Letters

Technical Information

Edward L. Brady and Lewis M. Branscomb (3 Mar., p. 961) provide an informed and thoughtful analysis of society's changing information requirements, with particular emphasis on the contents of the excellent 1971 OECD report *Information for a Changing Society*. Interested readers should also consult the more recent U.S. Conference Board Report No. 537 on this subject, *Information Technology—Some Critical Implications for Decision Makers*. It is available from the Conference Board, Inc., 845 Third Avenue, New York 10022.

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Archeological Looting and Site Destruction

Clemency Coggins (21 Jan., p. 263) and Hester Davis (21 Jan., p. 267) add new emphasis to the worldwide problem of archeological site-disruption. Davis points out rightly that without the help of "amateurs" there may be no hope whatsoever of salvaging a coherent record of prehistory. No band of organized professionals can outrun, outwit, or outdig the bulldozer, the "pot-hunter," and the ever-present sand and gravel company.

In that light, I would like to speak of a scheme for wedding the professional and amateur archeologists that worked—if only for a while. The scheme was tried in Marin County, California, and, having been in the thick of it for 2 years, I think it could work almost anywhere.

The American high school is an institution suffering from no lack of abuse. Its programs are called irrelevant and outmoded, its often restive student population is called (sometimes with justification) aimless and academically uncaring. On both those counts a group of students from the Novato Senior High School proved innocent.

A dedicated history teacher and an extraordinary young archeologist from Sonoma State College took 40 high school students, trained them, and instilled in them a fascination with the science of archeology and its demanding methodology. For over 2 years these unlikely apprentice archeologists systematically worked over the main part of a partially excavated site (Marin-374), another site scheduled for destruction by housebuilders, and a third that was being "leveled" for a parking lot. The site upon which the most time and care were lavished was Marin-374. No earthshaking hoard of unique prehistory was found, and yet the group's pride-in-effort is evident in reports (*1*, *2*) that were subsequently written. From those reports an extract was published in the "Amateur Scientist" column of *Scientific American* in December 1967 (*3*). For high school students, 2 years of weekends and summer days, rain or shine, might seem an impossible price to pay for a little "adventure in time." And yet, without receiving academic credit, and without pilfering for personal collections, the students joyfully worked on, with occasional professional monitoring.

It did not stop there. The case for a Marin County antiquities ordinance was carried by the group, both students and faculty supervisors, to the Marin County Board of Supervisors. The supervisors passed the ordinance, to their unending credit.

Then I graduated from high school—months before the program expanded to include four other schools. I do not know how the program has fared since then. All my old associates have gone their own ways. Two or three of them became professional archeologists. Others, like myself, turned to other fields. And I am sure that many of the group still can find no finer way to spend their leisure hours than doing supervised excavation with college or amateur groups, as I am doing with the University of Nevada at Las Vegas from time to time.

I carry to this day an interest and reverence for the proto- and prehistoric anthropological record. That is what can most help Coggins and Davis and their embattled co-workers. Programs similar to the Novato experiment carried out by graduate students and professional archeologists could utilize the vast reservoir of archeological manpower that exists in high schools and junior colleges.

The American archeological crisis is no less urgent today than it was in 1967, when my friends and I followed the bulldozers across Marin County. And although the methodological consistency of the amateur may be lacking, the mapping at time flawed, and the risk of damage to a site somewhat greater than when professionals do the work, it must be admitted that more can be pulled out of amateur reports like "Report on the excavation of MRN-374" (*1*) than from the dismal documentation of the road-grader.

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References

1. P. Moore and T. J. O'Neil, "Report on the excavation of MRN-374" (Novato Unified School District, Marin County, Calif., May 1967), unpublished, but copies are on file in the libraries at San Francisco State College and the University of California, Berkeley.
2. ———, "Errata and addenda to 'Report on the excavation of MRN-374' including obsidian hydration test results" (Novato Unified School District, Marin County, Calif., June 1967).
3. C. L. Strong and T. J. O'Neil, *Sci. Amer.* **217** (No. 6), 134 (1967).

In her article "The crisis in American archeology" Davis does not consider a very important aspect of the situation. The crisis caused by the increase in rate of destruction of archeological resources coupled with the decrease in funds available for salvage work has unfortunately arrived just at a time when American archeologists are involved in a phase of deep soul-searching which may lead to a virtual paralysis of fieldwork. To many archeologists, the crucial issue is the establishment of archeology as a science, the so-called "new archeology" (*1*). To new archeologists, the ideal scientific method is the deductive method; they therefore insist that before any fieldwork is initiated, hypotheses must be formulated that can be tested against data that must be selectively collected. Only those sites must be chosen and those data collected which pertain directly to test-

ing of the hypotheses of the day. This point of view is now sweeping through the discipline, and is being widely adopted in the current generation of graduate students. To many archeologists, then, salvage archeology, conceived of as digging simply for the sake of digging, has now come into very grave disrepute.

A recent article by Thomas F. King (*2*) summarizes the conflict that has arisen between the intellectual goals of many archeologists and the immediate practical necessities of salvage projects.

The simplest solution to the conflict between the interests of new archeologists and salvage-support organizations, King points out, is to disengage; but a mutual withdrawal will obviously have most unfortunate results. The salvage archeology agencies can find enough trained persons to carry out necessary excavations, but they will lose essential intellectual and material support from the academic community; and the academic archeologists, in a short time, will lose all the sites to the forces of destruction.

