CHAPTER 1

Archaeological Progress since 1984

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PERHAPS BEST KNOWN AS THE TITLE OF GEORGE Orwell's apocalyptic novel, 1984 is memorable for other reasons as well. In that year Ronald Reagan was reelected president of the United States, the Bell Telephone Company was broken up, and the Olympic Games were held in Los Angeles. The year 1984 also heralded the first two books offering a comprehensive survey of California's archaeological record: *California Archaeology* by Michael J. Moratto and *The Archaeology of California* by Joseph and Kerry Chartkoff.

Two decades later, the Society for California Archaeology (SCA) recognized the importance of these books by hosting a special symposium at its annual meeting, held at Riverside's venerable Mission Inn. That session included 14 papers written by more than 40 prominent scholars. While the papers were given to commemorate the twentieth anniversary of the books' publication, their topics emphasized what had been learned since 1984. The SCA symposium thus reflected two decades of progress by California's increasingly vibrant archaeological community.

California archaeology has grown phenomenally; indeed, "so much has been done and learned since 1984 that even a concise summary of major accomplishments would run to hundreds of pages" (Moratto 2004:xliii). Moreover, as Arnold et al. (2004:1) have observed, "This rich output of published work, virtually all of it about hunter-gatherer groups, may be the world's largest body of archaeological research on one region's hunter-gatherers."

The chapters in the present volume summarize many areas of active research and the new information gained. They highlight the challenges facing scholars who try to keep abreast of the rapid advances. Although up-to-date overviews of California prehistory are now more difficult to achieve than they were in 1984, they are also more needed.

Another book on the subject is Brian Fagan's *Before California* (2003). Although less comprehensive in scope than the 1984 books, it is more current and is written in an accessible style for a broad audience. Still, the field would benefit greatly from newer summaries and syntheses. The present volume is, we believe, a contribution of exceptional value in this regard.

SOURCES OF CHANGE

Whereas subsequent chapters in this volume detail perspectives and knowledge gained since 1984, this introduction offers a general overview. Much recent progress has emanated from the sheer volume of archaeological work done in California since the mid-1980s. Two factors contributing to this development are California's dramatic economic growth and federal and state environmental laws requiring consideration of archaeological and other cultural resources. Consequently the database has grown exponentially for all time periods and all regions of the state. Applying new theoretical approaches, methods, and techniques has resulted in the elaboration and refinement of testable models that help us understand human adaptations. The nature, timing, and causes of culture change have turned out to be more complex than previously thought, and our views of archaeological patterns have changed as new data have been gathered and processed.

Applying innovative technologies to the discovery and analysis of archaeological remains has also helped transform our perception of California's past. Methods already in use have been enhanced to yield data with greater precision and accuracy (e.g., the refinement of radiocarbon [^{14}C] dating, protein residue analysis, artifact replication and functional studies, and the geologic sourcing of obsidian through trace element analysis). New technologies and methods have also provided kinds of data not previously available (e.g., the analysis of mitochondrial DNA to characterize human populations and determine their biologic affinities, accelerator mass spectrometry ^{14}C dating of small organic samples, and studies of radiolaria and other microorganisms to build sea-surface paleotemperature chronologies and thus infer past distribution of marine fishes and mammals). New kinds of data have led to progress that goes beyond the quantitative increase of traditional categories of information. For

example, refined dating methods have led to accurate correlations of human responses to environmental change in various parts of the state.

The intellectual ferment in California since 1984 has stimulated the ongoing evolution of theoretical perspectives on the development of prehistoric cultures. Many California scholars have actively contributed to the growth of archaeological theory, and their findings regarding hunter-gatherer dynamics have gained worldwide influence (Arnold et al. 2004; Chartkoff 1992). Concepts such as evolutionary ecology, optimal foraging theory, resource intensification, gender differentiation in prehistoric economic systems, and causal factors in the rise of hunter-gatherer social complexity have been systematically explored and applied to California's archaeological record (Arnold 1992a; Basgall 1987; Hildebrandt and McGuire 2002; Raab and Jones 2004; Waechter 2005; Wohlgemuth 2005).

THE PRESENT VOLUME

Many scholars have joined in this effort to present current views of California prehistory based on research progress since 1984. Two chapters examine past environments as they relate to cultural ecology; six chapters variously cover the initial settlement of California, early lithic technologies, linguistic prehistory, trade and exchange systems, rock art, and DNA studies; and 10 chapters explicate cultural developments in particular geographic regions. Here we touch briefly on key findings reported by the contributors as a way to highlight in statewide perspective some of the recent archaeological advances. Our comments follow the order of chapter presentation.

