The Dean of the Medical Faculty at Johns Hopkins defends the way his institution handles misconduct charges. Investigators who use phytolith analysis to date the origins of agriculture provide evidence that their methods are sound. Two researchers point out that the cement in Biosphere 2 did not cause significant oxygen loss. Environmental scientists question the wisdom of producing a second "green revolution," asking, "Shouldn't we be able to learn from our past mistakes?," while experts in photosynthesis discuss the importance of developing genetic techniques for manipulating chloroplast DNA in plants. Theoretical physicists describe their work on dark matter. And the park created in Seveso, Italy, after the accidental release of TCDD in 1976 is said to be a model for restoration ecology.

Johns Hopkins Plagiarism Policies

The title and tone of the short item "Kinder, gentler plagiarism policy?" (Random Samples, 22 Jan. p. 483) not only begs its own question, but also misrepresents the serious and rigorous nature of the process by which the Johns Hopkins University School of Medicine handles charges of professional misconduct.

Hopkins takes second place to none in the thoroughness of its deliberations and review of alleged plagiarism or other violations of honest investigation and reporting, the very currency of science; moreover, its written policies guiding documentation, testimony, decision-making, recommendations, and other disciplinary action are exceptionally clear.

Readers of *Science* should know that these policies, which were strictly followed in the case discussed, involve a complete review of the facts and testimony by a peer group of faculty members; recommendations as a result of the review with respect to disciplinary action by a standing committee of senior faculty members; and approval of any recommended action by the full advisory board of the medical faculty. The Random Samples piece includes only one of the three components involved in the disciplinary action.

In addition, extraordinary care is taken to remove conflicts of interest. In the case discussed, for example, both the Vice Dean for Research and I recused ourselves from any participation in the process because we hold professorships in the department of the faculty members under review. The reported case was managed by the Vice Dean for Academic Affairs and Faculty.

At every step of the way, faculty members involved in the process behave as if our academic lives depend on the outcome. After all, they do. On their behalf, as well as my own, I take serious exception to the offhanded treatment in *Science* of this important issue.

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Phytolith Morphology

As investigators who have worked closely with phytolith analysis since its inception and development as a modern research tool in paleoethnobotany, we challenge statements made in a letter by Irwin Rovner (*Science*'s Compass, 22 Jan., p. 488) that questions the identification of phytoliths in archaeological sediments.

Excavations at China's Diaotonghuan Cave revealed a sequence of rice phytoliths, from which archaeologists are tracing the transition from wild to domestic rice.

CREDIT: G. CUNNAR

First, Rovner's contention that phytoliths the same as those produced in squash *(Cucurbita)* rinds also occur in two other tropical families is incorrect. This contention is based on photographs published by others, including one of us (*1, 2*). However (*1*), which concerned the African flora, did not compare the taxa in question, and (*2*), following (*3*) and using a large sample of plants, noted that spherical phytoliths with deeply scalloped surfaces of continuous cavities that originate from *Cucurbita* fruit rinds could also be distinguished in the Neotropics. Reproductive structures from many taxa contribute distinctive phytoliths not found in vegetative parts (*4–9*). Annonaceae and Burseraceae phytoliths, considered by Rovner to be the same as those from squash fruits, are formed in leaves, have surface ornamentations unlike those found on squash phytoliths, and are uncharacteristic of phytoliths from fruits and seeds (*1–10*).

The identification of archaeological *Cucurbita* phytoliths on morphological grounds (*11*) is further supported by recent studies showing that they do not occur in the approximately 3500 species of plants from 150 families represented in our modern reference collections from the Neotropics [including 45 species from 22 different genera in the Cucurbitaceae (*12*)] and from tropical Asia (*6–9, 13*) or in the many species from other regions of the world studied recently (*1, 5, 14, 15*).

