadar [Croatia] with Liburnian period pottery (conventional date: third quarter of the 6th century B.C.) crossdates with our long Bronze Age/Iron Age Master Chronology and has a last preserved ring, with the bark present, of 524 B.C.±37. Sasa Durman, University of Zagreb, who worked with us all last year, gets credit for that one.
2. The wood from the Elaia [near Pergamum] sarcophagus published in Ist. Mitt. 35 (1985) has a last preserved ring at 498 B.C.±37. This is at the early end of the excavator's estimate for the possible cutting date of the wood. Since the boards were trimmed, we have no idea how many rings are missing.
3. A long sequence from a Phrygian level at the Japanese excavations at Kaman- Kalehöyük near Kirsehir has a last preserved ring, but no bark, at 448 B.C. ±37. This was John Huber's *magna cum laude* undergraduate honors thesis, done under a series of handicaps: 1) the wood was horribly burned; 2) it was all oak with extraordinarily tiny rings; 3) we have no oak chronologies from this approximate time with which to try to compare it; 4) the excavator, Dr. Omura's best estimate of the cutting date was either the 8th or the 9th century B.C.

John first managed to combine 33 pieces into a 219 year chronology. We then showed him that we had excellent visual and statistical fits between ring-sequences from living oaks and living conifers whose absolute dates were already known. Finally, he found no fit whatever in the 8th/9th century B.C. with our available juniper sequence. But what he did find was an excellent fit between the Kalehöyük oak and the long chronology in 448 B.C. ±37, some 3 or 4 centuries later than had been proposed by the excavator. What is an undergraduate to do when in such a pickle? John's dilemma was resolved (we think) when we revisited Kaman-Kalehöyük this summer (minus John who was busy getting married and preparing to teach Latin to 5 classes of 40 students each, ouch!) Look at the photograph of the east scarp at Kaman-Kalehöyük, Fig.5, and note the enormous pit in the scarp above where the workmen are digging. The wall on the lower left is the excavator's 9th/8th century B.C. wall. The pit is thought to be 5th century B.C. John's charcoal pieces were found right next to the stones of the wall, right at the juncture of pit and wall, and at the bottom of an intrusion. We have proposed to Dr. Omura that our interpretation of the scenario is that the charcoal really belongs to the pit rather than the wall and that a re-excavation of

the expedition fieldbooks is in order.

4. From an Urartian palace at Ayanis on the east shore of Lake Van, Rachael Perkins was able to build for *her* undergraduate honors thesis (*cum laude*) a 189 year pine chronology that currently ends (no bark) in 654 B.C.±37. This would mean that the palace dates from just after the middle of the reign of King Rusa II. Last summer we collected about 200 more burned beam sections (excavators Maryanne Newton, Joan Ramage, Christine Latini, and Sasa Durman.) Christine, shown below in Fig.6 brushing clean the fallen roof timbers, is superintending the work on Ayanis this semester, hoping to extend the sequence in both directions but especially downward to include the bark so that we can tell you the year when the timbers were cut. Ayanis, because it lies so far to the east, is also of interest because it should crossdate with places like Bastam in NW Iran or Karmir Blur in Armenia as well as with other Urartian sites in Turkey like Kefkalesi or Çavustepe. [Rachael for her sins has been sent to a year's duration vile as an intern in the Ancient Near East Section of the Metropolitan Museum in New York.]
5. [Bracketed because it will not happen until next month.] The other day Fred Cooper called to report that at Minnesota he has some 70 pieces of wood from the palace at Pylos, carefully saved years ago by Carl Blegen. He could not tell us how many rings they have, but some, he says, are football-sized! This looks promising, indeed. Since living pines in western Greece which have not been imported from or exported to anywhere crossdate well with pines in both Turkey and Italy, the odds are that the ancient wood from Pylos ought to match *something*. And the construction date for the palace is well within the range of our long chronology. Stay tuned!

What was reported to you in 1990 as a 1503 year chronology became in 1991 a 1728 year chronology. Now it is 1761 years long with the inclusion of Elaia, and if Kaman-Kalehöyük stays firmly in place the chronology as of December 1992 is 1811 years long, although of mixed species. A skeptic might ask: is it valid to crossdate oaks and conifers? We had a look at how well the AEGEAN '90 OAK MASTER CHRONOLOGY crossdates with the AEGEAN PINE MASTER CHRONOLOGY, all pinned to living trees, so we knew the drilling dates before we started to measure. With an overlap of 838 years the parametric *t*-score is 11.70; the non-parametric trend-coefficient is 63.9%; and the D-score which combines the two tests is 162.81. Even the most dour of statisticians agrees that this is significant at a level of confidence beyond all his tables of probability. Oak vs. Juniper came out with *t*-score =9.96; overlap =883 years; trend =60.1%; and D-score =100.54.