Past Environments

Probably no aspect of California archaeology has progressed as far during the past few decades as our understanding of prehistoric environments and their effects on human activities. Prior to 1980, the majority view was that only a few long-term, large-scale (panregional) environmental changes occurred in the Far West during the time of human occupation: (1) the Terminal Pleistocene shift from glacial to postglacial conditions, (2) an Early Holocene Anathermal Period of warming temperatures, (3) a Middle Holocene Altithermal marked by elevated temperatures and xericity, and (4) a Late Holocene Medithermal interval typified by relatively moderate climates, like those of today (Antevs 1953, 1955). Anthropologists tended to view California as a set of rather stable landscapes on which culture change over time reflected such factors as immigration, the expansion or contraction of ethnic territories, and regional economic specialization. Thus a widely held assumption just a few decades ago was that "after 2000 B.C. there were no large-scale climatic disruptions and that the chief reasons for cultural variance in the several regions, besides 'normal' change through time, were based upon the necessarily differing cultural adaptations to the regional environments" (Elsasser 1978:57). In that context it is not surprising that many scholars resisted Moratto, King, and Woolfenden's (1978) assertion that cultural changes inferred archaeologically may be correlated with paleoenvironmental shifts in California, and that at least some of the former may have been adaptations to the latter.

We have come a long way since then. As a result of countless studies in many disciplines, it is now well established that precipitation and temperature regimes, quantities of surface water, vegetation series, and faunas in all parts of California have been dynamic and have fluctuated significantly, with episodes of dramatic, often rapid change, during the past 15,000 years. Those seeking to understand human prehistory in California, therefore, must not only ascertain and precisely date the social and economic patterns evinced by the archaeological record, but also examine such patterns with reference to contemporary local environments and their possible influence on cultural behavior. A particularly apt example of this approach is the study of ecologic relationships between human demographic crises and the Medieval Climatic Anomaly marked by severe droughts (ca. A.D. 892–1112 and 1209–1350) in the southern Far West (Jones et al. 2004).

In Chapter 2, authors G. James West, Wallace Woolfenden, James Wanket, and Scott Anderson consider Late Pleistocene and Holocene environments. They remind us that hunter-gatherers depend entirely on nature for water, food, and other necessities, and then show that the occurrence, location, and abundance of plant and animal taxa and other essential resources "have been re-sorted dramatically since the last glacial maximum (LGM), [and] are therefore of critical importance to understanding the behavior of California's prehistoric cultures." West et al. discuss how past climatic shifts have affected the resources needed for human survival and provide region-by-region summaries of environmental change over time. Chapter 2 is the most comprehensive statewide overview ever compiled of environmental dynamics and their relationships to cultural adaptations in prehistoric California.

Chapter 3 is organized in two parts. First, Patricia Masters examines the tectonic, climatic, and marine forces that shaped California's coast south of Morro Bay during the millennia since the LGM. In the second part, Ivano Aiello offers a comparable paleogeographic survey of the central coast from Point Sur northward to Bodega Bay. The authors of this chapter adduce and synthesize a great deal of new information derived from recent studies of coastal geomorphology, Holocene climates, postglacial sea levels, shoreline movement, marine currents and paleotemperatures, the formation of coastal habitats, and the ever-changing biodiversity and abundance of species in various settings. This effort shows how local manifestations of coastal evolution could have influenced human carrying capacity, economic practices, and settlement patterns over time. It also portends an exciting future for coastal archaeology not only by framing a dynamic context for new interpretations of prehistory but also by opening new avenues for studies of cultural ecology, settlement, subsistence, Pleistocene land use, and myriad other research domains. This chapter, which could not have been written 20 years ago, is a foundation on which future archaeological work along the coast must rest.

Ancient Cultures

Our knowledge of the initial human settlement of California (i.e., how and when this part of the Pacific Rim was first colonized) also has increased greatly since 1984. In fact, most of the older received wisdom about the origins, antiquity, routes and modes of travel, and cultures of the earliest Americans has been thoroughly revised or supplanted entirely by newer concepts. This paradigm shift is taken up in Chapter 4 by Jon Erlandson, Torben Rick, Terry Jones, and Judith Porcasi. A generation ago the archaeological consensus was that toward the end of the last Ice Age, small groups of people from northeastern Asia had trekked across Beringia (the Bering "land bridge" that connected Siberia and Alaska at times of low sea levels) and then, around 12,000 to 11,500 years ago, drifted southward through an ice-free corridor paralleling the Canadian Rockies. From there, populations fanned out across the Great Plains and beyond. As their numbers increased, these intrepid bands radiated outward to the coasts and to more southerly latitudes. In accordance with this model, the first Californians were perceived as big-game hunters from the interior who entered the state from the north and east approximately 11,000 years ago.

