THE PUEBLO GRANDE PROJECT, VOLUME 6:
THE BIOETHNOGRAPHY OF A CLASSIC PERIOD HOHOKAM POPULATION

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INTRODUCTION TO THE BIOCULTURAL ANALYSIS OF THE PUEBLO GRANDE HUMAN REMAINS

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Our introduction to the Pueblo Grande project began in July 1990, when we were asked to take a subsample of the Hohokam inhumations to our laboratory at the University of Colorado for demographic analysis. In spite of the many constraints and liabilities, this project was a remarkable opportunity for skeletal biology. The research design and scope of work (Volume 1) by Soil Systems, Inc. (SSI) of Phoenix, Arizona emphasized Hohokam adaptation and subsistence, including culture change, paleoenvironment, and population dynamics. This provided an excellent archaeological context for reconstructing patterns of adaptation and biocultural evolution from the perspective of biological anthropology.

Our research design was accordingly shaped by a commitment to reconstructing life and death at Pueblo Grande within time and preservation constraints. We developed a series of investigations, each conducted by a research team, designed to maximize our understanding of mortality, childhood stress, diet, and disease.

TIMEFRAME FOR THIS ANALYSIS

In July 1990, we were asked to analyze a sample of approximately 200 Hohokam burials judged to have the greatest likelihood of providing reliable age and sex information for Pueblo Grande. At this point in the investigation, our analysis was to be limited to age and sex estimation, from which life tables were to be constructed.

By September 1990, analysis of the burials remaining at SSI had stalled, and we were asked to expand our analysis of the demographic sample to include nutrition and disease indicators deemed pertinent to a more-general biocultural assessment of the demographic data. In August 1991, SSI asked us to expand our analysis to include the entire inhumation sample. We agreed, even though the majority of the material had yet to be either cleaned or processed in any way.

Within five months of the arrival of this second shipment, representatives of the Tohono O'odham tribe demanded the immediate return and reburial of the remains. This sudden and unexpected turn of events forced us into a most-unfortunate situation. Rather than proceed with each burial through the normal process of cleaning, inventory, and analysis, a protocol similar to battlefield triage was adopted. Focused investigations were selected based on two criteria: 1) the likelihood of providing bio-
cultural information most relevant to our and SSI's research design; and 2) the feasibility of the investigation in light of the material's condition and the now-horrific time constraints that faced us.

The majority of the analyses presented in this volume were conducted during the nine-month period between August 1991 and April 1992, when all remains were returned for reburial. Were it not for the diligent efforts of all of the participants, the task never could have been completed.

ANALYSES OF THE HUMAN REMAINS FROM PUEBLO GRANDE

The paleodemographic reconstruction was conducted by Dennis P. Van Gerven and Susan Guise Sheridan. The analysis was designed to provide the context of mortality and population structure essential to the interpretation of adaptation-related phenomena such as childhood stress, growth and development, diet, and disease.

An analysis of enamel defects was developed to exploit the relative abundance of well-preserved dental remains. The research was designed and carried out by Sandra Karhu and Julie Amon to provide a measure of both the timing and duration of childhood stress. As with even poorly preserved archaeological remains, teeth were the best-preserved tissue, and there was an abundance of comparative information on stress indicators against which to conduct the analysis. Because it was our expectation that Christy G. Turner II of Arizona State University would examine dental morphology as well as other aspects of the dentition, only enamel defects were examined. It is unfortunate that the remains were reburied before Turner's phase of the investigation was conducted.

Long bone growth and cortical bone maintenance were analyzed by Dennis P. Van Gerven and Susan Guise Sheridan. Although the adult bones were inadequately preserved for systematic measurement, a small but adequate sample of subadult femora was available for metric evaluation. Few growth studies have been conducted on archaeological remains, but it was anticipated that patterns of growth and bone tissue maintenance combined with mortality profiles would provide an important additional perspective on childhood stress.

