

## Editorial

The first issue of volume 7 of *Circaea* sees another change in style and in the means of reproduction; we are now able to originate copy on an IBM-compatible micro-computer and pass files for printing to the laser printer linked to the University of York mainframe computer. We hope that readers will approve of the new format!

In this issue, we are publishing two major articles, one a bibliography of books and papers relevant to the identification of plant macrofossil remains, the other a lengthy review of domestic mammal physiology in the context of domestication. Some of the references in these compilations have been obtained from secondary sources and they may not all be complete in detail—hence the occasional omission of page numbers, a publisher, or a place of publication. There are also three book reviews and some comments on the AEA's 10th Anniversary meeting in 1989.

We very much hope to produce part 2 of volume 7, the second part for 1989, soon after this one, and then proceed swiftly to volume 8 (for 1990). Needless to say we apologise to the readership and, most especially, to our authors, for these delays; we hope the use of new technology will speed the process up.

Grateful thanks from the Editors are due to John Carrott for typing in the paper by Barbara Noddle. The paper by Mark Nesbitt and James Greig arrived on a 5¼" floppy disk and saved immense amounts of editorial time! Please note that we are able to transfer files produced on 3" Amstrad disks (from LocoScript and LocoScript 2, WordStar or NewWord) and from 5¼" floppies (from WordPerfect or WordStar). Files formatted using WordPerfect (version 5.0) are currently the most acceptable. We can also utilise copy transmitted through JANET from computers in Britain (and perhaps also from further afield); our address is BIOL8 at UK.AC.YORK.VAX (please let us know by more conventional means—e.g. carrier pigeon—if you have any difficulties with electronic mailing).

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*Front cover:* Photomicrograph of a nymph of the psyllid bug or jumping plant louse, *Trioxa albiventris* Förster, associated with willows, *Salix*, from Anglo-Scandinavian deposits at 16–22 Coppergate, York (Photograph: Dr E. P. Allison).

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## Book reviews

H. Küster (ed.) (1988). *Der prähistorische Mensch und seine Umwelt*. Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg, 31. Festschrift für Udelgard Körber-Grohne zum 65. Geburtstag. Stuttgart: Konrad Theiss Verlag. ISBN 3 8062 0799 2. 430pp., figures and pls. Price DM 125,- (approx. £41).

Udelgard Körber-Grohne may be considered one of the trendsetters in palaeoethnobotany. Her publications, especially, show the importance of botanical methods for the study of the relationship of man and his environment in the past. Not only has she paved the way for the development of a methodological framework in palaeoethnobotany, but again and again she has proved that the boundaries of the identification of archaeobotanical material could be expanded (e.g. Körber-Grohne 1977; Körber-Grohne and Piening 1980).

The role of palaeoethnobotany in environmental archaeology has changed considerably during recent decades. At first merely the study of (sub)fossil macroscopic remains of cultivated plants, concentrating on the reconstruction of subsistence economy, diet, and vegetation and landscape, it now focuses increasingly on more sophisticated techniques such as the interpretation of archaeological features and the reconstruction of human behaviour (what Martin Jones (1985) calls 'archaeobotany beyond subsistence reconstruction'). In 1967 the definitive step to integrated eco-archaeological research was made by the publication of Körber-Grohne's monumental *Geobotanische Untersuchungen auf der Feddersen Wierde*. This study of a 1st–4th century AD habitation mound in the coastal area of northwestern Germany not only contains examples of 'classic' research in vegetation reconstruction, but also a thorough discussion on the spatial distribution of plant remains and their connection with the archaeological context, in relation to different stages in crop processing.

Since then, her name has stood for palaeoethnobotanical research of outstanding quality, as was recently proved by the publication of another *chef d'oeuvre*, *Nutzpflanzen in Deutschland* (Körber-Grohne 1987).

For the occasion of the 65th birthday of Professor Körber-Grohne, Hansjörg Küster has brought together a number of papers of palaeobotanical signature, under the title

'Prehistoric man and his environment'. Going through the index, it appears that this title does not really cover the contents of the book. The contributions are arranged in five sections: General, neolithic, Bronze and Iron Age, Roman period, and Middle Ages. The last two are represented by five and six papers, respectively, so about one-third of the contributions fall outside the timespan suggested by the title. Moreover, a number of papers, however interesting, are only remotely, if at all, concerned with the relationship of man and his environment.