The model presented by Erlandson et al. is quite different, reflecting current knowledge. Scholars now aver that ethnically diverse peoples from eastern and northern Asia migrated to the New World not only by crossing Beringia on foot but also by traveling offshore along the coast in seaworthy boats. Moreover, in light of data now available from sites in North and South America, occupation of the coast almost certainly preceded the opening of the ice-free corridor by at least 2,000 to 3,000 years. California thus would have been directly on the route taken by America's first colonists. In this regard, Erlandson et al. cite archaeological evidence of people living on the Northern Channel Islands some 12,000 to 13,000 years ago. This confirms the use of boats for sea travel in the California Bight at least 120 centuries ago. Such findings, as well as other discoveries of ancient cultural remains on the mainland coast, permit archaeologists working in California to enhance our knowledge about the earliest peopling of the Americas.

So what have we learned about California's most ancient cultures? Many archaeologists concerned with this question during the early 1980s thought that the state's earliest inhabitants were probably derived from big-game hunters farther east, and that their lithic technology—distinguished by large, lanceolate ("Clovis-like") fluted points—denoted a widespread culture that gave rise to more diverse adaptations. To be sure, in the mid- to late twentieth century some ministers of archaeology were preaching that California was first settled 40,000 to 200,000 years ago, but the march of science in recent years has laid waste to such notions. However, science has also been harsh on the "Clovis-first" dogma and its corollary that fluted points identify a continent-wide mother culture.

Chapter 5 provides a refreshing summary of current thinking about this perennial issue. In part 1, Michael Rondeau critically reviews what is currently known (and what has, perhaps without sufficient basis, been assumed) about the several hundred fluted points found in diverse settings throughout the state. In part 2, Jim Cassidy describes a fascinating microblade complex from Early Holocene archaeological deposits on San Clemente Island. Cassidy opines that "this tool kit is fully consistent with the Paleo-Arctic Tradition and contains all of the technological elements required for watercraft construction and maintenance." One of the remarkable things about this complex is that microblades are anything but typical of California; they are patently exotic.

The technique of manufacturing a series of thin, parallel-sided microblades from a single piece of

> stone is an efficient way to produce high-quality cutting edges. . . . [By using approximately] one pound of rock to produce microblades, as much as 1,300 centimeters of cutting edge can be produced (Hester and Grady 1982:169). In the arctic it is virtually impossible to obtain new sources of stone for about eight months of the year because the land is frozen and blanketed with snow during the winter months. By using the stone to produce microblades, these early arctic people were able to carry a small and comparatively lightweight supply of microblade cores with them and be assured that new hunting weapons could be manufactured and old weapons repaired through the long and difficult winter [Dixon 1993:60].

By contrast, California has numerous sources of abundant, high-quality toolstone available year-round. The microblade complex on Santa Catalina Island thus indicates the arrival of people who probably came from a very different climatic regime, most likely far to the north.

Based on their respective studies, Rondeau and Cassidy conclude that two separate lithic technologies (and by inference two distinct economic strategies) "can be linked with the earliest human occupation of California: fluted points from the interior and the coast (but not the islands) and a microblade complex currently identified only on San Clemente Island." These findings are not surprising in light of the remarkable cultural diversity evinced by Late Pleistocene and Early Holocene archaeological remains discovered recently in varied geographic settings throughout North and South America (Bonnichsen et al. 2005; Dillehay 1989, 1997; Dixon 1999; *Current Research in the Pleistocene* and *Mammoth Trumpet,* various issues). When California is viewed in the larger context of American archaeology, we would expect future investigations to reveal evidence of pronounced cultural diversity before 10,000 years ago.

Languages in California's Past

Anthropologists have long recognized that archaeology plays an important role in elucidating linguistic prehistory and, conversely, that the methods and results of historical linguistics may enhance archaeological reconstructions of the past. California is perhaps the best laboratory on earth for investigating relationships among past societies, their languages, and other aspects of culture. Interest in this research domain began during the late nineteenth century and was pursued intensively during the twentieth. General syntheses include those of Dixon and Kroeber (1919) and Moratto (1984:529–574). (See also Foster 1996; Shipley 1978.) In Chapter 6 of the present volume, Victor Golla (1) provides a state-of-the-art review of California's linguistic prehistory, focusing on six "primary language-family relationships represented in aboriginal California," and (2) proposes "a reconstruction of prehistoric events and developments that would account for the observed linguistic situation."

