[4] O.W. Muscarella, *Anatolian Iron Ages* 3 (A. Çilingiroğlu et D. French éd.) 1994 : 142, pl. 12.1.2.

[5] Cf. P.E. Pecorella, M. Salvini, *Persica X*, 1982 : 24.

[6] *Bibliotheca Orientalis* XLIV/1-2, 1987 : 255.

Archaeobotany in Turkey : a review of current research

The inspiration for this review came as we tried to calculate how many archaeobotanists were working in Turkey. Our guess suggested it was probably the most active country for the study of plant remains from archaeological sites in the Near East. We then decided to ask our colleagues working in Turkey to write a short paragraph about their work. We hope this will be a valuable aid to help archaeobotanists and excavators to keep in contact, and will also give an interesting "snapshot" of current work.

In total, we found about 30 archaeobotanists studying botanical remains from 39 excavations. Of these, 20 are currently in progress, while the rest ended in the 1980s or earlier. The chronological and geographical spread of the projects is impressive. While archaeobotany has long been an integral part of prehistoric excavations in central and southeast Turkey, little work has been done at later sites, particularly in western Turkey. This is changing rapidly, as the potential of bioarchaeology at classical or Medieval sites is recognised. The sampling techniques used by archaeobotanists also deserve comment. Of the 20 current excavations, a flotation machine is in use at 15 (75 %), with typical soil sample sizes ranging from 40-100 litres. This is because of widespread recognition that pump-driven flotation machines are a highly effective tool for recovering both charred plant remains (typically on a 0.25 or 0.3 mm mesh), and lithics, bones and small artefacts such as coins and seals in the heavy fraction (1mm mesh). A typical flotation machine is described by M. Nesbitt (1995), pp. 115-130 in *Essays on ancient Anatolia* (T. Mikasa, ed.).

The result of all this work is that regional and chronological patterns of agricultural change in Turkey are becoming increasingly clear: useful reviews of current ideas (and earlier work not covered by this guide) are given by N. Miller (1991), pp. 133-160 in *Progress in old world palaeoethnobotany* (W. van Zeist et al, eds.) and M. Nesbitt, *Biblical Archaeologist* (1995) 58(2) : 68-81. General archaeological work in Turkey is described each year by M.-H. Gates in the April issue of *AJA*.

The scope of this review covers plant remains - charred seeds, tubers and wood, phytoliths or residues - actually recovered from excavations. Sites are arranged in rough chronological order within each region. The account for each site was written by its archaeobotanist, though we have had to shorten all for reasons of space. Some abbreviations have been used, including : *U.* : University ; *Neo.* : Neolithic ; *Chalco.* : Chalcolithic ; *E/M/LBA* : Early/Middle/Late Bronze Age ; *IA* : Iron Age ; *Helln.* : Hellenistic ; *Byz.* : Byzantine ; *Med.* : Medieval ; *AJA* : American Journal of Archaeology ; *AS* : Anatolian Studies. Publications are cited briefly ; in Turkey the library of the British Institute of Archaeology at Ankara has the most comprehensive holdings in this field. We thank all the archaeobotanists who responded so quickly to our call for information.

