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Author

O'Connell, James F

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REVIEWS

Patterns of Indian Burning in California: Ecology and Ethnohistory. Henry T. Lewis. With an introductory article entitled "Some Explanations for the Rise of Cultural Complexity in Native California with Comments on Proto-agriculture and Agriculture," by Lowell John Bean and Harry W. Lawton. Ramona, California: Ballena Press, xvii + 101 pp., 3 figs., 5 plates. \$6.50 (paper).

Reviewed by JAMES F. O'CONNELL
Australian National University, Canberra

This modest volume is the first of what promises to be an interesting series of original papers in anthropology under the editorship of Lowell Bean, published by the Ballena Press. It includes two important contributions to the literature on the ecology of California Indians. Lewis' paper, which makes up the bulk of the volume, is an effort to document and describe the use of fire by native Californians and its effect on the natural environment. In order to provide ecological perspective for the limited and often somewhat equivocal body of ethnographic data on aboriginal burning practices, Lewis begins with a review of contemporary range management concepts concerning the effect of fire in different environments, especially mixed oak-grassland, chaparral, and montane and coastal forests. He pays particular attention to the pattern and timing of controlled burning which is likely to produce maximum increases in environmental diversity and productivity. Drawing primarily on the work of Biswell and others, he points out that appropriate pat-

terns vary from area to area, e.g., grasslands are best fired in the summer, while chaparral communities are most favorably affected by fires in spring or fall. Given this empirical framework, Lewis then reviews the available data on aboriginal burning practices in northern and central California, with emphasis on those of groups in the Sierra foothills and the north coast ranges. Not surprisingly, he demonstrates that the aboriginal patterns are generally consistent with those recommended by an increasing number of contemporary ecologists and range managers.

In general, I think Lewis' assessment of the *potential* significance of pre-European burning is fairly sound, but I was struck by the fact that he presents very little empirical data on its *actual* impact. Only two field studies contrasting proto-historic and historic plant community composition are reviewed, and although their results are consistent with Lewis' argument, they both pertain to montane forest communities in the southern Sierra, where man's impact by means of fire was probably less important than in other environments, notably chaparral. This lack of information reflects the amount of work done rather than the comprehensiveness of Lewis' review, but nevertheless it is surprising that the problem has not been addressed directly more often (e.g., by means of pollen analysis). Perhaps Lewis' work will serve to stimulate such efforts.

A minor but important point is that Lewis seems to have relied almost exclusively on the work of 20th century ethnographers for information on aboriginal burning practices. While this is no doubt the most comprehen-

sive source of data available, I suspect that a more careful review of late 18th and early 19th century Spanish and American accounts of exploration would have been profitable. By contrast, Bean and Lawton's thorough summary of the early Spanish sources on south coastal California has enhanced the value of their work significantly.

The Lewis paper has two important implications. First, it adds a well documented case to the growing literature on the impact of pre-agricultural human populations on their bio-physical environment. It is increasingly apparent that hunters act purposely and effectively to enhance environmental diversity and productivity and, in so doing, serve as a potent selective force. It is intriguing to speculate that hunters may have operated in this fashion for a much greater span of time than we have previously imagined. The second implication is more immediate and, in a sense, more important. As Lewis points out, the until recently widely accepted policy of absolute fire suppression in suburban and rural California is based on a serious misunderstanding of the dynamics of "natural" aboriginal ecology and as such constitutes a real threat to the resources it is intended to protect. There are now enough data on hand (both from California and elsewhere in the world as well) to show that a reconsideration of this policy is urgently necessary. It is encouraging to see this view argued publicly by Lewis, Biswell and others, and one must hope their efforts are successful.

