STUDIES IN CALIFORNIA PALEOPATHOLOGY:

I. A BIBLIOGRAPHY OF CALIFORNIA PALEOPATHOLOGY

by

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INTRODUCTION

The past decade has been a time of renewed interest in the study of the manifestations of prehistoric disease, i.e., paleopathology. This interest has seen not only the development of new techniques and formulation of theoretical models but also a continuing reappraisal of previously described and/or analyzed material. Because of the role such studies may have in the teaching of prehistoric skeletal biology and the adaptive responses of populations to environmental stresses, the compilation of previously published work in the field seems desirable at this time. Several extensive bibliographies on the general topic of paleopathology have been published in recent years (Armelagos et. al., 1971; Crain 1971) as well as a large collection of papers (Brothwell and Sandison 1967). In addition, The Paleopathology Newsletter of the Paleopathology Association attempts to keep its readers abreast of current work and publications from around the world.

Many of the paleopathologic studies conducted on skeletal material today are done by physical anthropologists. As a comparative discipline, anthropology has as one of its goals the understanding of human variation through time. Thus, through the medium of paleopathology, we can begin to trace the disease histories of native Californians over long periods of time -- from the prehistoric past to modern times. Unfortunately the pathways along which these changes can be viewed are very rough, inconsistent in their quality and, even at times, nonexistent. This is particularly true for the time period immediately following the first Spanish contacts with California natives in the sixteenth century until well into the twentieth century. Despite the vast amount of ethnographic information compiled by A. L. Kroeber and his students there are virtually no data on diseases present or therapeutic practices. However, there are some other, less formal, sources to which we can turn.

The first detailed description of California Indian life comes from a manuscript published in 1628, "The World Encompassed by Sir Francis Drake," reprinted in Heizer (1974). We find therein the following description which is probably the first documentation of the health status of native Californians:

> "After that time had a little qualified their madnes, they then began to shew and make knowne vnto vs their griefes and diseases which they carried about them, some of them having old aches, some shruncke sinewes, some old soares and canckered vlcers, some wounds more lately received, and the like, in most lamentable manner craving helpe and cure thereof from vs: making signes, that if we did but blow vpon their griefes, or but touched the diseased places, they would be whole" (Heizer 1974: 91-92).

An early southern California physician, P. C. Remondino, gives us some further clues in a book in which he attempts to give his readers "some general ideas on

climatology in relation to health and disease" (Remondino 1892: vii). The author gives us first-hand information from two army doctors stationed in the southern California deserts: Dr. William A. Winder, Fort Yuma, 1853, and army surgeon L.Y. Loring, Forts Yuma and Mojave, in the early 1870's. From Winder's report Remondino notes the following:

> "...Indians had one great enemy that took them off rapidly, that being pneumonia. There was some phthisis [a wasting away of the body, usually associated with pulmonary tuberculosis], but evidently as a result of pneumonia; rheumatism was not then [1853] as prevalent as at present [1892]. He particularly observed that those periods characterized by the greatest range of temperature were those in which attacks of pneumonia were most numerous. At the Old Mission of San Diego, then a military post, and at other camps on the west side of the mountains, he observed neither pneumonia nor phthisis" (Remondino 1892: 15).

Loring's observations are summarized in the following:

> "Although the troops never developed any disease that could be ascribed to climate or locality, phthisis was prevalent with the Indians at both posts, especially at Mojave. Rheumatism was also quite common. Both diseases were greatly aggravated by a syphilitic taint, their mode of living, diet, and going about naked. They use but little animal food, but subsist mainly on the mesquite bean, wild potatoes, and what little corn or grain they raise; so that, being poorly nourished, they early become consumptive" (Remondino 1892: 15).

Fortunately, there are here mentioned several diseases which have the potential of being identified in prehistoric osseus remains: phthisis (?TB), rheumatism (various forms of arthritis or degenerative joint disease) and the enigmatic problem of syphilis.

Gifford's monograph, Californian Anthropometry (1926), is one of the few sources to help us somewhat in reconstructing disease histories among native Californians. Here, too, the observations are confined to casual observances about injuries which do not help us a great deal. Gifford notes several instances of broken bones, a "shoulder injury," a "hunchback," some "crippled" hands and fingers, and other miscellaneous trauma. Tantalizing as these observations are, they hardly merit anything more than a mention. What is desired is population information, including age and sex distributions, plus etiologic determinations when known or inferable. And this we do not have.

Reconstructing disease histories is very problematic. Obviously when considering prehistoric material we are limited to those pathologic processes which leave

their impress on bone, except for the rare cases of mummified remains (either natural or intentional mummification) or the indirect knowledge gained from coprolites or artistic portrayals of disease. The reports annotated herein begin to give us a picture of the range of infirmities to which the prehistoric Californian was exposed. For the most part, these fall into three basic categories: trauma, infection, and degenerative joint disease. Numerous kinds of injuries are reported from fractured bones to man-caused occurrences such as imbedded projectile points. Infectious diseases are widespread in some sites, rare in others, except for the nearly omnipresent occurrence of dental abscesses and periodontal disease secondary to severe attrition. The differential distribution of infectious pathologies in time and space would be an important problem to investigate. Degenerative joint disease, especially of the vertebral column, is another widespread phenomenon. Here too, though, we note temporospatial differences which beg for understanding. Besides these three main categories which account for the vast majority of disease in ancient California which we can identify, there are examples of tumorous processes, developmental anomalies, genetic disorders and others. The wealth of material from California plus the uniqueness and diversity of the state, ecologically- and ethnographically-speaking, make it a virtual laboratory for testing many hypotheses about man and his ability to adapt to disease, adaptations which are both biological and cultural in nature.

