Book Review

Jean Dominique Meunier & Fabrice Colin, editors. 2001. *Phytoliths: Applications in Earth Sciences and Human History.* Lisse: A.A. Balkema Publishers.

—*Victor Paz*

Archaeology for generations looked at the nooks and crannies of other disciplines to pick up philosophies, theories, methods and techniques. This was done in an effort to expand the archaeological record, as well as help decipher archaeological materials. The know-how involved in extracting and analyzing Phytoliths—fossil micrometric minerals precipitating in plant tissues—is one of the later contributions coming from the plant sciences to archaeology. This review looks at the volume from the eyes of a Southeast Asian archaeologist very much interested in supporting the practice of Phytoliths analysis in the region.

The content of the book came from conference papers prepared for publication. The conference, held in August 1998, was the Second International Meeting on Phytolith Research convened by the Society for Phytolith Research—a conference series that takes place every two years. The venue for this conference was at Aix en Provence, France, at the Centre Européen de Recherches et d'Estudes de Géosciences de l'Environnement (CEREGE). It was pointed out in the book's preface that all articles were peer-reviewed to fit international publication standards.

The two editors of the volume are both associated with the CEREGE. J.D. Meunier is a co-author in one article on individual characterization of Phytoliths through experimental approaches. Fabrice Colin has no article contribution to the volume, but nevertheless heads the laboratory for paleoenvironmental studies. The editors' involvement in phytolith research is not deep—their work is not reflected in any recent phytolith bibliographic listings (see Pearsall 2001; Runge 1999). They may therefore have edited the volume as part of their CEREGE responsibilities.

The papers in the book are organized under five themes: *Phytoliths in paleoclimatology and paleoecology*; *Phytoliths, diet and health*; *archaeological structures*,

ancient agricultures and paleoethnobotany; *methodology, taxonomy and taphonomy*; and *soil-plant interaction*. The first article is by Page Twiss. As pioneer worker on phytoliths, he was in position to give a backgrounder on the state-of-the-art of phytolith research by 1998. Twiss's piece is clear and informative from a non-botanist or plant scientist point of view. All in all there are 30 papers in the volume, mostly collaborative work with only 8 papers with single authors; thus, single authorship is rare for other sciences. This observation is interesting because usually the study of phytoliths straddles sciences. Articles from the historical sciences such as archaeology, on the other hand, are still characterized more often by singular authorships. The topics chosen to be studied in the papers are also interesting for archaeology: half are directly related to archaeology while the other half are methodological papers equally interesting for an archaeologist specializing in proxy environmental markers. It is not possible to keep this review within the bounds of this publication if each article is given similar stress. Below are comments on choice articles per section of the book, which I think is most interesting for an archaeologist working in Southeast Asia.

In the chapter dealing with paleoclimatology and paleoecology, the most significant article for an archaeologist interested in Southeast Asia is the article by T. Sase and M. Hase. They discussed the nature of the phytolith record in soils interstratified with late quaternary tephras in the region of the Towada volcano in Japan. This is interesting especially for Island Southeast Asia where there are ubiquitous potential study areas with volcanic episodes recorded in the stratigraphy. The study gives a good reference line for anyone who wants to attempt a phytolith study towards environmental reconstruction between episodes of eruptions. Freya Runge's land use study based on phytoliths from the central African tropics in the Congo confirms that phytoliths survive well in tropical conditions and has potential to elucidate on land use. In my thinking, however, questions of land use can best be addressed not solely through the phytolith assemblage, but in conjunction with other data sets such as that coming from pollen, plant macro remains or soil micromorphology.

