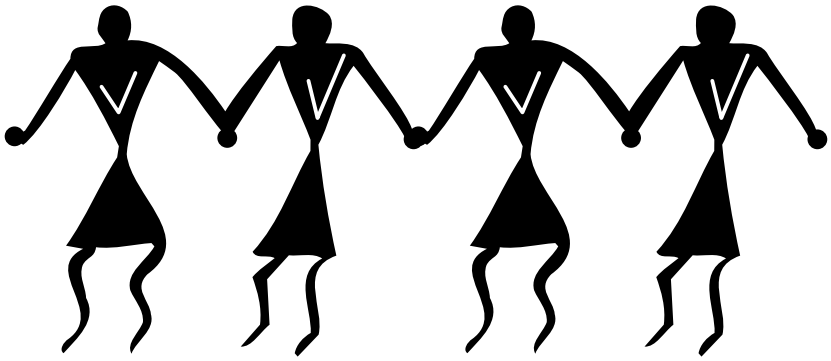
DOWNTOWN UNDER GROUND: ARCHAEOLOGICAL CLUES TO TUCSON'S PAST



THE RIO NUEVO PROJECT

Teacher Guide and
Elementary Classroom Activities

Kyle Lyn McKoy

Sponsored by the City of Tucson and
Desert Archaeology, Inc.
as part of the public outreach component
of the Rio Nuevo Project

DOWNTOWN UNDER GROUND:
ARCHAEOLOGICAL CLUES TO TUCSON'S PAST
THE RIO NUEVO PROJECT

Author Kyle Lyn McKoy
Project Manager Gwen Russell Harvey
Editors Nina Bell Allen, William Broughton, Bruce Dinges
Designer/Illustrator Kathleen A. Koopman
Maps Desert Archaeology, Inc., Kathleen A. Koopman

Consultants and Reviewers: James Ayres, Archaeologist; Allen Dart, Executive Director, Old Pueblo Archaeology; Beth DeWitt, Program Coordinator, Partnership Schools, Arizona State Museum; Dr. William Doelle, President, Desert Archaeology, Inc.; Barry Guerrero, Professor Emeritus, Hawaii Community College; Gwen Russell Harvey, Director of Education, Arizona Historical Society; Bruce Hilpert, Director of Public Programs, Arizona State Museum; Phyllis Lundquist, elementary school teacher (retired); Dr. Jonathan B. Mabry, Archaeologist, Desert Archaeology, Inc.; Marty McCune, Historic Program Administrator, Citizen and Neighborhood Services, City of Tucson; Irma J. Moreno, elementary school teacher (retired); J.Homer Thiel, Historical Archaeologist, Desert Archaeology, Inc.

Author: Kyle Lyn McKoy, BA Anthropology, University of Arizona, is a Curatorial Assistant in the Education Department at the Arizona Historical Society. She develops and teaches children and youth programs.

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Inset photo: Sara Plescia of Desert Archaeology, Inc.

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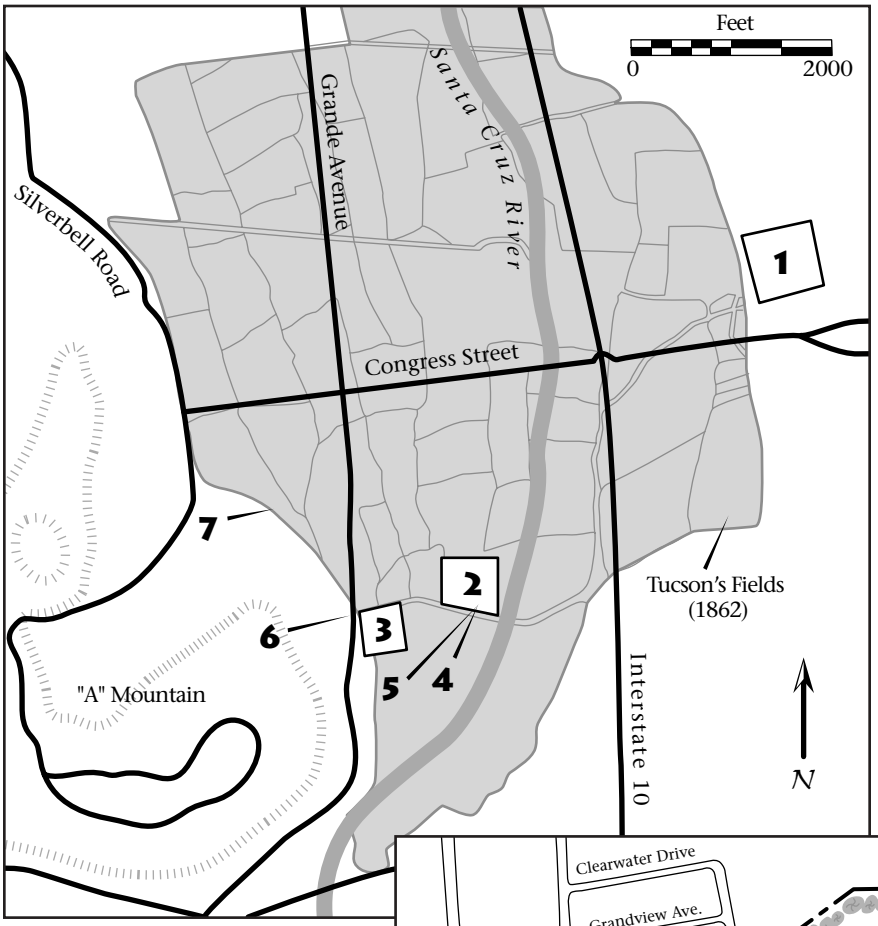
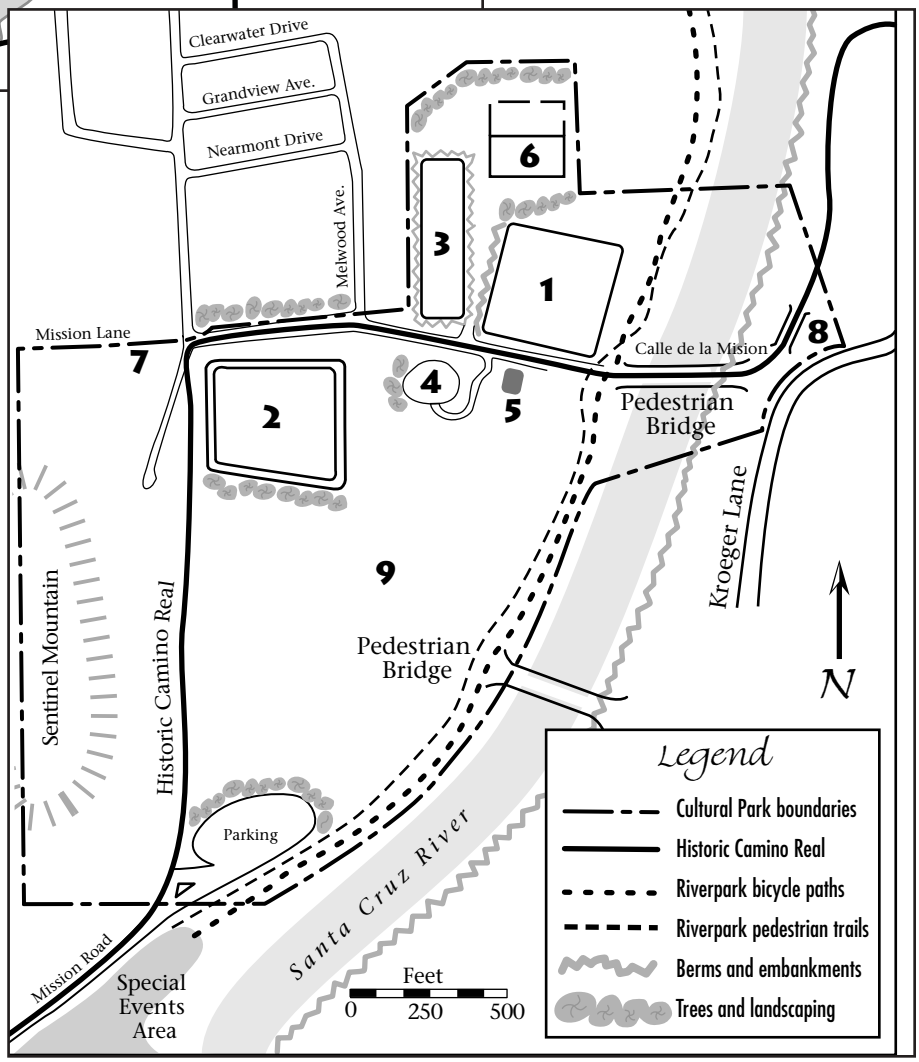


Rio Nuevo Excavation Areas

Location map:

1. Tucson Presidio
2. San Agustín Mission
3. Mission Gardens
4. Carrillo House
5. Well with Chinese Trash
6. Warner's Mill
7. Chinese gardener's household



Rio Nuevo Experience Areas as of 2001

1. Convento Complex
2. Mission Gardens
3. Prehistoric dwellings
4. Pima Village
5. Carrillo House
6. Cultural Center
7. Warner's Mill
8. Historic Footbridge replica
9. Open space, historic native vegetation

AN INTRODUCTION TO RIO NUEVO

In November, 1999, Tucson voters approved Proposition 400 which instructed the City of Tucson to create a new cultural district, called the Rio Nuevo District, in downtown Tucson. Rio Nuevo ("new river" in Spanish) is a 62-acre area that extends from "A" Mountain, west of the Santa Cruz River, and continues east down Broadway about six miles. The Rio Nuevo District will include shops, hotels, restaurants, theaters, museums, and other cultural attractions.

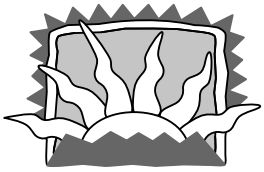
Although plans are not yet finalized at this printing, the project is presently conceived in three "experience areas." The historic/cultural park experience is slated for the west side of the Santa Cruz River and Interstate 10. This park-like setting may include the reconstructed San Agustín Mission complex, along with interpretation of early agricultural and Hohokam canals and habitation sites. A regional visitor's center, and historical and cultural museums, have been planned around a new plaza.

An urban/cultural experience is planned for the east side of I-10. Organized around a central plaza conceived to be Tucson's new "town square," it may include the Sonoran Sea Aquarium, a new science center and planetarium, a convention hotel, parking facilities, and the renovated Tucson Civic and Convention Center.

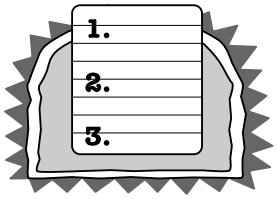
Upgraded and new buildings along Congress and Pennington streets, in the heart of the traditional downtown area, will transform the retail district into an expanded and improved arts and entertainment experience. The renovated historic Fox and Rialto theaters may serve as anchor attractions.

The goal of the Rio Nuevo project is to recapture and celebrate Tucson's history. One way to capture historical evidence is through the science of archaeology. The city has hired Desert Archaeology, Inc., to excavate the construction sites before the evidence is destroyed.

The excavations have uncovered evidence of 4,000 years of human occupation along the banks of the Santa Cruz River at the foot of "A" Mountain. American Indians, Spaniards, Mexicans, Chinese, European Americans, have all left their marks in the earth. Once the excavations are completed, the information will be used to interpret Tucson's past for visitors. The old river will begin a new life.



GETTING STARTED



LESSON SETUP

TEACHER'S CORNER

HOW TO USE THIS MANUAL

This manual was created by the Arizona Historical Society's Education Department for Desert Archaeology, Inc., and the City of Tucson, to inform the public and educate students in the classroom about archaeology and Tucson history as revealed by the excavations of the Rio Nuevo Project.

The first part of the manual consists of an *Introduction to the Rio Nuevo Project; 12,000 Years of Tucson's History;* and *Turning Points in Tucson's History: A Timeline.*

Section 1 provides basic concepts of the principles of archaeology. It includes a *Vocabulary List, Talking Trash: The Science of Archaeology,* and six lesson plans that build upon archaeological principles. By the end of these lessons, students will be able to define archaeology and key terms, demonstrate archaeological skills, and describe the work of archaeologists.

Section 2 aids students in understanding the history of their community by applying archaeological concepts to the City of Tucson's Rio Nuevo Project. This section includes six lesson plans or activities corresponding to periods in Tucson history. The lessons bring together archaeological principles and the Rio Nuevo Project.

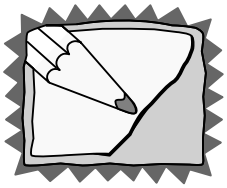
The lesson plans are divided into sections: *Objective, Key Words, Materials, Time, Teacher's Corner, Lesson Setup, Lesson Outline,* and *Pass It On!* They are uniform throughout the manual. Teachers may use the entire manual in the established order, or select individual lessons that fit into their prepared curriculum. The *Teacher's Corner* provides background information helpful in preparing the lesson. *The Pass It On!* section contains black line masters that teachers may copy for student handouts, or for transparencies for classroom presentation.

The final part of the manual, *State DOE Standards* and *Additional Resources,* features a list of field trip destinations, speakers, and other resources to help illustrate the concepts included in the lesson plans.

Most of the activities have been field tested in classrooms and work with upper elementary classes. Much of it should work with middle school as well. The educators at the Arizona Historical Society hope this manual provides an exciting and thought stimulating resource about archaeology and Tucson's heritage.

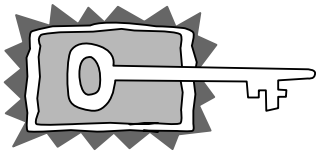
We encourage feedback on how this works in your classroom.

—Kyle McKoy

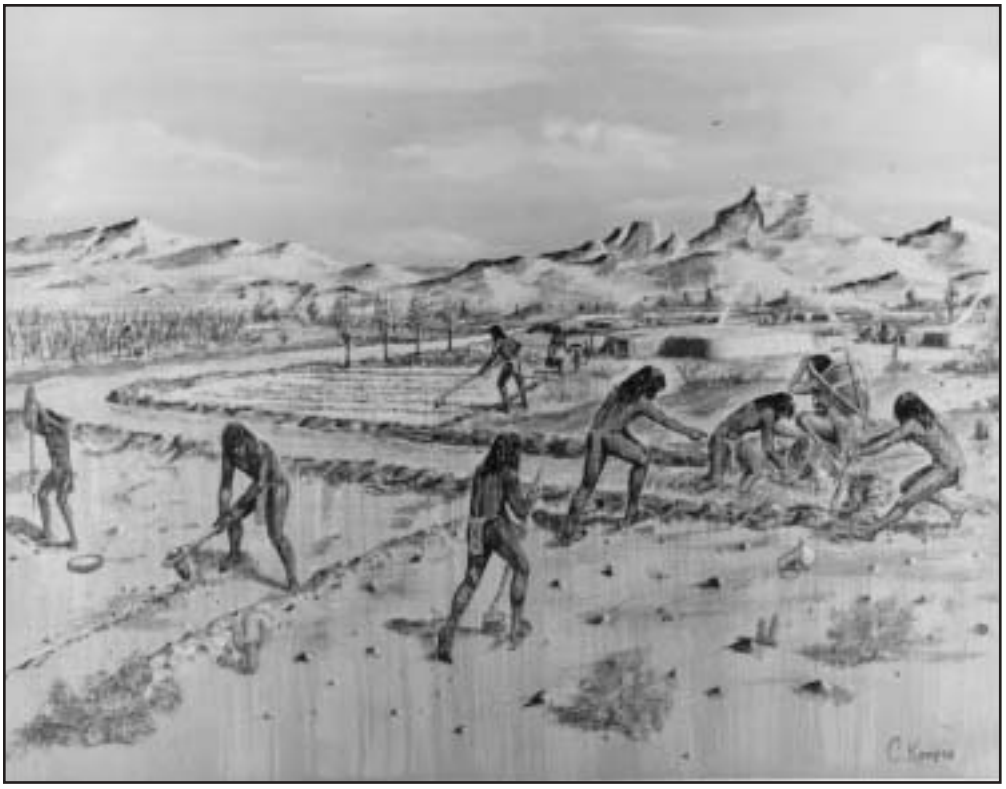


LESSON OUTLINE

PASS IT ON!



ANSWER KEY



Hohokam farmers digging irrigation canals. Painting by Charles O. Kemper. Courtesy Salt River Project Heritage.

12,000 YEARS OF TUCSON HISTORY

Archaeologists continue to debate the timing and the route of initial human habitation of the Americas. The possibilities include migrations by land and by sea between 30,000 and 14,000 years ago. Most archaeologists, however, agree that by 14,000 years ago, humans had arrived on the North American continent. These people successfully adapted to new and changing environments and spread throughout North and South America.

For thousands of years, the Santa Cruz River created a desert oasis that attracted many people. The Rio Nuevo excavations have uncovered different periods of occupation that include early farmers, Hohokam, O'odham, Spaniards, Mexicans, Chinese farmers, and Anglos.

The Prehistoric Period in the Tucson Basin began approximately 10,000 B.C., when Paleo-Indian hunters roamed the area hunting mammoths and other large mammals. As the climate warmed, these big game animals disappeared and people adapted to a way of life focused on hunting smaller animals and gathering seeds, nuts, and the fruits of wild plants. Excavations in the southern part of the Rio Nuevo property indicate that the earliest occupation of the area occurred about 2,000 B.C., when hunter-gatherers began supplementing their diet by planting maize. Farmers living in early villages along the Santa Cruz made the first irrigation canals around 1,200 B.C. They grew squash, beans, maize, and possibly cotton.

The later cultures in the prehistoric American Southwest are called the Anasazi (ah nah SAH zee, also known as Ancestral Puebloan), the Hohokam (HOE hoe kahm), and the Mogollon (MUH gee own). These groups developed sophisticated societies. They built extensive trade networks, lived in large villages, and developed public works systems such as irrigation canals and roads.

By A.D. 600, Hohokam villages flourished along the Santa Cruz River. Archaeologists have been unable to determine whether the Hohokam people were descendants of the earlier populations, or a new people who moved to the area. Centuries of plowing and other activities have destroyed much of these early archaeological remains. Archaeologists know from previous excavations in the region, however, that at the height of the Hohokam culture in southern Arizona, agriculture was a sophisticated and elaborate operation. Excavations at the Rio Nuevo sites support these previous discoveries, as they have revealed a series of Hohokam canals that run from north to south across the excavated property.

Despite the apparently successful adaptation to their desert surroundings, the Hohokam suffered a population decline between A.D. 1400 and 1500, which eventually led to the collapse of their culture. There are many theories about what caused the decline. One theory suggests that a combination of events including floods that ruined irrigation canals, warfare, and disease all contributed to the collapse. A different theory claims that the Hohokam abandoned ancestral lands and simply migrated to new areas. Another theory argues that the Hohokam people are ancestors of the Tohono O'odham (TOE hoe no AH ah tom) and never left the area at all. Little is known about life along the Santa Cruz between the disappearance of the Hohokam, around 1450, and the arrival of the Spaniards, around 1690. Archaeologists have become detectives as they try to piece together the story.