The following bibliography is offered, then, as a beginning point for those who seek information about ancient disease in California. It is not alleged to be completely exhaustive, and we hope that others will contribute items for possible future inclusion that we have failed to locate. Its focus is on those published writings that deal exclusively, primarily, or peripherally, with examples of paleopathology from California. To list every mention of disease would entail the compilation of scores of archeological reports noting the presence of "vertebral arthritis" and "dental disease." We felt this was unnecessary, partly for the reason that judgments have often been made by those not really capable of assigning such evaluations. We have, however, included some very brief items, a few instances of non-human animal pathology, and some very early historical material. Our reason for doing so was to include some of the more rare, unique, or unusual material.

There is, inevitably, some duplication of material. For example, Brabender's doctoral dissertation (1965a) and the derived publication (1965b) are both cited. The former includes all the specific details of individual specimens while the latter provides a good, detailed summary. We have also included a rather unusual source (Grinnell 1907, from Forest and Stream magazine) which is derived in part from a professional journal (Wilson 1901), to illustrate how such material is extracted, reworked and expanded.

Some guiding comments are provided, but the ultimate judgment on the validity of the published opinions must rest with the interested scholar who will at times want to see the actual specimens. Where we know the repository of the bones this has been indicated.

The bibliographers' tasks are never completed, not only in their own minds but also in those of the scholars who read the utilize their work. This is a beginning effort, and we hope that persons who use this bibliography will send us additional sources known to them and suggestions for improvement in order to increase its usefulness.

The following museum abbreviations are used in the annotations: LACM - Los Angeles County Museum; LMA - Lowie Museum of Anthropology; SDM - San Diego Museum of Man; USNM - United States National Museum.

Literature cited (not in annotated bibliography):

Armelagos, G.J., J.H. Mielke and J. Winter
1971 Bibliography of Human Paleopathology. Research Reports No. 8, Department of Anthropology, University of Massachusetts, Amherst.

Brothwell, D.R. and A.T. Sandison, Eds.
1967 Diseases in Antiquity. Springfield: C.C. Thomas.

Crain, J.B.
1971 Human Paleopathology: A Bibliographic List. Sacramento Anthropological Society Paper 12.

Gifford, E.W.
1926 Californian Anthropometry. Univ. of Calif. Publ. in Amer. Arch. and Ethnol. 22(2): 217-390.

Heizer, R.F.
1974 Appendix II. Extract from The World Encompassed by Sir Francis Drake. 1628. In Elizabethan California. Ramona, Cal.: Ballena Press.

Remondino, P.C.
1892 The Mediterranean Shores of America. Southern California: Its Climatic, Physical, and Meteorological Conditions. Philadelphia: F.A. Davis.

Abbreviations used in bibliography:

UCAS-AR (UCCA) University of California Archaeological Survey - Annual Report (UCCA)

UCAS-R University of California Archaeological Survey - Reports

UCPAAE University of California Publications in American Archaeology and Ethnology

BIBLIOGRAPHY

Abbott, K. H. and C. B. Courville
1939 Historical notes on the meningiomas. I. A study of hyperostoses in prehistoric skulls. Bulletin of the Los Angeles Neurological Society 4: 101-113.

[Well illustrated and described, a "pre-Spanish" skull from San Nicolas Island is presented. Diagnosed as a meningioma, it is a good example of the problem in assessing cranial hyperostoses; presently housed in SDM (no. 17661).]

Allen, H.
1896 Crania from the mounds of the St. John's River, Florida: a study made in connection with crania from other parts of North America. Journal of the Academy of Natural Science 10: 367-448.

[Included are some Santa Barbara Islands crania and a few other specimens, all currently at the Museum of the Academy of Natural Sciences. Although the study is of the classic descriptive nature, large exostoses are reported on crania numbers 1820 and 1821 (in the Academy).]

Angel, J. Lawrence
1966 Early skeletons from Tranquility, California. Smithsonian Contributions to Anthropology 2(1).

[Material from the central San Joaquin Valley is analyzed, C^{14} dated to 2550 $\pm$ 60 years. Angel attempts to place the pathologies in an ecological context (diet, activity); includes "atlatl elbow," early-age onset of vertebral arthritis, and dental disease.]

Bard, Cephas L.
1930 Medicine and surgery among the first Californians. Touring Topics 22: 20-30.