## **EXTENSIONS TO THE AEGEAN '90 MEDIEVAL-MODERN OAK CHRONOLOGY**

The one really significant addition here is the dating of the church of Hg. Sophia at Enez (ancient Ainos) on the Greek-Turkish border to 1162 with the terminal ring present, therefore one of the activities of Emperor Manuel I Comnenus? This building, badly damaged in an earthquake in the 1960s, yielded a 236 year ring-sequence; thus the date of the innermost ring is 927. Our oak chronology had extended only to 1044, the innermost-ring of the Sifaiye Medrese in Sivas, so we have added 117 years right where we needed them. We need now to look at a number of our late first millennium A.D. sites to see whether they can be dated with Enez.

## **NEWLY-DATED MEDIEVAL BUILDINGS**

Mary Jaye Bruce has been retyping and converting to a standard format our dendrochronological findings for some 200 medieval buildings in preparation for their final publication. She started alphabetically with Aghia, Hg. Panteleimon, and as of last week had reached T for both Thessaloniki and Thanksgiving. In the process a number of old problem pieces were remeasured, largely by Hope Kuniholm and Christine, and the sites may now be dated as follows:

Amphissa, Boeotia, Soter

1167vv only one lintel, though

Dodona, Kostaniane, Taxiarchs	1334vv	two tie-beams
Ioannina, Arslan Pasha Mosque	1543vv	much earlier than the inscription
Ioannina, Nik. Dilios Monastery	1690vv	
Makri, Hg. Anastasia	1831v	katholikon inscription = 1833
Meteora, Barlaam Monastery	1548v	katholikon inscription = 1548
Meteora, Rossanou Monastery Early	1555vv	primary
Omorphoklissias, Hg. Georgios	1296vv	published incorrectly (1987) as 1373
Rendina, Koimesis Theotokou	1568+vv	primary

## 1992 SUMMER SEASON

We did our usual 8000 mile roundtrip from Europe to eastern Turkey, avoiding what used to be Yugoslavia, collecting about 500 samples. Hard-core members were Sasa Durman, Christine Latini, and Samantha Williams. Maryanne Newton (Ayanis and Acemhüyük) and Joan Ramage (Ayanis) were on semi-detached service. After most of us had returned to Ithaca, Sasa went on to Bulgaria, Romania, Hungary, and Croatia from which he reports that he is sending us about 250 more samples, mostly from the Hallstatt period in the first millennium B.C. What we brought back ourselves has been augmented in recent weeks as noted below in Section 8.

## 1992 LABORATORY WORK

I never remember to say enough kind things about this part of our lives. The summer gang (who also have double-billing as lab rats) get the glamor, if that is the proper word, but the really important work goes on in our lab in the basement of Goldwin Smith. Some workers and their work not already mentioned are as follows: Hope Kuniholm has been cleaning up a number of outstanding Balkan problem sites and has just finished working on a number of intractable pieces from Sumela Monastery above Trabzon. She has also organized an enormous inventory of the lab: wood, equipment, files, and records, something that lesser souls had stayed away from in horror. Christine Latini has also been working on charcoal from the Troy II megarons excavated by Günter Mansfeld. She reports a 164 year chronology, not long enough to overlap with the 225 year sequence from Troy I, but long enough to send away for radiocarbon wiggle- matching. Lena Mortensen has been assisting Christine with the Urartian charcoal from Ayanis and has been helping supervise the eight newcomers to the laboratory work. Miles McCredie, our Systems Administrator/Programmer has built a Local Area Network which ties together 12 workstations. Eleven daily backups of the data are copied on separate hard drives on 4 different machines. Daily, weekly, monthly, and semi-annual backups are made on master tapes which are stored outside Goldwin Smith Hall in the event of disaster. [Miles says that paranoia should be a good systems administrator's dominant state of mind.] He has also written a convenient program for our four measuring stations which supersedes utilities about which we had grumbled in a more or less desultory fashion for years. Miles and Mary Jaye have combined to put our address list into database format as a preparatory exercise to doing the same with all of the archaeological and dendrochronological data. Carol Bliss Griggs had a baby: Kate Mary Griggs.