The transition from the Prehistoric to the Historic Period occurs when written language is introduced to an area. In the case of the American Southwest, this change happened with Spanish contact. The Historic Period in the American Southwest began with a shipwreck in the Gulf of Mexico in 1528. Alvar Nuñez Cabeza de Vaca survived the shipwreck and, along with three other survivors, wandered through Texas and northern New Spain (the Spaniards' name for Mexico) before finding his way to Mexico City. One of Cabeza de Vaca's companions was a black slave named Estevan de Dorantes. In 1539, Estevan left Mexico City and returned north with a Franciscan friar named Marcos de Niza to search for the legendary Seven Cities of Cíbola. When Zuni warriors killed Estevan, Fray Marcos returned to Mexico City. He boasted that he had reached the Seven Cities of Cíbola and spoke of the riches he had found there. This aroused the interest of the viceroy, Antonio de Mendoza. Mendoza selected Francisco Vasquez de Coronado to lead an expedition north to claim the riches for the Spanish Crown. The entry of Estevan and Fray Marcos into Zuni territory marks the beginning of Spanish history in Arizona.

Scholars still argue about Coronado's exact route, but it is almost certain that he did not enter the Tucson Basin. Therefore, the Historic Period in the Tucson Basin does not begin until the

arrival of the missionary Father Eusebio Francisco Kino in 1691. The arrival of Kino also marks the beginning of the Spanish Period.

The Spanish Period began as Kino, the first European to visit the Santa Cruz Valley, found villages of O'odham Indians at Bac and at Chuk-son, later to be called Tucson. In 1700, Kino established the foundations for the first mission church at San Xavier del Bac. Kino died in 1711, without ever having seen the church completed.

Another mission, San Agustín del Tucsón, was constructed in the 1770s at the base of Sentinel Peak, or "A" Mountain. The San Agustín Mission complex eventually included a convento, or living quarters; a chapel; and a granary, although they were only used for a short period. Ultimately, most of the mission was destroyed.

Archaeologists began excavations at the mission site in November, 2000. They uncovered what they believe to be the rock foundation of the wall that surrounded the mission complex. They also exposed the outline of the granary building. Artifacts such as cattle bones, potsherds, and arrow points, provide information about the diet and lifestyle of the mission residents.

In the early 1770s, the Spanish Crown decided to realign the chain of presidios, or forts, to better protect the expanding frontier against hostile Indian groups. Officials decided to relocate the Tubac presidio to Tucson. The Spanish Crown sent Lieutenant Colonel Hugo O'Conor, an Irishman, to claim the location on the east bank of the Santa Cruz River. The area had a plentiful water supply, irrigated fields, an abundance of trees that could be used for building purposes, and a full view of the valley for better defense. Also it was located near the O'odham labor force at the San Agustín Mission. The mission and presidio were settled across from each other on opposite banks of the river, separated by fertile farm fields and irrigation canals.

Computer model of San Agustín Mission Complex developed by Doug Gann, Center For Desert Archaeology, featuring the Convento and chapel in the foreground and the granary behind the chapel.

Family life in a presidio.
Cal Peters. AHS #64456

From the beginning of the 1770s, presidio soldiers and other Spanish colonists occupied lands that once belonged to the Tohono O'odham. Spanish frontier life was difficult, but the Spanish community grew and prospered. Presidio soldiers provided protection for Spanish colonists. They also guarded the peaceful natives and Spanish settlers who farmed the fields outside the presidio walls.

The community around the presidio continued to grow as soldiers and their families moved into the fort. Another form of settlement sprang up outside the presidio walls. In an effort to stop raiding, Spaniards offered Apaches food and other goods to induce them to settle in the area. According to historical records, these measures succeeded for a while. The Apaches who remained in the area became known as the peaceful Apaches, or Apaches de Paz. They helped fight off hostile Indians on several occasions. Archaeological investigations at Rio Nuevo have not uncovered signs of this Apache settlement. This is an important lesson about archaeological interpretation: do not confuse absence of evidence with evidence of absence.

The Mexican Period of Tucson's history begins in 1821, when the Spanish colonists won independence from Spain. The ten year war had drained the Mexican coffers, which left little government support for the inhabitants of the Tucson area. It was difficult to get supplies into the isolated presidio. Soldiers were not always paid and there were constant conflicts with various Apache groups.

In the midst of this turmoil, in 1829, the Mexican government expelled Spanish-born soldiers and missionaries from the country. Without proper staffing, the Tucson buildings began to fall into disrepair and much archaeological information about the mission complex was lost due to erosion and vandals.

In the mid-1800s, Mexican residents became alarmed by the arrival of another group: American explorers. Fur trappers, traders, ranchers, prospectors, and farmers all came to southern Arizona seeking opportunity and wealth. The United States, with its expansionist vision of manifest destiny, engaged in a war with Mexico over the southwest territory in 1846. The United States viewed the area as a much needed travel corridor and was looking for a railroad route to connect the east with the west. The war ended in 1848 with the Treaty of Guadalupe Hidalgo, which transferred ownership of a substantial portion of what is now the American West from Mexico to the United States. Tucson remained under the jurisdiction of Mexico. Then, in 1853, James Gadsden, a railroad promoter, concluded a deal with Antonio López de Santa Anna, president of Mexico, for the purchase of an additional 29,000 square miles of Mexican land for ten million dollars. The U.S. Congress ratified the purchase in 1854, although American soldiers did not arrive in Tucson until 1856. The Gadsden Purchase ended Mexican rule in southern Arizona as Tucson and its surrounding communities became part of the United States.

The Gadsden Purchase brought Arizona under the control of the United States, not as a state, but as a territory. Arizona's Territorial Period spanned the time from the Gadsden Purchase until statehood was finally granted in 1912.

Territorial status was a trying time for Tucsonans. Politicians in Washington largely ignored the Arizona Territory. Residents could not vote in presidential elections. The legislature could only pass laws subject to review in Washington. Most officials were appointed by people in Washington who had never visited the territory, and knew little of the needs of territorial residents. The U.S. Congress controlled all finances. Lawlessness and Apache wars threatened the safety of the population. Tucson's infrastructure was almost nonexistent as roads and public works were poor at best. Yet, droves of people moved west in search of gold, land, adventure, and opportunity. European and Mexican immigrants; Chinese railroad workers and miners; blacks fleeing the South and the remnants of slavery; Jewish families; Mormons; single women; military men; and many others sought their futures and their fortunes in Arizona.

In the 1870s, the United States began construction on a southern railroad connecting the east and the west. The railroad company hired Chinese immigrants who worked for low wages. As the Chinese immigrant population increased, more Chinese businesses opened such as bakeries, laundries, and grocery stores. The Southern Pacific Railroad reached Tucson from the west in 1880. Some of the Chinese railroad workers chose not to follow the railroad work, but remained behind to take advantage of a new business opportunity: growing fresh produce for the Tucson community.

By the 1880s, Chinese farmers were regularly providing Tucson restaurants and homes with fresh lettuce, watermelons, and strawberries. These crops required much water and put the Chinese in direct competition with Mexican farmers. A court case eventually settled the issue. The Mexican farmers lost

their water rights, just as the O'odham had lost their water rights to the Spanish, thereby ending a communal tradition that dated back to Spanish presidio days. Profitable farming along the Santa Cruz River ended for everyone around 1930, when the water table dropped due to extensive pumping of ground water. Many of the Chinese farmers became grocers, opening stores around the Tucson area.

Excavation of one Rio Nuevo site uncovered a deep well filled with objects discarded by Chinese farmers between 1880 and 1890. Soup spoons, soy sauce jugs, rice bowls, and food remnants indicate a strong desire by Chinese farmers to maintain their heritage in territorial Tucson.

Politics and current events played major roles in delaying the Arizona Statehood Period. Arizona's fight for statehood, which began shortly after territorial status was granted in 1863, was one of the longest in American history. Finally, in 1910, Congress passed the Enabling Act, which allowed Arizonans to write a constitution that Congress would either approve or disapprove. President William Taft signed the bill on February 14, 1912, making Arizona the 48th state.

Tucson has seen many changes since statehood. The World War II defense industry and training facilities brought jobs and thousands of people to Tucson in the 1940s. Over the years, the temperate climate attracted many more newcomers to Tucson as a prime destination for health, tourism, and retirement. The growth of the University of Arizona and Davis Monthan Air Force Base also contributed to the population increase.

Population growth triggered a building boom as more housing was needed for workers and more buildings were needed to house the new industries. In the 1940s, the Tucson Pressed Brick Factory mined clay in the mission area to satisfy the need for raw building materials. Several University of Arizona archaeology projects attempted to salvage information from the site before the brick company destroyed all the evidence of the past. As the company mined the clay and the sand, it also removed evidence of the earliest farming culture, Hohokam canals, the mission, and other historic remains.

The final insult to the mission complex site came in the mid 1950s, when the City of Tucson destroyed the remains of the convento and the chapel by replacing them with a landfill.

Today, Tucson is a thriving multicultural city, known affectionately as the Old Pueblo. Tucson's present is a direct reflection of its past. The City of Tucson's Rio Nuevo Project traces the story of 12,000 years of Tucson history. It captures the unique flavor of the city by exploring the past, building on the present, and preserving for the future.

TURNING POINTS IN TUCSON'S PAST: A TIMELINE

DESERT ARCHAEOLOGY, INC.

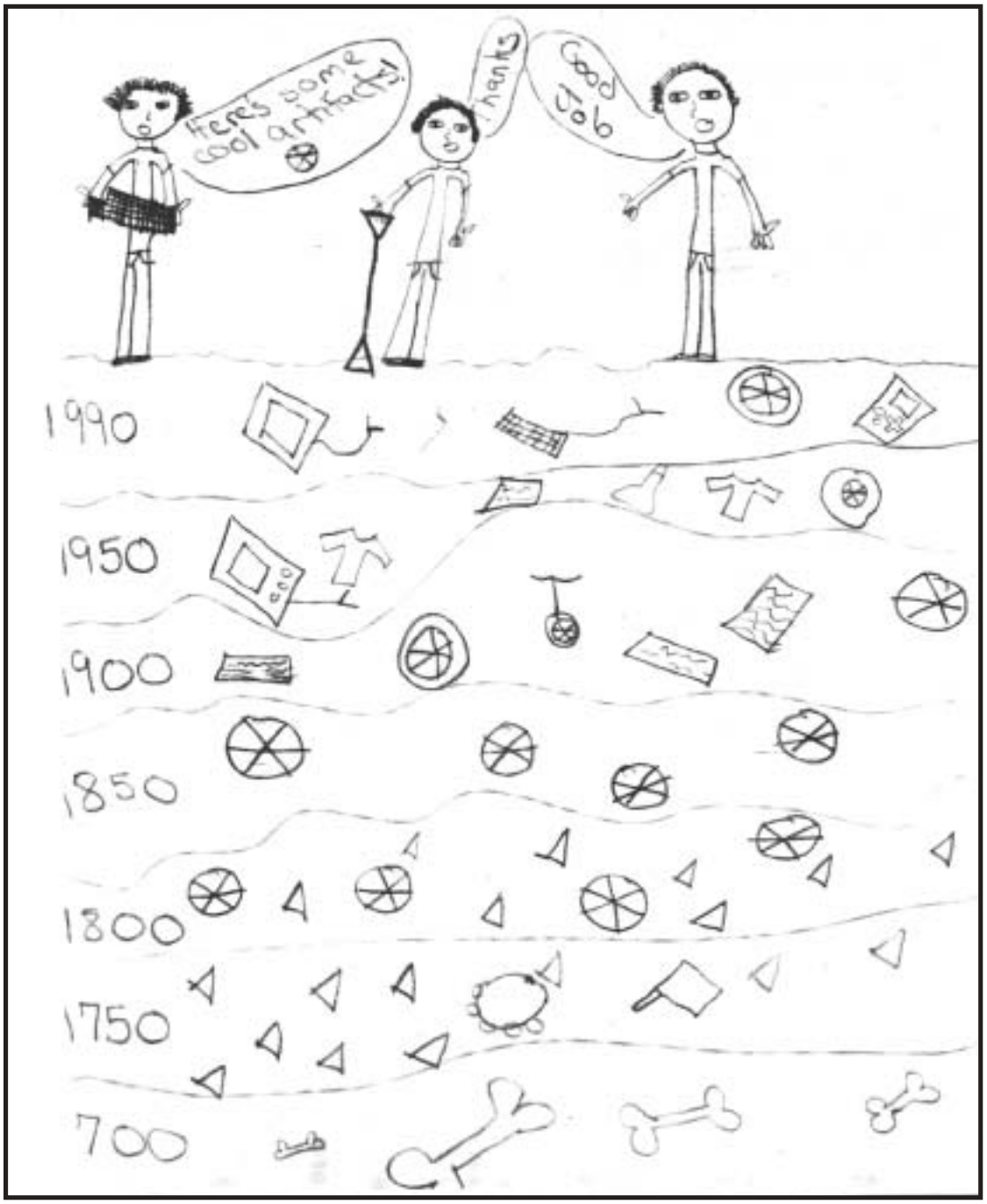
UPDATED 9-13-01

MODERN	A.D. 1999	**Rio Nuevo Cultural District created.** People have been living in the Tucson Basin for the past 12,000 years. By creating the Rio Nuevo District, Tucson has chosen to embrace the past as part of our shared cultural heritage.
	1968	**Urban Renewal began.** The Pueblo Center Redevelopment Project replaced approximately 80 acres of Tucson's oldest surviving neighborhood with the Convention Center, a shopping center, and a four-square-block government complex.
	1950	During the 1950s Tucson began using the base of "A" mountain as a landfill.
	1923	Between 1896 and 1935 bricks from the Tucson Pressed Brick Company, located at the base of "A" Mountain, were used to build many familiar buildings around Tucson, including San Agustín Cathedral, the Rialto Theater, and buildings on the University of Arizona campus.
STATE-HOOD	A.D. 1912	**Arizona Statehood.** By 1912, life in Tucson changed dramatically. Over the course of a few years, the river rapidly cut down over 10 feet as far south as the Mission of San Xavier.
TERRITORIAL	A.D. 1880	The arrival of the Southern Pacific Railroad allowed for rapid settlement of the Tucson basin. "Progress" arrived quickly with the telephone, electricity, and the central water system. In the mid-1880s, the Santa Cruz River became entrenched after an ill-fated irrigation scheme failed. Irrigation canals were no longer able to draw water from the river, and many farmers were no longer able to grow crops. Tucson now relied upon wells to draw water from an underground aquifer.
	A.D. 1862	**A Brief Confederacy 1861–1862.** In 1861, the citizens of Tucson voted to join the Confederate States of America. The occupying Union troops, led by Major David Fergusson, drafted the first two maps of Tucson. One map reveals that by 1862, the Tucson Presidio had been mostly dismantled.
MEXICAN	A.D. 1854	**Gadsden Purchase.** The 1854 purchase of the territory that is now Arizona and New Mexico brought Tucson and its surroundings into the American territorial system. Life began to change as Americans from the eastern United States moved to Tucson. Many people opened mercantile businesses, others developed ranches and mines.

SPANISH	A.D. 1821	**Mexican Revolution.** As Mexico gained independence from Spain, times were difficult in Tucson. Conflicts with various Apache groups took a great toll on the village. In response to the conflicts of the mid-19th century, the Tucson Presidio was expanded to better protect the community.
	A.D. 1800	Construction of the San Agustín Mission convento began. It was used as an administrative building, dormitory, and school for the San Agustín Mission.
	A.D. 1775	On August 21, 1775, Hugo O'Conor founded the Tucson Presidio, selecting this site for its location next to irrigated land and its extensive view of the valley.
	A.D. 1770	Although Tucson celebrates its birthday on the day that the Tucson Presidio was founded, the San Agustín Mission and the adjacent O'odham village were already in place. The mission was founded in the early 1770s at the foot of Sentinel Peak ("A" mountain) and would be part of the Tucson community for the next 75 years.
	A.D. 1700	Father Kino founded the Mission of San Xavier at the O'odham village of Bac, on the Santa Cruz River. This first church was never completed. Father Espinosa built the second church in 1755. In 1797, the third church, which still stands today, was completed.
PROTO-HISTORIC	A.D. 1691	Historic period began as Father Kino, the first European to visit the Santa Cruz Valley, found villages of Piman-speakers at Bac and (the next year) at Chuk-son—where the San Xavier and San Agustín missions were later established.
	A.D. 1600	Apache peoples arrived in southern Arizona from the north, and began raiding O'odham villages.
HOHOKAM CLASSIC	A.D. 1400	The Hohokam culture of southern Arizona collapsed after a population decline related to a series of disastrous floods in the Phoenix Basin that may have destroyed most canal systems.
	A.D. 1275	Population aggregated, possibly in response to warfare, into a few large villages. Platform mounds were built as public ceremonial structures within large walled compounds containing most of the houses.
HOHOKAM PRECLASSIC	A.D. 1150	In the Tucson Basin, many Hohokam villages were abandoned and new ones established. Compounds and rectangular aboveground architecture appeared.
	A.D. 1050	Ballcourts were no longer built in the Tucson Basin and most other Hohokam areas.
	A.D. 1000	Villages spread out along expanded canal systems.

HOHOKAM PRECLASSIC	A.D. 800	The first ballcourts were built in the Tucson Basin and elsewhere in the southern Southwest. Villages focused on large, central plazas grew in population. Hohokam styles and iconography from the middle Gila Valley were adopted.
	A.D. 500	Styles of architecture, artifacts, and burial practices of the Hohokam culture, centered in the Phoenix Basin, appeared in the Tucson Basin. Plazas became a feature of villages.
EARLY CERAMIC	A.D. 400	Pithouses shifted from round to rectangular, and large villages developed along the Santa Cruz River. Village locations moved to terraces above the floodplain. Canal systems were expanded.
	A.D. 100	New types of architecture, pottery, and burial practices suddenly appeared in the Tucson Basin, perhaps representing the arrival of a new cultural group.
EARLY AGRICULTURE	800 B.C.	The first ceremonial buildings in the Southwest were constructed in villages along the Santa Cruz River. Earlier than in other areas of the Southwest, the bow-and-arrow began to be used in southern Arizona alongside the older spear thrower and-dart.
	1,200 B.C.	Farmers living in early villages along the Santa Cruz made the first true irrigation canals in North America. They grew beans and possibly cotton in addition to maize, and developed trade connections with distant parts of the Southwest, California, and northern Mexico to acquire volcanic glass (obsidian) for making dart points and seashells for making jewelry.
	2,200 B.C.	Maize (corn) arrived in southern Arizona from Mexico. To supplement wild foods, hunter-gatherers in the Tucson Basin planted maize to grow some of their food for the first time. They built pithouses and storage pits in summer camps near their fields along the Santa Cruz River. They made the first ceramic figures and pottery in the Southwest.
ARCHAIC	3,000 B.C.	Groups of hunter-gatherers camped on the banks of the Santa Cruz River during their movements around the Tucson Basin.
	3,500 B.C.	The climate of the Southwest became cooler and wetter. Hunter gatherers began to spread throughout the Southwest.
	6,500 B.C.	A long period of hotter, drier climate began. Population began to decline in the Tucson Basin and much of the Southwest.
	9,000 B.C.	As the climate warmed at the beginning of a new global climatic era and the large Ice Age mammals disappeared, a hunting and gathering adaptation developed. The Archaic focus was on smaller animals, seeds, nuts, and fruits of wild plants, and seed-grinding tools were first used.
PALEO-INDIAN	10,000 B.C.	Paleo-Indian hunters crossed the Tucson Basin in search of mammoths and other now-extinct large mammals at the end of the Ice Age.