Clustering the papers in a manner perpendicular to Küster's division, the following topics (although a strict separation is not quite possible) may be discerned: General, Vegetation history/Phytosociology, Methodology, and Descriptive articles/Site reports. In spite of the development of archaeobotany towards the area beyond subsistence reconstruction, a large part of the contributions belong to this latter category. Dissatisfaction with the descriptive approach does not remove its necessity; it is generally acknowledged that it is often difficult or impossible to discuss archaeobotanical finds simply through lack of comparable material (Jacomet: *Forschungslücken*; Behre: *Unzureichende Kenntnisstand*). Illustrative of this category are the papers on *Pinus pinea* (Kislev), *Raphanus sativus* (Hopf; Buurman), *Vitis vinifera* (Gyulai), *Prunus cerasifera* (Stika and Frank), the use of *Polytrichum commune* for the plaiting of rope (Knörzer), and Schlichtherle's study of seeds as ornamental objects during the neolithic.

Site reports are presented by Piening (three papers on charred plant material from prehistoric sites in southwestern Germany, with an interesting observation on remains of hay from the Iron Age site of Stuttgart-Mühlhausen), Behre (a discussion of a find of charred grain from the Bronze Age settlement of Toos-Waldi, in Switzerland), Karg (Uhingen, Bronze Age), Küster (Burkheim, Iron Age), Tomzyńska and Wasylkowa (Kamieniec, Poland, Iron Age), S. Maier (Köngen, Roman well) and U. Maier (Bruchsal, medieval bishop's residence). Bakels' preliminary report on the neolithic site of Hekelingen (Netherlands) not only describes the plant remains, but also includes a discussion of the economy of the settlement.

The category 'General' is represented by, among others, an introduction by Planck to the state of archaeobotanical affairs in Baden-Württemberg, and a discussion by

Opravič of plant material from medieval urban and rural contexts. Especially interesting in this category are van Zeist's study of the relations between medieval settlements in the clay and sand regions of the northern Netherlands, Jacomet's paper on mediterranean taxa represented in neolithic lake-shore sites in Switzerland, and Rösch's article on the interpretative value of mosses for palaeoenvironmental research in general and the use of plant material by prehistoric man in particular.

In the category 'Vegetation History', the papers of Kalis (Rhineland, early neolithic), Smettan (Kupfermoor, neolithic to medieval) and Liese-Kleiber (Federssee, neolithic to Bronze Age) show what essential contributions 'classic' pollen analysis can make to settlement archaeology. The paper by Gaillard and Jacquat illustrates that the boundary between palaeoethnobotany *sensu stricto* and palynology is not sharply delimited: both disciplines are essential in the study of the relationship of man and his environment in the past. Phytosociological contributions concentrate on vegetation influenced by human activity: the phytosociology of weeds is discussed by Willerding (in general) and Jones (for southern England) and the importance of the preservation of existing field weed communities is stressed by the paper of Lange and Illig. In her contribution on forest border vegetation, Wilmanns shows the implications of changes in land-use for the interpretative value of (groups of) plant species in palaeoethnobotany.

The category 'Methodology' includes some articles of special interest. Greig, for example, discusses the interpretation of palaeoenvironmental results from Roman well fills and the processes involved in the formation of the different organic assemblages; Kreuz was able to establish functional differences of excavated structures on the basis of charcoal analysis; she also suggests taxon-specific gathering of firewood by the inhabitants of a Bandkeramik settlement and management of hedgerow vegetation for this purpose. The only paper with a statistical approach is van der Veen's study of the Roman grain from South Shields (NE England), which also includes a discussion of sampling methods.

Although the standard of the papers is variable, the book derives its main interest from the fact that it includes several original contributions on methodological topics (Greig, Kreuz, Rösch, van der Veen,

van Zeist). The relatively large number of 'site reports' is not significant, given the state of affairs within the research discipline, but inherent to the character of a *Festschrift*. Many authors consider it an opportunity to present 'goodies' from excavations for which the final reports are not going to appear in the near future, or to devote a discussion to an interesting and/or controversial species or groups of species.

The production of the book is fine—immaculate—although a few readers may be annoyed by the fact that scientific plant names are not printed in italics and that the tables are rather wasteful of space.

About two-thirds of the contributions are written in German (without a summary in English). This might be prohibitive for a large international distribution, which is a pity, because at a time when £40–50 is the normal price for a basic textbook, 125 D-mark is relatively cheap for such a splendid publication.

