

THE HOPI-SMITHSONIAN PROJECT: BRIDGING A GAP

Alfred Qoyawayma (pronounced ko-YA-way-ma) is an engineer from Scottsdale, Arizona and a Hopi potter in a culture where most potters are women. His aunt, Elizabeth White, encouraged him to learn this ancient craft. Qoyawayma is fascinated by the pottery of the long abandoned village of Sikyatki, the place of origin of his Coyote Clan, located near First Mesa in northern Arizona. These distinctive red and black on yellow polychromes, referred to as Sikyatki, were at their technological and artistic height during the 13th and 14th centuries and went into artistic decline following Spanish contact in 1540.

Hopi potters are reviving the curvilinear designs of ancient yellow ware polychrome pottery. The spiral and serpent motifs painted in reds and blacks are in contrast to the angular geometric designs of other Pueblo wares. Duplicating the technology of this ancient craft, however, remains problematic. The distinctive yellow hue of the fired clay, one of the finest achievements of American Indian ceramic art, has proven to be a major challenge. Was it an unusual clay source or a special technology that gives Sikyatki pots their unusual color?

The Smithsonian Hopi Ceramic Project

While attending a conference in San Diego, Qoyawayma approached archeologist Ron Bishop, a specialist in material analysis with the Smithsonian Institution's Conservation Analytical Laboratory (CAL). He wanted to explore with Bishop the possible sources of the yellow-firing clay by comparing samples from various clay beds around the Hopi mesas with samples from ancient pots. A colleague of Ron Bishop's, anthropologist Veletta Canouts, was recruited to analyze changes in stylistic design over time and among Pueblos. Together

with Suzanne De Atley, a California-based anthropologist who specializes in ceramic technology, and Qoyawayma, they established the Smithsonian Hopi Ceramic Project. Employing the latest technological methods in ceramic analysis, they are investigating the nature and transformation of yellow ware over time.

For more than 500 years, yellow ware was the principle manufactured Hopi ceramic, fired at the highest temperature of any pottery produced in the New World prior to European contact. The major questions these scientists are asking are: How did it slowly change in form, decoration, and firing technology over the centuries? How did it change following the Spanish arrival in the American Southwest, and why? Finally, what does the information contained in the ceramic changes tell us about the people and their history? To answer these questions, project leaders are studying firing techniques, tempering traditions, and painted designs with



the aid of sophisticated instruments. Their methods and techniques come from several fields--science, art, and history--resulting in an interdisciplinary approach.

The ceramic samples being tested include pottery (sherds and whole vessels) from seven Hopi mesa pueblos, which were inhabited in the 1300's. Collections from the Smithsonian Institution have formed the resource base for the project along with specimens from the Museum of Northern Arizona, Arizona State Museum, Maxwell Museum (NM), University of Colorado Museum, and the Peabody Museum, among others.

The Hopi inhabited the rocky mesas in northeastern Arizona, where abandoned pueblos still stand, as long ago as A.D. 600. The Smithsonian's Hopi Ceramic Project focuses on the period in Hopi history from 1300, following a severe drought between A.D. 1276-1299, to 1890, covering the period of social change after Spanish contact in 1540. Aside from Hopi oral tradition, little is known about Hopi social organization during this time. Drought conditions led to important social as well as environmental changes as populations fluctuated, causing social realignments that consequently influenced pottery production. Changes in sociopolitical units and exchange relationships are indicated in pottery style changes. For instance, the decline in quality of the yellow ware following Spanish contact is commonly thought to be attributed to the use of sheep dung rather than the hotter burning coal as a firing fuel. The reason for eliminating the use of coal is not clearly known, but according to Hopi legend, the Spanish disliked the smell of burning coal.

Identifying or finger printing the chemical composition of pot sherds and clay sources of the pottery reveals not only technological and temporal changes but also ancient trade routes and social organization. A pot intended for

trade may be painted in a design traditional to the distant recipient, but its chemical composition will reveal the source area where it was manufactured. Archaeological excavations provide yellow-firing pot sherds from ancient Hopi pueblos; Hopi oral traditions and historical accounts may help confirm the ancient networks suggested by the chemical analysis.

For the analysis, Bishop explains that "only the smallest sample possible is taken from the vessel, neither disrupting the viewing area or the structural integrity of the piece." Because the Hopi yellow ware is quite uniform compositionally, an area about a third the size of a dime is used. The analysis of coarser textured pottery would require a larger sample, supplied by sherds.