SECTION 1



Artwork by Hannah Willet, age 10.

PRINCIPLES OF ARCHAEOLOGY

TALKING TRASH:

THE SCIENCE OF ARCHAEOLOGY AND THE RIO NUEVO PROJECT

Cultures in the American Southwest, such as the Anasazi, Mogollon, and Hohokam, developed complex societies, but they did not develop a written language. Without written records to study, researchers must rely on the study of the objects that people left behind. These are the clues that archaeologists use to reconstruct human behavior. Archaeologists operate in a world of other people's discarded objects—their trash.

What is archaeology and how does the science work? Archaeology is a great opportunity to teach and practice the scientific method. Archaeology involves posing questions, making hypotheses, researching, conducting experiments, clarifying data, organizing data, reaching conclusions, and creating final reports. Archaeology is a subdivision of the broader subject of Anthropology, or the study of humans. The four areas of study within Anthropology are:

a. **cultural** the study of human societies often involving the comparison of one cultural system with another in an attempt to understand human nature.

b. **physical** (sometimes called "biological") the study of the human physical form and how forms change over time.

c. **linguistic** the study of humans, through the use of language, to discover the role language plays in the creation, transmission, and interpretation of daily life and culture.

d. **archaeology** the study of human cultures using artifacts people left behind.

Archaeology can be divided further into **prehistoric** and **historical** archaeology. Prehistoric archaeologists try to assemble, through the objects people have left behind, the story of ancient cultures that have left no written record. With the aid of written historical records and oral histories, historical archaeologists try to assemble the story of past cultures through the interpretation of the material objects they left behind.

A place that people inhabited or used in some manner is called a **site.** When a site is discovered, archaeologists conduct a **survey** to describe its physical appearance and location. A testing phase may take place to determine whether a site has deeply buried features. Archaeologists then develop a **research design**, or plan of action, to decide how to go about excavating the site. After defining questions they hope to answer, archaeologists begin the **excavation** by marking the site in **grids**, so they can map their finds. They select certain areas to dig. They sift dirt through screens to find small items and save **artifacts**, or items made or used by people, for further study. They also map walls, fireplaces, and other structures they find. The artifacts are separated into like groupings, called **assemblages**, which are studied by field and laboratory analysts.

Archaeologists rely on experts from other fields of study to help them interpret what they find. **Dendrochronology**, or tree-ring dating, is a technique developed by an astronomer at the University of Arizona. Physicists developed **radiocarbon** and **archaeomagnetic** dating techniques that date artifacts by measuring radioactivity and orientation of magnetic fields. Geologists developed the principles of **stratigraphy**, or layering of sediments, that help date objects in relation to one another. Botanists and zoologists may help analyze plant and animal remains.

Other information helps archaeologists reconstruct past cultures. They can compare the site with others that have already been excavated in the region. If historical documents exist, archaeologists consult them. They can study groups of living people to search for similarities with past cultures. This approach is called **ethnographic analogy.**

The last step for archaeologists is to publish their findings in a **final report.** This is essential so others can build on the research.

Several options are available to archaeologists and the public once a site has been excavated and its information recorded. What is left of the site may be destroyed to make way for a construction project. It can be turned into an interpretative site for the public. Parts of a site that have not been excavated may be preserved for future exploration. In the case of the City of Tucson's Rio Nuevo project, a combination of all the options will probably be used.

The Rio Nuevo archaeological excavations will provide a treasure chest of information and insight into Tucson's past. As archaeologists sift through the trash of the past, they will uncover the necessary information to piece together the story of Tucson. The Rio Nuevo project proves that Tucson's trash of the past may be its treasure for the future.

VOCABULARY

agriculture cultivating crops on a large scale.

Anasazi (a Navajo word for "ancient enemies") a culture that lived on the plateaus of the four corners area (northern New Mexico, northern Arizona, southern Utah, and southwestern Colorado) from about A.D. 200–1450.

anthropology the study of humans and human behavior. Can be divided into four subdivisions of study:

a. **cultural** the study of human societies often involving the comparison of one cultural system with another in an attempt to understand human nature;

b. **physical** the study of the human physical form, including the study of those changes over time;

c. **linguistic** the study of human language to discover what role language plays in the creation, transmission, and interpretation of daily life and culture;

d. **archaeology** the study of human culture using artifacts people left behind.

Archaic an early culture that lived in the Americas. In the southern Arizona area, it lasted from approximately 8,000 B.C. to about A.D. 200. The Archaic culture adapted to the changing climate by hunting small game and gathering plants from the land.

archaeologist one who studies human cultures by analyzing material objects cultures left behind.

archaeomagnetic dating archaeological dating technique based on the fact that the exact location of magnetic north changes over time. When clay from a hearth is heated to a high-enough temperature, the iron molecules realign to magnetic north. Thus, it is possible to determine an approximate date for when a structure such as a clay hearth was last heated.

artifact an object made or used by humans.

assemblage a grouping of like artifacts, or a group of artifacts found in the same location.

ceramic pertaining to anything made of clay that was fired to hardness.

coiling a weaving and pottery technique that involves making individual coils of material and placing them one on top of the last, constructing a finished product.

context interpretation of artifacts determined by the relationship in which they were found.

convento a religious administration building and/or dormitory.

crustacean an animal that has a shell for protection. Example: lobster, shrimp, crab, barnacle.

data interpretation to decipher information gathered.

dendrochronology archaeological dating technique developed by A.E. Douglass, a University of Arizona astronomer, most often used to compare tree growth rings to determine the age of wood roof beams.

early farmers a culture that lived in the Tucson basin area between 2,000 and 4,000 years ago.

ethnographic analogy using similar traits of living groups of people to interpret cultures of the past.

event an occurrence or happening.

excavate to dig up the soil in a scientific manner.

feature structure; could be either man-made or naturally occurring.

final report after an excavation takes place, all the information is gathered by the archaeologists and written into a final report that is released for peer review prior to being published.

forage to gather food from land.

granary a building used to store surplus grains.

grid a checkerboard-like network of uniform horizontal and vertical lines that provides guidelines for archaeological excavations.

hearth fireplace.

history recorded past events.

Hohokam (means "all gone" or "all used up" in the O'odham language) the culture that occupied the desert of south-central Arizona from about A.D. 300–1450.

huerta a private Mexican-owned garden in Tucson in the 1800s, 25–30 feet square in size.

hunter-gatherer culture people who hunt small game animals and gather plants from the land to satisfy their diet.

irrigate to divert water from a river, stream, or lake to farmland usually using ditches and canals.

laboratory analysis to decipher information in a scientific laboratory usually involving tests.

Law of Original Horizontality a geologic concept that states that soils are deposited first horizontally.

Law of Superposition a geologic concept that states that layers of soil deposited first are below those deposited at a later date. The layers that are the oldest are beneath those that are younger.

lithic referring to stone.

maize corn.

mano a hand-held rock used to grind grains, used in conjunction with a metate.

metate a rock used as a base to hold grains for grinding, used in conjunction with a mano.

mission a community established by and focused on the Catholic Church. Set up by Spaniards to colonize New Spain, the mission's purpose was to convert North American natives to Christianity and turn them into tax-paying Spanish citizens.

Mogollon refers to the culture found in the Mogollon Mountains. The Mogollon Culture existed approximately A.D. 200–1200.

ostracod water-dwelling crustacean.

paddle and anvil method a pottery technique used by Hohokam and O'odham people. First, coils of clay are stacked on top of one another. Once the basic shape is decided, the potter places his/her hand inside the pot while holding a smoothing rock (the anvil). The other hand gently pats the pot with a paddle to smooth out the coils.

Paleo-Indian migratory people who crossed exposed land in the Bering Strait from Siberia and spread throughout the Americas, following herds of mammoth, bison, and other big game, around 12,000–8,000 B.C.

Piman relating to a language from the Uto-Aztecan family.

pithouse a house built partially below the surface of the earth. Generally, the above surface part was made of sticks, desert brush, and mud. Pithouses usually had a dome shape, no windows, and one entrance.

plaiting braiding.

pothunter one who illegally removes evidence from an archaeological site.

potsherd piece of pottery or ceramic.

prehistory the period of time occurring prior to written language.

presidio a walled fort housing soldiers and their families, built by the Spaniards to help colonize Spanish-claimed land in North America. Presidios were part of a two-pronged approach, in conjunction with missions, to settle the land.

radiocarbon dating tests organic materials such as charcoal, bone, or wood, to determine the quantity of a radioactive form called carbon 14 (usually written 14C). Living things ingest carbon 14, which decays at a steady known rate. By determining the ratio between carbon 14 and regular carbon in the object, it is possible to discover an age range for the object.

relative dating techniques scientific measures that tell the age of an artifact, site, or feature by relating the object to another object. This technique can tell us whether an artifact is older than, younger than, or the same age as another. It cannot provide an exact calendar date for an artifact.

research design a plan of action that guides an archaeological excavation.

riverine pertaining to an aquatic setting, such as a river or stream.

sample grids specific grids chosen by archaeologists to excavate

sedentary to remain in one place.

sediment material deposited by water, wind, or glaciers.

site a place or area that was used by humans.

staple crop a principal plant raised for food or used for manufacturing.

storage pit underground storage used for surplus food.

strata layers.

stratification different layers of soil piled on top of each other.

stratigraphy the study and interpretation of soil or rock layers.

stylistic analysis determining the meaning of an artifact by comparing an artwork style with that of other cultures.

survey to examine a parcel of land to ascertain location, condition, and extent of property. An archaeological survey examines land to identify and record any cultural materials present.

temper adding products, such as grass, mica, or sand to clay, to strengthen the clay for firing

zanjero an elected water judge who oversaw the fair and equitable distribution of irrigated water.

ARCHAEOLOGICAL TECHNIQUES: DOCUMENTING EVIDENCE

Lesson 1

In this lesson, students will practice data recording and observation skills. Students will learn the importance of detailed and accurate data recording by mapping a designated area, recording and reevaluating data, and comparing final product with the original source.

GETTING STARTED

OBJECTIVES

- to introduce students to the scientific method, archaeological procedures, and vocabulary terms
- to enable students to perform an archaeological survey using scientific methods

STANDARDS ADDRESSED

Grades 4–5 1SC-E3 (PO1, PO2), 2SC-E4 (PO1)
Grades 6–8 1SC-E3 (PO1, PO2), 2SC-E4 (PO1), 2SC-E5 (PO3)

KEY WORDS

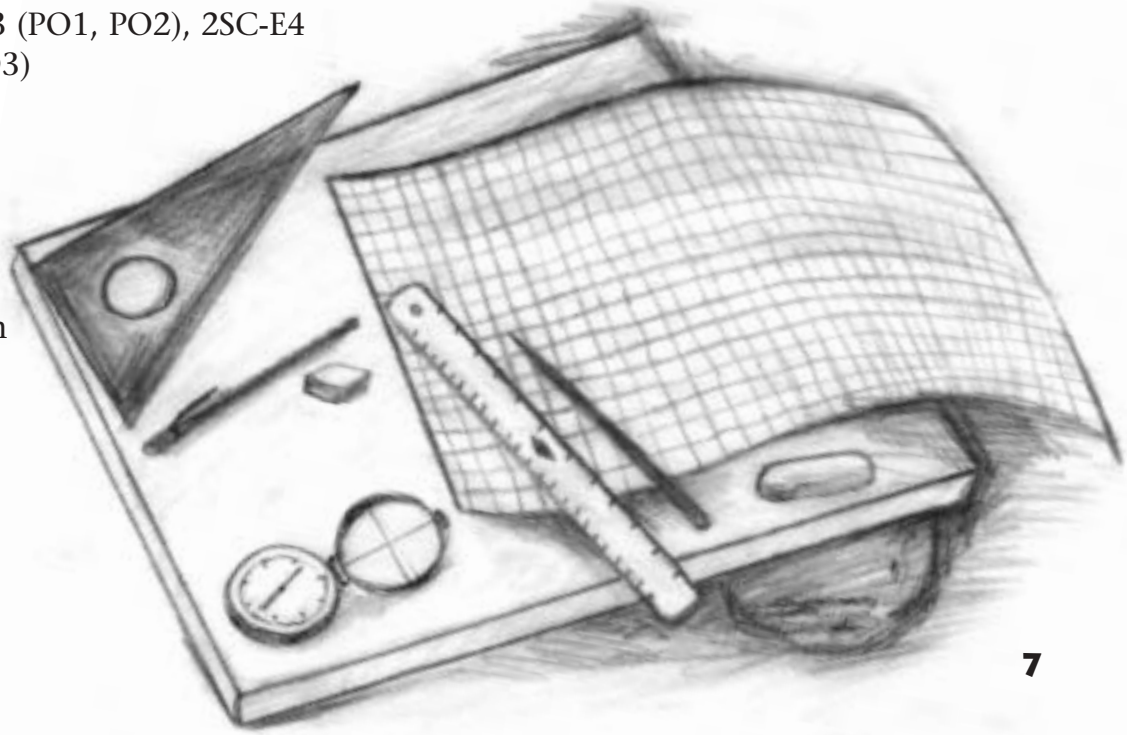
archaeology
artifacts
ceramics
context
data interpretation
excavate
features
grid
lithics
research design
site
survey

MATERIALS

- graph paper
- pencils
- rulers
- classroom, playground, or gymnasium
- tape, clothesline, or chalk
- compass

TIME

1–2 class periods



TEACHER'S CORNER

Archaeology is the study of human behavior by examining the ***artifacts,*** or material objects people have made or used. Among these pieces of evidence are ***ceramics*** (pottery), ***lithics*** (stone tools), and ***features*** (structures). A location that people used (blacksmith shop, school, animal carcass preparation area) or a location in which they lived (pithouse community, presidio, boarding house) is called a ***site.*** Once archaeologists excavate a site and recover the artifacts, they must piece together the story that the objects tell, just like a detective pieces together the clues at a crime scene to determine what happened. How do archaeologists do what they do? Archaeologists do their job in stages:

a. Survey and records check

b.Testing

b. Research design

d. Excavation

e. Laboratory analysis

f. Data interpretation

g. Final report

Q. What is the first step for an archaeologist?

A. Archaeologists are often asked to examine an area before development and construction take place. The first step is to do a records check and survey. Archaeologists read public records to discover if the area or surrounding areas have been examined before and whether any archaeological sites are present. Archaeologists will then walk across the surface of the project in transects, or lines spaced at regular intervals. Archaeologists search for evidence of human activity, such as broken pottery, stone chips, broken glass bottles, or mounds of earth. Earth mounds could indicate a buried structure or garbage dump. Archaeologists make detailed maps showing the location of everything they find. Photographs may also be taken to record what the site looked like.

Q. How are archaeological excavations planned?

A. Before archaeologists excavate a site, they prepare a research design. This is a plan of action that addresses the Who, What, When, Where, How, and Why questions. Some research design questions might be:

1. What kinds of crops were grown here?

2. Who lived at this site?

3. When did the people use the area?

4. Where did the people get food?

5. Why was the site abandoned?

6. How old are the artifacts?

The research design summarizes what is already known about the site and other sites in nearby locations. It identifies the best excavation methods and the experts who will analyze the artifacts.

Q. Why do archaeologists try to preserve some sites without digging them?

A. Archaeologists develop new techniques all the time. Radiocarbon dating, for example, first became available in the early 1950s; techniques for "floating" the burned wood and seeds to recover them from soils were not widely practiced until the 1970s. These new techniques have provided a great deal

of fresh information and have improved archaeologists' abilities to understand the past. Many more new techniques may become available in the next 50 or 100 years that will help answer questions that are mysteries today. This is one very important reason for preserving archaeological sites.

Another reason for preservation is that many archaeological sites contain cemeteries, places, or artifacts that are important to Native Americans and other descendants of people who lived here in the past. Although specific procedures for carrying out excavations—even human burials—have been developed, most groups prefer to see these sites remain undisturbed. In these cases, human remains and other sensitive artifacts are turned over to descendant groups for special treatment, which generally includes reburial of human remains.

Q. What happens during an archaeological excavation?

A. Archaeologists use a variety of tools and methods to remove soil. Smaller tools, such as picks, shovels, and trowels, remove dirt to locate the edges of pits, foundations, and floors. Sometimes excavators lay out the site in large squares, called grids. This allows for easier and more accurate mapping. The relationship between one artifact and another gives archaeologists important information; this is called context. For example, finding small pieces of stone together with drilling tools and finished beads might tell archaeologists that a jeweler lived in the house. Because excavating a site is a destructive process, accurate recording of information is essential.

Q. What happens to artifacts after they are excavated?

A. If artifacts are large and easily visible, archaeologists carefully remove them and pack them for shipment to the lab. Screening is the most efficient way to recover small items that may be hidden in dirt clumps or piles. Excavators shovel dirt onto screens, which are shaken so that dirt falls through, leaving behind gravel and artifacts. The artifacts are collected, sorted by material (pottery, stone, animal bone, shell, metal, glass, etc.), and placed in labeled bags. The artifacts are taken to the laboratory, where most items are washed and dried.

Q. What happens during the analysis phase?

A. Artifacts and samples are sent to experts for identification and interpretation. Experts look at potsherds to determine the type and age of a pot, who made it, and how it was created. Modern materials, such as tin cans and nails, can provide similar information. In order to reconstruct past environments and diets, zooarchaeologists study animal bones and ethnobotanists study plant parts. Once the experts have completed their analyses, the project director collects and collates all the reports and then writes a final report about the history of the site.

Q. What is in the final report?

A. The report usually includes a summary of previous work in the area, techniques used in excavating the site, documentation of what was found, conclusions, and suggestions for future research. At the end of the project, all of the paperwork, photographs, and artifacts are sent to a museum, where they may be exhibited for the public or stored for future researchers. Sometimes new technologies, or a reexamination of the information, yield different conclusions.

LESSON SETUP

Students will map the school playground, gymnasium, or classroom. Prior to the activity, prepare a transparency from the handouts in the Pass It On! Section. Prepare one transparency of the map and a separate one for the grid.

Prepare a grid area that students are to map. Use masking tape, clothesline, sidewalk chalk, etc., to establish lines for the grid on playground, in classroom, or in gymnasium. Grid lines should be 1' × 1' squares, or 2' × 2' squares. Number grid squares in any manner so long as there is some order to the grid. Materials used will depend on the type and location of the grid.

Within each square, place objects that students can draw, such as jump ropes, balls, rocks, and pencils. Try to choose objects that pertain to student life. To make it interesting, place some items so that they overlap grid marks. Have students draw ONLY the portion of the items that fall within their square. Students will record data on graph paper. Instruct students to use the graph paper to record object information according to scale. Students can work in teams or individually.

Students need to be aware that they are creating a primary source for future researchers. Recording information properly will insure proper context from which researchers can make plausible conclusions or inferences.