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Reviewer: Jan Peter Pals

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Hiko-Ichi Oka (1988). *Origin of cultivated rice*. Developments in Crop Science 14. Amsterdam: Elsevier. ISBN 0 444 98919 6. 254 pp. Price Hfl. 185 (approx. £61).

This quarto volume is comparatively thin for the price. It was very disappointing at first reading, perhaps because, given the title, the reviewer expected something with a higher and better quality of archaeological and palaeobotanical input. In fact Oka takes a rather wider view but the main thrust is from the point of view of genetics and on a second, thorough, reading this proved to be of considerable interest.

There are ten chapters, preceded by a brief synopsis. The titles of some chapters are in somewhat clumsy English, as is much, unfortunately, of Chapter 6, possibly a result of literal translation from the Japanese. The chapter titles, however, give a good impression of the general flavour of the book, apart from indicating the content. They are as follows :

1. The genus *Oryza* (this includes an enumeration of the species, notes concerning the confusion in species naming and the habitats of wild rice species);
2. The ancestors of cultivated rices (the contents are self-evident);
3. Ecology of population biology of common wild rice (!); common wild rice is taken as the *Oryza rufipogon* complex as far as the possible progenitor of *O. sativa* (long-grained rice) is concerned and *O. breviligulata* as far as the likely progenitor of *O. glaberrima* (glutinous rice) is concerned and the chapter considers distributions and habitats, variations in breeding systems, adaptive strategies and regeneration success;
4. Genetic variations and evolutionary dynamics;
5. The dynamics of domestication (including sections on the characteristics of domesticated plants, hybridization, selection, weedy forms of rice and the geographical distribution of genetic diversity);
6. The homeland of *Oryza sativa* (archaeology and history in relation to the origin of long-grained rice);
7. Indica-Japonica differentiation of rice cultivars (with sections on the classification of varieties into groups, differences

between Indica and Japonica types and intervarietal hybrid sterility);

8. Functions and genetic bases of reproductive barriers (this chapter considers reproductive barriers found in cultivated rices and their wild relatives, hybrids between *O. sativa* and *O. glaberrima*, etc.);

9. Variations in adaptability of environment (photoperiodic response, adaptation to upland and deep-water conditions, fertiliser response, and so on);

10. Germplasm conservation; not directly concerned with agricultural origins, more with agricultural futures, and unlikely to be of interest to archaeologists.

An integrating concluding chapter might of been of more value than an opening synopsis, as the book ends somewhat abruptly.

Oka states in his preface that the intention was to review the present state of our knowledge on the origin of rice cultivation, and the book must be assessed in terms of how far he succeeds in doing this. He goes on to assert that he is not competent to write such a review, saying that it was beyond his ability to cover the whole range of sciences related to the subject. On the face of it, this is a damning indictment of the weakness of the book, but one must not be too harsh. As in many areas of research these days, it is simply not possible for a single writer to produce a watertight overview of the whole field. Oka is clearly most at home with his own specialist area of genetics, and indeed he presents the findings of much experimental work conducted over many years by himself and colleagues in several countries, into the ecology of wild and cultivated rices. He should, however, have invited archaeologists and palaeoecologists to collaborate in writing Chapter 6, especially, or at least asked for their comments. It is a pity that the chapter that is so directly about the origins of rice cultivation is the weakest in the book.

The concern of the book is substantially, but certainly not exclusively (since Oka has carried out fieldwork in Africa) with the origin of *Oryza sativa*. While his definition of the *Oryza rufipogon* complex may be criticised, few would question his postulated origin of *O. sativa* in *O. rufipogon* and in this respect he is not really telling us anything new. However, he has verified that *O. rufipogon* has greater gene diversity

than other wild rice species and that the common wild rices of Africa and South America are isolated from *O. sativa* by reproductive barriers. Apparently *O. rufipogon* can be a perennial under everwet conditions or an annual in seasonal swamps and the two forms are very similar genetically although the perennial can reproduce vegetatively. Oka sees the origin of *O. sativa* in the perennial whereas Chang (1976) envisaged evolution from the perennial to a wild annual (*O. nivara*) and thence to an annual cultivar, like the other cereals. Oka dismisses the fact that the other cereals are annuals as 'not pertinent' and claims that *O. sativa* is essentially a perennial, a view which he does not substantiate anywhere in the book. Chang (1989) simply ignores Oka, whilst Oka deals rather sparingly with Chang's views—the very stuff of science! A compromise must be possible.