The chapter on diet and health has two methodological articles most relevant to Southeast Asian archaeology. The first is by P.F. Puech, J.M. Chevaux and R. Notonier on a method for the examination of exogenous deposits on dental surfaces. The authors' research interests were on homonid fossils and on distinguishing the exogenous deposits on them. This allowed the authors to determine if the deposits

were post depositional, taphonomic or the remains of the creature's diet. The particles were analyzed through moulds made from the original material with the help of Scanning Electron Microscopy. I agree with the authors' optimistic view that their method can be useful in elucidating deposition histories or even past subsistence strategies of hominids. Nothing should stop us in Southeast Asia from exploring the potentials of the method even for fossilized modern human teeth such as that from Tabon Cave, in Palawan. The article of L. Buchet, N. Cremoni, C. Rucker and P. Verdin on micro-striations and plant material included in the calculus of human teeth is a good study complimentary to that of Puech et al. and is equally significant to the study of human remains in Southeast Asia.

In the section on "archaeological structures and ancient agriculture," the work of C.J. Lenfer and W.E. Boyd is mainly an actualistic study with the intention of assessing if phytolith analysis may be applied to palaeoenvironmental reconstructions in West New Britain. They conclude that it is promising. In fact, their work was already reinforced more recently by the work of Jeff Parr (2002) in the area. It is also significant for Island Southeast Asia mainly because the environments used for the study coincide with the various environs found generally in tropical archipelagoes. Doreen Bowdery's work on extracting and analyzing phytoliths and starch data from obsidian tools coming from New Britain is another directly relevant article from this chapter. She managed to draw inferences based on the hafting material used for the obsidian tool as well as enhance the use-wear analysis of its edges. With obsidian research and use-wear analysis expanding in Island Southeast Asia—as seen for example in ongoing MA researches at the ASP of Leee Neri and Catherine Tulang and the published studies of Armand Mijares (2001), and Alfred Pawlik (2002)—Bowdery's work on the obsidian tool from New Britain should be a must read.

All four articles in the "soil-plant interaction" section are very useful to anyone into soil micromorphological studies of archaeological matrices. They cover the topics of silicon and aluminum co-deposition in the cell wall of phytoliths of gymnosperm leaves, and the relationship between silica and organic matter in a soil, phytoliths in podzol and podzolic soils. They also discuss the prospects of phytolith study on quaternary laterite in South China.

The book also touches on at least two major concerns of phytolith studies: the appropriate scale where a phytolith assemblage is most effective and the issue of standardizing nomenclature and systematics. The issue of scale deals with how we

use phytolith data sets best: on the small scale such as M. Madella's article in the volume on understanding specific structures in the Iron Age site of Kilise Tepe in Turkey; or on a large palaeoenvironmental reconstruction scale, such as the work of M. Blinnikov et al. on the presentation of a 100,000 year phytolith record—similar to how pollen records are utilized—for the Columbia Basin in Washington, USA. Rovner, who used to think that phytolith analysis should be used on the large scale, argued to the contrary in two articles included in the volume. For Rovner the phytolith data set is useful both for the small scale and large scale, as captured in the title of his second article in the volume "Phytolith evidence for large-scale climatic change in small-scale hunter-gatherer sites of the middle archaic period, eastern USA."

The second concern is on a discourse addressing the question of how to classify and name phytoliths. A quick divide will put those who approach the issue from a nonbotanist standpoint on one side, and those who approach it from a botanist or plant scientist standpoint on the other side (see Rapp & Mulholland 1992). Bowdery et al. attempted to address this issue in their article, "A universal phytolith key," clearly from a nonbotanical approach and argues for classification based mainly on morphotypes. Bobrov et al. approaches the issue on a more fundamental level, but definitely provides the basis for a botanical taxonomic approach by presenting data arguing that biogenic silica (phytoliths), because they are moulds of the organic parts of a plant, have the potential for a biosystematics. A recently concluded conference on phytolith systematics held at Cambridge University (see http://www.arch.cam.ac.uk/~mm10018/phytolith/) further pushed the issue toward resolution. As always, there is a middle way to this issue and both have merits, but will have to be resolved by the practitioners themselves in the different regions of the world.