[Includes medical and health practices among California Indians. Editor's Own Page, p. 9, gives background of Dr. Bard. The long article is a reprint of a rare booklet published in 1894, consisting of the paper read by Dr. Bard upon his retirement as president of the So. Calif. Medical Society, entitled "A contribution to the history of medicine in Southern California." Numerous medicinals are mentioned as well as other therapies, including the treatment of rheumatism by placing the patient on an ant hill until well-bitten].

Bennett, K.A.

1972 Lumbo-sacral malformations and spina bifida occulta in a group of proto-historic Modoc Indians. American Journal of Physical Anthropology 36: 435-439.

[Bennett presents material from the Nightfire Island site (CA-SK-4). The high frequency of a complex malformation is tentatively explained by inbreeding. The archaeology of the site is unpublished.]

Brabender, I.

1965a Die Palobiologische Rekonstruktion zweier Prahistorischer bevolkerungen aus Kalifornien. Doctoral Dissertation, University of Mainz, Germany.

[A comparative study of the paleodemography and paleopathology of two sites is presented: SJo-68 (Early Horizon) and Ala-328 (Middle and Late Horizons). Changing cultural conditions (diet, warfare) are felt to be reflected in the higher prevalence of pathologies in SJo-68 and the lower life expectancy in Ala-328. This is a very detailed work listing specific pathologies for individual burials as well as the summary statistics. (See Ryan (1972) below). Material is housed in LMA; dissertation on file in Archaeological Research Facility, Berkeley.]

1965b Beitrag zur palaobiologischen Rekonstruktion prahistorischer kalifornischer Populationen. Homo 16, Band 4: 200-230.

[This is a general summary of Brabender's (1965a) doctoral dissertation.]

Brennan, Edward

1971 Appendix B. The skeletal material from the new Don Pedro Reservoir. In: A Study of Prehistory in the Tuolumne River Valley, California, Michael Moratto, ed. San Francisco State College Anthropology Museum Papers No. 9: 161-166.

[Presented is material from CA-Tuo-279 and CA-Tuo-300, housed in the Treganza Museum at San Francisco State, C^{14} dated to post-915 A.D. Burial 9 (CA-Tuo-300) has a spinal kyphosis and an imbedded chert projectile point in one of the vertebrae immediately superior to the kyphotic section.]

Brooks, Sheilagh T.
1968 Appendix V: Skeletal material from LAn-227. UCAS-AR (UCLA) 10: 144-153.

[A small sample (n=30-32) of skeletons from the Santa Monica Mountains is analyzed. C^{14} dating of cemetery is 420 ± 100 years B. P. Pathologies were limited to the teeth and vertebral column in adults; no bone pathologies seen in children.]

Brooks, Sheilagh T. and William D. Hohenthal
1963 Archaeological defective palate crania from California. American Journal of Physical Anthropology 21: 25-32.

[Three examples of cleft palate associated with palatal exostoses are described and illustrated: two from CA-Ala-328 (2339 ± 150 years B. P.) now in LMA, and one from CA-Sac-29 (Early to Middle Horizon) housed at Sacramento State University.]

Bryan, Bruce
1970 Archaeological Exploration on San Nicolas Island. Southwest Museum Papers No. 22, 160 pp.

[Material from San Nicolas Island is reviewed (? dates); included are numerous wounds inflicted by stone implements, a "hunchback" and other pathologies. Material is presumably in the Southwest Museum.]

Cook, Sherburne F.
1947 Survivorship in aboriginal populations. Human Biology 19: 83-89.

[Cook contrasts the survivorship patterns in aboriginal American Indians with early historic (1800-1928) native Americans. Included in the former is a large sample from California, the latter, some mission groups. Concluding with a discussion of factors leading to differential survivorship, the paper is important in illustrating how demographic information can be integrated with paleopathology.]

1955 The epidemic of 1830-1833 in California and Oregon. UC-PAAE 43 (3): 303-326.

[Although this paper does not deal with prehistoric disease, it is an excellent example of the use of an epidemiologic framework to establish the determinants and distribution of disease. This approach can be used to great advantage in studies of paleopathology. The paper also dramatically portrays the effects of an infectious disease (malaria) on a nonimmune population.]

Courville, Cyril B.

1948 Cranial injuries among the Indians of North America. A preliminary report. Bulletin of the Los Angeles Neurological Society 13 (4): 181-219.

[This well-illustrated article describes numerous kinds of human-inflicted cranial injuries from a diversity of weapons in prehistoric California. Examples are primarily drawn from southern and central California; material is from several museums.]

1952 Cranial injuries among the early Indians of California. Bulletin of the Los Angeles Neurological Society 17(4): 137-162.

[This article expands the California material presented in Courville (1948). It also includes a discussion of legends and folk tales involving cranial injuries as well as "striking weapons" and methods of defense.]

1953 Cranial injuries in prehistoric animals. With special notes on a healed wound of the skull in the dire wolf (Canis Aenocyon dirus Leidy) and a mortal wound in the California black bear (Ursus americanus). Bulletin of the Los Angeles Neurological Society 18(3): 117-126.

[Since paleopathology is not confined to humans, this item is included for general interest. Expecially interesting is a case of a bear meeting its death from an obsidian spear point penetrating its cranium; found in the Santa Rosa Mountains.]