Mark Nesbitt & Delwen Samuel

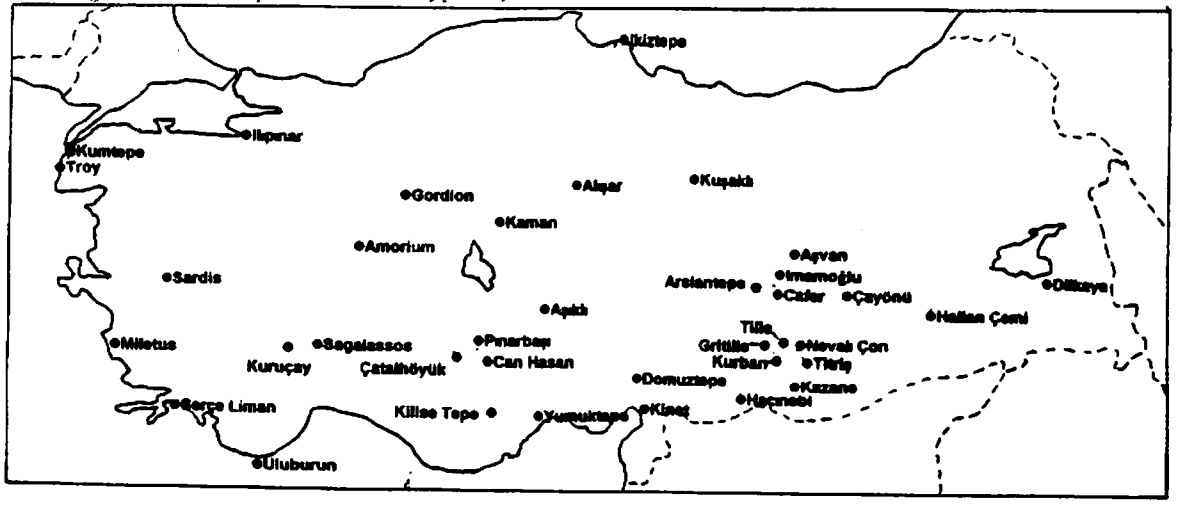

Fig. 1 : Carte des sites anatoliens cités dans le texte.

Dendrochronology :

Aegean Dendrochronology Project (Cornell U.) : 23 years of continuous dendrochronological investigations in the Aegean and neighbouring lands have resulted in tree-ring chronologies covering 6500 of the last 9200 years in an area 2400 km E-W by 1100 km N-S. There are significant chronologies for oak, juniper, pine, and cedar, and shorter ones for fir, spruce, boxwood, and yew. Our goal is a continuous dendrochronological time-line from the present to at least 7500 bc and possibly earlier. Thanks to foundation support we are able to perform our dating services free of charge. For comment on collection procedures see *AJA* (1995) 99: 99-102. *Publications*: (1996) pp. 401-409 in *Archaeometry 1994: The Proceedings of the 29th International Symposium on Archaeometry* (S. Demirci et al. eds.): *Nature* (27 June 1996) 381: 780-783. *Peter Ian Kuniholm, Department of the History of Art and Archaeology, G-35 Goldwin Smith Hall, Cornell University, Ithaca, NY 14853-3201, USA: Tel +1-607-255-8650 lab.: 255-9732 office; 257-7845 home; Fax: 255-1454; Email: peter@dendro.mail.cornell.edu*

The west

Ilıpınar (Bursa): Pottery Neo. to early Byz. Excavated since 1987 by Dr Jacob Roodenberg (Netherlands Arch. Inst., Istanbul). Plant remains recovered by manual flotation from Pottery Neo. levels (5250-4750 uncal bc) include einkorn, emmer and free-threshing wheat, naked and hulled 6-row barley, lentil, bitter vetch and flax. A major fruit - probably wild - was fig. *Publication*: (1995) pp. 159-66 in *The Ilıpınar excavations I* (J. Roodenberg, ed.). *Willem van Zeist and collaborators, Department of Archaeology, University of Groningen, Postraat 6, 9712 ER Groningen, The Netherlands.*

Kuruçay (Burdur): Late Chalco. (4th mill. bc) settlement excavated 1978-1988 by Prof Refik Duru (Istanbul U.). 25 samples from burnt houses, mainly pots of emmer wheat spikelets or barley grain. Other crops include einkorn, lentil, pea, chickpea and large quantities of grass pea. Of especial interest is the admixture with flax of classic flax weeds such as *Camelina sativa, Lolium remotum* and *Silene*. *Publication*: (in press) in *Kuruçay II* (R. Duru, ed.). *Mark Nesbitt, Institute of Archaeology, University College London, 31-34 Gordon Square, London WC1H OPY, UK. Tel: +44-171-387-7050 ex. 4763; Fax: 383-2572; Email: tcfa270@ucl.ac.uk*

Troy (Çanakkale): at least EBA (Troy I/II) to Roman (Troy IX). Excavations from 1988 by M. Korfmann (U. Tübingen) and C.B. Rose (U. Cincinnati). Archaeobotany since 1991. Machine flotation since 1993, up to 100-litre samples (average 35 l). Archaeobotany has concentrated on BA contexts, but more is planned on Roman deposits. Besides the economic information, a broad spectrum of water and wetland plants mirror the palaeoecological environment. Dissertation currently in progress. *Publication*: Jablonka et al. Studia Troica (1994) 4: 51-73. *Simone Riehl, Institut für Ur- und Frühgeschichte, Ältere Abteilung, Archäobotanik, Universität Tübingen, Schloß, 72070 Tübingen, Germany; email: Simone.Riehl-0001@t-online.de*