LESSON OUTLINE

1. Ask students if they have ever found an item while walking in the desert and were either unsure of what it was or how old it was. Did they ever drop something outside and never see it again? What do they think happened to that item? What would people in the future think they had found if they came upon the lost item?
2. Explain to students the processes and steps in archaeological survey. Define context and emphasize the importance of taking detailed notes. Inform students that they will be participating in a mapping activity.
3. Using the overhead map transparency, point out different structures and areas of activity. What artifacts could students expect to find in the trash area? What about the monkey bar area? Should they expect to see playground structures like picnic tables and monkey bars?
4. Place the grid over the map and show the students how the appearance of the area changes if viewed only in smaller squares of the grid. If students were only responsible for one grid square, could they still get an idea of the entire area? Explain how archaeologists grid an area and then choose sample squares to determine where they will excavate. What areas would students choose to excavate? What about the squares that appear to be empty? Should archaeologists select some of the empty squares? *(Yes, because some of the artifacts may not be visible on the surface. If they do not choose some empty grids, they may miss some artifacts below the surface.)*
5. Hand out the graph paper and pencils, and lead the class to the previously established grid.

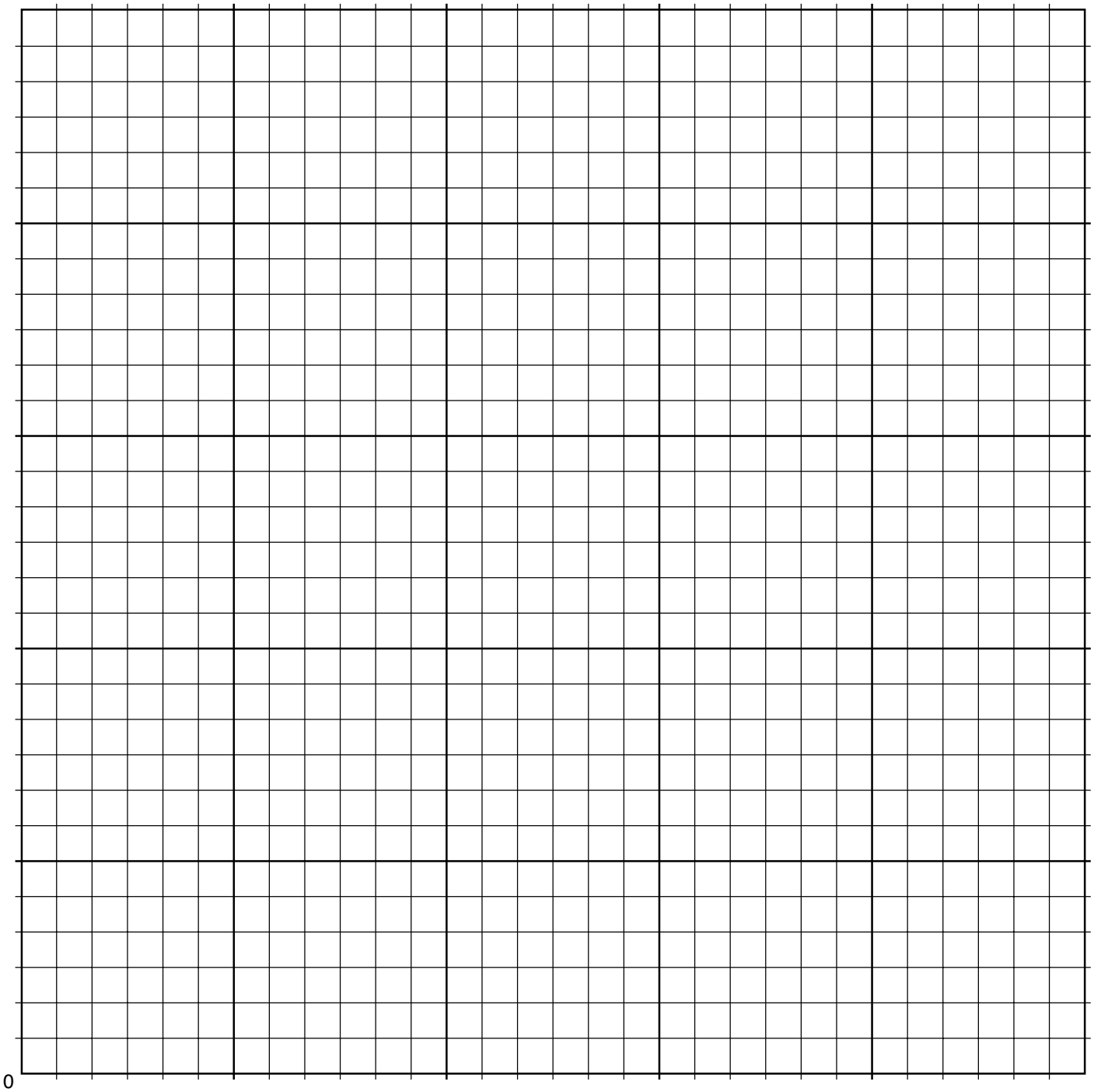
6. Divide children into groups and assign them to squares. This can be either a group or an individual project. As a group, use a compass to determine the location of North. Diagram the objects with north to the top of the page.
7. Have each group diagram the items within their square according to scale. Include vegetation, rocks, cracks in the playground, playground equipment, desks, changes in material (going from asphalt to gravel). Remind students that they are creating a historical document. Future researchers may use their maps as primary sources.
8. Once the students feel comfortable with their squares, hang squares on bulletin board and arrange them in proper order to form the entire mapped area. Have students determine whether or not the squares match the original area mapped. What are the differences? What are the similarities? By looking at the squares, can students tell which area was mapped? Could they reconstruct the site? Would someone unfamiliar with the area be able to locate the site by consulting the student maps?
9. Explain how historical archaeologists rely on primary sources to guide or double check their studies. Archaeologists may use maps, photographs, letters, and diaries to guide them toward areas that may then be excavated. They may also use primary sources to help them explain something they might have found.
10. Once the map is complete, the teacher should take the class back to the mapped area. Ask students to imagine that over many years four feet of soil has been deposited at this site. Illustrate to the students how high four feet is. What structures would still be visible on the surface? *(tops of monkey bars, swing sets or trees).* What objects would not be visible on the surface? *(jump ropes, seats, low lying objects).* Would students miss some valuable information if they only excavated the areas where they could see things protruding above the surface?
11. Based on the samples the class has chosen, what can they conclude about the site?

PASS IT ON!

Following two (2) pages are to be used as overhead slides or copied for handouts for the class.

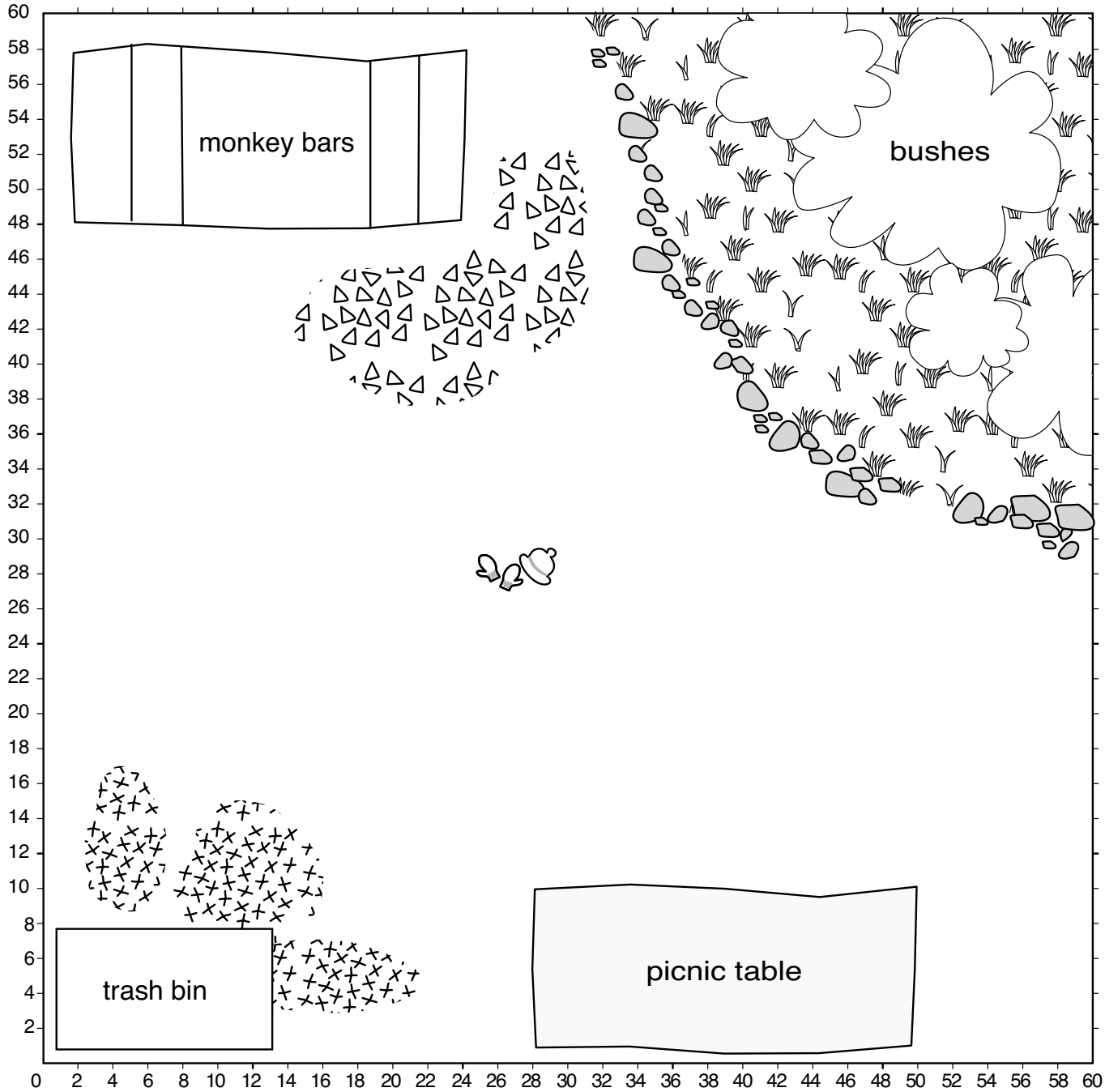
Name _____

GRID

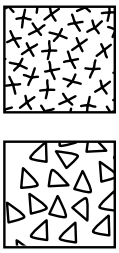


Name _____

MAP



1" = 2 feet


trash

grass

wood chips

rocks

THE SCIENCE OF ARCHAEOLOGY

Lesson 2

It is sometimes difficult to visualize different layers of soil. By using a layered dessert, students will understand the layering of soils. When spooning out the dessert, teachers illustrate how soil layers, and therefore artifacts, can be disturbed because of digging or animals burrowing.

GETTING STARTED

OBJECTIVE

- to introduce students to the geologic concept of stratigraphy
- to illustrate the Law of Superposition.
- to enable students to apply these concepts to the archaeology of the Rio Nuevo Project
- to learn Tucson's history through the interpretation of stratigraphic layers

Drawing by Hannah Willet, age ten.

MATERIALS

- Glass bowl in which to construct the dessert
- Six layer dessert ingredients; ingredients will vary
  - **a.** graham crackers
  - **b.** instant chocolate pudding
  - **c.** vanilla wafers
  - **d.** instant vanilla pudding
  - **e.** sliced bananas
  - **f.** non-dairy whipped topping

Use your imagination when deciding upon ingredients. Experiment with raisins, apple slices, sliced strawberries, Jello jigglers, jelly beans, peanuts, M&Ms, peanut butter, jelly, etc. **Make certain students' allergies, dietary restrictions, and taste preferences are taken into consideration when choosing ingredients for the layer dessert.**

TIME

Approximately one hour for overview; longer if detailed extensions are employed.

TEACHER'S CORNER

One way archaeologists determine the age of an ***artifact*** is through the use of ***relative dating techniques.*** Relative dating techniques provide the age of an artifact, ***site,*** or ***event*** by relating one object to another. There can be no absolute calendar date assigned to the artifact by using this method. Instead, relative dating techniques tell us if one object is older than another, younger than another, or appears to be the same age as another.

Relative dating techniques are based on the ***Law of Superposition*** and the ***Law of Original Horizontality.*** The Law of Superposition states that soils deposited first lie below those deposited at a later time, unless the soils have been disturbed. Therefore, the soil layers, or strata, on the bottom are older than those found at the top. The Law of Original Horizontality states that initially, soils are deposited horizontally. Therefore, layers of soil can be followed to determine the original placement of the layers.

These geologic concepts can be extended to archaeology. Artifacts found in lower layers of soil are said to be older than artifacts found in the higher layers. It may be helpful to get students to think of the classroom waste basket. When students throw items into the trash can, the can fills from the bottom to the top. Items at the bottom may have been deposited in the morning. Those items at the top may have been deposited in the afternoon. Therefore, students can deduce that the items at the bottom have probably been there longer, and are probably older, than the items deposited on the top. There can be exceptions to this general theory. For instance, animals burrowing into the ground may upset soil layers and mix the original order. The process of one layer of soil being deposited on top of another is called ***stratification***. The study of strata is called ***stratigraphy.***

LESSON SETUP

Prepare ingredients for layered dessert ahead of time. Preparation time will vary according to ingredients chosen.

LESSON OUTLINE

1. Have you ever been on a walk in the desert and found something lying on the ground that looked old, like a spoon, bottle, or piece of pottery? Did you wonder who might have used it? How old is it? How was it used? It's interesting to try and guess how old the object is; and who left it in that spot? If you think you have found something really old, don't pick it up and take it home, rather contact an archaeologist because you might have found an artifact, which is any material object made or used by humans.
2. Using the transparency, or copying the master for handouts, explain how Tucson's history can be interpreted through six layers. You may want to find some pictures to help illustrate each layer to the class. A good focus for each layer is to discuss how each group used the river. The six layers on which to concentrate, from youngest to oldest, are:

6. Modern Tucson (1912–present)
5. Territorial Tucson (1854–1912)
4. Mexican Period (1821–1854)
3. Spanish Colonial Period (1775–1821)
2. European Contact (1690–1775)
1. Prehistoric Tucson (10,500 B.C.–A.D.1690)

3. "Layer Dessert" activity. Teacher creates a six-layer dessert in a glass bowl so that students can view the six layers. The teacher writes a list of all possible ingredients on overhead or on a chalkboard and explains that each ingredient represents one layer of Tucson history. Identify which food represents which layer and describe as you go. For example, the first layer of graham cracker crumbs represents prehistoric Tucson. The dessert can be shared with students upon completion. The teacher can also share the recipe with students to try at home with their families.

4. The teacher discusses with the class the different layers of Tucson history, beginning with Prehistoric Tucson. What was the climate like? *(In Paleo-Indian times it was rainy, grassy, there were many trees and no saguaros. Later the climate began to dry out.)* Who lived here? *(American Indians, including early farmers, Hohokam, O'odham)* How do we know anything about the people who lived here? *(Through archaeological discoveries)* How did these people utilize the Santa Cruz River? *(Through farming using irrigation canals. Also probably bathed in, drank, and fished the river.)* Once the teacher feels that the students have a sense of Tucson in prehistoric times, put the first layer into the bowl.

5. Proceed to the next layer: European contact. What was the climate like? *(much like today).* Who lived here? *(Native American groups: O'odham, Apache, earliest Spanish missionaries like Father Kino).* Why would we mark the end of the Prehistoric times with the arrival of Father Kino? *(Because he introduced the Spanish language to the area. Prior to his arrival, the Native American groups had no written language.)* How did the people use the Santa Cruz River? *(They farmed using irrigation techniques. They also probably bathed in, drank, and fished the river).*

6. Proceed to the next layer: Spanish Colonial. What was the climate like? *(little changed from the arrival of Father Kino).* Who lived here? *(O'odham, Apache, Spanish settlers, missionaries, Spanish soldiers and their families).* How did they use the river? *(farmed using irrigation techniques, bathing).*

7. Proceed to the next layer: Mexican Period. What marks the change between Spanish Colonial and Mexican period? *(Local people wanted their independence from the Spanish Crown. After a ten-year war leading to independence, the area became Mexico.)* Who lived here? *(Native American groups, Mexicans)* How did they use the river? *(people continued to farm the land using irrigation techniques, drinking, and bathing).*

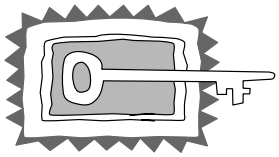
8. Proceed to the next layer: Territorial Tucson. What marks the change in periods between the Mexican period and the territorial period? *(The Gadsden Purchase of 1854 transferred ownership of 29,000 square miles of present-day southern Arizona and southern New Mexico to the United States from Mexico.)* Who lived here? *(Native American groups, Hispanics, railroad laborers, miners, explorers, American and European pioneer*

settlers, and immigrants from around the world.) How did these people use the river? *(farming using irrigation techniques).*

9. Proceed to the next layer: Modern Tucson. What marks the change from Territorial Tucson to Modern Tucson? *(Statehood was granted on February 14, 1912.)* Who lives in this area? *(people from all over the world.)* How do Tucsonans use the river today? *(There is no river to use today unless it rains.)*
10. By now, all six layers should be visible to the students.
11. Why would it be difficult for us to find artifacts from people who lived in the Rio Nuevo area 2,000 or even 3,000 years ago? *(The people moved around instead of staying in one area. River flooding and continued building on top of older sites has covered evidence. Pothunters, construction companies, archaeologists, have disturbed the sites throughout the years, and some of the information has been removed from the site.)* What types of artifacts might we expect to find in the excavation of the Rio Nuevo area? *(House remains, glass, metal, pottery pieces, animal bones, tools)* Would we be able to tell which artifact is older than another artifact? *(Possibly. We could use various dating techniques)*
12. Review the six layers of Tucson's history with the class, using the overhead projector.
13. After the review allow students to take a bite out of Tucson's history!

PASS IT ON!

The following pages are to be used as transparencies or copied for handouts for the students.



ANSWER KEY

Science of Archaeology worksheet, page 20.

1. relative dating techniques
2. artifacts
3. Law of Superposition
4. excavate
5. site
6. stratum
7. stratification
8. stratigraphy
9. relative age
10. artifact

Name _____

TUCSON'S SIX-LAYER HISTORY

6 _____

5 _____

4 _____

3 _____

2 _____

1 _____

Unscramble the layers of Tucson's history and place them in the correct sequence using the choices below.

a. Mexican Period

b. Modern Tucson

c. European Contact

d. Prehistory

e. Territorial Tucson

f. Spanish Colonial Period

Name _____

THE SCIENCE OF ARCHAEOLOGY

Use the following word list to fill in the blanks for the following worksheet. Use each word only once. It may be helpful to read through the page once before trying to fill in the blanks.

One way archaeologists determine the age of an artifact is through the use of _____ _____ _____. Relative dating techniques provide the age of _____ (1) , sites, or events by relating one object to another. There will be no exact calendar date assigned to the artifact by using this dating technique. Instead, relative dating techniques tell us which object is older than another, which is younger than another, or which is the same age as another.