Golla notes that "while the calibration of linguistic dates with archaeological dates is fraught with difficulties, some correlations are clearly more probable than others, and where there is a congruence of linguistic and archaeological dates the correlation may be considered firm." He then moves on, first, to discuss native California languages and their relationships and, second, to build on and update previous models of the population movements, linguistic borrowing, and internal diversification that resulted in the historically observed geolinguistic mosaic of California. Readers will find that Golla's synthesis diverges in some important respects from earlier ones, a result of knowledge gained from more recent linguistic studies.

One such point of divergence is that linguists now deem the Chumashan family to be an isolate rather than a part of the Hokan stock, and not demonstrably related to any other language. Yukian in the North Coast Ranges was so identified long ago, but the isolated status of Chumashan is a more recent determination (Campbell 1997). Both of these linguistic groups seem to have deep roots in California's past, and either or both may be the ultimate products of languages spoken by some of California's earliest inhabitants. This and many other aspects of Golla's reconstruction offer a rich lode of data and hypotheses that could, and we think should, inform and guide archaeological research in California for many years to come.

Regional Prehistories

Each of the next 10 chapters presents an overview of a particular region (Figure 1.1), emphasizing the directions and results of archaeological work since 1984. More than just adding new archaeological data, however, Chapters 7 to 16 also employ current theoretical approaches, methods, and techniques. Consequently the overview authors are able to define cultural manifestations, pose and answer research questions, and provide explanations that were unattainable 20 years ago.

Advancing knowledge, however, also generates difficulties. For one thing, the more we learn, the more we have to face the complexity of the archaeological data. As we are now aware, there is no single cultural

