BIOGRAPHICAL MEMOIRS

Michael Edward Moseley

March 29, 1941–July 8, 2024
Elected to the NAS, 2000

A Biographical Memoir by Joyce Marcus, Daniel Sandweiss, and Charles Stanish

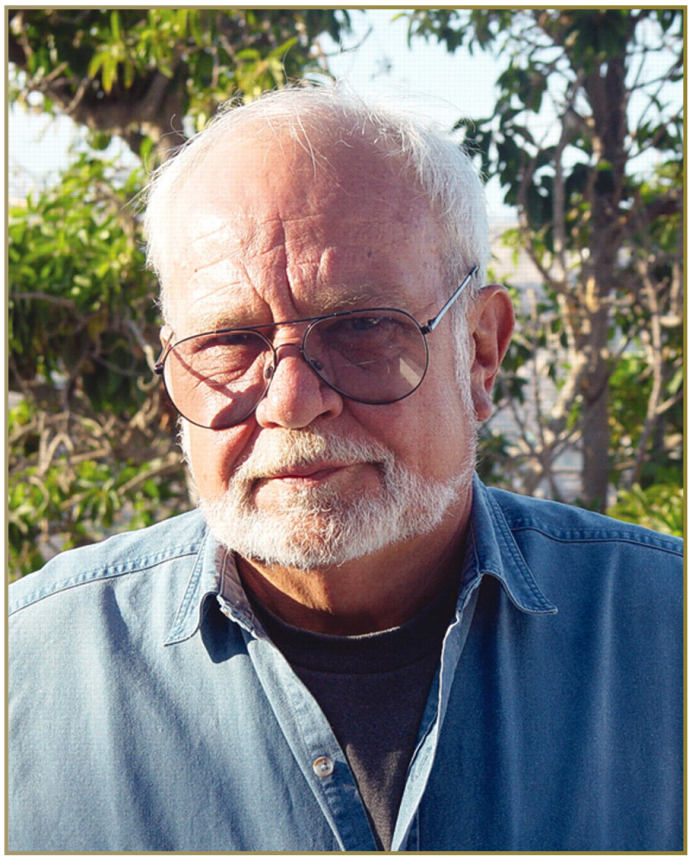

Figure 1 Mike Moseley.

Michael Moseley (known as "Mike" to his students and colleagues) was an outstanding field archaeologist, a prodigious research scientist, an inspirational professor, and an extremely generous mentor. He shed new light on the early societies inhabiting the Andes, generating new data on the nature of early fishing economies; the role of preindustrial irrigation; geographic, geologic, and climatic constraints on Andean agriculture; and the organization of urban settlements. What truly set him apart was his willingness to engage in "big topics," such as long-term environmental change, plate tectonics, and the impact on ancient populations of natural disasters, such as devastating earthquakes and major El Niño floods. His influence on Peruvian archaeological science in general and landscape alterations in particular remains profound.

Early Life and Education

Mike Moseley was born on March 29, 1941. His interest in archaeology was ignited as a child when he saw arrowheads displayed in a museum in Washington, D.C. He said that seeing those objects made by early occupants of the planet hooked him on scientific discovery and archaeology. By age thirteen, he was already participating in excavations in the southern California deserts. At fourteen, he attended an archaeological field school in Colorado. At nineteen, he was a member of the Glen Canyon project in Arizona, and the following year he worked in New Mexico on the Navajo Reservoir salvage project. Even though he said he really enjoyed all his fieldwork experiences in North America, he wanted to pursue archaeology in an area that was underexplored and where he could direct a multidisciplinary scientific project.

Mike attended the University of Redlands in southern California and majored in geology. After two years, he transferred to the University of California, Berkeley, graduating with a bachelor's degree in 1963. For graduate studies, he went to Harvard University, where he earned a master's degree in 1965 and a Ph.D. in 1968, both in anthropology and specializing in scientific archaeology. Moseley worked on his first international excavation at this time, at Ambrona, an early human site in Spain, directed by a team from the

University of Chicago that included other future Andean archaeologists such as Craig Morris.