Turning to *O. glaberrima*, there is, likewise, little doubt that it originated in *O. breviligulata* in Africa, where it is endemic. What is open to question is when it originated. Oka (p. 12) gives a 'date' of 1500 BC from a source written in 1939. The truth of the matter is that the origin of glutinous rice is even more obscure than that of long-grained rice. So, again, Oka is not telling us anything which is essentially new.

Returning to *O. sativa*, which is the more important of the two cultivars, not only does Oka disagree with Chang on the method of origin but also on the number of races which can be distinguished in the cultivar. Oka recognizes Indica (Hsien) and Japonica (Keng) types only, while Chang (1976) also distinguished a Javanica type. Oka claims that this name has never been formally published and argues his case very convincingly using genetics: apparently Javanica has almost the same isozymes as Japonica and it may simply be a tropical sub-group. He acknowledges that both may have sub-types. Temperate-area rice cultivars are exclusively Japonicas (these have higher cold tolerances) but they also include hill-rices of the tropics and subtropics. At least the two writers agree that gathering preceded cultivation—something which neither can, of course, prove! Oka makes the bland comment (p. 140) that phytoliths (opal silica) may be useful in separating Indica and Japonica races, but we hear nothing more of them and there is no reference to the literature on rice phytoliths even from Japan, e.g. Fujiwara (1976) and Watanabe (1968).

Despite the information outlined above, Oka, perhaps rightly, is not prepared to defend a case for separate origins of Indica and Japonica races. There is an interesting section on weed rices, which he suggests are possible relics of ancient cultivation. These include the 'red' rice of Japan which has both Indica and Japonica types and which he unconvincingly states might represent intermediate stages in the domestication of wild plants as they accumulate genes of cultivars by introgression.

There is little mention of rice pollen except in relation to plant breeding. He is correct in stating that *O. rufipogon* pollen tends to be oval in shape and that this cannot be regarded as diagnostic as intermediates with the more usual spherical shape occur. He makes no comment on why rice cultivar pollen, unlike that of other cereals, shows no tendency to gigantism. Could this be because cultivated rice is of more recent origin? (This reviewer is not a geneticist and would hesitate to stick his neck out, however.) As with phytoliths, there is no reference to the data on rice pollen, which are mainly published in Indian journals. The statements about pollination mechanisms seem partly contradictory. At first *O. sativa* is said to be predominantly self-pollinated, then (p. 35) that both it and the wild species are wind-pollinated and finally (p. 83) that common wild rices are partly self-pollinated. There is general agreement in the literature (reviewed by Maloney, 1989) that *O. sativa* is self-pollinated, that the pollen is not dispersed very far and that it produces fewer pollen grains per anther than the wild species. Oka is at least consistent in producing data which support the latter finding.

Having been fairly critical so far, the points which have been made are, perhaps, minor in comparison with those which have to be made about the archaeological survey, which is naive in the extreme. He starts badly: one of the general comments made (p. 126) is that man has been on the earth for two million years—the source is a book written in 1975. The attempt at amateur comparative linguistics on p. 135 is even worse, however. As far as the evidence from Thailand is concerned, one of his main sources is the now infamous paper written by Solheim in 1972. There is no reference to more recent research, which I will spare the reader by not quoting at length, but many quite important articles have been published in the *Indo-Pacific Prehistory Bulletin*, various conference

proceedings and there is Higham's important three-volume *British Archaeological Reports* on Ban Nadi. The supposed date of c. 6,000 bc for the first rice cultivation in Thailand may well prove to be true (cf. Maloney *et al.* 1989) but cannot be substantiated at present. Both myself and my research partner, Charles Higham, agree that rice cultivation could have originated anywhere in a broad area ranging from southern China to the Red River valley of Vietnam to Thailand. Both the book under review and Chang (1989) draw attention to a secondary source which claims that cultivated rice occurs in archaeological contexts dated 6,570±210 bc to 4,530±185 bc at Maharaga, Uttar Pradesh, India—considerably earlier than dates from other Indian sites. No laboratory numbers are given for the radiocarbon dates and this writer would prefer to see the primary source before passing judgement on this report. Nevertheless, Oka states on p. 130 that archaeological evidence and historical records (which?) show that rice culture in China started some 1,000 years earlier than in India! It should be noted that the attribution of *O. sativa* to c. 4,000 BC at Ulu Leang, Sulawesi, in Chang's table is obsolete. It is now known that the true age is much younger.

The account of rice in Chinese archaeological contexts is the best part of this chapter although this, too, is not completely up-to-date. It is useful to have translations of summary accounts of the literature in Chinese, however. There is no mention of rice origins in Japan, but what information there is suggests that it is late.