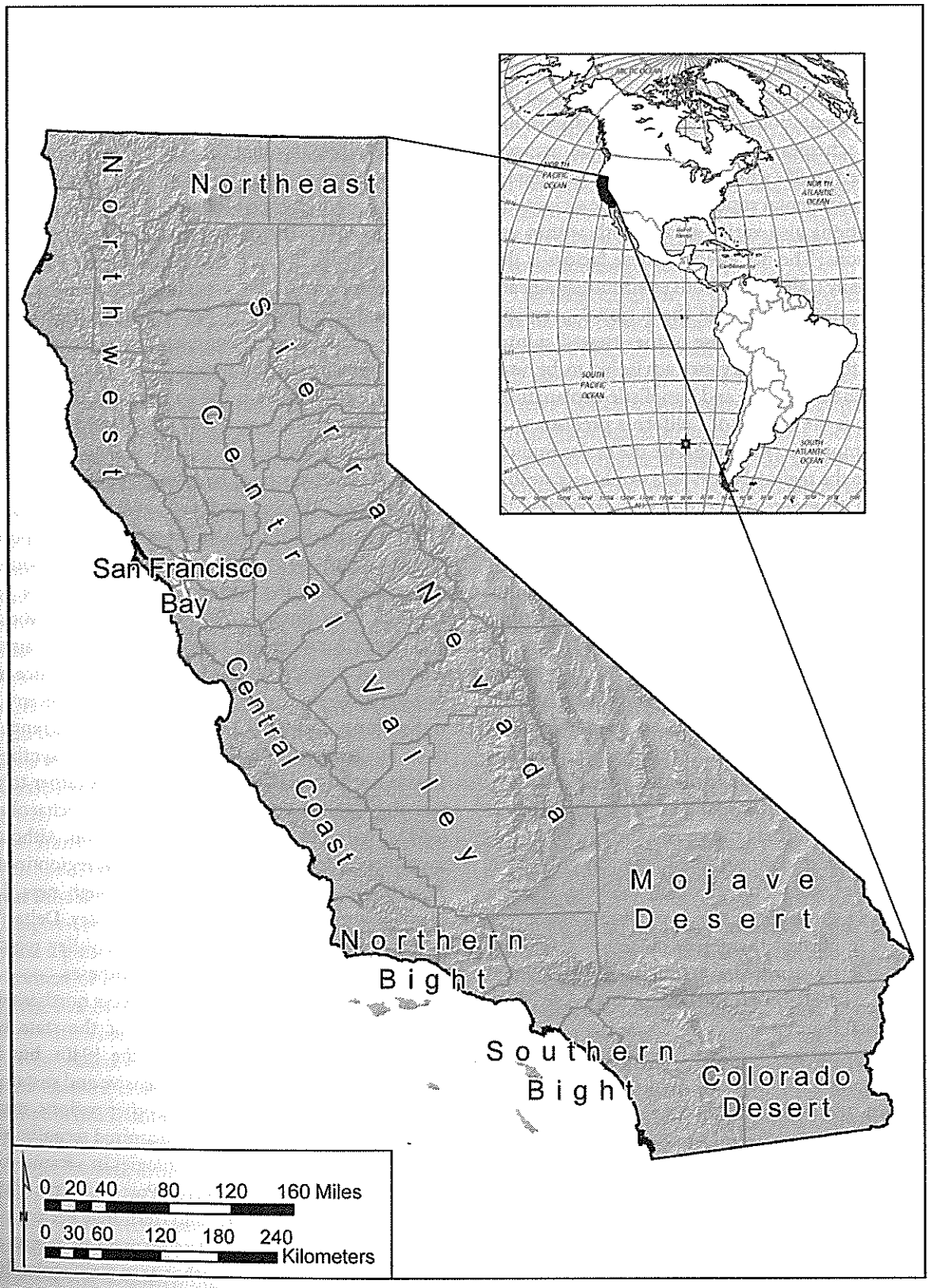

Figure 1.1. California's Place in the Americas, modified from the HOUGHTON MIFFLIN EDUCATION PLACE® website (www.eduplace.com/ss/maps/pdf/americas.pdf). Copyright © Houghton Mifflin Company. Reprinted by permission of Houghton Mifflin Company. All rights reserved. The map may be printed and copied for classroom use. Any other use of the material is strictly prohibited unless written permission is obtained from Houghton Mifflin Company.

sequence (i.e., chronology) for any region of California, and most regions encompass many localities and sequences. Moreover, each region has its own peculiar history and traditions of archaeological work so that theoretical orientations, research foci, methods, and taxonomic schemes vary enormously. The archaeological record itself (which reflects cultural behavior, diverse environmental conditions, and the vicissitudes of preservation) also varies greatly both within and among regions. The net effect of these factors is that there are many Californias, both environmentally and archaeologically. Thus, while the regional overviews in this volume convey a sense of the attested cultural variability, the same overviews advise us to be wary of broad generalizations and simplistic explanations. Complexity is the essence of California prehistory.

Any attempt by us to summarize the major findings presented in the regional overviews would risk stealing the authors' thunder (not to mention expanding the introduction into a book of its own), and so we will only highlight a few aspects of each chapter.

Chapter 7 by William Hildebrandt examines six major cultural patterns and their space/time distributions in northwestern California. Although more is known about some localities than others, Hildebrandt describes the patterns with admirable clarity and relates them to environmental changes, economic shifts, and population movements. Given the large number of native languages spoken in northwestern California, it is not surprising that much of the archaeological record seems to indicate the arrival and spread of certain societies (e.g., Pomo and Athabascan groups) at the expense of others (most notably the Yuki). Having synthesized regional prehistory, Hildebrandt proceeds to discuss important themes or objectives for future research. He thus provides a concise yet substantial update of Fredrickson's (1984) classic overview of the north coastal region.

Few if any parts of the state have witnessed culture histories as complicated as those of the San Francisco Bay region, and perhaps no other area of equal size in California has been studied as intensively by archaeologists during the past 20 years. To synthesize the major results of these studies, Randall Milliken and 13 coauthors have prepared Chapter 8. The new dating scheme, fresh interpretations of the social context of shell mounds, and other innovations arrayed in Chapter 8 extensively revise our understanding of Bay Area prehistory.

Of California's many regions, the Central Coast was one of the least known archaeologically in 1984, and neither of our books said much about it. But during the past score of years numerous studies have yielded a great deal of information about diachronic changes in settlement patterns, subsistence, trade, and relationships between human land uses and evolving coastal environments. The corpus of new data is synthesized in Chapter 9 by Terry Jones, Nathan Stevens, Deborah Jones, Richard Fitzgerald, and Mark Hylkema. Of particular interest in this chapter are the recent insights into Early Holocene adaptations, evidence for prehistoric population movements in the region, impacts of human predation on target species, and the emergence of complex socioeconomic patterns in late prehistoric times.