Relative dating techniques are based on the _____ _____ _____ (3) , which states that soils deposited first are located beneath those deposited (3) at a later time. Therefore, those soils that are deposited first are at the bottom and are considered older than those soils at the top. This geologic concept can be extended to archaeology. Artifacts found in the lower layers of soil are said to be older than those found in the higher levels of soil.

When archaeologists _____ (4) a _____ (5), they sometimes remove one layer of earth at a time. Each layer of soil is called a _____ (6) . The process of one stratum being deposited on another is called _____ (7) . The study of these strata is called _____ (8) .

No matter how the earth rotates or tilts; no matter how the earth may be rearranged by earthquakes or uplifting mountains, the original placement of the sediment was horizontal, according to the Law of Original Horizontality. By understanding the Law of Superposition and the Law of Original Horizontality, archaeologists can determine the _____ _____ (9) of an _____ (10) by studying the stratification of soil in which the object was discovered.

a. excavate
b. relative age
c. law of superposition
d. stratification
e. artifact
f. site
g. stratigraphy
h. relative dating techniques
i. stratum
j. artifacts

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Archaeologists at work.
Photo courtesy Desert Archaeology, Inc.

Lesson 3

ARCHAEOLOGICAL TECHNIQUES: DIGGING THE PAST

Shoebox archaeology gives students the opportunity to see how archaeologists find artifacts in different layers of soil and how the different layers of soil help archaeologists approximate dates of the artifacts.

GETTING STARTED

OBJECTIVES

- to enable students to assemble clues and indicators concerning a family
- to enable them to develop an understanding of how archaeologists discover the story of the past by digging for clues.
- to provide students with an exercise in problem solving and deductive reasoning

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO1, PO2), 1SC-E1 (PO3, PO4)

KEY WORDS

artifact
context
excavate

MATERIALS

- shoebox
- personal items
- family items
- small paintbrush
- spoon
- sand or dirt

TIME

1 hour

TEACHER'S CORNER

Shoebox archaeology can be performed in the classroom or outside to minimize the mess. Extensions to this lesson plan can be added to include a mock excavation. For a fee, Old Pueblo Archaeology provides an educational experience for a classroom excavation at their headquarters:

Old Pueblo Archaeology Center
1000 East Fort Lowell
Tucson, AZ

Teachers may also want to contact a local archaeology firm to see if it has any excavations in progress available for class field trips. If no excavations are underway, teachers may want to contact Pima Community College West Campus Archaeology Department, 206-6022. The college has a mock site established and regularly train field archaeologists.

Following is a list of archaeology firms that have been contacted and have agreed to try to accommodate students. There are other archaeology firms in Tucson. A complete list can be obtained by contacting the State Historic Preservation Office (602) 542-7159.

Desert Archaeology, Inc.
3975 North Tucson Blvd.
Tucson, AZ 85716
(520) 881-2244

Old Pueblo Archaeology Center
P.O. Box 40577
Tucson, AZ 85717
(520) 798-1201

Statistical Research, Inc.
P.O. Box 31865
Tucson, AZ 85751
(520) 721-4309

SWCA
343 South Scott Avenue
Tucson, AZ 85701
(520) 325-9194

LESSON SETUP

1. Copy directions in the Pass It On! Section. Instruct each student to prepare at home a shoebox for archaeology. The teacher should go over instructions in class and send instructions home with each student. Shoeboxes should be layered, alternating soil or sand with personal objects. Teachers may choose to use sand in various colors or soils with various textures to represent different soil layers. To prevent layers from combining beyond recognition, it may be necessary to moisten soils or sands prior to placing them in the box.
2. Teachers may choose to create kits complete with all materials and instructions to send home with each student.
3. See directions on worksheet.
4. Once all shoeboxes are in the classroom, the teacher should number them. Do not place names on the shoeboxes. Students should not know whose shoebox they have.
5. Teacher should provide some sort of repository for sand or soil once students begin excavating. Students will need something in which to place the excavated sand or soil.

LESSON OUTLINE

1. Once all shoeboxes are in the classroom and numbered, pass boxes out, one per student. Make certain no student has his/her own shoebox.
2. Pass out plastic spoons or brushes for the excavation.

3. Instruct students to gently remove the soil to expose the first layer of artifacts. Make sure they know that there may have been shifting in the boxes, so not all layers of soil will be the same. Some of the artifacts may be fragile, so it is important that the students do not simply "dig in."
4. Once students have begun to uncover artifacts, lead a class discussion as to what students are finding and how they are finding the artifacts. Sample questions include:
   a. What can you tell from the artifacts? Male/Female? Old/Young? Ethnicity? Family interests?
   b. How many people do these artifacts represent? Can you tell what the people did to make a living? Were they farmers, bankers, photographers, etc? What language did the people speak? What other information might you need to complete the interpretation?
5. Instruct students to remove the top artifacts and place them in one pile on their desks before moving to the next layer. The teacher may want to provide paper lunch bags to keep artifacts separate.
6. Have students continue excavating until they find the next layer of artifacts. Repeat the questions from before. How do these new artifacts impact the students' original interpretations? Do the new artifacts help interpret the preceding artifact? Do the new artifacts add any information? Or do they confuse the interpreter?
7. Have students remove the second layer of artifacts and place them in a separate pile or bag on their desks.
8. Continue the excavation until all artifacts are removed and placed in their separate piles.
9. Have students interpret their assemblages for the class.

PASS IT ON!

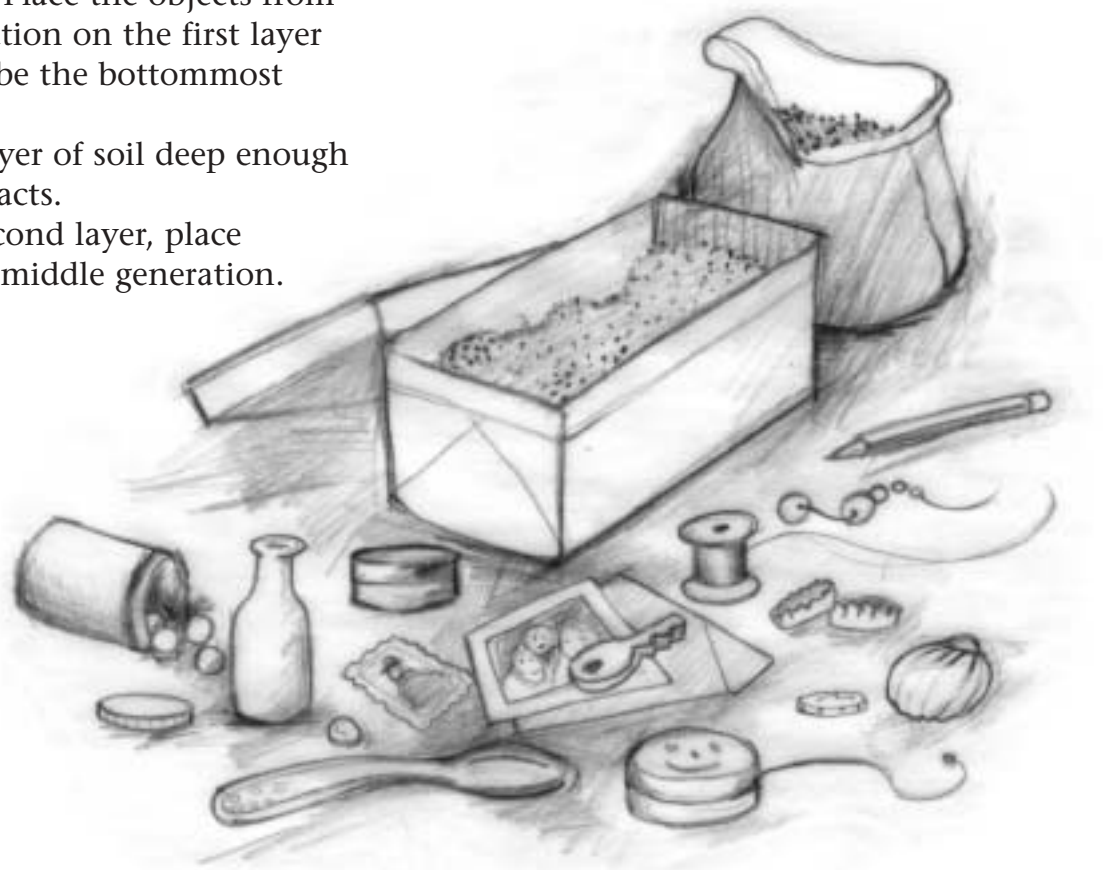
The following pages can be copied for students as take home directions for constructing shoebox archaeology.

Name _____

SHOEBOX ARCHAEOLOGY

Directions

1. Select a few personal objects that represent three generations. An example of three generations is grandparents, parents, and students. Objects to consider include photos, coins, jewelry (not expensive), key chains, pens, toiletries, etc. If using actual items, place in Ziploc bags to prevent soiling. You may also wish to draw or make representative objects dated from the time periods.
2. Place a thin layer of soil (or one color of sand) at the bottom of the shoebox. If sand or soil is too dry, you may need to moisten the layers with a spray bottle to prevent shifting. Place the objects from the oldest generation on the first layer of soil. This will be the bottommost layer of artifacts.
3. Place a second layer of soil deep enough to cover the artifacts.
4. On top of the second layer, place objects from the middle generation.
5. Place a third layer of soil on top of these artifacts.
6. Place some of the youngest generation's items on top of the third layer of soil.
7. Cover with a final layer of soil.
8. Cover shoebox and tape shut to prevent spilling.
9. Bring shoebox to class for classroom activity. Try not to move the box around too much.
10. DO NOT write your name on the box. You will be excavating another student's box.



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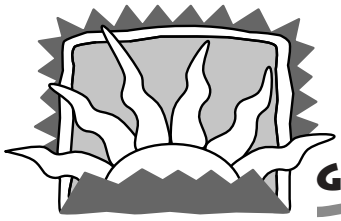
ARCHAEOLOGICAL TECHNIQUES: LABORATORY INTERPRETATION I

Lesson 4

We all have preconceived notions and personal biases, which can lead to misinterpretation. Archaeologists have personal biases also, some of which result from their specialized training. In this lesson, students will interpret artifacts.



GETTING STARTED

OBJECTIVES

- to enable students to learn the function of the laboratory in interpretation of artifacts excavated from archaeological sites
- to encourage students to understand how different archaeologists may derive different conclusions from the same artifact
- to develop deductive reasoning skills

STANDARDS ADDRESSED

Grades 4–5 1SC-E1 (PO4), Language Arts Standard 3 Listening and Speaking Essentials
Grades 6–8 1SC-E3 (PO2), 2SC-E4 (PO1)

KEY WORDS

analysis
artifact

MATERIALS

- Personal items children bring from home
- Paper grocery bags
- Paper and pens for documenting the artifacts and writing the story
- *Motel of the Mysteries* by David Macauley, Houghton Mifflin Company, Boston, 1979. ISBN 0395284252 (optional)

TIME

Approximately 50–60 minutes.

TEACHER'S CORNER

Personal knowledge and biases contribute to interpretation of an artifact. Someone familiar with a certain subject will have different interpretations from someone who is unfamiliar with that same subject. For instance, most people are familiar with baseball artifacts such as bases, bats, balls, and mitts. But only the most avid fans may know what the *on deck circle* (place where a batter next in line waits for his turn to bat) or a *donut* (a weight that is slipped over the large end of the bat that helps batters practice their swing) is. Someone who is unfamiliar with the game may have different interpretations than those who are familiar with it.

Archaeologists rely on their past training and experience to determine the function and meaning of an artifact. Because archaeologists bring to the laboratory different levels of knowledge and different areas of expertise, they sometimes do not agree on the interpretation of an artifact.

LESSON SETUP

The teacher should collect items from a subject area with which the students will be unfamiliar and place them in a paper bag. Examples include objects involved in training a dog, objects from a historical game that children don't play any more, or objects used in preparing a certain food dish.

Request, one week or a few days ahead of time, that students bring in one item that reflects their personalities, or something that they use often. Students may choose to bring in items that are familiar to other students. However, encourage them to look for items with which other students may not be familiar. Teachers may also want to include items that are broken and/or have missing pieces.

The teacher collects the items brought in by the students. The teacher places items inside paper bags to prevent students from seeing items ahead of time. Prepare one bag per group of students, dividing the artifacts among the bags.

LESSON OUTLINE

1. Discuss how interpretations of artifacts can differ according to different people. Have students ever seen an object that they thought had one function, only to discover that they were wrong? Have students ever come into contact with an object and had no idea of what it was used for? Read excerpts from *Motel of the Mysteries* to illustrate the difference between interpretation and misinterpretation.
2. The teacher takes one item from his/her special collection. Lead a discussion about the object's function. Display all items. Have class try to put all the clues together and discover what the assemblage is used for. Eventually, the teacher may have to reveal the answers. Explain to the students that because you had personal knowledge of the subject matter, you were able to interpret the artifacts. Because the students had no prior knowledge of the subject, they had difficulty in interpreting the artifacts.
3. Divide class into groups, separate the groups, and spread throughout the

classroom. Have groups remove one item at a time from their group bag and analyze the item, filling out the worksheet to document their decisions. What is it made of? Who may have used the item? How was the item used? Does the artifact resemble anything they have ever seen or used before? What can you conclude from the item? Can you conclude anything in particular about the people who may have used the item?

4. Have group justify and record its interpretation.
5. Once all groups have completed their bag, ask that one representative from each group go to the front of the class and report on the group's findings. Ask the class to help interpret the items the group may have been unable to decipher. Does anyone have any differing ideas about the group's interpretation? Does everyone agree with the group's interpretation?

PASS IT ON!

The following page should be copied and distributed to the group members to help them record data regarding the artifacts.

Name _____

ARCHAEOLOGICAL TECHNIQUES

ARCHAEOLOGY LABORATORY ACTIVITY

Remove one artifact at a time from the bag and discuss it with your group. Record your observations and conclusions. Repeat the process until all artifacts have been observed, discussed, and recorded.

Item#	What is it made of?	What was its use?

What do these artifacts tell us about the people who used them? Why?

_____

_____

_____

_____

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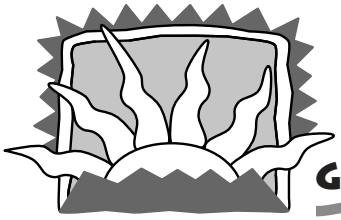
ARCHAEOLOGICAL TECHNIQUES: LABORATORY INTERPRETATION II

Lesson 5

Creating, breaking, and reconstructing pots is a fun way to simulate the work archaeologists do in laboratories. An extension to this activity includes having students create pottery from clay instead of purchasing store-bought pots. Students can create their own designs on the pottery or may choose to duplicate Hohokam, Anasazi, or Mogollon designs.



GETTING STARTED

OBJECTIVES

- Students will learn the difficult job archaeologists have when reconstructing damaged/partial artifacts recovered from site excavations.
- Students will understand how pothunters damage archaeological sites when removing artifacts and information.
- Students will attain an understanding of the importance of pottery to the archaeologist.
- Students will associate decorations and artwork on pottery to the society that created them.

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO2), 1SS-E2 (PO1, PO4)

KEY WORDS

assemblage
artifact
potsherd
stylistic analysis
temper

MATERIALS

- One terracotta flower pot large enough to allow all students in the group to add their artistry to the pot. Plan on using at least an 8-inch pot.
- 4-inch terracotta flower pots, one per student
- quick-drying paint, do not use acrylic
- paint brushes, twigs, feathers, etc., any implement to apply paint
- large grocery bags, one per group
- rubber mallet or hammer to break pots
- glue and glue brushes for reassembling pots
- *When Clay Sings* by Byrd Baylor, Charles Scribner's Sons, New York, 1972, ISBN 0689711069.

Note: use a glue called "Incredibly Tacky," available at craft stores. Glue must be brushed onto each side of the potsherd that is being reconstructed. Elmer's glue, rubber cement, and glue sticks do not work. They don't dry quickly enough.

TIME

1–2 hours depending on size of the class

TEACHER'S CORNER

Archaeologists find many pieces of pottery. Ceramic artifacts are among the most durable objects in the archaeological record. Pieces of pottery, or potsherds, can survive in the soil under a variety of circumstances. Ceramic technology is considered a recent innovation and is associated with the change between humans as a hunter-gatherer society and a more sedentary, agricultural lifestyle.

All sciences use classification to impose order on a data group. The first step in classification is to determine assemblages, or groups of similar artifacts with like characteristics. The principle behind this method of classification is that similarities do not occur randomly, but reflect the culture or society that manufactured the object. To classify an assemblage in the present does not necessarily reflect the classification the original creators may have used. Archaeologists have used this type of classification to determine the associations of sites on a timeline. Recently, however, archaeologists have used this type of classification to study cultural aspects of a community, such as trade, population movements, and social organization.

Stylistic analysis studies the artistic and decorative traits within an assemblage. This analysis documents the traditions and decorative styles of the community that manufactured the items. Many archaeologists believe that these traits are culturally conditioned by, and reflective of, the social systems of the community. People who live in the same village will tend to create the same type of pottery, using the same temper (materials added to clay to strengthen the pottery during firing), methods, style, and decorations.

Traditionally, archaeologists have used stylistic analysis to focus on decorative layouts, motifs, and configurations. The design categories are then used to reconstruct site sequences by documenting stylistic changes through time. As people change, so do their styles.

The objective of systematic analysis of ceramic artifacts is to aid in understanding human behavior. The goal of such analysis is to explain the role ceramics hold within a cultural system.

LESSON SETUP

Divide class into teams of two or three. Each team will be responsible for painting one large pot. Make sure the students know that the large pot is for smashing and the little pot is the one they get to take home. You may find resistance to the idea that they will have to smash the pot. Emphasize that the purpose of this activity is to give the students an idea of how an archaeologist really works in a ceramic analysis laboratory. Remind them that they will still have a pot to take home. Make sure each student team paints the large pot first, before painting the smaller one. This gives the paint time to dry prior to smashing the pots. It also gives the students incentive not to dawdle while painting the larger pot.

A good introduction to the meaning and importance of pottery is the book by Byrd Baylor, *When Clay Sings*. After reading the book (entirely or partially), you may want to ask the students, "How does your clay sing?"