1962 Cranial injuries in the Gold Rush period of California. Report of a skull showing fatal gunshot wound. Bulletin of the Los Angeles Neurological Society 27(2): 91-94.

[This specimen is from the Gold Rush Museum, Amador City (Museum No. 285) and is probably a (?white) miner. Trepanation must be considered here or in any case of a circumscribed cranial defect. Burial in the basement of a saloon helps determine the etiology.]

Dahlberg, A.A.

1963 Analysis of the American Indian dentition. In: Dental Anthropology, D.R. Brothwell, ed., pp. 149-178. New York: Praeger.

[This general survey includes several good photos of early California Indians (provenience unstated) illustrating dental pathologies of various kinds.]

D'Amico, A.

1958 The edge-to-edge bite: resolution of its development. In: The canine teeth; normal function and relations of the natural teeth of man. The California Indian. Journal of the Southern California State Dental Association 26: 132-142.

[Through an analysis of pre-white specimens of children and youth, the author demonstrates that the antero-posterior progression of dental attrition is what results in an edge-to-edge bite at maturity. Nevada and California (Maidu) skulls from the LMA collection were used and the number of each specimen is given. Comparisons are made with some Australopithecine, Homo erectus, and Mount Carmel skulls and similarities in the progression of attrition are noted. The author then discusses that the change in Western Europe from edge-to-edge overbite was not an evolutionary one but due to elimination of abrasive elements in the diet.]

Drake, Robert J.

1948 Archeological investigation of the San Bruno shellmound, San Mateo County, California. El Palacio 55(10): 317-323.

[Presented is material currently at LMA from San Bruno Site 1 (late Transitional or early Late Horizon). In addition to several evidences of healed injuries are what the author presents as two examples of "head-taking" (see also Rackerby (1967) below).]

Gifford, E. W. and W. Egbert Schenck

1926 Archaeology of the southern San Joaquin Valley, California. UCPAAE 23(1): 1-122.

[Included, from the Buena Vista Lake Region (Site 14, Item 1), is the first of several discussions of the Buena Vista Lake skull, LMA No. 12-1731. (See also Kroeber (1951) and Pope (1961) below). The authors also hypothesize that possibly the confused burial of bodies at Site 6 may have been due to the epidemic of 1833 (see Cook (1955) above).]

Grady, Mark Allen

1969 An osteological analysis of selected burials from the Rooney extension of 4-Sac-127, Sacramento, California. Unpublished M.A. thesis, Department of Anthropology, Sacramento State College.

[The Rooney extension of the Augustine site (CA-Sac-127) is tentatively dated to the Middle Horizon and provided a skeletal sample of 152+

individuals. The thesis includes a general pathological survey including inflammation, arthritis, trauma and neoplasms. No comparative data are given.]

Grinnell, George Bird
1907 Primitive bows and arrows. Forest and Stream LXIX (21): 808-810, 848-851.

[Grinnell discusses California weaponry and illustrates cranial injuries in early California Indians (provenience unknown); specimens from the Army Medical Museum. This is essentially a rehash of Wilson's (1901) article cited below, although Grinnell includes more material on the nature of weapons -- a prime agent of pathologies often overlooked (see also Pope (1962) below).]

Haney, Patricia J.
1974 Atlatl elbow in Central California prehistoric cultures. In: Readings in Archaeological Method and Techniques, Robert Kautz, ed., pp. 31-34. Center for Archaeological Research at Davis, Publication No. 4, University of California, Davis.

[This study attempts to correlate changes in the arthritic patterns of the elbow with changing subsistence and technology. Material is drawn from three sites: CA-SJo-112 (Early Horizon), CA-Sol-257 (Middle Horizon) and CA-Sac-145 (Late Horizon). The very small sample size detracts from the conclusions, nor are other possibilities entertained for the changes seen since there is no conclusive archaeological evidence of the atlatl.]

Hawkes, Phillip Newill
1967 An Application of Methods for the Determination of Age, Sex, Stature and Pathologies Applied to the Skeletal Material from 4-Sac-29 and 4-Yub-1. Unpublished M.A. Thesis, Department of Anthropology, Sacramento State College.

[This thesis provides a good, general survey of skeletal pathologies and is very well illustrated. Material dated from the Middle and Late Horizons and includes numerous and varied pathologies. Of special interest is the presentation of two possible cases of syphilis from CA-Sac-29 from the post-contact period.]

Hester, T.R. and R. F. Heizer
1973 Arrow points or knives? Comments on the proposed function of 'Stockton Points'. American Antiquity 38(2): 220-221.

[This paper concerns the interpretation of functional use (cutting implements vs. projectile points) and used paleopathologic specimens to settle the case. Several examples of points imbedded in the bones of prehistoric California Indians are presented; LMA specimens from Central California.]

Hohenthal, W.D. and S.T. Brooks
1960 An archaeological scaphocephal from California. American Journal of Physical Anthropology 18(1): 59-65.

[This pathologic cranium is from CA-Ala-328 (Late Middle Horizon), presumably housed in LMA.]