His first summer in South America was spent working in the Cauca Valley of Colombia with a British excavation team. At that time, however, the political climate in Colombia had become unsafe for foreigners to continue work there, so in 1966 he traveled to Peru, where he conducted fieldwork at six sites along the coast.[1] This multisite fieldwork laid the foundation for Mike's future projects on the coast of Peru.

Teaching and Curating

Moseley's first teaching job was at Harvard University. He began as an instructor in 1968, was named assistant curator in the Peabody Museum and assistant professor in 1969, and was promoted to associate curator and associate professor in 1973. In 1976, he joined the Field Museum of Natural History in Chicago as curator and was a research associate of the University of Chicago from 1980 to 1984.

In 1984—after experiencing some rough Chicago winters—he told us: "I am heading south for warmer winters; I am taking a job at the University of Florida." And that is where he taught from 1984 until his retirement in 2016 when he became a distinguished research professor.

Fieldwork

Moseley's fieldwork in Peru can be roughly divided into three parts: (1) the study of early fishing communities on the central coast, which led to his formulation of Maritime Foundations of Andean Civilizations theory (MFAC); (2) directing excavations at the huge prehistoric city of Chan Chan on the north coast and studying the sophisticated irrigation technology of the Chimu and their predecessors; and (3) directing the Contisuyu Project in the Moquegua Valley in the far south.

Maritime Foundations of Andean Civilization

Based upon an initial interest in the "neolithic" transition that he addressed in a paper written for a course he took in graduate school with Gordon R. Willey, Moseley examined Peru's coastal sites to assess the evidence of early agriculture. As Moseley himself noted, he inductively developed what would become one of the most influential theories in Andean archaeology.

In his formulation of MFAC in 1975, Moseley argued that the early development of complex societies in the Andes occurred along the coast and relied largely on maritime resources rather than irrigation agriculture.[2] He never argued that the coastal populations relied exclusively on maritime resources, but rather pointed out that "fishing provided early coastal populations with greater caloric support than did farming."[3] As time went on, he refined his initial argument by recognizing that the bulk of the maritime resources came from schools of small fish, such as sardines and anchovies, not from mollusks and large fish.

Figure 2 Moseley digging in 1969.

Moseley noted that the understanding of the origins and evolution of early monumental architecture was being revolutionized by ongoing discoveries of settlements with large-scale construction dating to the third and second millennium B.C.E. along Peru's coast. The first systematic excavation of such monumental structures was in 1941 at Áspero, a site at the mouth of the Supe River whose ancient inhabitants constructed impressive architecture before pottery made its appearance.[4] In that era, archaeologists had yet to posit the existence of a preceramic stage with monumental constructions supported by anything other than maize agriculture. Consequently, large stone buildings that dominated the preceramic site of Áspero were dismissed as natural hills.

Moseley's maritime model suggested that, to the contrary, in coastal Peru it was far less demanding to net abundant fish from the ocean than to construct massive canals to irrigate one of the driest deserts in the world. Even today, fishing can be done in simple watercraft with small crews, whereas irrigation is a large, cooperative venture involving multiple canals and greater engineering and technological skills. Moseley noted that the maximum capacity of anchoveta harvests would be ten million metric tons per year, and that if preceramic fishing populations lived at 60 percent of this yield capacity and ate nothing but fish meal, the anchoveta stock could support six million people—about half the total population estimated for the entire Andean area at the time of European conquest. Moseley was not arguing that prehistoric fishing ever supported so many people, but rather that fishing for anchoveta must be understood as a viable economic base with potential that was analogous to agricultural

Figure 3 Moseley (left) with Paul Goldstein at the Omo site, Peru.

productivity. If the preceramic population just operated at a 10-percent clip, the demographic maximum might be one million people, making the rise of sedentary maritime communities and the development of monumental architecture expectable features of the archaeological record.

Moseley's Maritime Foundation hypothesis generated a large response and new research to test its empirical validity. It also led to healthy debates about its significance for many areas outside the Andes. Although modifications of the hypothesis have been proposed, it has been well demonstrated that the earliest complex coastal societies in the Andes relied heavily on marine foods. MFAC continues to be a touchstone of coastal research and constitutes one of the enduring legacies of Moseley's work.