The Central Valley is the subject of Chapter 10 by Jeffrey Rosenthal, Gregory White, and Mark Sutton. This is a large, naturally diverse province in which cultural sequences have been defined for only some localities (e.g., the Sacramento–San Joaquin Delta and western Merced County) while others remain poorly known. Rosenthal et al. fit archaeological components and phases into five "periods" (actually stages with ascribed time limits): Paleo-Indian; Lower, Middle, and Upper Archaic; and Emergent. They then discuss a series of themes, mostly related to subsistence and demography, that have been the focus of recent investigations. Chapter 10 summarizes a wide range of data, but it does not cohere very well as a synthesis. This is not to fault the contributors, but rather to say that the Central Valley is too large and archaeologically varied to be treated as a single region. Although we too accepted the valley as a cultural region in our 1984 books, Chapter 10 provides enough new data to suggest that separate Sacramento Valley, Delta (or, perhaps, Bay/Delta), and San Joaquin Valley regions might better accommodate future syntheses.

Chapter 11 by Kelly McGuire surveys northeastern California prehistory. This corner of the state was probed sporadically beginning in the 1940s, but archaeological research has been intensive and sustained only since the 1970s. Thus, as in other regions, much of the synthesis is based on data acquired recently. McGuire places diverse local chronologies in a framework of six periods: Early Holocene; Post-Mazama; Early, Middle, and Late Archaic; and Terminal Prehistoric. Chapter 11 provides a lucid assessment of recent archaeological findings in northeastern California, thus building on and updating Raven's (1984) synthesis. Comparing the two works shows that during the past 20 years scholars have pursued innovative research, especially as related to obsidian analysis, while con-

tinuing to study long-established topics such as prehistoric boundary maintenance (at the juncture of the Great Basin, California, and Plateau culture areas) and population movements.

The Sierra Nevada provides another example of the extent to which our command of regional prehistory has been transformed since 1984. In Chapter 12, Kathleen Hull portrays the Sierra as a cultural province linked closely to both the Central Valley and the Great Basin. Hull's summary of archaeological advances since 1980 showcases our improved knowledge of local cultural sequences (beginning in the Early Holocene), more precise correlations of natural and cultural changes over time, and refinements in obsidian studies used to date archaeological assemblages and elucidate prehistoric trade. The author also discusses lithic technology, bedrock mortars (and inferred acorn use), social organization, and demography. Although organic remains are rare at high elevations in this region, the abundance of habitation sites, milling features, and obsidian artifacts make the Sierra Nevada particularly well suited for studies of changes in settlement systems, population levels, and environmental conditions over time. Since the Sierra Nevada covers such a vast area and encompasses so much cultural variation perhaps it, like the great Central Valley, should be subdivided into two or more archaeological regions when the next synthesis is contemplated.

Coastal southern California is the subject of two chapters. The Northern Bight and adjacent portions of the Transverse Ranges are covered in Chapter 13 by Michael Glassow, Lynn Gamble, Jennifer Perry, and Glenn Russell, while the Southern Bight is considered in Chapter 14 by Brian Byrd and L. Mark Raab. In both regions, a great deal of archaeological work, mostly in the context of cultural resource management (CRM) projects, has been done over the past 20 years. The research often has been guided by new theoretical perspectives related to social evolution or cultural ecology. As Glassow et al. observe, the investigations have "resulted in substantially more knowledge about the prehistory of the Northern Bight than was the case 20 years ago. Indeed, articles in prominent journals and books published by well-known presses have brought national and international visibility to the region." The same may be said of recent archaeological progress along the Southern Bight. In both areas the past two decades have witnessed phenomenal advances in environmental reconstruction (see also Chapters 2 and 3) as well as in our understanding of Late Pleistocene and Early Holocene occupation of the coast, human adaptation to natural changes over time, the development of maritime cultures, intra- and interregional exchange systems, craft specialization, and the emergence of remarkable social complexity. In sum, Chapters 13 and14 not only provide exceptional regional syntheses but also reveal how much has been learned since 1984 and why archaeological research in California has now assumed such a prominent role globally in the advancement of knowledge about prehistoric hunter-gatherers.

The desert regions of California are also the subjects of two contributions. Chapter 15 by Mark Sutton, Mark Basgall, Jill Gardner, and Mark Allen deals with aspects of Mojave Desert prehistory, while Jerry Schaefer and Don Laylander devote Chapter 16 to recent archaeological advances in the Colorado Desert. As in other regions of the state, an enormous amount of archaeological work has been undertaken in the deserts since 1984. For example, Sutton et al. point out that large-scale surveys and excavations at Fort Irwin in the central Mojave Desert "have made it the most thoroughly investigated . . . [area] of comparable size in western North America."