LESSON OUTLINE

1. Archaeologists find lots of pottery at excavation sites. Why do you suppose this is? *(Fired pottery is very durable.)* Does the pottery tell us anything in particular about the people who made it?
2. Some artwork on prehistoric pottery may have been somewhat like photographs of today. It wasn't always possible for people to take photos or videos of things that were important to them, or things they wanted to remember. People used art on pottery to record their observations, thoughts, and beliefs.
3. We can learn a lot about a people by studying their ceramics. We can learn:
   a. what was important to them;
   b. what types of animals might have been around at the time;
   c. what types of celebrations they had;
   d. in what manner they created the pottery;

   What else might we be able to learn?
4. It would be helpful to show photographs or slides of some of the pottery styles excavated from the Rio Nuevo archaeological sites. This will help illustrate the styles on pottery. If this is not possible, the teacher may want to compare and contrast the styles of pottery among the Hohokam, Mogollon, and Anasazi.
5. When archaeologists found pottery at the Rio Nuevo sites, were all the pots intact? *(No)* Were they whole or in pieces? *(Most were in pieces)* How did the archaeologists figure out what decorations were used? *(They had to put the pots back together as best as they could.)*
6. What happens if the archaeologist doesn't find all the pieces? *(It may not be possible to reconstruct the object.)* Where could the missing pieces have gone? *(Pieces could have been moved by rodents or reused for other purposes. Pothunters may have removed the pottery or the pieces may have never been recovered by archaeologists.)* Pothunters are people who illegally remove items from an archaeological site. Because of pothunters, we could be missing out on some valuable information. Archaeologists cannot make positive conclusions if some of the information is missing.
7. "Smash-a-pot" activity. Divide class into teams and give each team one large pot to paint. Make sure the students know that this is the pot that will be smashed and reconstructed. Have them paint symbols and objects that are important to them. The purpose of the painting is to leave clues for the group who will be reassembling their pot. The team doing the reassembly of the pot will "read" the painting group's pot for clues to the painter's identity.
8. Once student teams finish painting the large pot, hand out the smaller pots and let the students paint them according to their personal tastes. By the time they finish painting the smaller pots, the larger ones should have dried.
9. Set the small pots aside and place one large pot in each paper grocery bag.
10. The teacher should be the one to smash the pots. Take the rubber mallet and hit the bag with the pot inside once. If the pot doesn't break into more than two pieces hit it again. Once all the pots are broken, hand them out to the teams, making sure no team gets its original pot.

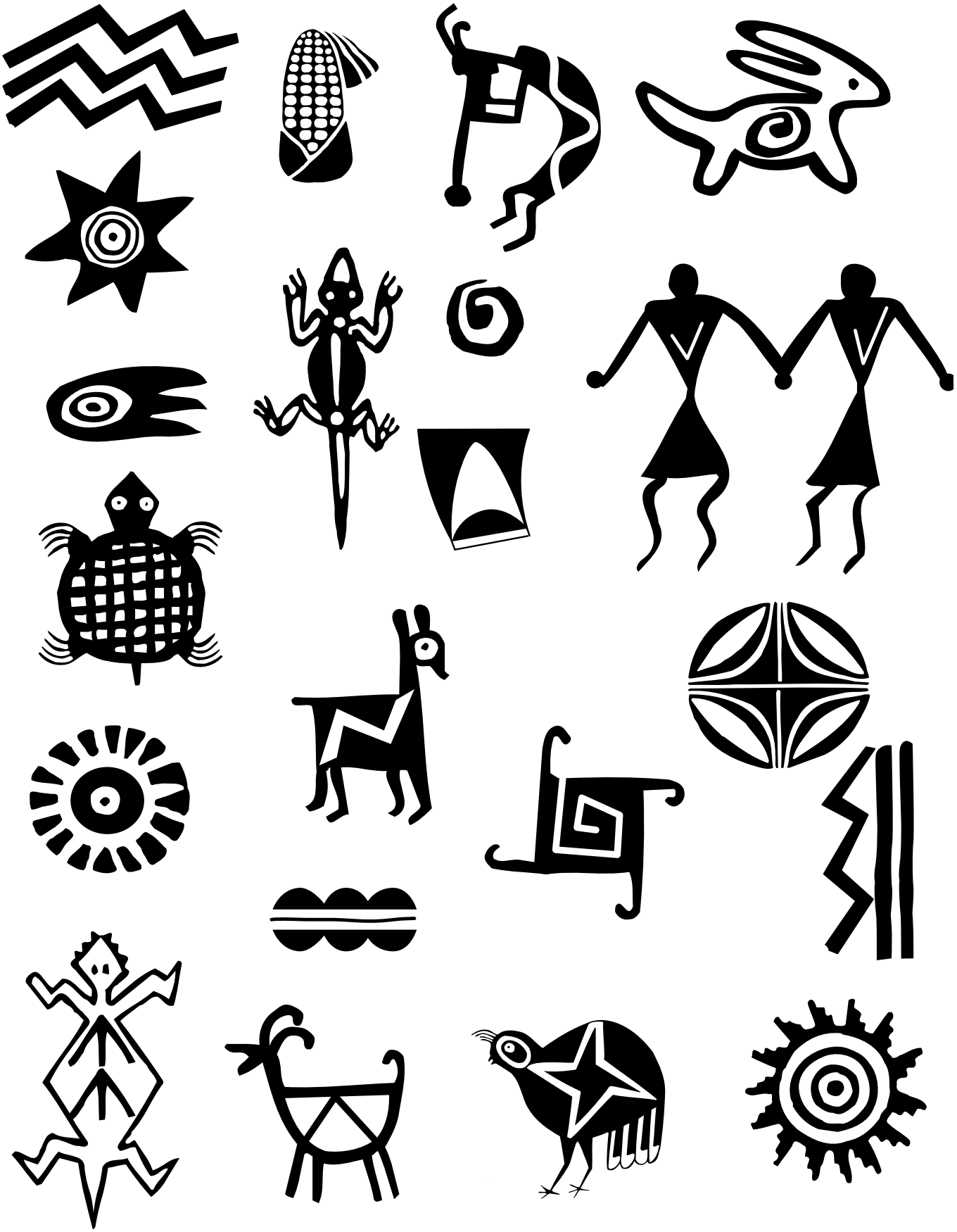
11. Pass out the glue and glue brushes for each team. Have the team look at the pieces (the assemblage) and try to get a sense of the pottery to be reassembled. Let the teams try to reassemble the pot.

The teacher can check for understanding of the lesson by leading a group discussion about the "smash-a-pot" activity. Once pots are reassembled, ask the teams to make some conclusions about the students who painted the pot. Does their clay sing as in the Byrd Baylor book? What items/objects were recorded in paint? What does this tell us about the people who decorated the pot? What colors did the painter choose? How did they apply the paint? How do archaeologists read pottery? How do archaeologists reassemble pottery?

PASS IT ON!

The following page may be copied for handouts to help students gather ideas for images to paint on the pots.

Name _____

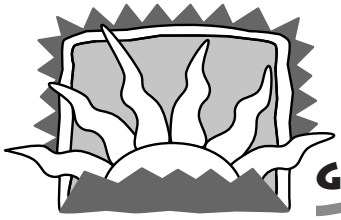


Lesson 6

THE GARBAGE PROJECT

ADAPTED FROM THE "STUDIES IN ARIZONA HISTORY" TEXTBOOK

Archaeologists learn about the past by studying artifacts. Many times, the items left behind are from ancient garbage piles. By using the same techniques and examining modern trash, we can learn about modern society.



GETTING STARTED

OBJECTIVES

- to show students how deductive reasoning works in studying artifacts
- to illustrate that different assumptions can change interpretations and that removing key pieces of evidence can change interpretations
- to enable students to gain an understanding of why archaeologists are tentative in their conclusions
- to show students that the garbage they leave behind contains artifacts that can be analyzed just as archaeologists analyze other artifacts from the past0

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO2), 1SC-E1 (PO3, PO4), 2SC-E4 (PO1), 2SC-E5 (PO1, PO2, PO3)
Grades 6–8 1SC-E3 (PO2), 2SC-E4 (PO1), 2SC-E5 (PO3)

MATERIALS

- paper grocery bags, two per household
- items from the Household lists
- Household lists can be copied and handed out to the student groups instead of collecting the items. However, using real objects increases the amount of information students will have for analysis and increases the interest and level of involvement of the students.
- paper and writing instruments for students to record their findings

TIME

The lesson can take as little as 50 minutes and as long as 90 minutes, depending on extensions and involvement of the group.

TEACHER'S CORNER

Archaeologists learn about the past through the study of artifacts. Often this involves sifting through ancient garbage. We can learn about modern societies using the same techniques. The University of Arizona has an ongoing program called The Garbage Project, directed by Dr. William Rathje, that has studied landfills from different cities. In this lesson students will have an opportunity to analyze fictitious, but feasible, household items and draw conclusions about human behavior based upon their observations. In this exercise ***there are no right or wrong answers, just logical deductions.***

Like detectives, archaeologists use clues from artifacts to reconstruct human behavior. By studying garbage, we can apply the same reasoning to the study of modern societies.

LESSON SETUP

1. Collect all items listed on the Household List. Substitutions can be made. All items must be emptied and cleaned. Make sure all can rims are free of sharp edges.
2. On the day the project will be done, distribute items into four paper grocery bags marked with "household number 1–4 A." (1A, 2A, etc.)
3. In four separate grocery bags, place the remaining two household items that will be introduced after each group makes the first conclusions. Make sure to mark the bags "household number 1–4 B." (1B, 2B, etc.)
4. Divide the class into four groups. If the class is large, you can duplicate the households. Instead of four groups, you would have eight. It doesn't matter that the households are duplicated. Different groups will come to different interpretations and conclusions.

LESSON OUTLINE

1. Ask students "How do archaeologists know what they know?" List their answers on the board for the entire class to see. Discuss each answer as it is given.
2. Ask students to consider why one archaeologist may come to a different conclusion than another if examining the same artifacts.
3. Bring in one item with which the students are not familiar (such as a grapefruit spoon, a tool, an old TV channel dial, etc.). The item can be broken, old or new, or just unfamiliar to the students. Pass the item around the classroom. After everyone has had a chance to view and touch it, have students discuss the artifact. What are some of their conclusions, assumptions, and interpretations? How are they making their interpretations? On what evidence are they basing their conclusions?
4. Read and/or discuss *Motel of the Mysteries*. You can also use excerpts from the book to illustrate misinterpretation of evidence. If the book is unavailable to the class, be sure to illustrate how analysts, when assuming too much, can easily misinterpret information that leads to wrong conclusions.

5. Instruct the students about what is going to happen. Each group will receive one household bag. As a group, the students must make interpretations and come to conclusions about the people of the household. Questions to consider are:
   a. What can students deduce for ***absolute certainty*** about their household?
   b. Can students tell the age, gender, and number of household occupants?
   c. Is it possible to figure out the social status (including occupation and education level)?
   d. Are the occupants poor, middle class, or wealthy?
   e. What other information can students deduce from the household items?
6. Ask students to record the reasons for their deductions. Are some items more helpful in determining the answers than others?
7. Have students break into their pre-assigned groups.
8. Each group should choose a spokesperson to report on the findings of the group.
9. Allow groups ample time to analyze the artifacts in their bag. The teacher can determine the proper amount of time by circulating around the classroom and listening to the group discussions.
10. Once the interpretation phase is over, ask the spokesperson from each group to go to the front of the class. The spokesperson should introduce the items from the household bag and show the class each item. The spokesperson should report the group's interpretations and conclusions.
    A class discussion should follow regarding the group's interpretations. Does anyone have anything to add? Does anyone question any of the group's interpretations?
11. Continue until all groups have reported their findings.
12. Once spokespeople return to their groups, hand out the second part of the household bags. The two remaining items must now be figured into the group's original interpretation of the first bag of household artifacts. Repeat the reporting step, as the spokesperson reports on how/if the additional items changed their interpretation and why. Have the added items changed any of the original interpretations? Make the analogy between the missing information and the damage pothunters do to archaeological sites. When evidence is missing, it is impossible to know the entire story.

PASS IT ON!

Use the following page as a handout (if not using real objects for the activity) or use as a list in order to locate objects for each household.

Name _____

HOUSEHOLD #1

1. broken hearing aid or hearing aid batteries
2. diet soda can
3. large enchilada sauce can
4. small green chili can
5. plastic tortilla bag, preferably brand name (not hand-made)
6. broken Barbie doll
7. baby food jar with small screws in it
8. action figure toy
9. sawdust (can be placed inside a Ziploc bag)
10. computer floppy disk

HOUSEHOLD #1 ADDITIONS

1. *Wall Street Journal*
2. empty pill bottle labeled Nitroglycerin Tablets

HOUSEHOLD #2

1. plastic name badge on pin
2. pizza box
3. used lipstick: the most "in" color
4. hair spritz or hairspray
5. macaroni and cheese box
6. toy bear losing stuffing
7. worn women's tennis shoes: Size 7
8. SunTran bus passes/transfers
9. empty vitamin bottle
10. cat litter bag

HOUSEHOLD #2 ADDITIONS

1. baby diaper
2. *People* magazine in Spanish

HOUSEHOLD #3

1. wine bottle
2. steak bones
3. recipes clipped from a magazine
4. used deodorant container
5. empty film cans
6. *Sports Illustrated*
7. used deck of cards; preferably partial deck
8. empty cigar box
9. photographs of a basketball game

HOUSEHOLD #3 ADDITIONS

1. worn, run pantyhose
2. African American hair braid and extension conditioner

HOUSEHOLD #4

1. brown rice box
2. empty can of water chestnuts
3. soy sauce bottle
4. worn sandal
5. plastic water bottle
6. worn cloth shopping bag
7. hair tie
8. empty vitamin bottle
9. empty package of garden seeds

HOUSEHOLD #4 ADDITIONS

1. *Consumer Reports* magazine
2. broken high-heel shoe

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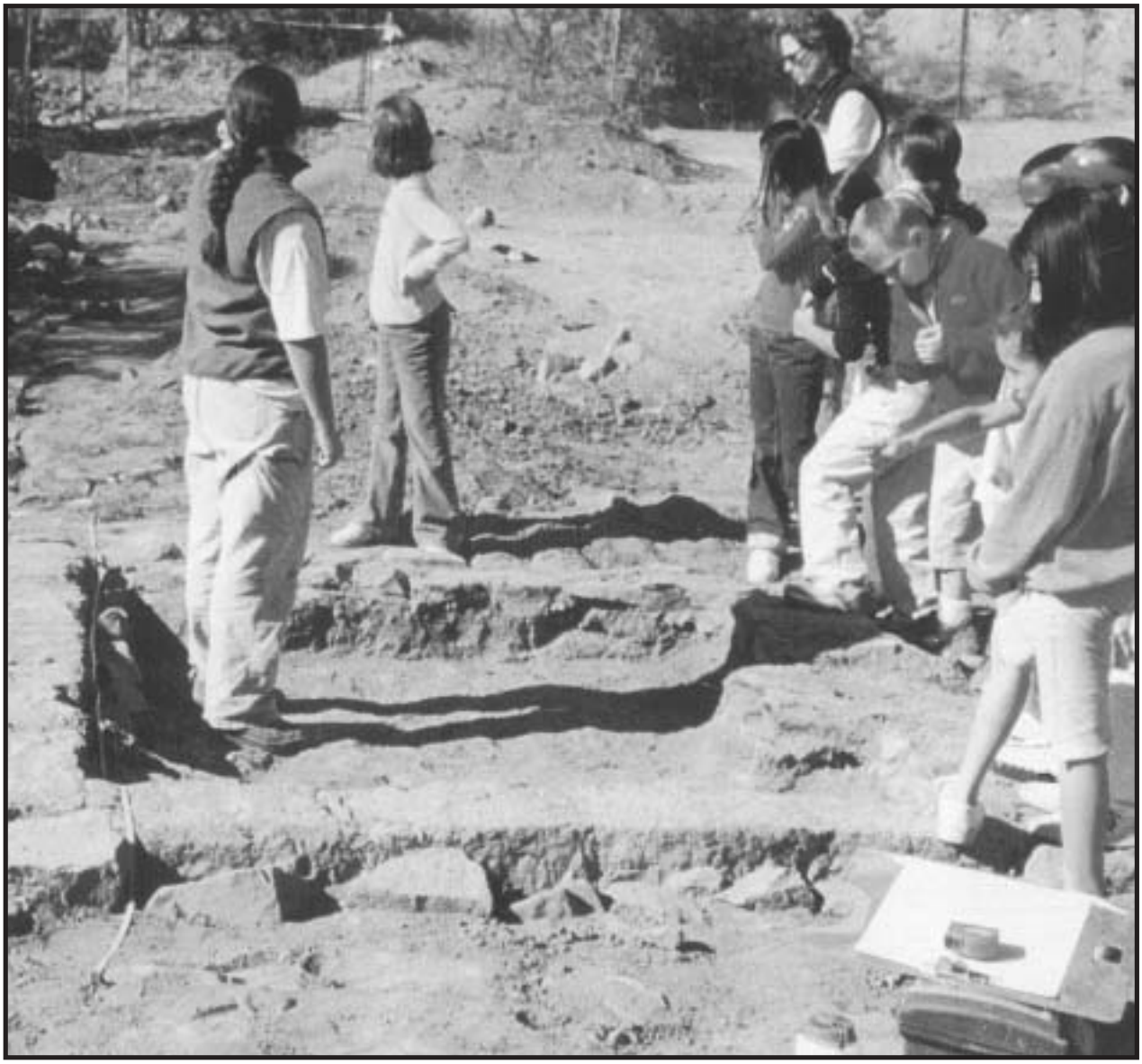
SECTION 2



Rio Nuevo Partnership schools on tour of the excavation site.

APPLYING ARCHAEOLOGY TO RIO NUEVO

Lesson 7

ARCHAEOLOGY AND RIO NUEVO

In this lesson, students will read newspaper articles to discover what archaeology is taking place during the Rio Nuevo Project.

GETTING STARTED

OBJECTIVES

- Students will use the *Arizona Daily Star* newspaper articles as primary research tools to discover the history, scope, and future plans for the Rio Nuevo Project.
- Students will develop a sense of community involvement by researching the Rio Nuevo Project.

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO2), 1SS-E2 (PO1, PO3, PO5), 3SS-E2 PO1, PO4), R-E2 (PO2, PO5, PO6)
Grades 6–8 R-E2 (PO1, PO2, PO6, PO7), R-P1 (PO2, PO3, PO 4)

KEY WORDS

Convento
granary
Hohokam
pithouse

MATERIALS

- *Arizona Daily Star* newspaper articles:
  "Unearthed History to Be Reburied," by Carmen Duarte, January 26, 2001
  "Learn More About Rio Nuevo Development," by Paola Banchero, January 1, 2001

TIME

50–60 minutes, depending on class reading level and whether or not both articles are used.

TEACHER'S CORNER

Some students may have difficulty reading the newspaper articles and may need assistance.

The information found in the newspaper articles is dated, but the articles provide a good overview for the Rio Nuevo Project at its inception. Teachers should direct the class to research newer articles and compare/contrast the information. Recent information can also be obtained through the Desert Archaeology Inc. website at www.rio-nuevo.org

LESSON SETUP

The teacher can copy the newspaper articles and worksheets to hand out for individual students or small groups; or create an overhead transparency if doing as a class exercise.

LESSON OUTLINE

1. Hand out copies of newspaper articles and question sheets. Students can either work in teams, as partners, or alone.
2. Ask students to read the articles and answer the questions in the spaces provided on the answer sheets. Remind students that it is helpful to review the questions before reading the article. This will give them an idea about what information to look for during their reading.
3. Review the topic by leading class discussion on the answers students have recorded.

PASS IT ON!

The following articles and question sheets may be copied for classroom distribution, or made into overhead slides for a class project.

ANSWER KEY

"Unearthed History to Be Reburied" page 46.