The paper by Bean and Lawton is billed as an introductory article, but as the title suggests, it is really much more than that. The authors address themselves to two problems: (1) the failure of the Mesoamerican complex of domesticated plants to spread to the heavily populated coastal and interior valley regions of prehistoric California, and (2) the factors which contributed to the newly appreciated political, social, and eco-

nomix complexity of aboriginal culture in those areas. Regarding the first issue, they rightly reject the argument offered by Sauer and others that climatic conditions (notably the presence of a winter rainfall regime) precluded the introduction of Mesoamerican domesticates. The successful cultivation of these plants by California Indians under the Spanish seems to refute this argument conclusively. Nevertheless, Bean and Lawton propose that the reasons for non-diffusion were still essentially ecological. Specifically, they point to the productiveness of the pre-European subsistence economy, with its emphasis on abundant native plant and animal resources. Building on the framework established by Lewis, they argue for the consistent and often self-conscious manipulation of these resources, primarily through the use of fire. They even go so far as to suggest that techniques of sowing and harvesting native grasses may have brought some species to the stage of domestication. "In short," they conclude, "agriculture was an unnecessary alternative for the California Indian because of an efficient, interlocking series of energy extraction processes, some of which were semi-agricultural" (p.xxxvi). Their explanation of the rise of cultural complexity is directly dependent upon the matter of cultivation, for they contend that by increasing the rate of production and providing for the creation of a storable food surplus, California Indians put themselves in a position to develop regional exchange systems which made critical resources more widely available and cushioned individual social units against the vicissitudes of fluctuations in the natural environment, while at the same time stimulating the growth of economic specialization.

The Bean-Lawton paper is an imaginative and stimulating piece of work. The most exciting aspect is their suggestion that some native California grasses may have been independently domesticated. Although the idea

may seem surprising to some, it is not at all unlikely, particularly in view of the recent work of Higgs, Flannery, Halbaek and others on the process of seed plant domestication in similar environments in Southwest Asia. The evidence presented for California is quite circumstantial, but nonetheless theoretically sound and sufficiently intriguing to encourage further work by local archaeologists and botanists in the near future.

In spite of its provocative appeal, however, the paper falls short in two important respects. First, the suggestion that Mesoamerican plants failed to spread to California because of the existence of an established system of plant cultivation begs the question. Most middle and low latitude hunter-gatherers throughout the world practice plant cultivation to some degree, certainly to the extent that they are all, in Rhys Jones' (1969) useful phrase, "fire stick farmers." I see no reason to think that this situation has been different since the end of the Pleistocene, the implication being that many hunter-gatherers have adopted exotic domesticates in spite of pre-existing cultivation practices. The most dramatic North American example is the Hopewell-Mississippian transition, in which complex societies with subsistence based on abundant natural resources, as well as independently developed cultigens (probably including species of *Chenopodium*, *Iva*, and *Helianthus* among others), subsequently changed their economic system to incorporate a preponderance of Mesoamerican crops. The real issue here is not cultivation practices or economic complexity per se, but the relative carrying capacity of native and exotic resources at a given level of labor input. In the California case, one can propose that native cultigens supported a denser population than could the Mesoamerican domesticates—with a comparable labor input—which were therefore rejected. In the Hopewell area, the situation was perhaps just the reverse. Further development

of the Bean and Lawton argument along this line might prove enlightening.

Second, while Bean and Lawton are probably quite correct in the idea that native California societies were politically and economically more complex than previously recognized, and in their argument that such complexity was somehow related to the productivity of the natural environment, their paper tells us little about the processual relationship between these phenomena. Perhaps it is premature to look for comprehensive analysis in a preliminary statement of this kind, but having proposed a causal connection, it would be useful if the authors could support it in more detail in future work.

Overall, the volume is a good effort. The papers are worth reading, and the book itself is pleasing in format. The editorial and copy reading work needs improvement (there are at least eight typographical errors in the text), but this is a minor problem which is bound to accompany the birth of a new publication series.

REFERENCES

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The Drawings of Ignacio Tirsch, a Jesuit Missionary in Baja California. Narrative by Doyce B. Nunis, Jr. Translated by Elsbeth Schulz-Bischof. Los Angeles: Dawson's Book Shop, 1972. 121 pp., glossary, 46 plates. \$15.00 (cloth).

Reviewed by HOMER ASCHMANN
University of California, Riverside

First-hand records of the Jesuit mission to Baja California are of singular interest because the missionaries sustained intimate contact