Two decades ago, Warren's (1984) chapter in Moratto's book provided an archaeological synthesis of the entire desert (i.e., virtually all of arid southeastern California). So much new information has come to light during the intervening years, however, that a comprehensive, chapter-length synopsis is no longer feasible. For this reason, Sutton et al. do not attempt a systematic update of Mojave Desert prehistory, but instead discuss just a few of the topics that have been studied intensively in recent years: paleoenvironment, chronology, linguistic prehistory, and the evolution of cultural systems. Archaeological findings relevant to these topics are temporally ordered and discussed with reference to eight periods, ranging from Pleistocene to Late Prehistoric. For the Colorado Desert, Schaefer and Laylander face a slightly less formidable literature and endeavor to synthesize the major findings since 1984. They discuss such research issues as the prehistory of Lake Cahuilla, toolstone procurement at Obsidian Butte and other sources, trade and travel, ceramics, and cultural relationships with neighboring regions.

Trade and Exchange Systems

Returning to a statewide perspective, Chapter 17 by Richard Hughes and Randall Milliken examines prehistoric trade and exchange, or "prehistoric material conveyance." The authors do not attempt a compre-

hensive synthesis of the data related to their subject, "which has increased by orders of magnitude" since 1984, but instead highlight dating and methodological issues. Accordingly, Chapter 17 captures what has been learned about the chronology, dynamics, and social context of material procurement and conveyance in prehistoric California. Hughes and Milliken show how studies of the voluminous data on obsidian and shell beads, when combined with state-of-the-art analytic methods and revised correlations with newly refined cultural sequences in various parts of the state, have enhanced our understanding of prehistoric cultural evolution in California. Twenty years ago a simple progression from small populations to ever-larger ones, with increasingly complex sociopolitical and economic systems over time, was generally assumed. Now we can see that the course of prehistory witnessed many fluctuations as population levels rose and fell, political systems and economies waxed and waned, and regional interaction networks emerged and declined. Within these dynamic contexts, material conveyance also was influenced by a host of local factors. Invigorated by all that has been learned since 1984, we stand on the threshold of learning even more about the economic systems of ancient California.

Rock Art

Prehistoric rock art is found throughout California, although the types and styles, quantities, and settings are highly variable among and within regions. Studies of rock art can yield insights into aspects of culture seldom accessible to archaeologists: cosmology, religion, shamanism, ritual, and aesthetic expression, to name a few. Rock art motifs may also portray clothing (including ceremonial regalia), tool use, events, activities (e.g., mountain sheep hunting), and astronomical observations. Not surprisingly, rock art in the American West has attracted scholarly interest for well over a century. While several important overviews were published before the 1980s (e.g., Grant 1965; Heizer and Baumhoff 1962; Heizer and Clewlow 1973; Steward 1929), the majority of rock art research in California has been done during the past quarter century.

Our 1984 books repeatedly mention rock art and comment on its inferred functions and cultural contexts, but the scope of our work precluded topical overviews of the subject such as the one that Clewlow (1978) wrote for the *California* volume of the *Handbook of North American Indians* (Heizer, ed. 1978) or Fagan's cleverly titled chapter "Art on the Rocks" in *Before California* (Fagan 2003). In Chapter 18, Amy Gilreath presents an up-to-date synopsis of California rock art and its significance. This treatment is organized according to rock art categories, with discussions of small decorated rocks (incised slates and painted pebbles), pictographs, cupules, petroglyphs, and earthen art (stone alignments and geoglyphs). The author considers the geographic distribution and, as data permit, the age, cultural tradition, style, social context, and function of various rock art forms. Above all, Gilreath reminds us of the people who left behind this evocative and durable record of their humanity and views of the cosmos. We anticipate that future rock art studies will yield even more fascinating insights.

The Promise of DNA Analysis

In 1984 few if any Californianists were using DNA data in archaeology. Now, some two decades later, mitochondrial DNA (mtDNA) analysis plays a major role in interdisciplinary research designed to elucidate prehistory. For a sterling example of the explosive growth since 1984 of new methods and knowledge related to California's human past, we need look no further than molecular anthropology, particularly as it relates to mtDNA.