Second, there is no basis for Rovner's blanket statement that moisture variation causes substantial variation in phytolith size and, therefore, that increase in size of archaeological *Cucurbita* phytoliths could be explained by climatic change. Correlations between size and moisture have been studied only for leaf phytoliths in a few species of grasses, and these studies did not address the more important question of whether infraspecific variation conflated interspecific comparison. Our examination of phytolith size in six different populations of two wild *Cucurbita* species sampled from localities in Central America, where growing season precipitation differs considerably, indicated that infraspecific variability is unremarkable (*11*). Rather, phytolith size in these and other modern wild, semidomesticated and domesticated squashes, like seed size, was strongly correlated with the size of the fruit ($P < 0.001$; $R^2 = 0.894$) (*11*). No wild squash in five different species we studied contributed phytoliths with length and breadth dimensions as large as those found in South American domesticated squashes (*11*).

Our archaeological samples from the Vegas site in southwest Ecuador demonstrated a dramatic increase of size in phytoliths from squash rinds between 10,000 years B.P. (before the present) and 7000 years B.P. The sizes of the earliest phytoliths fell within the range of modern, wild squash, and the sizes of the later phytoliths overlapped the range of modern domesticated species (*11*). Other phytolith evidence from Vegas pointed to little or no moisture increase during this period, and paleoecological records from the region indicate that the period was probably the most stable climatic interval of the Holocene (*11, 16*). Further, a recent analysis of a Vegas phytolith sample from before 10,000 years B.P. (*12*) indicated that no change in squash phytolith size occurred between about 10,500 years B.P. and 9700 years B.P., when regional precipitation probably did increase as a result of the environmental changes that accompanied the close of the Pleistocene (*11*), Therefore, as with archaeological seed analysis (*17*), our data likely indicate that early squash domestication occurred.

Third, Rovner's assertion that phytoliths are difficult to identify at refined taxonomic levels is contradicted by a large body of empirical evidence accumulated in the past 15 years by investigators around the world who, for the first time, closely studied phytoliths in a wide sample of angiosperms (*1–10, 13–15, 18*). As with *Cucurbita,* three different sets of researchers agree that *Otyza* (rice) can be identified on the basis of the morphology of a single type of phytolith that occurs in reproductive organs (in this case, the glume) (*7, 19–21*), Our classifications have been validated by multivariate analysis, namely, multiple discriminant functions. In our studies of rice, the measurements were specifically taken to capture size and shape because, as is well known in taxonomy, these attributes together are often necessary for efficient classification (*20*). Since wild and domesticated *Oryza* can be distinguished in a randomly reserved test set from functions prepared from the training set (*7*), Rovner's objections that such classification is not yet possible are refuted by the empirical evidence. Our work with maize used frequencies of phytolith variants where the variants are defined by shape as well as by a size measurement; once again, our success in prediction is due to including both size and shape in the analysis (*18*).

Finally, Rovner's statement that early maize phytoliths from Ecuador are "*larger* than the size values presented for any and every modern reference maize tested" is contrary to the evidence. Rovner could be referring to one Valdivia sample that had a slightly increased fraction (by about 10%) of "extra-large size" phytoliths (those measuring from 20 to 25 micrometers in width) (*22*). However, when the broad size categories are converted into average mean widths, these phytoliths are smaller than many modern maize races (*18*),

Studies of agricultural origins demand the highest standards of research, and interested scholars from other disciplines deserve reliable information on this crucial transition in human prehistory.

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A Small Misconception

Regarding "Carbon sink: A clue from Biosphere 2?" (R. L. Walford, *Science*'s Compass, 15 Jan., p. 330), I want to clear up a small misconception that has been widely repeated in the press (and also in the Perspective by J. E. Cohen and D. Tilman, 15 Nov. 1996, p. 1150), namely that "carbon dioxide [CO_2] was combining with the cement of the structure, carrying oxygen along with it to form calcium carbonate… hence the fall in oxygen concentration." The cement in Biosphere 2 did not cause the oxygen loss. It is true that the CO_2 reacted with the cement and that CO_2 contains oxygen atoms. But it is molecular