Based on an insufficient review, Oka has claimed simultaneous origins for rice cultivation in India, Thailand and China. If the Indian site is ignored, most people would at present opt for a southern Chinese origin around 7,000 BC.

The inference (p. 137) that the expansion of the Indica varieties began in the last millenium is highly questionable because of the extent of the source material and the methods used, of which Oka himself is critical. The data consist of length/breadth measurements, mainly on impressions in brick. Oka admits that these are not reliable in differentiating modern material, that there is a 39% possibility of misclassification, and that even if you could distinguish fossil Indica from Javanica this does not prove which race originated first.

Chang (1976) argues against an origin for rice in the humid tropics, partly because of its sensitivity to photoperiod. Oka points out that wild species are usually sensitive but common wild rices from Sumatra and Borneo, which have a long period of vegetative growth, are not—nor are some cultivars (tropical Japonicas). The corollary of this is that Chang is correct, but an early expansion into the humid tropics cannot be ruled out.

It is clear from this review that the topic of rice agricultural origins is not readily resolved. From the point of view of the archaeologist and palaeobotanist, the attempt to seek origins is futile: all that can be achieved is to push the date backwards and, as far as south-east Asia is concerned, the possibility that the earliest sites lie deep beneath the sea on the Sunda Shelf cannot be neglected.

Oka's book is not one which is easy reading for the non-geneticist but, with the exception of Chapter 6, it is worth the effort as the most thorough survey of the background to the agricultural origins of rice in existence. It is not the book for every environmental archaeologist's collection but it is an important specialist work of reference and it is to be hoped that there will be a second edition which will meet the criticisms delineated above. However it does not meet the intended aim of an up-to-date review of knowledge on the origins of rice agriculture because of the weakness of Chapter 6.

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Wheeler, A. and Jones, A. K. G. (1989). *Fishes*. Cambridge: University Press. ISBN 0 521 30407 5 Pp. xiv + 210, numerous illustrations. Price £32.50 (\$59.50).

This book is the sixth in the series *Cambridge Manuals in Archaeology*, other titles in which include Simon Hillson's *Teeth* (1986) and Richards and Ryan's *Data Processing in Archaeology* (1984). The series describes itself as 'reference handbooks designed for an international audience of professional archaeologists and archaeological scientists in universities, research laboratories, field units, and the public service' (back cover). *Fishes* has fourteen chapters, which may be divided into four sections. Chapters 1–3 provide an introduction to archaeological fish remains, their importance and potential, and provide some background on fish ecology. Chapters 4–8 examine the nature of the evidence, looking first at how to recover it, then at taphonomy and finally at the skeletal anatomy of fish. Chapters 8–12 deal with analysis and interpretation. Finally, chapters 13 and 14 are a sort of miscellany, detailing the preparation of reference collections and indicating future directions for research. There is a useful and extensive list of references (over eleven pages) and an index. The book is well packaged and presented, with many fine line drawings and a small number of photographs, but is very expensive, working out at 14.5p per page, and will be beyond the pocket of many at whom it is aimed.

Archaeology is becoming an increasingly diverse and specialised discipline with the result that there is a growing gap between those involved in the very specialised areas (e.g. archaeological scientists) and excavators. There are even problems of communication between archaeological scientists, let alone between scientists and other archaeologists! Often the excavator will also have his or her own specialisation, which traditionally is oriented towards artefacts, such as pottery or coins. Although the situation is changing slowly, this diversity often leads to the situation where the excavator has too little knowledge of the specialist subject to be able to understand and integrate the results, whilst the specialist may not be well-versed in stratigraphy, for example, to be able to understand the archaeological potential and problems of the project. The result is often the 'relegation' of scientific reports to the appendices of excavation reports and little or no attempt to integrate the findings. This the authors recognise and address early in the book (p. 7). They have attempted to write a book that is useful and accessible to both excavator and scientist, and it is a brave try, but I feel that the authors never quite find the right balance, with the result that in many places the book goes into too much detail at too basic a level on one side or the other. This would be fine if it were directed at undergraduate students or excavation supervisors, but the series is aimed at a much higher level, and one where much of the information provided seems like overkill. For example, the 22 pages devoted to methods of recovery (chapter 4) include ten pages itemising methods of sieving even to the extent of providing a 'shopping list' of materials required: clean trowel; nylon string; sample book and pencil; and so on (p. 48). It would be an insult to suggest that any competent excavator should require such information in a book like this, whilst this amount of detail is irrelevant as far as the scientist is concerned. Other examples could be quoted. One feels that the authors could not quite make up their minds whom they were addressing: novice, excavator or scientist.