Johnson, Jerald Jay
1967 Excavations at the Old Bridge site (Site 5-237). In: The Archaeology of the Camanche Reservoir Locality, California. Sacramento Anthropological Society Paper 6: 185-282.

[Included are sixty-three burial descriptions, from Calaveras County, from all three Horizons. Evidences of pathologies are noted in several cases but the author includes no diagnostic interpretations: e.g., Burial No. 38, "Left tibia diseased."]

1970 Archeological investigations at the Applegate Site (CA-Ama-56). In: Papers on California and Great Basin Prehistory. Center for Archeological Research at Davis, Publication No. 2. University of California, Davis, pp. 65-144.

[The author assigns an early Middle Horizon age to most of the material. Pathological conditions are listed for sixteen of the twenty-nine burials; although primarily of the dental and arthritic lipping variety, he notes the spongy nature and enlargement of long bones in Nos. 6 and 7 and lesions on long bones in Burial Nos. 7, 16, 18, and 21.]

Kennedy, K.A.R.
1959 The aboriginal population of the Great Basin. University of California Archaeological Survey Report 45: 1-84.

[Kennedy proposed to determine the nature of the morphological differences between the several regions of the Great Basin. He demonstrates a difference between the western and eastern geographical segments. Included in the western region are four crania from Rose Springs in Inyo County, California (Site CA-Iny-372) housed in LMA. He lists frequencies by sex of some dental and cranial pathologies for the population as a whole.]

1960 The dentition of Indian crania of the Early and Late Archeological Horizons in Central California. University of California Archaeological Survey Report 50: 41-50.

[Cranial material from Early and Late Horizon sites, pooled from several localities in the lower Sacramento Valley, are compared to assess if morphological differences can be attributed to dietary customs change (see also Leigh (1928) below). Only slight changes were noted.]

King, Thomas R.

1968 Part 2: The archeology of the Schwabacher site, 4-Mad-117. In: A Survey of the Archeological Resources of the Buchanan Reservoir Region, Madera County, California, San Francisco State College Anthropology Museum Occasional Papers No. 4, pp. 1-135.

[The result of salvage archeology, this material is currently at the Treganza Museum. One cemetery was discovered under a structure C^{14} dated to 1705 A.D. Individual burials are listed for which the author includes a "Pathology" category if appropriate; for example, "calcified lump on femur" plus a few instances of imbedded projectile points.]

Klatsky, M. and J.S. Klatell

1943 Anthropological studies in dental caries. Journal of Dental Research 22(4): 267-274.

[The purpose of the inquiry was to determine whether primitive man did suffer from caries or was he, in fact, immune or partly immune. Study was of 4000 skulls from the American Museum of Natural History from 46 geographical groups including thirty skulls from California (provenience unlisted). The California specimens had a low percentage (1.6%) of carious teeth (see Prero (1970) below).

Results of the study showed that all primitive peoples are not immune to caries, that resistance displayed is not due to immunity by an antigen-antibody reaction, but is a result of proper alignment and the need for more forceful and thorough mastication of more abrasive diets (see D'Amico (1958) above).]

Kroeber, A.L.

1951 At the bedrock of history: recent remarkable discovery of human remains over three hundred years old in the San Joaquin Valley of California. University of California Archaeological Survey Report 11: 5-10. Reprinted from Sunset Magazine, September, 1910 25(3): 255-260.

[Kroeber discusses the Buena Vista Lake skull (see Gifford and Schenck (1926) and Pope (1962) as the most interesting of the remains from the San Joaquin Valley. A photograph is given of the skull in which an arrow-head has pierced the right orbit, downward. He speculates that the fatal wound was not received in battle but was on an unsuspecting victim -- perhaps as an example of the custom of dispatching unsuccessful medicine men.]

Leigh, R. W.

1928 Dental pathology of aboriginal California. UCPAAE 23(10): 399-440.

[Leigh based this study on 300 crania -- pre-Spanish and early post-Spanish -- from LMA. A dozen of the fifty tribes of California are represented. The author demonstrates a correlation between dental pathologies and general food habits and mode of life (see Kennedy (1960) above).]

1929 Dental pathology of aboriginal California. Dental Cosmos 71: 756-767, 878-889.

[A reprint of the above article.]

Lillard, J. B. and William K. Purves

1936 The archaeology of the Deer Creek-Cosumnes area, Sacramento County, California. Bulletin No. 1, Sacramento Junior College, Department of Anthropology.

[Although generally of the skull measurement and physical type genre, the authors discuss injuries and imbedded projectile points, i.e. a burial in Site 1 had a skull in which a chert arrowhead had penetrated the nose and protruded through the upper palate. Also, a test pit in Site 1 uncovered a burial of a female with three recently born infants.]

Littlewood, R. A.

1960 Appendix: Measurements and techniques. In: Analysis of skeletal material from the Zuma Creek site (LAn-174). UCAS-AR (UCLA) 1959/1960, pp. 135-154.

[This is a comparative study of the Zuma Creek crania with other published western cranial series. The author describes an extreme degree of dental pathologies including attrition abscesses.]

Loud, Llewelyn L.