Kumtepe (Çanakkale): Neo./Chalco. to EBA. Excavated from 1993 by M. Korfmann. Lying in the same palaeoecological environment as Troy (c. 5 km apart), Kumtepe was a small coastal settlement (less than 1.4 ha) during its whole sequence, reflected by large amounts of water and wetland plant remains. Archaeobotany started 1993 with the same sampling methods as in Troy. *Simone Riehl (see Troy).*

Shipwrecks (Milas): Serçe Limanı, Med. glass-laden wreck (c. 1025/6 AD) excavated 1972-78 by G.F. Bass (Institute for Nautical Archaeology). Identifiable seeds were hand-picked, including peach, apricot, almond, grape, olive and sumac. Combination of Islamic and Christian elements points to co-operative trade along a route from the Black Sea to Caeserea in Israel. *Uluburun*, LBA wreck excavated by G.F. Bass and C. Pulak 1984-1994. All contexts systematically sampled by bucket flotation and hand-picking. Kilos of terebinth resin, 1000s of pomegranate, olive, fig, coriander, almond, grape and weed seeds; also leaves and twigs used as packing, and wood shavings and charcoal. At least 7 cultures represented on this wreck that carried luxury materials of the time. *Publication: World Archaeology (1993) 24: 348-60. Cheryl Haldane, INA-Egypt, P.O. Box 432, El Ibrahimia, Alexandria, Egypt. Fax/Tel: +203-546-6872; Email: ina_misr@auc-acs.eun.eg*
Resin from Uluburun was identified as from *Pistacia* by J.S. Mills and R. White of the National Gallery, London. *Publication: Archaeometry* (1989) 31: 37-44.

Sardis (Manisa): major city occupied from the late IA to Byz. periods; excavations since 1958, now directed by C.H. Greenewalt, Jr (U. California, Berkeley). Since 1983 large quantities of charred plant remains have been recovered in pots and heaps within Lydian rooms, probably burnt in the Persian conquest of 546 bc. Mainly 6-row hulled barley and chickpeas. Other crops include bread wheat, lentil, grape, broomcorn millet and garlic. Analysis is complete; interpretation is being integrated with studies of cooking and grinding installations in the same area by N. Cahill (U. Wisconsin). *Mark Nesbitt (see Kuruçay).*

Miletus (Aydın): the Greek city before the Persian sack of 494 bc. A long-term project of different German Institutes. In 1993, Prof Dr Volkmar von Graeve (Bochum) directed

excavations in which 50 Archaic samples were taken from an area of workshops near the ancient city wall at the Kalabaktepe and from a nearby temple of Aphrodite. Nearly one ton of soil was floated. Plant remains were mostly charred with a few desiccated remains. Fig, olive and grape were most abundant; cereals (barley, foxtail millet, einkorn, spelt wheat, free-threshing wheat) and other crops (pomegranate, almond, beet) were scarce. In autumn 1996 an excavation of the ancient harbour area was directed by Prof W.-D. Niemeier (Heidelberg). Minoan and Mycenean plant remains are expected; machine flotation planned. *Hans-Peter Stika, Institut für Botanik 210, Universität Hohenheim, D-70593, Stuttgart, Germany; Fax: +49-711-459-3355.*

Sagalassos (Burdur): large Helln./Roman city, excavated since 1990 by Prof Mark Waelkens (Catholic U. Leuven). Pollen analyses of travertines and other sediments near the site has been completed as a thesis; it is hoped work on macroremains from the site will begin soon. *Marleen Vermoere, Laboratory of Plant Systematics, Botanical Institute K.U. Leuven, Kardinaal Mercierlaan 92, B-3001 Heverlee, Belgium. Email: Marleen.Vermoere @bio.kuleuven.ac.be*

Central Anatolia

Aşıklı Höyük (Niğde): Aceramic Neo. (6900-6500 uncal bc). Excavated since 1989 by Prof Ufuk Esin (Istanbul U.). Plant remains recovered by manual flotation. Cereal crops include einkorn, emmer and free-threshing wheat, hulled 2-row barley and naked barley. Bitter vetch, lentil and probably pea were grown. Wild pistachio and almond were collected, and hackberry was gathered intensively. *Publication: Vegetation History and Archaeobotany* (1995) 4: 179-185. *Willem van Zeist (see Ilıpınar).* Phytolith samples contain remains of wheat and barley. Abundant remains of wild grass seeds may be evidence of gathering. Reed phytoliths were common, probably derived from building or matting materials. *Arlene Miller Rosen, Archaeology Division, Ben Gurion University, P.O.B. 653, Beer Sheva 84105, Israel. Email: amrosen@bgumail.bgu.ac.il*