King says that the salvage agencies should yield to the point of view of the new archeology and be reorganized accordingly. The best solution, he suggests, is for salvage agencies and theory-oriented archeologists together to work out, for given geographical regions, large-scale long-range research projects in which salvage is incorporated within a deductive research program. Given the present self-righteous, more-scientific-than-thou attitude of new archeologists, which is so clearly expressed throughout King's article, however, it is doubtful that cooperation between academics and salvage program administrators in the face of the immediate crisis of destruction described by Davis can be achieved in time.

Meanwhile, given the present atmosphere within the profession, it seems likely that new archeologists and their graduate student followers (who, incidentally, may perhaps be the last generation to see an undisturbed archeological site in certain areas) will continue to be explicitly disdainful or even fearful of undertaking fieldwork without specific deductive hypotheses to test; or before the millenarian development of "more sophisticated" theory and methodology with universal application. One scholar (*3*) has already called for a moratorium of at least 5 years on all professional archeological excavations in the State of Oregon, despite the horrendous rate of destruction of Oregon sites which he himself documents, for fear that, with the presently perceived deficient state of theory and methodology in archeology, excavation even by professionals will ruin the remaining sites for the truly scientific and anthropological analyses which are expected to come from the new archeology.

The crisis in American archeology that Davis describes, then, has caught professional archeologists in a bind between idealism and reality. It looks as if the result could be paralysis and loss.

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References

1. [illegible] B. K. Swartz, *Amer. Antiquity* **32**, 487 (196[illegible] L. R. Binford, *ibid.* **29**, 425 (1964); in *New Perspectives in Archaeology*, S. R. Binford and L. R. Binford, Eds. (Aldine, Chicago, 19[illegible] J. M. Fritz and F. T. Plog, *Amer. Antiquity* **35**, 405 (197[illegible] G. Kushner, *ibid.*, p. 125.
2. T. F. King, *Amer. Antiquity* **36**, 255 (1971).
3. T. M. Newman, *Tebiwa* **14**, 1 (1971).

If the destruction of archeological sites is to be prevented, more assistance is needed from professional archeologists. If the archeologist becomes involved at the planning and early stages of development projects, site destruction, as well as salvage, can be avoided. Archeologists may have to serve in dual capacities to achieve these ends. One young archeologist in southwestern Colorado served as the rod man on a seismograph crew so he could direct the survey line away from archeological sites.

Enforcement and conviction of archeological looters occurs under present laws and works best with the cooperation of the archeologist. The Bureau of Land Management (BLM) in California, with the help of the FBI and a college student, convicted a man under the Antiquities Act for stealing a bedrock mortar valued at $1000 from public lands. The FBI recovered a Mayan stela worth $350,000 from a collector, under laws that deal with interstate transportation of stolen goods. Convictions have been obtained by the BLM and the Forest Service under state antiquity laws in Utah.

There is a need to stress all aspects of the preservation of archeological sites and their proper recreational use. Popular articles extolling preservation should be written by professional archeologists. Talented students should be encouraged to work for the government in the archeological preservation

field. Finally, museums need to adopt an accessions ethic for the purchase of archeological materials from the United States, as well as from foreign countries.

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The antiquities market should be exploited rather than suppressed. There is obviously reason enough for all museums to want all the "goodies" of any ancient civilization, but knowledge and preservation might both be improved if the sale of these art objects were sponsored by the government, scientifically controlled, and if their ultimate sale price went to finance the proper excavation of such items. The purchaser would prefer a pedigree to go with his purchase, and the object would probably land in a museum anyway, if proper tax credits are continued.

Like many social proposals, the idea of retaining historical items as part of the public property of the country is idealistic, but human morality often suffers from the effects of greed.

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Smoking at Scientific Meetings

A. B. Pardee's suggestion (Letters, 17 Mar., p. 1194) that smokers be separated from nonsmokers at scientific meetings is fine, so long as the nonsmokers are not downwind from the smokers.

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Proximate Cause

James S. Dwight, Jr. (Letters, 11 Feb., p. 581), of the California Department of Finance, objects to the implication that Governor Reagan denied faculty salary increases for 2 years in a row, since Governor Reagan did recommend an increase for 1970–71. Dwight concedes that no increase was recommended for 1971–72. But it must be remembered that, in addition to failing to recommend an increase, Reagan vetoed a 1971–72 10 percent faculty pay raise for our university and state college systems which had been passed by the legislature. Later in the legislative session, when a second bill authorizing a 7.5 percent increase was passed, he also vetoed that. What galls is Dwight's remark on the limited authority of the governor's office, "The governor proposes, but the legislature ultimately disposes." It was Governor Reagan alone who disposed (twice) of our 1971–72 pay increase, and by doing so he and he alone was responsible for our being denied a salary increase for two consecutive years.

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Crystal Structure of UpA

Although we referred to the paper of Seeman *et al.* (*1*) on the crystal structure of uridylyl (3′,5′) adenosine hemihydrate (UpA) in our report on the same structure (3 Dec., p. 1020), the relationship between these two structural determinations was not made clear. Herein, we wish to clarify the matter.

Seeman *et al.* studied the crystal structure of UpA independently from us and in parallel. Although different conditions were used in crystallizing the UpA, the two structures were, indeed, identical. In retrospect, it is apparent that the Seeman group completed the structure analysis prior to us. Their original paper in *Nature New Biology* was submitted on 24 May 1971, at which time our structure determination was only partially complete. However, their paper did not appear in print until after our paper had been submitted to *Science* (31 August 1971). In addition, Seeman *et al.* reported the structure of UpA at the American Crystallographic Association meeting, which took place on 15 to 20 August 1971 at Ames, Iowa. At that time, our structure had been solved and was being refined, as was reported by M. Sundaralingam at the meeting.

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Reference

1. N. C. Seeman, J. L. Sussman, H. M. Berman, S. H. Kim, *Nature New Biol.* **233**, 90 (1971).