Geographically, the papers covered a good span of the globe, covering North America (2), Japan (1), Africa (2), South America (2), Eastern Europe (1), West Germany (2), West Asia (1), South Asia (2), PNG (2), North Asia (1), and East Asia (1). Unfortunately there was not a single paper that dealt with phytoliths in Southeast Asia. This is, however, not surprising given the small amount of work done on phytoliths in the region. An early work was done by Pearsall in the Mountain province of Luzon—looking for rice phytoliths in agriculture terraces (Pearsall 1986). With Doreen Bowdery's (1999) work in the Malay peninsula, Java and Sulawesi and some preliminary work in Sumatra

(Maloney 1996), and in the Batanes Island (Paz 2001), these sum up the phytolith work done in Island Southeast Asia over a period of almost 15 years. There was more work done in Mainland Southeast Asia specifically in Thailand where the phytolith work was almost always integrated with the palynological data set (see Thompson 1996, Kealhofer 1996, Kealhofer & Penny 1998). However, while there were clusters of work done in the late 1990s in the Mainland, there is not much follow-up work reported in more recent periods.

While I maintain that proceedings for conference papers on methodology should come out almost immediately or not take this route at all, and instead allow participants to publish in journals, it is still useful to find the proceedings finally published even if three years after the event. At Php 11,284, and the basic quality of the printing, the book is exorbitantly priced and only libraries or insane individuals collecting books can afford it. It is still, however, a good benchmark for the development of phytolith analysis that may still be useful for years to come. In the meantime, we patiently wait for the 2000 & 2002 proceedings, hopefully sooner than later.

References

Bowdery, D.
1999 Phytoliths from tropical sediments: Reports from Southeast Asia and Papua New Guinea. *Indo-Pacific Prehistory: the Melaka papers* 2: 159-68.

Fourth International Meeting on phytolith research, McDonald Institute for Archaeological Research, University of Cambridge, U.K. http://www.arch.cam.ac.uk/~mm10018/phytolith.

Kealhofer, L.
1996 The human environment during the terminal Pleistocene and Holocene in northeastern Thailand: Phytolith evidence from Lake Kumphawapi. *Asian Perspectives* 35(2): 229-54.

Kealhofer, L. and D. Penny
1998 A combined pollen and phytolith record for fourteen thousand years of vegetation change in northeastern Thailand. *Review of Palaeobotany and Palynology* 103: 83-93.

Maloney, B.
1996 Possible early dry-land and wet-land rice cultivation in highland North Sumatra. *Asian Perspectives* 35(2): 165-92.

Mijares, A.

2001 An expedient lithic technology in Northern Luzon (Philippines). *Lithic Technology* 26(2): 138-52.

Parr, J.

2002 *A pre-lapita landscape at Numundo, West New Britain, Papua New Guinea as indicated by fossil; phytoliths.* Paper read at the 17th Congress of the Indo-Pacific Prehistory Association, Academia Sinica, Taipei, Taiwan, R.O.C., September 9-15.

Pawlik, A. F.

2002 Acheulean in Nueva Ecija? A report from the 2001 ASP field school in Arubo, General Tinio, Nueva Ecija, Central Luzon. *Hukay* 4(1): 1-22.

Paz, V. J.

2001 *Archaeobotany and cultural transformation: Patterns of early plant utilisation in northern Wallacea.* Unpublished dissertation. Department of Archaeology. Cambridge, University of Cambridge: 484.

Pearsall, D. M.

1986 Phytolith analysis of soil from the Lubuk (I-1982-W) and Bekes (I-1982-X) sites Mountain Province, Philippines. *On the evolution of agriculture in central Bontoc. C.* In Bodner. Unpublished dissertation. Columbia, University of Missouri. Appendix 2 526-86.

2000 *Palaeoethnobotany: a handbook of procedures*, 2nd edition. San Diego: Academic Press.

Runge, F. (ed)

1999 *Bibligraphy of phytolith research.* Paderborn: University of Paderborn.

Rapp, G. J. and S. C. Mulholland (eds)

1992 *Phytolith systematics.* New York, Plenum Press.

Thompson, G. B.

1996 *The excavation of Khok Phanom Di: A prehistoric site in Central Thailand.* London, Society of Antiquaries.