

Review of: “Plants, People and Evolution: a Meeting in Honour of Barbara Pickersgill”, Linnean Society and Society of Antiquaries, London, 4th August 2006

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A conference entitled “Plants, People and Evolution” was held on 4th August 2006 at the Linnean Society and the Society of Antiquaries in London. The conference, which was organised by Julie Hawkins, Mark Nesbitt and Sarah-Jane Senior, was held in honour of Dr Barbara Pickersgill, the geneticist and expert on *Capsicum* (peppers), and was attended by around 100 people. Nine papers were presented by a range of international specialists in plant domestication, cytogenetics and taxonomy. A number of posters also examined origins of domestication and crop evolution throughout the world, with a particular emphasis on genetic analyses. This review will concentrate on papers relating to plant domestication, which is a topic of considerable importance in both archaeobotany and archaeology. Grain crops in the Near East and Europe have for many decades provided a focus for research into domestication but, as this conference highlighted, studies have more recently expanded to include crop evolution in other parts of Asia, Africa and the Americas. Analyses in molecular biology, along with technological and methodological advances in archaeology, have revolutionised investigations over the past decade, and presentations at this conference confirmed that research into plant domestication continues to be a vibrant and exciting field of study.

Following welcome addresses by David Cutler (Linnean Society) and Vernon Heywood (University of Reading), the morning session opened with a paper by Duncan Vaughan and colleagues (National Institute of Agrobiological Sciences, Japan), which was entitled “Rice, People and Evolution: From Prehistory to the Biotechnology Era”. Vaughan highlighted the phenomenal increase in rice research in recent years, particularly in molecular genetics and also into archaeological remains of rice. Vaughan suggested that protective layers encasing the rice grain were important in enabling early rice movement around the world: the layers could enable survival of the grains on long voyages and provided extra resistance against insects. Despite separate domestication of rice in Africa and Asia, Vaughan indicated that similarities can be observed in the harvesting and processing of rice in these diverse regions. Vaughan also examined why many rice-growing countries have such large populations, emphasising the significance of certain farming systems, such as double-cropping, in providing the nutritional foundations for population increase. The next paper was presented by Daniel Zohary (The Hebrew University of Jerusalem, Israel) and was entitled “The Impact of Self-Pollination on Early Crop Domestication in the Near East”. The annual flora of the Near East contains both self-pollinated and cross-pollinated grain plants in roughly 50:50 proportions, many of which appear attractive for domestication. The eight ‘founder crops’ that started Neolithic agriculture in the Near East are, however, predominantly self-pollinators. Zohary proposed a range of factors to explain why self-pollinators were more suitable for rapid domestication, including

the structuring of genetic variation, reproductive isolation caused by self-pollination, and domestication traits and their inheritance.

Morning tea-break was followed by Mark Nesbitt (Royal Botanic Gardens, Kew), who presented a paper entitled “Wheat Domestication: Integrating Archaeology and Genetics”. This paper provided a useful round-up of research that has been carried out since the 1990s relating to archaeological, archaeobotanical and genetic approaches to understanding wheat domestication. Nesbitt avoided considering the Fertile Crescent as a homogeneous area of activity, which is a welcome development, instead highlighting that we now need to talk about different regions within the Fertile Crescent. New data from the northern Fertile Crescent and Cyprus, along with re-analysis and re-dating of crop remains from northern Levant, continue to provide many new insights into the timing and locations of wheat domestication. Nesbitt highlighted the complex history of *Triticum spelta* L. (spelt wheat) – new genetic evidence and a reassessment of the archaeobotanical record were used to provide a convincing argument that spelt wheat may have had multiple origins of domestication. Nesbitt also noted that research is ongoing into relationships between Near Eastern and European wheat populations, as was also evident in a number of the posters displayed at this conference.