1924 The Stege Mounds at Richmond, California. UCPAAE 17(6): 355-372.

[The Stege Mound is one of the group of Berkeley-Richmond mounds which include the Ellis Landing (see Nelson (1910) below), West Berkeley and Emeryville (see Rackerby (1967) and Uhle (1907) below) shell mounds. From mound no. 300 is a skeleton (LMA cat. no. 12-3445) exhibiting a diseased left femur resulting from a wound near the left acetabulum where an obsidian point has broken off in the bone.]

McHenry, Henry

1969 Transverse lines in long bones of prehistoric California Indians. American Journal of Physical Anthropology 29(1): 1-18.

[Material is from Early, Middle and Late Horizon sites from Central California (sites unspecified); housed in LMA.]

n.d. Harris lines, enamel hypoplasia, and subsistence change in prehistoric California. Ballena Press Anthropological Papers, in press.

[This paper confirms and extends McHenry's (1968) earlier studies and adds enamel hypoplasia as another potential indicator of biologic stress associated with subsistence change. Central California skeletons were studied, housed in LMA and Museum of Anthropology, University of California, Davis (sites unspecified).]

Moodie, Roy L.

1929a Deafness among ancient California Indians. Bulletin of the Southern California Academy of Science 28: 46-49.

[Auditory exostoses are examined as a cause of deafness; specimens from San Nicolas Island, now housed in LACM.]

1929b Studies in paleodontology, XIII. Diseases of the teeth of an Indian from a post-Spanish interment in the desert of southern California. Pacific Dental Gazette 37: 81-86.

[This is a detailed exposition, well-illustrated, of an Indian skeleton from Mason Valley, Laguna Mountains, now housed in SDM (no. 8766). The severe oral disease contains everything but caries.]

1929c Studies in paleodontology, XIV. A curious example of dental abrasion in an ancient California Indian. Pacific Dental Gazette 37: 87-94.

[In another well-illustrated article, a Moodie hallmark; a "pre-Spanish" specimen from La Jolla Shores is shown with a severe oral disease consequent to attrition; housed in SDM (no. 8873).]

1929d Studies in paleodontology, XV. Dental attrition and its results among certain ancient Indians from southern California. Pacific Dental Gazette 37: 217-227.

[This article discusses further oral disease in specimens from La Jolla Shores.]

1929e Studies in paleodontology, XVI. The California sabre-tooth; the mandibular teeth and associated structures. Pacific Dental Gazette 37: 317-321.

[This brief article surveys the pathologies in specimens from LaBrea. Sixty of the twelve hundred sabre-tooth tigers manifested pathologies, including: gigantism (hyperpituitarism), pyorrhea, osteomyelitis, apical abscesses, osteomata, trauma and impactions. Specimens housed in LACM.]

1929f Studies in paleodontology, XXI. A further note concerning the association of arthritis with diseased teeth. Pacific Dental Gazette 37: 681-682.

[Illustrates and briefly discusses the association of infected teeth with rheumatoid arthritis in a California Indian (provenience unknown).]

1929g Studies in paleodontology, XXV. The California sabre-tooth: facial asymmetry following loss of sabre. Pacific Dental Gazette 37: 764-766.

[Specimen in LACM illustrating facial changes following loss of sabre teeth and subsequent socket resorbtion.]

1929h Studies in paleodontology, XVII. The California sabre-tooth: two impactions and an abscess. Pacific Dental Gazette 37: 767-770.

[Specimens in LACM.]

Moratto, Michael J.

1969 The archeology of the Jones site, 4-Mad-159. In: The Archeology of the Buchanan Reservoir Region, Madera County, California, T. F. King, ed. San Francisco State College Anthropology Museum Occasional Papers No. 5: 82-218.

[Appendix 1 lists complete burial records including "Discontinuous Traits" (mainly Wormian bones) and "Pathology" (mainly dental and arthritic) for each of 55 burials. Material housed in the Treganza Museum. In the discussion, an instance is mentioned (for which no number is given) of a skeleton having "semi-ankylosis in the spine."]

Nelson, Nels C.
1910 The Ellis Landing Shellmound. UCPAAE 7: 357-426.

[Material is housed in LMA and assigned an age of ca. 3500 years B. P. Some pathologies listed are a tooth grown well up into the nasal cavity, fused cervical vertebrae and a fracture at the elbow which has mended in a flexed position (another specimen is described by Pope (1923) below).]

Newman, Russell
1949 Appendix II. Preliminary report of the skeletal remains (of the Early Central California Culture). In: The Archeology of Central California. I: The Early Horizon, R. F. Heizer, ed. UCAS-R 12: 49-50.

[This is a brief, preliminary description of crania from four Early Horizon sites: C-56 (CA-SJo-56), C-68 (CA-SJo-68), C-107 (CA-Sac-107), C-142 (CA-SJo-142). The author lists per cent distribution of auditory exostoses in each site (there is a high occurrence), observes that there is pronounced vertebral lipping only in C-68, and that alveolar abscesses and ante-mortem tooth loss are very common throughout.]