Can Hasan III (Karaman): Aceramic Neo. village (6500 uncal bc), excavated 1969-70 by David French (BIAA). Large-scale machine flotation recovered good evidence for crops including einkorn, emmer, free-threshing wheat, rye, lentil and bitter vetch. *Preliminary reports*: (1972) pp. 182-88 in *Papers in economic prehistory* (E.S. Higgs, ed.); on the rye: *AS* (1978) 28: 157-74. Final report in preparation. *Gordon Hillman, Institute of Archaeology, University College London, 31-34 Gordon Square, London WC1H OPY, UK. Tel: +44-171-380-7484; Fax: 383-2572; Email: g.hillman@ucl.ac.uk*

Pınarbaşı (Karaman): Early Neolithic rockshelters at the foot of Karadağ ; excavated since 1994 by Dr T. Watkins (U. Edinburgh). Machine flotation has recovered large quantities of charcoal, but few seeds so far. Potentially important results for early Holocene environmental history of central Anatolia. *Mark Nesbitt (see Kuruçay).*

Çatal Höyük (Konya): primarily Pottery Neo. Current excavations began 1995, directed by Dr Ian Hodder (U. Cambridge). In 1995 Ann Butler (University College London) built a pump-driven flotation system for about 200 samples of sixty litres, collected from every excavation unit. In 1996, archaeobotanists were C. Hastorf, J. Near and M. Mangafa. Blanket sampling was continued, usually with 40 litre samples. A second pump-driven flotation machine was built to process over 500 samples. Finds included an acorn cache on a floor and a storage bin dating to about 6,000 bc filled with lentils. *Christine Hastorf and Julie Near, Dept. of Anthropology, University of California-Berkeley, Berkeley, California 94720, USA. Email: hastorf @qal.berkeley.edu; near@qal.berkeley.edu; Maria Mangala, Dept. Archaeology and History of Art, University of Thessaloniki, S4006, Thessaloniki, Greece. Email: mangafa@olymp.ccf.auth.gr*

Can Hasan I (Karaman): Pottery Neo.-Early Chalco., excavated 1961-67 by David French (BIAA). Numerous small samples collected mainly by dry sieving; dominated by hulled barley, emmer wheat and free-threshing wheat. Some samples rich in wild fruits including acorns, hawthorn, wild pistachio and tubers. 2 Neo. samples published by J.M. Renfrew AS (1968) 18: 55-56. Final report being prepared by *Mark Nesbitt (see Kuruçay).*

Ikiztepe (Samsun): Chalco.-MBA mound on Black Sea coast, excavation began 1974 under the late Prof U.B. Alkım (Istanbul). Plant remains from these periods include einkorn, emmer and free-threshing wheat, hulled 6-row barley, lentil, bitter vetch, grass pea and flax. Fruits include grape, fig, blackberry and elder. Examination of samples collected by manual flotation by H. Woldring in 1980 and 1981 is not yet complete. *Publication*: (1989) pp. 257-60 in U.B. Alkım et al, *Ikiztepe I. (Willem van Zeist, see Ilıpınar).*

Alişar Höyük: Chalco. through Turkish.; renewed excavations begun 1993 by Dr Ronald L. Gorny (Chicago). A major Hittite city (MBA-LBA). Machine flotation will be applied with 40 litre samples. *Miriam Chernoff, 37 Harland Rd., Waltham, MA 02154, USA. Fax +1-617-642-0900; Email: chernoff@sdac.harvard.edu*

Çadır Höyük: Chalco. to Roman/Byz. Excavations since 1994 by Dr Ronald Gorny (Chicago). Forty two soil samples ranging in volume from 4-50 litres were floated during the 1994 season from late IA, early Helln. or Persian

fill layers and Chalco. deposits. Flotation with bucket or machine. Helln. crops include hulled barley, emmer and free-threshing wheat, lentil, bitter vetch and pea. Ethnoarchaeology with local farmers is a key part of the project. This and neighbouring Alişar offer opportunity to study environmental and agricultural change over time in central Anatolia. *Publication: Anatolica* (1996) 22: 159-179. *Miriam Chernoff (see Alişar).*