Skeletal indicators of nutritional stress were examined by Diane M. Mittler and Dennis P. Van Gerven. The presence of nutritional anemia in the American Southwest is well established, and a comparative analysis of the Pueblo Grande remains appeared to have a high probability of success. Although preserved subadult cranial were rare, and orbital tissues necessary for observations of cribra orbitalia were virtually absent, fragmentary adult cranial were abundant. Ironically, fragmentation of the cranial made it possible to conduct one of the few systematic investigations of diploic thickening and its relationship to porotic hyperostosis. This aspect of the Pueblo Grande project, combined with mortality and subadult stress, was a critical link in the analysis of both population adaptation and culture change at Pueblo Grande.

The decision to conduct a comprehensive trace-element investigation was in many ways the highest risk component of the entire research program. Fortunately, Susan Guise Sheridan had access to a state-of-the-art Inductively Coupled Plasma-Atomic Emission Spectrometer at Trace Minerals International, Boulder, Colorado. The combination of rigorous quality controls and strict adherence to Class 100 Cleanroom procedures for all sample preparation, combined with superb instrumentation, maximized the information content of the poorly preserved remains. As a result, the Pueblo Grande skeletons made an important contribution to both the immediate objectives of dietary reconstruction as well as the more-general literature on archaeological bone chemistry. The trace-element team was composed of Susan Sheridan, Deborah Jones, Paul Tunnell, and Dennis Van Gerven.
CHAPTER 1 • INTRODUCTION

Age-related degenerative changes were the last area chosen for investigation. Patterns of degenerative joint disease have long been recognized as an important indicator of activity patterns, as well as cumulative stresses of everyday life. Although joint surfaces were inadequately preserved for a study of osteoarthritis, a sufficient number of vertebral elements were available for an investigation of osteophytosis. Kathryn McCafferty and Diane Mittler analyzed these vertebral body lesions to provide important information on male-female activity patterns as well as sex-specific patterns of bone maintenance.

The most-direct evidence for adult age changes in cortical bone maintenance, however, was provided by a thorough investigation of femoral osteopenia (bone loss). Male-female patterns of adult bone loss have been studied extensively in both modern and archaeological populations. Archaeologically, the degree of bone loss among premenopausal women has been particularly useful in the assessment of nutrition and reproductive stress. Given the archaeological evidence for eventual site abandonment, this aspect of the research, conducted by Christopher Kuzawa and Dennis Van Gerven, was designed to reveal changing patterns of adult stress during the final phases of site occupation.

Each research project was formulated to provide an independent assessment of population biology and adaptation of the Pueblo Grande community during the Classic period. At the same time, they were designed to share a common focus and problem orientation. Our objective was to reconstruct the biocultural evolution and adaptation of the Pueblo Grande population. Each conclusion stood or fell on the basis of the independent lines of circumstantial evidence contributed by these studies. Their coherency and the quality of the data they provided were critical to our success.

Several traditional areas of investigation are notably absent from our investigation. For example, morphometrics and biological distance studies are not represented. This omission is owing to the absence of adequate samples for such research. Also, population studies of infectious disease and trauma could not be conducted. Here again, fragmentation and the poor quality of tissue preservation made systematic observations and statistical assessments by age and sex impossible. Notable individual cases, however, are described in Appendix A.

Finally, as noted previously, only dental information related to enamel defects was collected. This was because of an agreement between Christy G. Turner II and SSI that the dental analysis be conducted at Arizona State University. Unfortunately, the premature reburial of the remains precluded his phase of the research.

In summary, our objective was to develop a research program designed to maximize our reconstruction of biocultural adaptation at Pueblo Grande during the Classic period. The investigations were conducted under considerable constraints, but nevertheless a remarkably coherent picture of the life and times of these ancient people has emerged. In combination with the archaeological evidence, we think that the objectives of SSI's research design (see Volume 1) have been well realized.