1957 A comparative analysis of prehistoric skeletal remains from Lower Sacramento Valley. UCAS-R 39: 1-66.

[Compared are three skeletal series, grouped on the basis of the chronological Horizons, from several sites in the Interior Valley Zone (the sites are listed). Pathologies include: arthritic changes, auditory exostoses, cranial injuries and imbedded projectile points. Material housed in LMA.]

Oetteking, B.
1930 An extreme case of arthritis deformans from San Nicolas Island. Museum of the American Indian, Heye Foundation, Indian Notes 7: 52-56.

[Well-illustrated, describes specimen now housed in the museum. Site is not stated.]

Olson, W. H. and F. A. Riddell
1962 Salvage of the Rio Oso site. Ms. on File, State of California Resources Agency, Department of Parks and Recreation, Division of Beaches and Parks.

[Material currently at the State Indian Museum in Sacramento has been assigned to Late Horizon, Phase I; site number is CA-Yub-14. No pathologies are listed but under a discussion of "evidences of conflict", the authors list imbedded projectile points and wounds.]

Orr, Phil. C.
1943 Archeology of Mescalitan Island. Santa Barbara Museum of Natural History, Occasional Papers, No. 5.

[Mescalitan Island is the Museum's locality number 46, sites I, II and III; material is in the Museum and has been assigned to the Canalino Culture. Site I is of particular interest for the number of imbedded projectile points described. Burial AA has 17 points imbedded in various parts of the body -- one of which has pierced an orbit.]

Peck, Stuart L.
1955 An archeological report on the excavation of a prehistoric site at Zuma Creek, Los Angeles County, California. Archeological Survey Association of Southern California, Paper No. 2.

[Site CA-LAn-174, a very small amount of material, of interest only in that Burial 13-12 has a mandible so small that M_2 and M_3 were "well within the condyle."]

Pepper, O. H. P. and E. P. Pendergrass
1936 Hereditary occurrence of enlarged parietal foramina. American Journal of Roentgenology 35: 1-8.

[Article includes two photos of a skull from the Ponce Mound (CA-SCl-1) now housed in USNM (no. 276981).]

Pope, S. T.
1962 Bows and Arrows. Berkeley: University of California Press. Originally published in 1923 as "A Study in Bows and Arrows," University of California Publications in American Archaeology and Ethnology, 13(9): 329-414.

[This small volume is the result of experiments using museum specimens of bows and arrows to compare mechanical efficiencies and penetration ability. Plates 16 and 20 illustrate examples of deep penetration into human bones. The former is a representation of the Buena Vista Lake skull (see Gifford and Schenck (1926) and Kroeber (1951) above) with a good discussion of the path of the arrow and the anatomy affected as well as descriptions of other anomalies

and injuries of the skull. Plate 20 (LMA no. 12-2340), from the Ellis Landing mound (see Nelson (1910) above), is of a left femur with an obsidian point imbedded in the greater trochanter.]

Prero, Michael Dwayne

1970 An osteological analysis of a prehistoric California Indian site: Sac. 43. Unpublished M.A. Thesis, Department of Anthropology, University of California, Davis.

[The material from site CA-Sac-43, the Brazil Mound, dating from the Middle Horizon and housed in LMA, was used in a comparative study of Middle Horizon material from Sacramento Valley. General poor health was seen in Sac-43, with females showing more pathologies than males. The high prevalence of dental caries found in Sac-43 (58%) is very unusual in California (see Klatsky and Klatell (1943). Sac-43 manifested higher prevalence of pathologies, generally, than the Cook or Augustine site material to which it was compared.]

Rackerby, Frank

1967 The archeological salvage of two San Francisco Bay shellmounds. San Francisco State College Anthropology Museum Occasional Papers No. 3: 1-83.

[The material, form sites CA-Ala-12 and CA-Ala-13, is in LMA. The burials are individually described with pathologies and injuries noted where appropriate. Skull wounds and imbedded projectile points are numerous and there is an instance which is interpreted as "head-taking" (see Drake (1948) regarding the San Bruno shellmound): i.e. Burial 19 (Ala-13) has had the skull removed and placed between the knees.]

Ragir, Sonia

1972 The Early Horizon in Central California. Contributions of the University of California Archaeological Research Facility (Berkeley), No. 15.

[Pages 40-43 of this monograph summarize the paleopathological findings of Brabender on SJo-68 (Early Horizon) written in a manuscript in 1963. (See Brabender (1965a, 1965b.)]

Rogers, D. B.

1929 Prehistoric Man of the Santa Barbara Coast. Special Publication of the Santa Barbara Museum of Natural History, No. 1.

[In the appendix of this book are references to several specimens that had been "bludgeoned in life" and to imbedded arrowheads. In anecdotal

fashion, the author describes one skull in which the atlas had fused to the cranium, "due to a broken neck in infancy, leaving a permanently stiff neck." "Thus handicapped, she fell once too often at age 25 and suffered a fatal basal fracture."

He tells of another skull with a congenital deformity: there was a "small amount of brain quantity on the left side. Thus incapable of normal mental functions: the personal belongings which were buried with this "man give a fair reflection of his aberrant tastes." (Proveniences are not stated.)]