Kuşaklı (Sivas): Hittite town and IA houses. Excavations since 1993, by Prof Dr Müller-Karpe (Regensburg/Marburg). Bucket flotation of 10-40 litre samples. Archaeobotanical analysis will be done in three steps: first, a big temple; second, big buildings on top of the site; then probable domestic areas. The temple samples contained 20,000 grains of very well cleaned bread wheat, with einkorn and emmer in small numbers. Barley was obviously the second most important cereal. Lentil and common vetch were the only pulses in the temple. *Publications: Mitteilungen der Deutschen Orient-Gesellschaft zu Berlin* (1995) 127: 27-30. *Rainer Pasternak, Hansastrasse 48, D-24118 Kiel, Germany. Fax: +49-431-577-233.*

Gordion (Ankara): EBA to Med. U. Pennsylvania Museum project since the 1950s, current excavations by Dr Mary Voigt (College of William and Mary, Williamsburg) since 1988. About 1400 samples floated by machine, mainly from LBA to Helln. Juniper, oak, and pine constitute over 80% of the charcoal. A steady increase in secondary forest woods suggests a gradual loss of primary forest between the LBA and the Med. period. Total loss of trees from the surrounding slopes is relatively recent. The seed samples complement the charcoal, suggesting an episodic increase in plants unpalatable to animals. *Publication: AJA (1995) 99: 91-93. Naomi F. Miller, University of Pennsylvania Museum, MASCA, 33rd & Spruce Streets, Philadelphia, Pennsylvania 19104, USA. Fax: +1-215-898-0657; Email: nmiller0@sas.upenn.edu* Seed samples from burnt destruction levels (mainly Phrygian) from the 1950-1973 excavations by Rodney Young are under study by *Mark Nesbitt (see Kuruçay).*

Amorium (Afyon): Roman, Byz., Seljuk and Ottoman. Excavation since 1987, now directed by Dr C. Lightfoot. Sampling began 1992. Charred remains first recovered by bucket flotation; in 1996 a flotation tank was built and used to process 50 10-30 litre samples. All datable deposits from a range of feature types were collected. Samples include mixed assemblages of free-threshing wheat, barley, chaff, weed seeds and occasional charred grape seeds. *Publications: AS (1993) 43: 151-53; AS (1995) 45: 124-27. John Giorgi, Environmental Section, Museum of London, Walker House, 87 Queen Victoria St., London EC4V 4AB, UK. Fax: +44 (0) 171-410-2201; Email: molas@molas.demon.co.uk*

Kaman-Kalehöyük (Kirşehir Province): EBA to IA (Phrygian), and Ottoman. Excavations since 1986 directed by Dr S. Omura (Middle Eastern Culture Centre in Japan). Minimum sample of 50 litres of soil from areas of in-situ burning such as hearths and ovens, burned soil levels, middens and pits. Over 600 flotation samples processed by machine since 1993, 200 of these from Med. deposits. Preservation excellent with rich diversity of plant material. Construction of an on-site archaeobotany laboratory will begin in early 1997. Publications: M. Nesbitt (1993), pp. 75-97 in *Essays on Anatolian archaeology.* (T. Mikasa, ed.). A. Kennedy (1996) *M.Sc. dissertation*, University College London. *John Letts, Dept. of Agricultural Botany, School of Plant Sciences, Whiteknights, Reading University, P.O. Box 221, Reading, RG6 2AS, UK. Email: J.B.Letts@reading.ac.uk*

The south

Yumuktepe (Mersin): early Neo. to Byz., excavated since 1994 by Dr I. Caneva (Rome U.). Manual flotation of 10-20 litre samples has focused on Neo. and Chalco. deposits. A wide range of crops and wild plants has been recovered, including grape pips from Chalco. pits. *Hala N. Barakat, Cairo University Herbarium, Department of Botany, Faculty of Science, Cairo University, 12013 Giza, Egypt. Tel: +202-572 7022; Email: Halanb@frcu.eun.eg*

Kinet Höyük (Iskenderun): at least late Neo. to Med., excavated since 1991 by Dr M.-H. Gates (Bilkent U.). A pump-operated flotation machine began operation in 1995. 40-litre samples were taken from most excavated contexts, which in 1995 dated to MBA, IA and Helln. periods. An MBA burnt store and kitchen area contained one large storage jar full of very clean emmer grains. The site lies at a cross road of ancient trade and offers an excellent opportunity to look at the influence of coastal, Anatolian and Syrio-Mesopotamian cultures on plant resources. *Delwen Samuel, McDonald Institute, University of Cambridge, Downing Street, Cambridge CB2 3ER, UK. Tel: +44-1223-339338; Fax: 339285; Email: ds123@cam.ac.uk*