## FORMER MEMBERS OF THE PROJECT

We started a survey last month of the 350+ people who have worked in the dendro lab from 1976 to present to find out what they have done since graduation. There has been an excellent response, and after we finish tabulating the results we will share them with you. What we can say for starters is what we had guessed already: that there is a splendid lack of correlation between one's undergraduate major and what one does afterward. Also some of our more shy, retiring violets have gone on to do astonishing things. **AND THERE IS A DRAMATIC IMPROVEMENT IN THEIR SPELLING!** (with, alas, occasional lapses).

## 1992 SAMPLE COLLECTION LIST

GR-Arcadia, Neda, near Sanctuary of Pan, Hg. Strategos (Medieval)	2 samples
TR-Hacilar (Chalcolithic)	13 samples
TR-Çatal Hüyük (Neolithic)	43 samples+
TR-Beycesultan (mixed levels?)	5 samples+
SY-Ugarit, Palace (Late Bronze Age)	6 samples+
GR-Makri (late Neolithic) (identification only)	1 sample
TR-Enez (Hellenistic/Roman)	3 samples
TR-Kütahya, Altintas Tumulus (Phrygian)	1 sample
TR-İznik, Seyh Kudbettin Türbesi and Camii	8 samples
TR-İznik, Çandarlı İbrahim Paşa Türbesi	4 samples
TR-İznik, Çandarlı Kara Ali Türbesi	6 samples
TR-Eskisehir, Dorylaion (Phrygian)	2 samples
TR-Ordu, Boztepe Köyü, Akçaova İrmağı (Devlet Su İşletmesi)	2 samples
TR-Ordu, Çambasi, Gerceovasi Mevkii (Orman Genel Md.)	12 samples
TR-Trabzon, Maçka, Kustul Monastery	13 samples
TR-Trabzon, Maçka, Sumela Monastery	28 samples
TR-Van, Ayanis/Ağarti (Urartian)	209 samples
TR-Kültepe, Karum II 1992/1 (Middle Bronze Age)	1 sample
TR-Göltepe/Kestel (identification only)	1 sample
TR-Porsuk/Ulukisla (Iron Age?)	1 sample
TR-Malatya/Arslantepe (Chalcolithic & Bronze Age)	12 samples
TR-Aksaray/Acemhüyük (Middle Bronze Age)	24 samples
TR-Konya, Karahöyük (Middle Bronze Age)	19 samples
TR-Aphrodisias, Portico of Tiberius	1 sample
TR-Ephesos (various contexts)	31 samples
GR-Rhodes, Triandha (LM I A & LH III A1)	2 samples
GR-Rhodes, Kremasti (Hellenistic & Roman)	2 samples
GR-Cos, Tsoxas plot (Late Archaic)	1 sample
TR-Kinet Hüyük (Archaic)	8 samples
<b>TOTAL:</b>	<b>461 samples+</b>

## PLUS SAMPLES RECEIVED SINCE OCTOBER 1992:

- 16 bags from Prof. Marc Waelkens at Sagalassos (2nd cent. A.D.)
- 1 box from Prof. Aliye Öztan at Acemhüyük (Middle Bronze Age)
- 1 box from Dr. Guillermo Algaze at Büyüktepe
- 1 box of Iron Age Material from Dr. Olivier Pelon at Porsuk
- 250 est. from Dr. Aleksandar Durman's expedition to Bulgaria, Romania, Hungary, and Croatia (prehistoric) en route
- 3 pieces from the Adiyaman Survey (Byzantine) en route?
- 1 from Dr. Martin Harrison at Amorium (Late Antique?) en route?
- ?? from the Israel Antiquities Service (mixed periods) en route
- ? from Dr. Jane Whitehead at LaPiana, Italy (Hellenistic?) en route
- 1 plastic vegetable tray [sebzelik] of Iron Age charcoal from Dr. Marie- Henriette Gates at Kinet Höyük was perhaps the most surprising and tasteful present this fall term.

## LECTURES FORTHCOMING

I will be making public presentations on the work of the project as follows.

Monday, 28 December 1992

Archaeological Institute of America, Annual Meeting, New Orleans Hilton Riverside Hotel, 9:30 A.M.

Tuesday, 2 February 1993

Archaeological Institute of America, Finger Lakes Chapter, Cornell University, Goldwin Smith Hall, Room 22, 8:00 P.M.

Thursday, 4 March 1993

A.I.A. Travelling Lecturer Series, Washington Chapter, George Washington University, Smith Hall of Art (22nd Street, between H and I Streets), Room A114, 7:00 P.M. (Reception beforehand at 6:15 in the hall outside the lecture room.)