Chan Chan Moche Valley Project, Peru

Moseley's project on Peru's north coast was very ambitious. In 1968, he initiated the Chan Chan Moche Valley Project, which lasted from 1969 to 1980. He recruited a large group of researchers, including both undergraduate and graduate students from Harvard and elsewhere; when they joined Moseley in the field, they soon learned they could conduct regional surveys, major excavations, and original research for their undergraduate honors theses or doctoral dissertations.

Moseley's Moche Valley project focused on the massive city of Chan Chan, the capital of the Kingdom of Chimor (or Chimu), an expansionist kingdom of the late first to mid second millennia CE. This pre-Columbian city, which was located near Trujillo, was a kingdom that at its height extended approximately 1,000 kilometers along the desert coast from southernmost Ecuador to central Peru. The Kingdom of Chimor was thus the largest empire in the Andes before the Inca Empire surpassed it. In the middle of the fifteenth century, the Inca subjugated and incorporated Chan Chan and resettled the latter capital's skilled goldsmiths and artisans so that the Inca Empire could control them and their crafts.

When Moseley started his Chan Chan project, little was known about the sprawling ancient city that covered more than eight square miles. By focusing his attention on the ten enormous high-walled compounds (*ciudadelas*) and a wide range of residential structures, Moseley suggested that Chan Chan once housed about 25,000 people. He concluded that the ten huge compounds were constructed by the state and built by distinct work parties drawn from different communities outside the capital. By determining when each compound was constructed, Moseley's project suggested that as the state expanded, its control of artisans also expanded and it invested increasingly in storage. He found no evidence of a monetary system or of a developed market economy. His project showed that the high walls were built for privacy and security, not for external defense. The towering walls—some more than nine meters tall—were needed to protect the nobles residing inside as well as luxury items stored there. Moseley was able to show that Chan Chan exacted a "labor tax," controlling those who worked for the state, and that the city had an economic structure very different from the ancient cities of the Near East and Europe. Chan Chan now has the distinction of being a UNESCO World Heritage Site.

At Chan Chan, Moseley addressed the topic of how the city met its massive need for food and water, showing that irrigation agriculture complemented by fishing formed the basis of the city's subsistence. He studied the Chicama-Moche Intervalley Canal, an impressive engineering feat built for the kingdom. This 70-kilometer canal system transported water from the Chicama Valley in the north to Chan Chan and the Moche Valley, supplying water for its agricultural lands. Moseley's work amply illustrated the advanced hydraulic engineering skills of the Chimor Kingdom.

Mike had an enduring fascination with large-scale landscape alterations, especially those resulting from major earthquakes;[5] massive flooding, destructive landslides, and field-covering sand sheets that resulted from rainfall produced by ENSO (El Niño Southern Oscillation);[6,7] and tectonically-induced coastal uplift, which challenged the engineers trying to bring water from the Chicama Valley to the Moche Valley.

The South Coast Moquegua Project (Programa Contisuyu)

After Moseley took a position at the Field Museum of Natural History in 1976, he shifted his work from the

Figure 4 Moseley at Quebrada Tacahuay, Ilo, Peru, in 2001.

north coast of Peru to the south to the small but scientifically critical Moquegua Valley. With support from the Southern Peru Copper Corporation, Mike and his Peruvian colleagues Fernando Cabieses and Luis Watanabe created the Programa Contisuyu. This project took its name from the mineral-rich quarter (*suyu)* of the Inca Empire in which it is located.

Once again, Moseley created a multidisciplinary and multi-year project, inviting anyone with interest and expertise to join him. Mike's innately generous nature positively affected science. He created the physical, administrative, and intellectual infrastructure for everyone to flourish. Mike commendably gave graduate students a lot of freedom, all the while ensuring that their individual projects fit within the larger theoretical and empirical goals of the Moquegua project. Programa Contisuyu participants studied the settlement patterns of the indigenous cultures, kingship and split inheritance, agricultural systems, trade, migration, and a whole host of other critical theoretical topics.