Conversely, there are areas which could profitably have been covered but which have either been glossed over or ignored. For example, the authors mention historic and prehistoric evidence in the form of pictorial representations (p. 3). They dismiss it, however, as being able to provide 'only a rough guide to the knowledge the respective cultures possessed of

their fish fauna' choosing not to cover it in any detail. I feel this is a great loss because it has been shown in the case of other animals that such evidence can be extremely useful and revealing (for example in Michael Ryder's *Sheep and man*, 1983, which makes extensive use of this kind of evidence for his chosen species). The authors themselves use such evidence in places, as when describing wall-paintings from Egyptian tombs which confirm ideas about ancient processing (p. 65). Furthermore, there is increasing evidence that prehistoric depictions can be highly precise in details concerning hunting and capture of prey, and pertaining to processing—after all, ancient peoples had minute empirical knowledge of their environment and the habits and habitats of their prey; it is only logical this should be communicated in their art. Linked to this is documentary evidence, and again the authors pay little heed to the importance of it.

A second sad omission is the lack of 'a survey of the interactions between fishes and man' (p. 2). Were this book a manual of fish recovery and identification only, such an omission would be understandable, but it aspires to be a book about fish remains and archaeology (p. 1), and archaeology, by definition, involves man. Any archaeologist wishing to learn more about the potential of fish remains would list as a primary criterion the interactions between fishes and man. These, then, are the main failures of this book. There are a few minor points which hardly need labouring for they are insignificant (Table 5.3, for example, is not referred to in the text and appears incomplete).

The book as a whole, however, is not a failure. To write it off as such on the basis of the omissions described above would be folly, for it fills an important gap in the literature, the subject being long overdue for this sort of treatment. There is no lack of literature regarding fishes, as the references show, but there has hitherto been no attempt made to provide a broad but detailed account which will be accessible to scientist and excavator alike (Richard Casteel's *Fish remains in archaeology*, 1976, was aimed primarily at the specialist, and was a very unsatisfactory book on both levels). This book is readable and literate and contains a mine of valuable information. For instance, the two chapters (6 and 7) on fish anatomy are clear and most usefully enumerate those elements that are best preserved and most useful for identification in the context of archaeological remains, and the inclusion of a comparative

list of the main schemes of nomenclature (Table 7.1) is a real boon. Similarly, the discussion of methods of recording and analysis (chapters 8-11) are well argued and presented (if slightly patronising in one or two places).

Despite its flaws and its price, this book must be compulsory reading for any archaeologist with a genuine interest in fish remains. And with increased standards of recovery on modern excavations there will be fewer situations where fish remains are not encountered (especially on urban sites). The authors deserve every congratulation and encouragement. They honestly admit the areas where simply not enough work has been done, and it is hoped that their endeavour will spur others on to fill those gaps in our capability and knowledge.

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**Cinderella's kitchen: a personal view  
of environmental archaeology  
past and present.**

The 10th Annual Symposium of the AEA invites historical thoughts. I cannot say exactly when the archaeological virus permeated my existence turning me into an archaeozoologist, environmentalist or whatever, because 25 years ago, which is approximately when it happened, these terms were not in use. The inclusion of the Greek 'logos' in the word archaeology should indicate that it is a science, and so it may well have seemed in the early days when excavated objects were contrasted with classical literature. Prehistory, blending as it does with palaeontology in its Palaeolithic period, ought to have increased the scientific bias, but an obstinate public, although it enjoys spectacular grave-goods and stone circles, believes that they too have something to do with the Romans.

In the early days of the subject, archaeologists were amateurs, frequently wealthy ones: the professional barrow-openers who performed before excursion parties from antiquarian societies can hardly be included. These people were often land-owners interested in agriculture or in natural history, and in any case everybody rode or at least drove horses, so animal as well as human bones received some attention. Abercrombie's ceramic revolution

had not yet taken place, so as far as they were concerned potsherds were either decent Samian or 'quantities of rude pot'. Environmental interests were probably at their nadir during the first half of the 20th century. Some work was done by museum staff, apparently voluntarily and without payment; they probably gained their expertise on the job. As recounted in a recent AEA Newsletter, the Institute of Archaeology in London was set up just before the last war, against the odds, with a strong environmental interest, but a subject with so many constituent sciences is a difficult one both to teach and to study. I was delighted to learn that it does form a whole degree course at one enlightened polytechnic and a second degree at the Institute of Archaeology. Nevertheless, Ian Cornwall found himself having to become a jack of many biological trades and to his great credit mastered most of them and taught them well.