What put the yellow in Hopi pottery? "Lots of ideas surround it," says Canouts. "For example, was it the clay or the firing? Limited experimental work done in the 30's generated the idea that coal and the firing time played parts. But based on Bishop's and De Atley's work on the diversity of the clay, paste preparation, and firing technology, we are finding that the answer to the yellow color is not as simple as anyone believed. We are having to refine our questions."

"We may eventually be able to recreate the appearance of the pottery [at its height]," explained Bishop, "but we are doing it under very controlled conditions, which gives us an ability to do it in a short time rather than the trial and error experimentation that went on over generations."

In project interviews with Hopi potters, traditional technology was defined as "making it the way our ancestors did." "However, water for mixing the clay as is done today was too precious then, so preparation techniques had to differ as did firing

techniques," explained De Atley. For instance, "there had to be enough animals around for dung firing to be used regularly. One of the potters we talked to doesn't sit her pots around the fire to warm them; she puts them in a 400 degree oven before putting them around the fire. 'Traditional technology' changes in ways that relate to socio-economic conditions of the people who are making the pottery and for whom they are making it. Just as Canouts will contrast potting designs among groups or pueblos, I intend to see if firing techniques are practiced slightly differently from pueblo to pueblo and compare my information with hers. In this way we can see if exchange of information about making pottery includes both technology and design."

The Hopi Education and Video Outreach Program

To increase communication with members of the Hopi community who use and produce the pottery, project members established the Hopi Education and Video Outreach Program, funded by the Smithsonian Institution. The outreach program consists of three components: 1) a science course on methods in materials analysis taught at the Hopi Junior/Senior High School during spring semester by project members; 2) one-month internships for six Hopi high school students at the Smithsonian's Conservation Analytical Laboratory in Silver Hill, Maryland during the summer of 1988; and 3) the production of a video by Hopi filmmaker Victor Masayesva Jr. to convey the results of the scientific analyses and relate them to the oral traditions of Hopi ceramic history and art.

What prompted the students' interest in this program? Besides offering an opportunity to visit the Nation's Capital and to meet with Supreme Court Justice Sandra Day O'Connor and John Kyl (Republican, Arizona), a highlight for Paulette

Honyouti, the program gave the students a chance to be personally involved in a scientific investigation of an important aspect of their own culture. For some of the students, such as Miguelita Torivio, Kim Garcia, and Francine Honie from First Mesa, known for its famous potters, pottery production is a family tradition that has passed down from the older women to the younger ones. Today, when modern materials and lifestyles are often chosen over traditional ones, the course has given these students, and often their families as well, a new appreciation for a major art form and an interest in learning to pot like their grandmothers and aunts.

Although pottery is no longer produced at Second Mesa, now known for its baskets and kachinas, Charles Cleveland's interest was aroused when he heard that an internship at the Smithsonian would involve learning about new scientific techniques. With the other students, he conducted firing experiments with Hopi region clays and analyzed the results using the x-ray diffractometer and microprobe on the scanning electron microscope. These instruments allow one to see the mineralogical or structural properties of a ceramic. The students also visited the neutron activation analysis facilities at the National Bureau of Standards. Here chemical fingerprinting of clay is achieved by irradiating the material with neutrons generated in a nuclear reactor and counting the gamma rays given up by the radioactive isotopes that are formed, to determine the particular elements of the clay. Regardless of the array of high technology equipment available, visual interpretation with the naked eye remains a significant part of pottery analysis. From the large array of sherds and pots from the museum study collections, Anjanette Tenakhongva devoted much of her internship to a comparison of design styles and also looked at evidence of different firing techniques.

Bridging a Gap

What project scientists are discovering is a correspondence between the Hopi oral narratives and their own findings as reflected in their analysis of the ceramic materials. "Empirical evidence is coming forth to support the Hopi view of their migrations and socioeconomic relationships; Anglos will need to reconsider treating Hopi oral tradition as mere legend," says Bishop.

The Hopi Ceramic Project will have lasting effect both for the Hopi people and for southwest archeologists, bringing 20th century technology to bear on the analysis of traditional technology. In addition to the video, slides of all the vessels studied and data reports from the project will be deposited with the Hopi Cultural Center.

Perhaps more importantly, the project has brought a new approach to education. "By teaching science and history together and by using something [pottery] that is commonly understood and commonly available in the community, we were able to communicate [difficult scientific concepts] in a way that is usually not possible," remarked De Atley. "Hands-on learning is the only way."

The Hopi-Smithsonian project has demonstrated the bridges that can be built using this hands-on approach. The bridges between scientists and artists, Hopi students and their ancestors, and the Smithsonian and the Hopi Reservation, from where the ceramic collections came, that enable both the Hopi and Smithsonian scientists to take a fresh look at the past.

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