1. West of the Santa Cruz River below "A" Mountain.
2. November 2000 to February 2001.
3. ancestors of the Tohono O'odham, Spanish conquistadors, Mexican farmers, Chinese businessmen.
4. San Agustín Mission site.
5. The archaeologists found a prehistoric village dating back 2,500 years.
6. The river contained fish and turtles. Cottonwoods, mesquites, willows, and tall grasses grew in abundance; not mentioned in the article, but gives students a chance to compare then and now.
7. corn, beans, squash, deer, rabbit, wild spinach, mesquite pods, and cactus fruit.
8. Father Kino brought written language to the area.
9. He brought wheat, cattle, horses, and chickens. He wrote journals describing what he found and mapped the area.
10. The City of Tucson operated a landfill.

ANSWER KEY

"Learn More about Rio Nuevo Development" page 49.

1. parks, walkways, museums, theaters, restaurants, convention hotel, housing and gathering places.
2. 62 acres.
3. "A", "10", "6", El Con, Park Place.
4. **a.** water, Santa Cruz.
   b. natural open, park, greenery, housing.
   c. east, downtown.
5. San Agustín, Convento, rebuilt.
6. culture, heritage.
7. **and 8.** Students will express their understanding of culture and heritage.

Name _____

Unearthed History to be Reburied
Archaeologists complete excavations on Rio Nuevo site

By Carmen Duarte *Arizona Daily Star,* 01/26/01

An archaeological dig that uncovered precious Tucson history dating back 2,500 years is about to go underground once more.

But before it does, you can go today and tomorrow to view an area known as the "Birthplace of Tucson," just west of the Santa Cruz River below "A" Mountain.

Since November, crews of archaeologists began unearthing layers of history buried there.

These past worlds were occupied by pre-historic people—ancestors to the Tohono O'odham-and Spanish conquistadores, Mexican farmers and Chinese businessmen.

The current dig is going to be covered up by mid-February and then decisions will be made later on which historic finds will be re-constructed and which will be excavated and protected.

The $360 million Rio Nuevo project aimed at revitalizing downtown includes a cultural center and re-creation of San Agustín Mission, and the Convento where the priests lived. The mission was built in 1771.

Pithouses, irrigation canals, and a Chinese outhouse are among the discoveries at the site.

Chinese dishes, including a rice wine jar, brown stoneware, rice bowls, sauce bowls and a spoon dating from 1880–1900 will also be on display.

These discoveries and more, including stones used for pounding and grinding, and oval and square bowls made out of stone, may be going into a cultural museum.

Plans are not complete, but the latest details by Hunter Interests of Maryland, Rio Nuevo's master planners, show the museums were moved from west of the river to east of Interstate 10, south of West Congress Street.

Meanwhile, archaeologists Jonathan B. Mabry and J. Homer Thiel will lead crews that will continue to dig in the area and east of I-10, doing fieldwork and mapping out findings in the area that will help shape Rio Nuevo's look.

About $2.1 million is expected to be spent on archaeology throughout the 11-year Rio Nuevo project, which includes excavations downtown, east of Interstate 10.

So far, the findings at Tucson's birthplace-also known as the San Agustín Mission site-make Mabry marvel.

"We found a prehistoric village dating back 2,500 years. This tells us that Tucson is the longest, continuously occupied settlement in the United States," Mabry said yesterday while giving a tour.

Back then, the area was lush and the Santa Cruz River carried fish and turtles. Cottonwoods, mesquites, willows and tall grasses grew in abundance.

People living in the pithouses farmed corn, beans and squash. Their diet also included deer, rabbit, wild spinach, mesquite pods and cactus fruit.

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Name _____

Mabry said it is not known where the early farmers came from. He said the Hohokam came to the area 1,500 years ago, and possibly learned farming from the earlier Sonoran Desert farmers.

"People lived in this spot for so long because "A" Mountain is a volcanic hill. The rock barrier forced ground water up to the surface," Mabry said.

He said everything before the coming of early missionary Eusebio Francisco Kino is considered prehistoric because it was not written.

"Father Kino came to the Santa Cruz River Valley in the 1690s and found a Pima village. He brought wheat, cattle, horses and chickens to the area that was known as San Cosme," Mabry said. Kino wrote journals describing what he found and mapped out the area.

Mabry pointed to the volcanic rock foundation of a wall that stood around the San Agustín Mission site, the Convento and two cemeteries. There also was a granary, and its foundation is visible.

Many of the prehistoric sites and the mission settlement are believed to have been destroyed because the city of Tucson ran a landfill in the area in the 1950s and 1960s, Mabry said.

However, what has been found has given archaeologists a good view of the area's history—a good foundation to what can be reconstructed, Mabry said.

This is the first time the area has been dug up and the studies of prehistoric findings done, Mabry said.

Police will patrol the area regularly while the excavations continue.

Updates of the findings will be posted on the Web site www.rio-nuevo.org

Name _____

Read the article, "Unearthed History to Be Reburied", and answer the following questions. It may help to read the questions first to give you an idea what to look for when reading the article.

"Unearthed History to Be Reburied"

by Carmen Duarte *Arizona Daily Star,* 01/26/01

1. Where is the "birthplace of Tucson" located? _____

_____

2. What was the period of time the archaeologists had to work on the excavation?

_____

_____

3. Name the four groups of people, mentioned in the article, who occupied the area.

_____

_____

4. Tucson's birthplace is known as the _____

5. An archaeologist said, "Tucson is the longest continuously occupied settlement in the U.S." What proof does he have to make this statement?_____

_____

_____

6. The area around the Santa Cruz River looked much different 2,500 years ago than it does now. Describe what it looked like at that time. _____

_____

What does the area look like now? _____

_____

7. What did the people who lived in pithouses eat? _____

_____

8. Father Kino came to the Santa Cruz River Valley in the 1690s. Why is everything before the coming of Father Kino considered prehistoric?_____

9. What contributions did Father Kino make to the area known as San Cosme, as mentioned in the article? _____

10. Many of the prehistoric sites and the mission settlement were apparently destroyed during the 1950s and the 1960s. What happened? _____

_____

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Name _____

Read the article, "Learn more about Rio Nuevo development," and answer the following questions. You may want to read the questions first so you know what to look for when reading the article.

Learn more about Rio Nuevo development

By Paola Banchero *Arizona Daily Star,* 01/01/01

Rio Nuevo, painted only in broad brush strokes so far, will become clearer Wednesday when the public gets its first look at an early version of the $360 million plan for revitalizing downtown.

Developed by consultant Hunter Interests after a series of public meetings, the plan likely will call for a mix of entertainment and cultural offerings, such as parks and walkways, museums, theaters, restaurants, a convention hotel, housing and public gathering places in the 62-acre Rio Nuevo district.

The district abuts "A" Mountain, runs east past Interstate 10 through Downtown, then six miles down Broadway to include the El Con and Park Place malls.

Here are some details about the project that have emerged from public meetings since October:

- Plans for putting water in the usually dry Santa Cruz River would probably limit the flow to a small stream during most of the year, perhaps just a trickle during dry seasons.
- The west side of I-10 will have more natural open space, a cultural park flanked by greenery, and mixed-use development that may include housing. This is where a replica of 18th-century-era Mission San Agustín, along with a two-story convento and a granary, would be rebuilt.
- The arts and entertainment district and many of the cultural and visitors attractions will be on the east side of the highway, in the heart of Downtown.

The Wednesday forum begins at 6:30 p.m. at the Tucson Convention Center. A final version of the plan will be presented at a public hearing before the mayor and council on Feb. 27.

"As Rio Nuevo's plans are shaping up, it's clear we are going to be in the heart of the tourist part of Downtown," said Jane McCullom, vice president of MRO Management Inc., which manages La Placita Village, the Downtown retail office complex at Congress Street and Church Avenue.

McCullom, a member of the Rio Nuevo Citizens Advisory Committee, said the project must be economically sound and "Tucson-centric."

"It means Rio Nuevo has to represent Tucson's culture and heritage in an authentic way."

Carmen Villa Prezelski, another member of the advisory committee and a fifth-generation Southern Arizonan, crystallized that view when she urged that the project steer away from "Taco Bell meets Disneyland."

Rio Nuevo's planners have picked up on the expression.

"We want something that pays homage to the desert architecturally, that is Sonoran, not Californian mission revival or Santa Fe-an," Villa Prezelski said.

At neighborhood meetings, public forums and design workshops, Tucsonans have been asked what would make Downtown inviting, livable and enjoyable.

It's a process launched when voters in November 1999 approved the outline of Rio Nuevo plan, including funding through so-called tax-increment financing. That means setting aside for Rio Nuevo use some of the tax revenue raised within the Rio Nuevo area—including the two malls.

One-third of the money will come from this public source, with the remaining two-thirds from private investment.

Besides the public forums and meetings about Rio Nuevo, the 21-member citizens advisory committee has been hashing out its role in the process.

The group has regularly scheduled monthly meetings, but in recent weeks it has met more frequently to establish what criteria it will use to evaluate each proposal.

The open-ended dialogue of the meetings has heartened Tucson City Manager James Keene, who accepted the city manager job last year in part because he saw Rio Nuevo as the mechanism to bring Downtown back to life.

"I'm very optimistic about the way the public process is unfolding," Keene said.

Rio Nuevo's citizen guardians are aware that attractions must connect to each other or run the risk of failing, he added.

"If we cherry-picked projects and they were disconnected and all over the place, they wouldn't provide enough critical mass to convince the private sector to invest."

Anna Landau, who attended a two-day design workshop in early November with her family, recognizes that Rio Nuevo must have a commercial component to succeed.

"But it can't be the reason for the project," Landau said.

"It can't be a theme park," her sister Sonya Landau added.

Cele Peterson, their grandmother, had a fashion boutique Downtown for years and was one of the last to leave the area. If Tucson's Downtown is to thrive again, it has to be "a place the [sic] piques your interest and maintains it by encouraging exchanges with other Tucsonans," Anna Landau said.

Their comments were echoed in the public gatherings, where Rio Nuevo Project Director John S. Jones heard participants bemoan the loss of public spaces.

"I want to embrace this plan," Jones said, "and I want the people who see the plan to embrace it, to see that it is something that has come out of them, out of this dialogue we've been having, that it's their vision of the future."

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Name _____

"Learn More About Rio Nuevo Development"

1. The development plans for Rio Nuevo will likely call for a mix of entertainment and cultural offerings such as _____

2. How many acres will there be in the Rio Nuevo District? _____

_____

_____

3. The district abuts _____ Mountain, runs past Interstate _____, through Downtown, then _____ miles down Broadway, including the _____ and _____ Malls.

4. Details about the project include the following:

a. There are plans for putting _____ in the usually dry _____ River.

b. The west side of I-10 will have more _____ space, a cultural _____ flanked by _____ and mixed-use development may include _____

c. The arts and entertainment district and many of the cultural and visitors attractions will be on the _____ side of the highway, in the heart of the _____

5. A replica of the 18th century mission _____, along with a two-story _____ and granary, would be _____.

6. A member of the Rio Nuevo Citizens Advisory Committee said, "Rio Nuevo has to represent Tucson's _____ and _____ in an authentic way."

7. What do you think the above statement means? _____

_____

_____

8. What do you think would make the downtown area inviting, livable, and enjoyable? _____

_____

_____

Dr. Jonathan Mabry shows a cross section of an irrigation canal. Photo courtesy of Desert Archaeology, Inc.

Lesson 8

AN INTERVIEW WITH AN ARCHAEOLOGIST

New information gathered from the Rio Nuevo excavations is changing our knowledge of Tucson's history and prehistory. This interview was conducted with one of the archaeologists involved with the Rio Nuevo excavations.

GETTING STARTED

OBJECTIVES

- to provide students with the most up to date information regarding prehistory of the Tucson Basin
- to help students hone questioning and reading comprehension skills

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO1, PO2), 1SS-E2 (PO1, PO3, PO4, PO5), 3SS-E2 (PO4), 2SC-E2 (PO2), 2SC-E4 (PO1), 2SC-E5 (PO3), 2SC-E6 (PO1, PO2), 6SC-F8 (PO1, PO2, PO3), 6SC-E4 (PO1, PO2), R-E2 (PO2, PO7), W-E1 (PO1, PO2, PO3, PO4, PO5), W-E2 (PO2), W-E5 (PO1, PO2, PO3), W-E6 (PO1, PO3)

KEY WORDS

excavation
irrigation
ostracods
prehistory

MATERIALS

copies of interview for class

TIME

50–60 minutes

TEACHER'S CORNER

There are many possibilities to extend this lesson plan. Two students may be selected to role-play in front of the class. The class can be split into groups, with each group taking on one question or acting the roles for each question. Teachers may want to consider calling local archaeology firms to have an archaeologist speak to the class.

LESSON SETUP

The teacher decides whether to read the interview as a group project or for individual students. Copy "An Interview with an Archaeologist" and hand out to students. If the teacher has chosen to divide the class into groups, one copy per group is sufficient.

LESSON OUTLINE

1. The teacher asks students to read the interview as homework and be prepared to role play or discuss the next class period.

2. Ask students about the prehistory of the Tucson basin.
Questions to consider:
- **a.** Do we know what the climate was like?
- **b.** What types of animals lived in this area?
- **c.** What types of vegetation were there?
- **d.** Did anyone live in this area during prehistoric times?

PASS IT ON!

The following pages may be copied for individual handout or made into a transparency for class discussion. Teachers can assign the following activities for homework or classroom discussion. The teacher may want to assign each student one activity, or break class into teams and assign each team one activity.
NOTE: Letters can be written on an individual basis, or as a class or group project. Should the teacher decide to have each student write a letter, the possibility of receiving an answer improves **if all letters are not directed to one archaeologist.** Not all archaeologists will answer the same question in the same manner.

Name _____

AN INTERVIEW WITH AN ARCHAEOLOGIST

Interview with Dr. Jonathan B. Mabry, Friday, November 16, 2001
Senior Project Director, Desert Archaeology, Inc.

Interview by Kyle McKoy
Curatorial Assistant, Arizona Historical Society

Some people have no idea what the world of archaeology is or what archaeologists do. Others have very specific ideas. Some people think that archaeologists dig up dinosaur bones. Others think that archaeologists are treasure hunters who keep everything that they find. Thanks to some Hollywood movies, many people think that archaeologists travel the world, filling their lives with adventure and excitement around every turn. To find out what a real archaeologist does, I interviewed one.

Dr. Jonathan Mabry is an archaeologist who investigates the prehistoric past. At the time of this interview, he was employed by Desert Archaeology, Inc., in Tucson, Arizona, and working on the excavations for the Rio Nuevo Project. He investigates the people who lived in the Tucson Basin during prehistoric times. The information gathered from the excavations for Rio Nuevo has shed new light, not only on the history of the Tucson Basin, but also on the history of the entire region.

Interviewer • **What information about the prehistory of the Tucson Basin has been gathered from the recent excavations?**

Dr. Mabry In 1993, before the work began for Rio Nuevo, we began uncovering some large villages and learning more about an early farming culture that lived in this area during prehistoric times, long before the Hohokam culture. We knew very little about this earlier culture before. Since then, there's been a series of excavations of early farming villages right here in Tucson. Recently, we've been excavating some of these villages near downtown Tucson near the Santa Cruz River at the base of "A" mountain. The deeper we dig into the soil of the Santa Cruz River floodplain, the farther back we're pushing the dates of this culture. The most recent excavations for the Rio Nuevo Project have exposed a deeply buried site with pithouses, storage pits, grinding tools, pottery, ceramic figurines, and corn.We've been able to date many of the artifacts already. We've dated some corn and found that it's 4,000 years old! That's almost the oldest corn ever found in the Southwest. We also know that the pottery is the oldest pottery found in the Southwest. The pithouses we have uncovered are the oldest pithouses that have been found in southern Arizona. We're extending the origins of agriculture, village life, and pottery back in time much farther than we thought before.

Interviewer • **What did archaeologists believe before these discoveries?**

Dr. Mabry Before the 1980s, we thought that agriculture (cultivation of corn, beans, and squash) arrived from Mexico around 2,000 years ago. Since then, we discovered some earlier evidence of agriculture that pushed the dates back, and we realized that agriculture had arrived by at least 3,000 years ago. The most recent discoveries push the arrival of agriculture back to 4,000 years ago.

Interviewer • **What new information have you gathered from the recent excavations that has helped shed new light on the early farmers?**

Dr. Mabry The most exciting new information comes from finding canals that were built 3,000 years ago. They prove that canal irrigation goes back that far in the Sonoran Desert. Before this discovery, the oldest canals that had been found in the Southwest were 2,000 years old and were built by the Hohokam culture. For many decades a big question about the Hohokam has been, "How did they learn to build these huge canal systems?" We had no evidence of anything that looked like an earlier stage of development. With the discovery of canals in several locations that are between 2,000 and 3,000 years old, we've extended the history of irrigation technology much farther back in time and now we can see the evolutionary process. The most recent excavations done for Rio Nuevo at the base of "A" Mountain have uncovered some very large canals that date to about 2,500 years ago. What is interesting about them is that they are as big as the biggest Hohokam canals in this valley. We did not previously think that they were making canals that large that long ago.

Interviewer • **How can you tell the difference between an early farmer canal and a Hohokam canal?**

Dr. Mabry We only know the difference by dating them. We know that the recently discovered canals were built 2,500 years ago because we radiocarbon dated some charcoal that was found in them. In terms of time, the Hohokam culture did not develop until about 1,500 years ago, so these canals are about 1,000 years older than the Hohokam culture.

Interviewer • **What other information have you gathered from studying the canals?**

Dr. Mabry We can see the history of a canal by studying the sediments. When people think of a canal, they think of an empty ditch or a ditch that is filled with water. When archaeologists find a prehistoric canal, it is completely full of sediments. Some of the sediments are from water that was running in the canal for irrigation purposes, and some are from floods that filled the canal very quickly. These sediments have different appearances from different causes. We can look at the different layers of sediment in the canal and see its history. We can also learn about the

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canal by looking at the microscopic crustacean shells of organisms called ostracods (AH strah cods) preserved in the sediments. There are many different species of ostracod and each species survives under different environmental conditions, depending on their tolerance for temperature, velocity, and salinity of the water in which they live. So by identifying the species that are represented, we can identify whether the water source is from a river, water table, or spring. We can tell whether the water flowed continuously or only in brief surges. We can tell what season of the year the water was flowing in the canal. We can tell whether the canal dried out for periods of time, signaling perhaps that people were having trouble getting water.

Interviewer • **What types of artifacts are you finding from the early farmers and what does this tell us about their lifestyle?**

Dr. Mabry We've been very surprised to find that they were making pottery. We did not know that before. They were also decorating pots, not with paint, but with engraved markings. We find their hunting weapons—dart points with spear throwers. During the development of their culture, they started using the bow and arrow. With the discovery of their small arrowheads dating to about 2,500 years ago, we are pushing back the age of the bow and arrow in the Southwest by a thousand years. Previously it was believed that the bow and arrow was not used in the region until A.D. 500.