However, the powers that be, whether University Senates or the late UGC, were firmly of the opinion that archaeology belongs amongst the humanities, if anywhere. One gains the impression that the recently-retired generation who once had charge of the Civil Service thought archaeology to be a dilettante subject unsuited to taxpayers financial support, though it probably served to keep the long-haired and trendy Left out of mischief. The general public, however, was fired by the enthusiasm of Sir Mortimer Wheeler and Glyn Daniel on the television, and their interest was maintained by the excellent *Chronicle* series. The early death of Paul Johnstone, chief *Chronicle* producer, was a sad loss to archaeology. During the 1960s and early 1970s, amateur 'rescue' excavations were carried out with a crusading zeal within inches of bulldozers, as redevelopment took place with unprecedented speed. Extra-Mural classes, at least in Glasgow where I acquired most of my archaeological knowledge, were usually over-subscribed.

Purveyors of environmental appendices to excavation reports were in very short supply. Museum and university staff were overwhelmed, as were those interested parties in industrial laboratories who had been so helpful in metallurgy and such fields. Extra-Mural departments were again called upon to help, giving courses not only about the various disciplines, but also in DIY. Dedicated amateurs actually travelled long distances and paid to attend weekend courses. I did so myself, and eventually came to run my own 'bone

weekends' for the University of Bristol. And I must say how gratified I am by the subsequent work of some of those who attended.

It is a pity that some professional archaeologists have depised the amateurs and the general public. In an age troubled by accelerating change, a sentimental attachment to the past is a source of comfort, and if the archaeologist wants financial support from the taxpayer he should also seek its interest. The public is certainly becoming more interested in its present and future environment. It would not be so comforted by the past if it better appreciated the destructive effect which man has had on his surroundings. Knowledge of the past should be general knowledge for the environmentally-aware and its increase should be supported. To some extent the public is extending its interest beyond the trappings of the rich. I was delighted to hear the forthright comments of a formidable lady with a strong northern accent at Knossos: 'Never mind about dining room. Where's bloody kitchen?'. Needless to say, the guide could not answer.

The Civil Service eventually gave way to the archaeologists' demand for environmental data, and the Ancient Monuments Laboratory was established. Unfortunately, it was conceived as an industrial type of laboratory, staffed by technicians carrying out prescribed tests to order for the Ancient Monuments Inspectorate, and part of the then Department of the Environment. The environmental divisions of the Institutes of Archaeological Research set up in Holland and Scandinavia would have been a more fortunate model. However, the establishment of regional AML outposts associated with universities greatly improved the situation, and recent changes amongst the upper echelons of the staff may indicate that the word *research* is less of an anathema in the future.

Archaeology tends to study the remains of top people, be they rulers or priests, or both. Their magnificent grave-goods and fine dwellings are comparatively easy to locate and excavate. They are obvious raw material for the tourist/heritage trade, and are thus potential income-generators. In contrast to this, the slave leaves little but his or her chains, whilst the anonymous peasant (who still bears much of the world on his shoulders) and the hitherto-despised savage hunter-gatherer leave nothing but an altered environment. One of the few positive contributions of the Marxist school

of history has been to develop an interest in these underlings, though proponents have done little about it in their home territories. However, this climate of opinion, together with the revelation of the antiquity of the indigenous inhabitants of the Americas, provided a great stimulus to environmental studies in the USA.

Here they caught the interest of the late Eric Higgs, whose major achievement was to transmit his enthusiasm to the University of Cambridge, the British Academy, and thence to a large part of the archaeological fraternity. Higgs' former students have done magnificent work, particularly in Australasia. However, he himself could not be called a genuine scientist, though he espoused science like a religion, thinking that enthusiasm and repetition of jargon would allow him to add up two and two to make far more than the prescribed four in order to support preconceived conclusions. Unfortunately some of his former students still impart this ethic to their students. There is still a tendency to extract revolutionary new ideas from limited and dubious new data, supported by a partial (in both senses of the word) reading of the literature, denigrating received wisdom as the product of outmoded fuddy-duddies. These would-be scientists gain much support from their computer programmes, obediently printing out results to the third decimal place with spurious accuracy.