Mike himself initially focused on the towering massif of Cerro Baúl in the upper reaches of the Moquegua Valley. He and his team soon realized that this was the largest colony of the Wari civilization (which flourished in the first millennium CE), whose capital was located in the highlands of Ayacucho. Through careful excavations at Cerro Baúl, Mike and his team discovered an ancient brewery that produced *chicha*, the traditional Andean corn beer. They discovered that large-scale feasting and ceremonial drinking were important aspects of this Wari colony. This discovery fit in well with the theoretical literature on feasting and ceremony, two major state-sponsored strategies of the great Andean states. Cerro Baúl was in fact a massive colonial outpost of the Wari surrounded by local people and immigrants from the highlands.

Members of Programa Contisuyu also discovered the remains of a Tiwanaku outpost (Omo), a colony of the contemporary Tiwanaku civilization, whose capital lay in the altiplano of Bolivia.

The Legacy of Michael Moseley

Mike was famous for his witty aphorisms and his big ideas. Here is one example: The site of Omo had been identified on aerial photos, so the Contisuyu team, including many eager graduate students, drove out to the archaeological site. As the team was discussing the specific details of the site's layout (its pottery styles and other features), Mike impatiently looked on and blurted out, "Folks, it's the Talking Dog, it is not what it says but it's the fact that it talks at all!" Indeed, the discovery of this Tiwanaku colony (the Omo site) was major and can truly be said to have rewritten a part of Andean prehistory. Students were mired in details, and Mike was thinking about regional-scale issues. Thanks to Mike's mentorship, many more "talking dogs" were discovered up and down the Andean coast.

The existence of Omo (a Tiwanaku outpost) on one side of the river and Cerro Baúl (a Wari outpost) on the other side of the river was an unprecedented situation in the ancient Andean world. It meant that each empire had an outpost that was visible to the other. The Wari enclave of Cerro Baúl (which looks like a footlocker or trunk) was in a highly defensible location (Moseley referred to it as the "Masada of the Andes"), whereas the Tiwanaku sites, including Omo, were in open non-defensible locations. With extensive excavations and survey, Mike was able to highlight the complex social and political institutions of the indigenous Andean peoples.

Moseley's three major projects—the central coast work leading to the Maritime Foundations model, the Chan Chan project, and the Moquegua Valley project—are landmarks in the history of Peruvian archaeology. Moseley added his Maritime Foundations model—sedentary life was sustained by a reliance on small fish—to older models that featured a reliance on agricultural intensification. Today, thanks to Moseley, it is taken for granted that social complexity can be sustained through predominantly nonagricultural subsistence strategies.

Moseley's Chan Chan project revealed the wonders and architectural sophistication of the Moche people. His work expanded our definition of urban centers that had formerly been understood as crowded places with a single downtown core area. His work on the effects of El Niños and tectonic activities on preindustrial agricultural infrastructures, particularly canals and field systems, stands as a model of socially relevant social science research. His eager embrace of

multi-year, multinational, and multidisciplinary research has set a high bar for all archaeologists.

The work of Programa Contisuyu researchers not only taught us much about the Andean past, but also led to the preservation and documentation of the cultural heritage threatened by economic development. Mike's efforts spurred the creation of the Museo Contisuyu, supported by the copper mine and municipal authorities. The museum continues to be one of the finest regional cultural repositories in the country that collects and documents the craft products and ancient remains that would have been irretrievably lost. Of Mike's many accomplishments, this museum contributes mightily to the preservation of our global cultural heritage and ranks as one of his enduring legacies.

Mike was a mentor to many rising archaeologists, both his own students at Harvard, Chicago, and Florida and others who contacted him out of the blue for the advice and help he gave so freely and effectively. Many went on to make major contributions to Andean archaeology and beyond, often acting as force multipliers for Mike's brilliant ideas.

Moseley was elected to the National Academy of Sciences in 2000 and the American Academy of Arts and Sciences in 2013. He was recognized as a Huésped Ilustre (Illustrious Guest) by the city of Moquegua (Peru) and was awarded an honorary doctorate from José Carlos Mariátegui University in that city. He passed away on July 8, 2024, at his summer home in Moquegua, Peru.