Kilise Tepe (Içel): at least EBA to Byz. Excavations began in 1994, directed by Prof N. Postgate (U. Cambridge). Over 100 samples of 60 litres from all phases were processed by machine flotation in 2 seasons. A primary aim is to establish qualitative and quantitative descriptions of all constituents (plants, bone, pottery, flint, ground stone, molluscs, etc.). Important finds include 100s of emmer grains in a Byz. pit; whole, pierced figs in a LBA destruction layer; and lentils and einkorn under a sandstone slab, associated with burnt snake vertebrae, in IA-LBA occupation. *Sue Colledge,*

McDonald Institute, University of Cambridge, Downing Street, Cambridge CB2 3ER, UK. Email: smc25@cam.ac.uk

The southeast

Hallan Çemi (Batman): Epipalaeolithic (9000-8000 uncal bc) village, excavated since 1991 by M. Rosenberg (U. Delaware). Large-scale machine flotation of samples up to 400 litres, abundant plant remains. The site is of particular interest as an apparently sedentary village based entirely on hunting and gathering. Preliminary analysis shows the plant remains include wild almond and pistachio, wild pulses, and fruits of a range of other wild plants including *Bolboschoenus* and *Gundelia*. Charcoal (studied by Rowena Gale) is dominated by river valley taxa, but also includes oak. *Publications: Anatolica* (1995) 21: 1-12; *Diversity* (1995) 11: 142-3. *Mark Nesbitt (see Kuruçay).*

Çayönü (Diyarbakır): mainly PPN (7200-6700 uncal bc). Excavations began 1964 directed by Profs. H. Çambel (Istanbul U.) and R.J. Braidwood (U. Chicago). Manual water flotation. Crop plants include einkorn and emmer wheat, pea, lentil and bitter vetch, but no barley. In the lower levels wild-type emmer grains may point to cultivation of wild emmer. Grass pea and chickpea may have been cultivated; the large numbers of wild vetch seeds may have been gathered. *Publications: Palaeohistoria* (1991/1992) 33/34: 65-96. *Willem van Zeist (see Ikiztepe).* Phytoliths under study by *Patricia Anderson, Institute de Prehistoire Orientale, CNRS, Jalès, Berrias, F-27460, St. Paul-le-Jeune, France; Tel: +33-7539 3161; Fax: 3796 and Jordi Juan-Tresserras, Unitat d'Arqueobotanica, SERP/Dept. Prehistoria, H. Antiga I Arqueologia, Universitat de Barcelona, Baldiri I Reixac, s/n Torre B pis 11, E-08028 Barcelona, Spain; Tel/Fax: +34-3 424 8035; Email: juan@trivium.gh.ub.es*

Nevali Çori (Urfa): aceramic Neo. to EBA. Well preserved PPNB house and temple. Excavation from 1983 to 1991 by Prof Dr H. Hauptmann (now Istanbul). Bucket flotation of 10-20 litre samples. Probable domesticated einkorn and emmer. Pulses: lentil, pea, grass pea, common vetch, chickpea. *Publications*: (1995), pp. 247-8 in *Res Archaeobotanicae* (H. Kroll & R. Pasternak, eds.). *Rainer Pasternak (see Kuşaklı).*

Cafer Höyük (Malatya): Pre Pottery Neo. B (c. 7000 uncal bc), excavated 1979-1986 by J. Cauvin and O. Aurenche. Manual flotation recovered crops including einkorn, emmer, free-threshing wheat and lentils. *Publication: Cahiers de l'Euphrate* (1993) 7: 191-234. Further publication in English forthcoming. *Dominique de Moulins, Ancient Monuments Laboratory, English Heritage, 23 Savile Row, London W1X 1AB, UK. Tel: +44-171-973-3303; Fax: 973-3330; Email: dominq@eng-h.gov.uk*