Three papers presented in the afternoon session would have been of particular interest to archaeologists. Colin Hughes (University of Oxford) presented a multi-authored paper entitled “Backyard Sympatry, Spontaneous Hybridisation and Crop Domestication in Pre-Columbian Mexico – Insights from *Leucaena* (Leguminosae)”. The legume tree *Leucaena* has provided a minor but constant food source in south-central Mexico for the last 6000 years. Hughes utilised archaeological, ethnobotanical, geographical and genetic data to explore the extensive history of pre-domesticated *Leucaena* cultivation. This cultivation involved numerous repeated (temporally and spatially isolated) wild to cultivated transitions of a range of *Leucaena* species. Hughes also provided evidence for a series of geographically-dispersed spontaneous hybrids. It appears, therefore, that the history of *Leucaena* cultivation is more complex than previously considered, as there is now considerable evidence for a widespread mosaic of wild, managed and cultivated populations. The next paper focused on columnar cacti, which are among the main plant resources in Mesoamerican prehistory. The paper was presented by Alejandro F. Casas (Universidad Nacional Autónoma de México) and was entitled “Evolutionary Biology of Columnar Cacti under Domestication in Mesoamerica”. Casas explored the relationship between variations in columnar cacti and human management of these plants. He found that domestication of columnar cacti can involve *in situ* management as well as agricultural management. It appears that human selection in both management systems can be significant: Casas presented evidence that indigenous peoples of central Mexico were found to favour, and therefore encourage, plants producing larger and sweeter fruit with thinner peel, fewer spines and pulp colour other than red. Casas then questioned whether morphological variation in various genera of columnar cacti was allied to management type. In studies carried out on *Escontria*, *Polaskia* and *Stenocereus*, Casas observed that cultivated populations did indeed display increased morphological variation when compared with wild populations.

Remaining in the Americas, Bruce D. Smith (Smithsonian National Museum of Natural

History, USA) then presented a paper entitled “*Lagenaria siceraria*: Genetic and Archaeological Evidence for the Early History of Domesticated Bottle Gourd”. Bottle gourds have long been valued as container crops, and Smith and collaborators have been carrying out research into determining whether bottle gourds were native or introduced to the Americas. In his update on latest findings, Smith noted that no evidence has been found for wild gourds in the Americas, and it was thought that American gourds derive from either African or Asian landraces. Research focused on archaeological rind fragments and 12 examples were dated from sites with a good geographical distribution across North, Central and South America, producing evidence for the presence of bottle gourd in the Americas by 8000 Cal BC. The archaeological rind specimens were compared with recently discovered wild bottle gourd rinds from Zimbabwe and the archaeological specimens appeared to be much thicker than their African wild counterparts. Smith suggested, therefore, that the American archaeological specimens derive from domesticated rather than wild bottle gourds but it should be noted that this hypothesis is based on a comparison with only one population of wild gourds. Ancient DNA sequence analysis of the archaeological rind specimens, and comparison with modern Asian and African landraces of bottle gourd, identified Asia as the source of introduction. The question of how bottle gourds reached the Americas remains a contentious issue. Smith has yet to find convincing evidence for the movement of gourds by ocean currents and he feels that the transport of gourds by waterborne vessels is even less likely. Despite Smith’s contention that the movement of gourds is a ‘red-herring’ question – he feels that it may be unanswerable – it remains an interesting issue, and it is hoped that future investigations can develop new analyses to help in resolving this question.

Many of the papers and posters presented at this conference were multi-authored and collaboration by colleagues from a range of different academic backgrounds is becoming increasingly frequent in archaeobotanical studies. This is a welcome, and indeed necessary, development given the increasing specialisation by individual scholars and the remarkable rate of advance in scientific analyses. Presentations at this conference investigated plant domestication throughout the world; Europe and the Near East are no longer the focus of many analyses but it was interesting to hear that research in these ‘traditional’ areas is ongoing and there are many questions that remain unanswered. While many geographic areas were investigated at this conference, most studies were confined to the examination of a distinct area (such as the Near East or South America); the opportunity to compare approaches to plant domestication around the world generally appears to have been missed. The undoubted diversity of topics addressed at this conference was a fitting tribute to the varied interests of Barbara Pickersgill and it is intended that papers from the conference will be published in a special issue of *Annals of Botany* in 2007.

For further information on the conference and the participants see www.rbg.kew.org/scihort/ecbot/ecbot-pickersgill.html.

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