Roney, James G.

1959 Paleopathology of a California archeological site. Bulletin of the History of Medicine 33: 97-109.

[This paper explicitly used an epidemiological approach, which includes skeletal material, cultural data and environmental factors to reconstruct the determinants and distribution of disease. Emphasis is on a population approach. Site CA-Son-299 is a Middle Horizon site (ca. 500-200 B. C.); material housed in LMA.]

1966 Paleoepidemiology; an example from California. In: Human Paleopathology, Saul Jarcho, ed., pp. 99-120. New Haven: Yale U. Press.

[This is a brief, updated version of Roney's 1959 paper.]

Rootenberg, Sheldon

1960 Cranial and post-cranial measurements and observations for San Nicolas Island skeletal remains. University of California Archaeological Survey, Annual Report (University of California, Los Angeles) 1959/1960, pp. 115-129.

[Material is in the UCLA Museum, from several San Nicolas Island sites (the sites are listed) and is dated to Early Canalino period. The author discusses the extreme amount of dental attrition and resultant dental pathologies. There is a burial from SNI-18 with two cranial osteomata and another from SNI-56 having a cylindrical growth of the cranial base.]

Ryan, Dennis John

1972 The Paleopathology of Ala-328: the Relationships among Disease, Culture, and Environment in a California Indian Population. M.A. Thesis, Department of Anthropology, San Francisco State University.

[Thorough, well-illustrated thesis of material from Middle and Late Horizons, now housed in LMA and Treganza Museum. Does not mention Brabender's (1965b) work on the same site.]

Schenck, W. Egbert
1926 The Emeryville Shellmound: Final Report. University of California Publications in American Archaeology and Ethnology, 23(3): 147-282.

[Site Ala-309, housed in LMA; no. 12-3801 has a left tibia and fibula fused at the ankle, no. 12-3604 has an unusually large mandible due to the teeth not having erupted properly, no. 12-3640 has a healed depressed skull fracture, and "a body in the NW perimeter had a pathological elbow."]

Schenck, W.E. and E.J. Dawson
1929 Archeology of the northern San Joaquin Valley. University of California Publications in American Archaeology and Ethnology 25(4): 289-413.

[Provenience is not stated for the skeletal material, but the authors describe several badly healed bone injuries, fused vertebrae, imbedded projectile points, and an example of presumably porotic hyperostosis.]

Schulz, Peter D.
1970 Oral morphology and disease in a prehistoric Central California population -- 4-Mer-14. Ms. on file, Archeological Resources Section, Department of Parks and Recreation, Sacramento.

Schulz, P.E. and H.M. McHenry
1975 Age distribution of enamel hypoplasia in prehistoric California Indians. Journal of Dental Research, in press.

[Material from unspecified sites in the lower Sacramento-San Joaquin Valley, representing Early, Middle and Late Horizons, is presented; housed in LMA and Museum of Anthropology, University of California, Davis. (See McHenry (1968) and McHenry and Schultz (1975).]

Snure, Henry
1924 A roentgen-ray study of the LaBrea fossils (California). American Journal of Roetgenology 11: 351-354.

[This is the first X-ray study of the LaBrea fossils (all nonhuman material). The focus is on infections (?TB); material housed in LACM.]

Stewart, T. Dale

1941 Appendix A: Skeletal remains from the Buena Vista site, California. In: Archeological Investigations at Buena Vista Lake, Kern County, California, W. R. Wedel, ed. Bureau of American Ethnology, Bulletin 130: 172-188.

[Stewart examined 75 specimens, in the USNM, from four Buena Vista sites. No. 372297 has pathological changes he attributes to syphilis, but the dating is uncertain and could be post-1542 (a photograph is given). He diagnoses osteomyelitis in the femur of another specimen --also illustrated -- and describes a third having separate neural arch in the fifth lumbar vertebra.]

1974 Nonunion of fractures in antiquity, with descriptions of five cases from the New World involving the forearm. Bulletin of the New York Academy of Medicine 50(8): 875-891.

[Article includes a specimen from near Palo Alto, a "Digger" Indian now housed in the USNM (no. 225001).]

Uhle, Max

1907 The Emeryville Shellmound. University of California Publications in American Archaeology and Ethnology 7(1): 1-107.

[Presumably in LMA, one burial contains a cranium which shows a "lupus-like mutilation of the nose" for which a drawing is given.]

Warren, G. L.

1971 Skeletal analysis of 4-SLo-406. San Luis Obispo County Archeological Society, Occasional Papers, No. 4.

[The result of salvage archaeology, there are good descriptions of each burial. Osteitis of undescribed types, a skeleton with twelve large projectile points imbedded in it, and fused vertebrae are representative of the pathologies outlined. Material dated to ca. 500 B. C. - A. D. 500.]

Wilson, Thomas

1901 Arrow wounds. American Anthropologist 3(3): 513-531.

[This general review of arrow wounds, prehistoric and historic, includes an early California Indian with a penetrating wound of the left orbit (p. 517). (See Grinnell (1907) and also Pope (1962).]