Friday, 5 March 1993

A.I.A. Travelling Lecturer Series, Baltimore Chapter, Johns Hopkins University Homewood Campus, Milton S. Eisenhower Library, Garrett Room, 5:00 P.M.

Saturday, 6 March 1993

A.I.A. Travelling Lecturer Series, Ohio Valley Chapter, Parkersburg, W.Va., The Lecture Hall, Room 1305, 8:00 P.M.

Late April 1993 (to be announced)

Annual Ithaca Patrons' Night at our house.

Late May 1993

Annual Symposium of the General Directorate of Monuments and Museums, National Library, Ankara, Turkey.

Early June 1993

Institute of Archaeology, Vienna, Austria.

**VISITORS, OF COURSE, ARE ALWAYS WELCOME TO OUR LABORATORY B-48  
GOLDWIN SMITH HALL**

### **MISCELLANEOUS/ OR CATEGORY DIFFICULT TO DETERMINE**

1. *TR-Trabzon*: Of a number of small, late Ottoman mosques near Trabzon visited in 1991, seven can be dendrochronologically dated, all in the 19th century. The wood is usually chestnut or fir. Results are as follows:

Ahi Evren Dede	1850vv+5 (chestnut)
" " "	1853vv+1 (fir)
Çaykara, Dernek, Güney Mahallesi	1879+1 (chestnut)
Çaykara, Dernek, Kondu Mahallesi	
Merkez Camii	1893+1 (chestnut)
Of, Bölümlü, Mithatpasa	1873+v+1
Sürmene, Karacakaya Camii	1862+1 (beech)
Of, Uzungöl, Filak Mahallesi Camii	1896+1 (fir)
Of, Sugeldi Köyü	1842+1 (chestnut)

2. *GR-Florina* (Hellenistic) 105 year sequence crossdates with the Comacchio Shipwreck and the Sisak Oak Master Chronology.
3. *TR-Ortaköy* (Late Bronze Age) 102 year sequence crossdates with the 23rd/5th Century Master Chronology.
4. *BG-Sozopol* (Early Bronze Age) 114 year sequence from 8 pieces has been constructed and is being wiggle-matched. May crossdate with Fiavé-Carera.
5. *BG-Sozopol* (Eneolithic) 247 year sequence from 10 pieces has been constructed and is being wiggle-matched.
6. *EG-Dashur Boat* (EBA wood in an MBA context?) Reused timber from the deck planking yields a 410 year ring-sequence which does not crossdate with the rest of the boat (time of Sesostri III).
7. [*GR-Nemea Project*] (Early Helladic) Promised this month by Jim Wright. ("The wood is in the mail.")

### **SUPPORT FOR THE PROJECT ("The check is in the mail...")**

We continue to enjoy support from the National Endowment for the Humanities, the National Science Foundation, the Malcolm H. Wiener Foundation, and several hundred Patrons of the Project, 25 of whom are New. We seem to span the breadth of the research support spectrum from the sciences to the

humanities and in amount from the sublime to the ridiculous.

CATEGORY	NUMBER OF GIFTS		NUMBER OF GIFTS (for comparison)
	Dec. '91-Dec. '92	Dec. '90-Dec. '91	
\$75,000+	1	0	A new category
\$25,000+	0	1	An old category
\$10,000+	0	0	<u>vacat</u>
\$ 5,000+	0	0	<u>vacat</u>
\$ 1,000+	4	4	Stable
\$500+	8	6	Improved
\$100+	44	48	Dollar total higher, though
\$50+	78	87	Down a bit
\$25+	131	113	See where our friends cluster....
\$10+	70	71	Stable
\$ 5+	3	8	Serious decline
\$ 1	0	1	Category totally eliminated
<u>Bounced</u>	<u>1</u>	<u>0</u>	An old category revived!
<b>GIFT TOTAL:</b>	<b>340</b>	<b>339</b>	No recession blues here....

All 678 negotiable gifts were matched one-for-one by NEH. At a time when people are quaking about the future of Federal and Private Sector support, we take great comfort in the essential robustness of our society and the generosity of our friends.

*NOTE:* Our lab operates on a steady diet of cookies and caffeine. Last December a Patron became quite exercised that I had not thanked formally and in print THE COOKIE LADY, i.e., my wife Eleanor who tries to resist public acclaim. So thank you all and especially Eleanor!

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*Peter Ian Kuniholm*  
 CORNELL UNIVERSITY