But how is the would-be environmentalist to get a proper training? An excellent starting point is of course to have a degree in the parent science, the diversity of which is indicated by the qualifications of the Institute of Archaeology's staff. These scientists can take the Institute's MSc course, but this is possible only for a few, and the expense is considerable. Also, not all the relevant disciplines have a relevant parent science, in particular archaeozoology. The most relevant discipline is veterinary anatomy, not separable from a full veterinary course, or perhaps a degree in animal husbandry. The archaeozoologists of Eastern Europe work in agricultural colleges or universities, a very remote possibility in this country. There is a distinct tendency, in my opinion, for archaeozoology to win Cinderella's wooden spoon in this, as in several other respects.

What of the naive undergraduate, not even armed with science 'A'-levels, or whatever it is they have to take nowadays? Most university archaeology departments have at least one resident environmental archaeologist who may be an outstanding scholar

in his or her own branch of the subject. Compare this to a department of music, where the principal subjects are music *per se* and music history, but where the student would be expected to be a competent performing musician. A would-be clarinettist would not accept that the only available teacher happened to be a violinist, and that student would probably have passed the 8th Grade in music exams before entering the university. It may be argued that this makes the comparison invalid, and that any environmental scientist can teach the rudiments of all the sciences, but it means that the student who wishes to specialise in an environmental subject which is not the specialism of the teacher is out on his or her own, and the skills used even in an honours dissertation will have to be self-taught.

Given the size of most archaeology departments, which is about what it should be in such an individualistic 'hands-on' subject, the situation outlined above is inevitable. My remedy is again suggested by the musical world; to use peripatetic teachers. These teachers could be recruited part-time from amongst the AML's misnamed and underpaid technicians. In the form of an intensive teach-in, this could be a stimulating and profitable experience for both parties. Research students expect and get help from staff of other universities. Some of them, indeed, seem to think that their right to other peoples' time and expertise is such that they need not even bother to acknowledge replies to their letters, particularly if these point out the impossibility of an ill-advised project.

Nevertheless, environmental archaeology is out of place in a humanities-oriented department, a Cinderella whose funds are administered by an unsympathetic Baron Hardup. This analogy casts non-environmental archaeologists in the role of the Ugly Sisters, an allegation that contains some truth, though less so than in the past. However, there is still a dislike of this poorly-understood subject, extending its tentacles into more and more artistically-conceived typologies. Professor Ian Simmons has compared this to the opinion of the general public about vaccination: 'they accept it as a necessary evil but they have no wish to know what is in the syringe'. There are, of course, real converts who do not just pay lip-service to the specialists. As long ago as the seminar held by the publishers Duckworth to launch Ucko and Dimbleby's seminal

volume *The domestication and exploitation of plants and animals*, David Allchin stated, apparently without rancour, that he could imagine himself excavating under the direction of a number of persons in white coats. More recently, Bill Britnell (Director of the Clwyd-Powys Archaeological Trust) has said that he would be quite happy to attend a course giving instruction in the type and quantity of samples which should be collected for environmental studies.

Funds are, in theory, available for environmental research, and are so ear-marked by the Science and Engineering Research Council. I have vetted a number of applications for such grants. The norm seems to be for some £30-45,000, to be paid over three years, supporting a research student and a technician and usually allowing for the purchase of an expensive machine and its consumables. This must, of course, be housed in an established department and be backed by a senior academic. The latter are in short supply in the relatively young discipline of environmental archaeology, and such a project would have to be 'sold' to the professor of either an archaeology department or of the parent science involved. Were I to embark on such an application, I would expect it to take about six months, allowing for other activities. Expert secretarial assistance would be a great help and there would be a considerable bill for telephone and postal charges. A successful trial-run might well be required for a really new technique. This is out of the question as far as I am concerned, as it is for the majority of environmental archaeologists as they slave away at their never-ending site reports. This situation was pointed out by the Hart Committee, which was good on diagnosis, but largely silent on therapy.

To achieve such a grant would indeed be like Cinderella to the ball and getting her man (after all, she used decent environmental materials such as mice and pumpkins). And when it was all over, would she be back in her kitchen? It was suggested at one AGM (I think) that the AEA should now have sufficient standing to be allowed to administer a SERC grant but, within the normal limitations of a 24-hour day, who is there to organise it? No doubt we shall muddle on much as we are, stretching the *ad hoc* shoestring (and mixing our metaphors) to unbelievable lengths.

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