During the twentieth century anthropological research in California focused on relationships among race, language, and culture, as well as their distribution in time and space. A central concern was with phylogeny—reconstructing the family tree of societies and cultures. Archaeology played a key role in this research, as did historical linguistics, but there were many obstacles to progress. Not the least of these was the assumption that "race" (actually, human populations), language, and culture covaried, and that from the identification of any one (e.g., a distinctive archaeological assemblage) the presence of the others (i.e., the corresponding ancient language and population) could be inferred. Over the years, critics rightly admonished that California ethnography is replete with cases where "race," language, and culture are *not* coincident. A classic example comes from northwestern California, where remarkably similar ways of life are shared by the linguistically and biologically distinct Yurok (speakers of an Algic language), Hupa (who speak an Athabascan tongue), and Karuk (belonging to the Hokan linguistic stock). Another case in point involves the spread of the Wailaki group of Athabascan languages southward into lands long occupied by Yukian people who seem to have lost their own ancestral language(s) in the process.

Historical linguistics and archaeology are powerful, especially when they join forces. However, the former is limited in what it can reveal about the prehistoric distributions of culture and populations, just as the latter is mute with respect to the idioms of the subject peoples. Archaeology has made human remains available for study, but analyses of these remains by traditional methods (e.g., comparative osteometry and odontometry, statistical analysis of nonmetric skeletal traits, etc.) has not always proven satisfactory. Even when samples of human remains from a skeletal population were sufficiently large for statistical purposes, there was the vexatious problem of determining the extent to which the observed measures and indexes actually reflected genetic penetrance (i.e., inheritance). The objective has long been to compare the remains of individuals representing defined populations as a means to characterize the genotype (e.g., Brace et al. 2004), but osteological data are at best a proxy record of population genetics. In brief, phenotypes are not simply genotypes cast in bone. The analysis of mtDNA largely avoids the proxy issue by identifying and comparing genetic material directly. This does not mean that we should discard the osteological data acquired so meticulously over the years. It does mean, however, that we have a new, very promising method at our disposal for the study of human population distributions and movements in prehistory.

This exciting development is the subject of Chapter 19 by Jason Eshleman and David Glenn Smith, which considers mtDNA from living Native Californians and its implications for prehistoric population movements. Eshleman and Smith provide an especially lucid discussion of mtDNA and pertinent analytical procedures, and then apply their mtDNA data to test models of prehistoric population movements derived from both linguistic and archaeological sources. We found it fascinating to compare the models of prehistory based on mtDNA with Golla's presentation of linguistically based models in Chapter 6. Prehistorians will find much of value in a comparative appraisal of these two chapters and their respective interpretations of the data.

SOME FINAL THOUGHTS

The chapters in this volume review changes in our understanding of specialized fields such as rock art and linguistic prehistory as well as cultural developments in particular regions. Not every topic or corner of the state is included, but the collective updating at this level cannot be found anywhere else. The new findings replace simple models with more sophisticated ones and give rise to many important questions about what caused the various patterns, processes, and fluctuations evident in the archaeological record. Pursuit of these questions is fostering an increasingly dynamic intellectual environment in California archaeology. It is helping make California archaeology a world-class influence on archaeological thought, particularly as regards hunter-gatherer studies.

The accelerating pace of research, along with the fact that so much has been learned during the brief interval since 1984, suggests that even more will be discovered in the next 20 years. Who could have imagined in that Orwellian year that archaeologists would soon discover cultural deposits 120 centuries old on San Miguel Island, or assemblages like those of the Paleo-Arctic tradition on San Clemente Island, or widespread evidence of demographic stress linked to Medieval-era droughts, or indications of Polynesian seafarers visiting the California coast a thousand years before the Spanish "discovered" this fabled land? And who can imagine what still awaits our spades and trowels? In Chapter 15, Sutton et al. raise the possibility of pre-Clovis occupation(s) in southeastern California. Perhaps future discoveries will confirm the presence of humans in California 15,000 or even 20,000 years ago, and perhaps not. But if this does happen, the paradigm shift will send us back to the intellectual drawing board. If we keep an open mind while adhering to and refining our scientific methods, the future could prove very exciting.

As time passes and we continue to expand the horizons of California archaeology, we should pause now and then to reflect gratefully on the vision and editorial labors of Terry Jones and Kathryn Klar as well as the efforts of the contributors who prepared the following chapters. Theirs is an immensely significant contribution to our field, for they have not only synthesized a great deal of information but also have charted numerous directions for future research. This volume will surely serve for years to come as the definitive reference work on California prehistory.