Mike is survived by his loving wife of twenty-six years, Susan D. deFrance, daughters Sedna and Maya, three grandchildren, his dog Daisy, and his cats Wurm and Tira. We all miss him. He was a wonderful person and a marvelous mentor to us.

Note

We acknowledge and appreciate the information and photographs provided by Mike's wife, Susan deFrance. We also drew on *The Gainesville Sun* (July 17, 2024) article[8] and Regina Nuzzo's "Profile of Michael E. Moseley" that appeared in the *Proceedings of the National Academy of Sciences* on March 28, 2006.[9]

References

1 Nuzzo, R. 2006. Profile of Michael E. Moseley. *Proc. Natl. Acad. Sci. U.S.A.* 103(13):4805–4807.

2 Moseley, M. E. 1992. Maritime foundations and multilinear evolution: Retrospect and prospect. *Andean Past* 3:5–42.

3 Moseley, M. E. 1992.

4 Moseley, M. E., and G. R. Willey. 1973. Aspero, Peru: A reexamination of the site and its implications. *Am. Antiq.* 38(4):452–468.

5 Keefer, D. K., and M. E. Moseley. 2004. Southern Peru desert shattered by the great 2001 earthquake: Implications for paleoseismic and paleo-El Niño–Southern Oscillation records. *Proc. Natl. Acad. Sci. U.S.A.* 101(30):10878–10883.

6 Moseley, M., S. D. deFrance, and B. R. Vining. 2017. Droughts, floods, and farming at Quebrada Tacahuay from late prehispanic to colonial times. *Ñawpa Pacha* 37(3):25–37.

7 Ortloff, C., and M. E. Moseley. 2012. 2600-1800 BCE Caral: Environmental change at a late archaic period site on north central coast Peru. *Ñawpa Pacha* 32(2):189–206.

8 Dr. Michael Moseley Obituary, *Gainesville Sun,* July 17, 2024, https://www.gainesville.com/obituaries/psar0884630.

9 Nuzzo, R. 2006.

Selected Bibliography

1973 With G. R. Willey. Aspero, Peru: A reexamination of the site and its implications. *Am. Antiq.* 38(4):452–468.

1975 *The Maritime Foundations of Andean Civilizations*. Menlo Park, Calif.: Cummings Publishing.

1982 Co-edited with K. C. Day. *Chan Chan: Andean Desert City*. Albuquerque: University of New Mexico Press.

1983 The good old days *were* better: Agrarian collapse and tectonics. *Am. Anthropol*. 85(4):773–779.

1992 *The Incas and Their Ancestors: The Archaeology of Peru*. London: Thames and Hudson.

Maritime foundations and multilinear evolution: Retrospect and prospect. *Andean Past 3*:5–42.

2002 Modeling protracted drought, collateral natural disaster, and human responses in the Andes. In: *Catastrophe and Culture*, eds. S. Hoffman and A. Oliver-Smith, pp. 187–212. Santa Fe, N.M.: School of American Research.

2004 With David K. Keefer. Southern Peru desert shattered by the great 2001 earthquake: Implications for paleoseismic and paleo-El Niño–Southern Oscillation records. *Proc. Natl. Acad. Sci. U.S.A.* 101(30):10878–10883.

2005 With D. J. Nash et al. Burning down the brewery: Establishing and evacuating an ancient imperial colony at Cerro Baúl, Peru. *Proc. Natl. Acad. Sci. U.S.A.* 102(48):17264–17271.

2008 With C. B. Donnan and D. K. Keefer. Convergent catastrophe and the demise of Dos Cabezas. In: *The Art and Archaeology of the Moche: An Ancient Andean Society of the Peruvian North Coast*, eds. S. Bourget and K. L. Jones, pp. 81–91. Austin: University of Texas Press.

2009 With D. H. Sandweiss et al. Environmental change and economic development in coastal Peru between 5,800 and 3,600 years ago. *Proc. Natl. Acad. Sci. U.S.A.* 106(5):1359–1363.

2010 With C. Stanish et al. Tiwanaku trade patterns in southern Peru. *J. Anthropol. Archaeol.* 29:524–532.