Domuztepe (Maraş): A major Halafian and post-Halafian settlement. Excavations since 1996 by Dr S. Campbell (U. Manchester) and Prof E. Carter (U. California, LA). A flotation machine processes 50-60 litre "whole-earth" soil samples from most excavated contexts. Seed density is low this first season, dominated by einkorn and emmer wheats. A deep sounding was more productive and bodes well for future seasons. *Seona Anderson, "Ashvale", Kirkfieldbank, Lanark ML11 9JS, UK.*

Arslantepe (Malatya): Chalco to Neo-Hittite; fragmentary Roman. Excavations since 1961, currently by M. Frangipane (Università "La Sapienza", Roma). Hundreds of kg of material have been processed by dry-sieving from burnt levels. The recovery of grape pips in storerooms of a wide area of the important public monumental buildings dated to the end of fourth mill. (Late Uruk) is noteworthy. *Publications:* (1994) pp. 77-90 in *Drinking in ancient societies* (L. Milano, ed.); *Origini* (1983) 12: 599-617. *Maria Follieri & Laura Sadori, Dip. Biologia Vegetale, Universit‡ "La Sapienza" di Roma, P. le A. Moro, 5 - 00185 ROMA, Italy. Fax: +39-6-49912279; Email: Follieri@axrma.uniroma1.it; Sadori@axrma.uniroma1.it*

Kazane Höyük (Urfa): Pottery Neo. to early MBA. Excavated since 1993 by Dr P. Wattenmaker (U. Virginia, Charlottesville). 12 late Chalco. and EBA phytolith samples analysed with R.M. Albert. Results show intensive use of cereals (mainly wheat), and marsh rushes and reeds support geoarchaeological evidence for moister environments near the site at the time. Further phytolith analysis will investigate change in agriculture through time, in the light of geomorphological evidence for a drying environment in the later phases. *Arlene Rosen (see Aşıklı).*

Southeastern Turkey/Euphrates (Urfa): Several sites in the rainfall agriculture zone have been sampled: *Kurban Höyük* (dir. Lee Marfoe, 1981-84) Halaf - EB/MB transition, over 800 samples. *Gritille* (dir. Richard S. Ellis, Bryn Mawr College, 1981-84) Pre Pottery Neo. B: 146 samples; EBA: 39; Helln.: 3 samples; Med. 137. *Hacınebi Tepe* (dir. Gil Stein, Northwestern U., 1992-ongoing) Late Chalco./Uruk and Helln.) about 225 samples. *Tell-es Sweyhat*, Syria (dir. Richard Zettler, U. Pennsylvania, 1992-ongoing) E/MBA. Manual flotation at Kurban and Sweyhat, and machine flotation at Gritille and Hacınebi. Samples generally 8-10 litres. One goal is to recognise patterns reflecting the north-south precipitation cline and cultural factors which might vary independently. Results suggest that in the north heavier reliance was placed on crop production and wheat. In the drier south pastoral production and barley were more important. PPNB levels from Gritille yielded a very high proportion of legumes relative to cereals. *Publications:* Kurban: *Anatolica* (1986) 13: 85-89;

119-120. Gritille (Med.): *Anatolica* (1992) 18: 87-99; (in press) in AIA Monograph by Scott Redford. Hacınebi (Chalco. and Uruk): *Anatolica* (1994) 20: 168-172; *AJA* (1996) 100: 248-257. *Naomi F. Miller (see Gordion).*

Imamoğlu (Malatya): EBA III, excavated in 1980s by E. Uzunoğlu. Seed samples from milling and storage areas under study. Work is also beginning on plant remains from Liman Tepe (Urfa), Bakla Tepe (Menderes) and Panaztepe (Menemen). *Dr Emel Oybak, Department of Biology, Faculty of Science, Hacettepe University, 06532 Beytepe, Ankara, Turkey. Email: polen@eti.cc.hun.edu.tr*

Titriş Höyük (Urfa): mid-late EBA to Med. Large exposures of EBA domestic buildings possible in 50 hectare city state on an important EW overland route. Excavation since 1993 by G. Algaze (U. California, San Diego). All reliable primary and significant secondary contexts, from 100% to a minimum of 100 litres, are processed by machine flotation. The aim is to look at spatial variation across the site between different building types and phases. EBA crops so far include: hulled barley, free-threshing wheat, lentils, grass pea, grapes, pistachio, *Prunus* spp. Notable finds include acorns, possible figs, bark, a mineralised thistle in a tomb vase. *Publications: Anatolica* (1995) 21: 13-64; *Duncan E. Schlee 126a Gilbert Road, Cambridge, CB4 3PD, UK. Tel: +44-1223-51280.* Residues on plaster features and whole vessels collected by V.R. Badler; chemical analysis by P.E. McGovern, D.L. Glusker, and L.J. Exner. The calcium salt of tartaric acid was chemically identified from a large plaster basin, suggesting that it may have been used for grape pressing. *Virginia R. Badler 123 Buck Lane Haverford, Pennsylvania 19041 USA. Tel: +1-610-642-5134; Fax: +1-215-898-0587; Email: vbadler@central.cis.upenn.edu; Patrick E. McGovern, MASCA, University of Pennsylvania Museum, Philadelphia, PA 19104 USA. Tel: +1-215-898-1164; Fax: 898-0657; Email: mcgovern@sas.upenn. edu*

Aşvan (Elazığ): 3 sites (Çayboyu, Late Chalco.; Taşkun Mevkii, EBA; Aşvan Kale, EBA-Med.) excavated by David French (BIAA), 1968-1973. Large-scale machine flotation of numerous samples, currently under study. Classical and Med. millets published in *AS* (1988) 38: 85-97. *Mark Nesbitt (see Kuruçay).*

Tille Höyük (Adiyaman): a small mound on the Euphrates, excavated by David French (BIAA), 1979-1990. 16 samples from an IA (Neo-Assyrian) burnt level (7th-8th C. bc), also some Hellin. and LBA material. The IA samples are dominated by free-threshing wheat, 2-row hulled barley, chickpea, bitter vetch, pea and flax. Of particular interest are charred unshrunken grapes, suggesting the settlement was burnt in September. Report submitted in 1993; publication expected in IA final report. Foxtail millet published in *AS* (1988) 38: 85-97. *Mark Nesbitt (see Kuruçay).*

Dilkaya (Van): EBA settlement and IA cemetery excavated 1980s by Altan Çilingiroğlu (Ege U., Izmir). 80 EBA samples recovered by machine flotation in 1987; detailed analysis of 9 samples found only cereals (bread wheat and 2-row hulled barley) and wild plants. Numerous fragments of dung and the composition of the samples strongly suggests the charred seeds derive from dung fuel. Analysis complete; interim report submitted for publication in final excavation report. *Mark Nesbitt (see Kuruçay).*

Recherches sur l'occupation du début du Bronze ancien I sur le djebel Mutawwaq (Jordanie).

Le projet de recherche a été élaboré en 1989 par une mission espagnole sous la direction de Juan Fernandez-Tresguerres de l'Université d'Oviedo (sous les auspices de l'IEBAJ et du Ministère de la Culture espagnol) avec une collaboration de l'IFAPO depuis 1995.

Le djebel est à 10 km au sud-est de Jerash, surplombant le wadi Zarqa à une altitude de 650 m. Le secteur étudié actuellement est la partie supérieure du djebel. Cette occupation se compose d'un champ de dolmens, de structures d'habitat, d'enclos, de tumuli (une douzaine), de tours, de grottes (plusieurs sont fouillées), de terrasses agricoles et d'un mur de clôture.

Les premières campagnes ont été consacrées à l'étude des structures funéraires mégalithiques que l'on trouve sur le site et qui avaient été déjà décrites brièvement par Hanbury-Tenison. Il s'agit d'une vaste nécropole composée de dolmens. Hanbury-Tenison en énumérait une centaine. Malgré d'importantes destructions du site intervenues entre-temps, une étude typologique (entreprise dans le cadre d'une thèse par Fernando Junceda de l'Université d'Oviedo) a permis de cataloguer 650 dolmens. Ils sont localisés sur une carte et dessinés au 1:25 pour les plus représentatifs. La fouilles de certains de ces dolmens n'a pu fournir, comme c'est généralement le cas pour des structures de ce type, que quelques éléments lithiques, quelques tessons de céramique, un poignard et deux épingles en bronze. Les deux grandes périodes d'utilisation de ces dolmens sont la transition Chalcolithique/Bronze ancien IA et le Bronze moyen I avec parfois des réutilisations tardives à l'âge du Fer.

En 1995, la mission a commencé l'étude de l'habitat localisé sur le djebel. Il s'agit d'un grand village de la période du Bronze ancien IA entouré par un mur qui enserre un espace de 800 m du nord-ouest au sud-est sur 200 m du nord au sud. Cette aire est plus ou moins