Interviewer • **The canals tell us that people were farming. What do the other artifacts tell us about their lifestyle?**

Dr. Mabry These are the first people in this part of the world to live in one place all year round. Before that, people were hunters and gatherers who had to move constantly to find food. We know these early farmers did not move around because they built houses and pits for storing foods. The storage pits allowed them to store harvested foods to get them through the wintertime, which meant that they did not have to move somewhere else to look for food. When people settle down in one place, they also have more free time. The presence of pottery, clay figurines, and stone smoking pipes tells us that these people had time to develop new types of objects and crafts. We have even found remains of tobacco in pipes, and this is the oldest evidence of tobacco use in North America.

Interviewer • **When did the early farmers live here?**

Dr. Mabry They lived here between 4,000 and 2,000 years ago.

Interviewer • **How are you certain that the early farming culture was different from the Hohokam culture? What are some telltale signs that these cultures were different and separate?**

Dr. Mabry First of all, the two cultures were separated by thousands of years in time.

Secondly, there are differences in their lifestyles; in how they built their houses, the type of pottery they made, and how they buried their dead. Even though they both made jewelry from seashells for which they traded, the kinds of jewelry they made are not the same. The two cultures cultivated crops, prepared, and ate wild foods in different ways. There are differences in the styles of projectile points they used and the baskets they wove. On almost every level we see differences between the two cultures. The only things they had in common were that they lived in pithouses, built canals, made pottery, and made jewelry out of seashells. The thing that makes us think that there may be some cultural continuity between the early farmers and the Hohokam culture is the irrigation canal technology. That knowledge was probably not lost over the generations. It is likely that the Hohokam culture did not invent this technology independently, but that they learned it from an earlier culture that passed along the knowledge.

Interviewer • **Why is the discovery of this early farming culture so important to the history of the Tucson Basin area?**

Dr. Mabry Before this series of discoveries, it was generally thought by archaeologists that the Santa Cruz River valley was an unoccupied area until the Hohokam culture expanded southward from the Phoenix Basin.We also thought that agriculture arrived in this part of the world much later in time. With these discoveries, we realized that the Santa Cruz River valley, and the other river valleys of southeastern Arizona, were the most densely inhabited areas of the Southwest between 2,000 and 4,000 years ago. These people preferred settlement along the river valleys because it was the best place to do their type of agriculture. The other parts of the Southwest did not have the same agricultural conditions as river valleys, and the earlier farmers did not know how to farm in other conditions yet. They developed those skills and techniques later. With agriculture, people were able to grow enough food to allow their populations to grow. The early farmers were the first to do many things in the Southwest. They lived in the first villages. They built the first canals, made the first pottery, and used the first bows and arrows. They did many things a lot earlier than most archaeologists thought before the discoveries in the last ten years right here in Tucson.

Interviewer • **Do you have any additional comments?**

Dr. Mabry I want to impress on the students that right here, in their hometown, over the last several years there have been a number of important scientific discoveries that have changed our understanding of the past. These discoveries have not simply changed our understanding of the prehistory of Tucson, but the entire prehistory of the Southwest, and have even changed things we knew about prehistory in North America.

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Name _____

ACTIVITIES FOR INTERVIEW WITH AN ARCHAEOLOGIST

- Imagine that you are one of the early farmers who lived in the prehistoric Tucson Basin area. Write a creative story about one day in your life. What crops did you plant? Where did you go to get water? How did you carry water? What animals do you see around you? Were there any dangers?

- The recent archaeological excavations have produced new information about the past. Write an essay about how these new discoveries have changed our ideas of the past and project how our ideas may change with new discoveries.

- Do you have any questions about archaeology or being an archaeologist? Write a letter to one of the archaeologists listed on the next page and ask your question.

Name _____

SOME ARCHAEOLOGISTS TO WRITE TO

Allen Dart
Old Pueblo Archaeology Center
P.O. Box 40577
Tucson, AZ 85717-0577
adart@oldpueblo.org
Area of expertise: water control and irrigation, southwest history and prehistory

Carol Ellick
Statistical Research, Inc.
P.O. Box 31865
Tucson, AZ 85751
Area of expertise: archaeology and public education

Doug Gann
Center For Desert Archaeology
300 East University, Suite 230
Tucson, AZ 85705
Area of expertise: applying computer technology to archaeology

India Hesse
SWCA, Inc.
343 South Scott Avenue
Tucson, AZ 85701
Area of expertise: Paleo-Indian and lithic technology

Jonathan B. Mabry
Desert Archaeology, Inc.
3975 North Tucson Blvd.
Tucson, AZ 85716
Area of expertise: prehistoric archaeology

J. Homer Thiel
Desert Archaeology, Inc.
3975 North Tucson Blvd.
Tucson, AZ 85716
Area of expertise: historical archaeology

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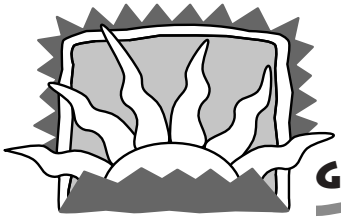
Lesson 9

FATHERS, FARMERS, AND FIGHTERS IN TUCSON

The Spanish priests, settlers, and soldiers came to the Tucson area and played an important role in shaping the culture of the area. Information found in the reading can be compared to the up to date information found on Desert Archaeology, Inc., web page: www.rio-nuevo.org and the City of Tucson's web page: www.ci.tucson.az.us/rionuevo



GETTING STARTED

OBJECTIVES

- to develop reading comprehension skills
- to explore the most up-to-date information on the Rio Nuevo excavations

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO1, PO2), 1SS-E2 (PO1, PO3, PO5) 1SS-E3 (PO1, PO3, PO4, PO5, PO6), 3SS-E2 (PO1, PO2, PO4), 6SC-E4 (PO1, PO2), R-E2 (PO2, PO4, PO5, PO6), W-E1 (PO1, PO2, PO3, PO4, PO5), Standard 4: Viewing and Presenting Essentials

KEY WORDS

conquistador
mission
presidio

MATERIALS

- One copy per student of readings in the **Pass It On!** Section.
- Computer access

TIME

60–120 minutes

TEACHER'S CORNER

The following activities should be done after students complete the reading.

ACTIVITIES

- Go to the web page (www.rio-nuevo.org) and take the virtual tour through the San Agustín Mission Complex.
- Go to the web page (www.rio-nuevo.org) to discover what archaeologists have uncovered from the Mission Complex during the Rio Nuevo excavations.

PASS IT ON!

The following pages should be copied for student handouts.

Cal Peters' painting of an 18th century Spanish expedition in Tubac. Can you identify the fathers, fighters, and farmers? Courtesy of Tumacácori National Historic Park Service.

Name _____

FATHERS, FARMERS, AND FIGHTERS IN TUCSON

When the Spanish conquistadors first came to what is now Arizona, they claimed a land that had been inhabited by people for thousands of years. The Indians living in southern Arizona called themselves Tohono O'odham (TOE-hoe-no AH-ah-tom) meaning, "the desert people." The Spaniards called them Papago, a Piman word meaning "bean eater," because the pods of mesquite beans were a staple food in their diet.

The O'odham and the Spaniards had very different lifestyles. The O'odham had adapted to living in the desert. They wore few clothes. They lived in houses made of mud and desert brush. Their houses were scattered about in small villages. They moved during the year to be near the best places for food and water. In the winter, they moved to higher areas where there were good springs and hunting. In the summer, they went to lower elevations to farm near the washes where they could divert summer rainwater into their fields. They also depended on wild plants that were available at different times of the year. The O'odham had different religious beliefs from those of the Spaniards.

In contrast, the Spaniards were used to permanent towns, wore clothing that completely covered the body, and believed in the Christian religion. They saw the O'odham life as uncivilized. The Spaniards wanted the O'odham to adopt Spanish customs, religion, and government so that they could become productive citizens of the Spanish Empire.

The O'odham people had several reactions to the arrival of the Spaniards. Some welcomed the arrival of the strangers. They hoped the Spaniards would join in the fight against the Apache groups that frequently warred with O'odham groups. Many accepted the new products like horses, cows, chickens, and winter wheat introduced by the Spaniards. On the other hand, some O'odham people resented the arrival of the Spaniards. They refused to cooperate and sometimes warred with the Spaniards.

The Spanish government sent priests, or missionaries, to convert the Indians to the Catholic religion. The priests established mis-

sions, or communities focused on the church. They encouraged, and sometimes forced, the O'odham to settle on lands around the missions. The priests taught the Indians new skills such as blacksmithing, how to plant new crops, and how to raise animals they brought from Europe. They even taught the O'odham people European-style music, dance, and clothing. In turn, the Indians provided labor to expand and operate the missions.

Father Eusebio Francisco Kino, an Italian Jesuit priest, was the first missionary to explore the Tucson area. He had already established a number of missions in northern Sonora. He arrived in southern Arizona in 1687, and within a few years, established missions along the Santa Cruz River. These included Tumacácori and the foundations for San Xavier del Bac. However, Father Kino's church at San Xavier was never completed. The present church was completed many years later in 1797.

Father Kino treated the Indians with respect, and they worked well with him. But some of the priests who came later did not get along as well. Some of the O'odham resented the treatment they received from the priests. In 1736, Spanish colonists found silver near a place called Arizonac (located today in northern Sonora). Spanish prospectors moved into the area to mine the silver. They clashed with the native peoples. As a result, in 1751 some of the O'odham rose up against the Spaniards.

The Spaniards and the O'odham also had a common enemy: the Apaches. Apache groups who lived nearby saw the growing herds of cattle as a new food source. They raided for cattle, horses, and other goods. People on both sides were sometimes killed in these raids.

To protect the missions, mines, and its northern border, the Spanish government established a line of walled forts, called presidios. The line stretched from what is now northern Sonora to Texas. Each presidio had a garrison of thirty to fifty soldiers. The soldiers wore thigh-length, heavy leather vests that protected them from enemy arrows. They fought on horseback with long lances. The soldiers lived with their families inside the forts.

Spanish colonists moved near the forts to farm. They provided

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the presidios with food. In turn, the soldiers protected the farmers and the missions from attack.

In the early 1770s, Father Francisco Garcés established a new mission at the foot of what we now call "A" Mountain. He preferred to minister to the O'odham living in the nearby village of Chukson rather than to the residents of Bac, and felt that they deserved their own mission. Chukson was near a good spring and fertile fields that the O'odham had been farming for many years. The priest named the mission San Agustín. The completed mission had a church, a residence for the priest, a granary, and gardens surrounded by a wall.

Five years later, the Spanish government decided to realign its string of presidios. This meant moving the presidio from Tubac to a location further north. They sent Lieutenant Colonel Hugo O'Conor, an Irishman working for the Spanish military, to claim the new site. Tucson was chosen because it had the Santa Cruz River for water, trees for constructing buildings, and good farmland. Also, it was near the San Agustín Mission and the O'odham village. The O'odham could provide labor to build the presidio and to farm the land. O'Conor called the new presidio San Agustín del Tucson. Tucson was the Spanish version of the name, Chukson. The community around San Agustín del Tucson grew as the soldiers, their families, and other colonists moved there. Together, the fathers, farmers, and fighters created interdependent communities on the northern frontier of New Spain.

The Spanish soldiers continued fighting the Apaches, but were unable to subdue them. Finally, they tried a new tactic. The Spaniards offered to give the Apaches food and other supplies, if they remained peaceful. This worked with some Apache groups. Some even settled near the presidio. The Spaniards called them Apaches de Paz, or peaceful Apaches. In 1804, they helped the Spaniards fight off other Apaches. But the peace did not last.

As time passed, people born in Mexico wanted their own government, free from Spanish rule, just as early east coast American colonists had decided to become independent from England. The Mexicans declared themselves free from Spain in 1811. They had to

fight a ten-year war before gaining their independence. The war left the Mexican government with little money and unable to pay its soldiers or to provide food for the Apaches. Without food, the Apaches began raiding again. Without government support, the missions and presidios had a hard time protecting themselves. Many people left.

Then, in 1822, the Mexican government expelled all Spaniards who remained loyal to the Spanish crown. Some of the people expelled were priests and soldiers. Because of the expulsion, few priests and soldiers remained to care for the missions and presidios. The San Agustín Mission was abandoned and soon fell into disrepair.

The San Agustín Mission complex was mentioned in a report written in 1843 by a justice of the peace. The report said that the mission's roof had caved in, the wood structures had rotted and fallen down, and the walls had split in many places. This report has been very useful for the modern archaeologists attempting to reconstruct how the mission looked in the mid-1700s, when it was an active community.

FATHERS, FARMERS, AND FIGHTERS IN TUCSON

Questions to Consider After Reading Text

1. How did the O'odham people living in the Tucson area react to the arrival of the Spaniards?

2. How did the lifestyles of the Spaniards differ from the lifestyles of the O'odham?

3. Describe how the Spanish mission system worked.

4. Why was the presidio in Tubac relocated to Tucson?

5. What types of artifacts might an archaeologist uncover if excavating the San Agustín Mission site?

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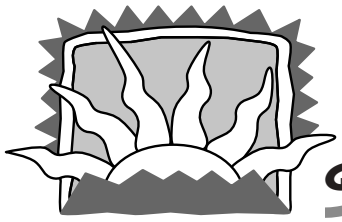
Lesson 10

THE CHINESE EXPERIENCE IN TUCSON

The Chinese immigrants that came to the American Southwest in the 1800s adapted to their new surroundings while maintaining some of their native culture. The in-class project has students looking at photographs and artifacts to see how immigrants adapted to their new home while maintaining their traditions.



GETTING STARTED

OBJECTIVES

- to look for historical clues and information found in photographs
- to make students aware of the contributions of the Chinese community to Tucson history

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO2), 1SS-E4 (PO2), 3SS-E2 (PO1, PO4), Language Arts Standard 4: Viewing and Presenting Essentials
Grades 6–8 Language Arts Standard 4: Viewing and Presenting Proficiency

KEY WORDS

discrimination
immigrant
prospector
segregation

MATERIALS

Copies of student handouts; one per student or student group

TIME

60 minutes

TEACHER'S CORNER

Many Chinese immigrants came to Arizona from California because of prejudice and exclusionary laws that hindered their ability to earn a living there. Not all immigrants, however, came from China through California. Some came from seaports in Mexico and then overland through Sonora.

Many Chinese immigrants first came to the Arizona Territory following the rush for gold. They worked as prospectors, reworking old Spanish claims. They originally encountered little trouble or resistance from the territorial residents. Their numbers were small and they were segregated into specific areas. As their numbers increased, Chinese immigrants began to experience discrimination. As early as 1878, there were territorial city ordinances forbidding the Chinese to work in the mines.

In 1880, the Southern Pacific Railroad reached Tucson, which brought even more Chinese immigrants. According to Lawrence Michael Fong's article, "Sojourners and Settlers: The Chinese Experience in Arizona," which appeared in the Autumn 1980 issue of the *Journal of Arizona History,* the 1880 United States census "lists 1630 Chinese residents, of which 1153 lived in Pima County, 159 of them in Tucson." The Chinese came in direct competition with Anglo and Mexican labor.

Anti-Chinese sentiment rose with the increase in numbers of Chinese immigrants. The United States government passed the Chinese Exclusion Act in 1882, banning further immigration of Chinese laborers. Those Chinese already in the country could remain, but they faced rising hostility and discrimination.

Upon completion of the railroad, many Chinese chose to remain in Tucson. They established restaurants, grocery stores, and other businesses. Some remained to labor as domestic servants and gardeners. The Chinese gardens provided territorial Tucson residents with fresh produce, which no other farmer felt was profitable enough to market.

LESSON SETUP

Make copies of handouts in **Pass It On!** Section for each student. Use information in **Teacher's Corner** section for an introduction to lesson.

LESSON OUTLINE

1. Ask students if any of them have ever moved from one home to another. Did they take everything with them? When they arrived at their new home, did they try new things that were common to the new area or did they keep doing things the way they always did before? Try to get students to see that if they moved, they probably kept some of their old habits, but they probably also adapted to their new area.
2. The teacher leads a class discussion on Chinese immigration to the Tucson area.
3. Pass out the handouts.
4. The teacher leads a class discussion as students answer questions that are printed on handout.
5. Have students compare the two photos. What do they see in the photos? What

do the two photos tell them about the life of a Chinese immigrant in territorial Tucson? *(The Charley Lee Grocery snapshot store photo; advertising in Spanish and English shows the target market of Anglos and Hispanics instead of other Chinese immigrants. Although the photo is in black and white, we can assume that the bunting on the front of the store is probably red, white, and blue and shows patriotism to the new country. Products sold include produce and baked goods, catering to the tastes of the local markets. Because this is a snapshot, it is a candid photograph of territorial Tucson. We do not know who took the photo.) (The Chun Wo family formal portrait has all the males in western wear and the females in eastern wear. Mrs. Wo was one of the first Chinese women in the Tucson area. Although Mr. Wo was adapting to his new country, he still went back to China to find a wife. Mrs. Wo's eastern wear illustrates her wish to maintain her identity with China. This is a formal portrait taken by an unknown photographer. Formal portraits are different from snapshots as they indicate the participant's willingness to pose for the photo. Because participants are willing subjects, they have time to plan what* they *will wear, how they will sit, where the photo will be taken. All of these decisions give us insight to the portrait subjects.)*

PASS IT ON!

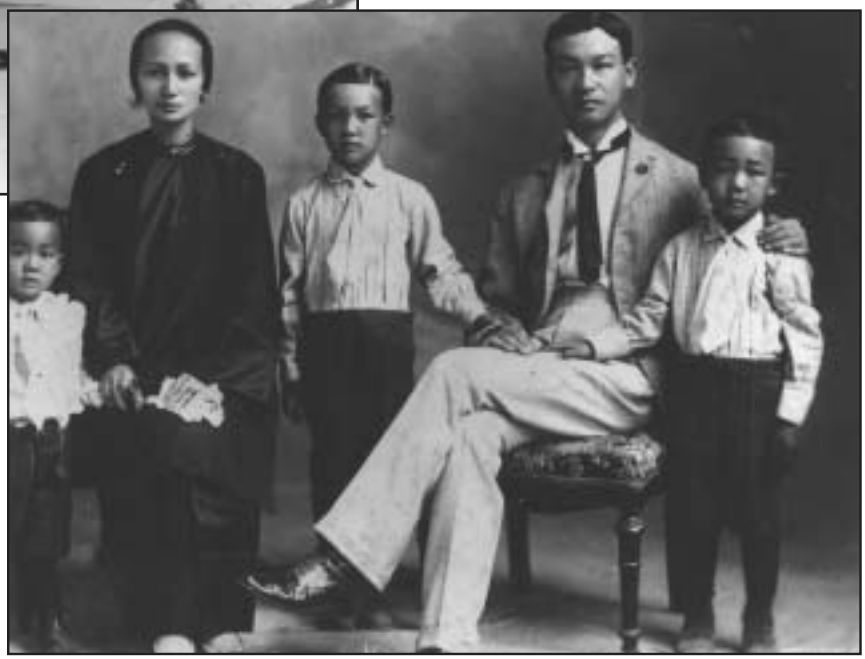
The following page is to be copied for student handouts.

Name _____

Look carefully at the photographs of Charlie Lee's grocery store and the Chun Wo family portrait. Then answer the following questions.

1. What clues help date these photos?
2. Why do you think each photo was taken? For example: Is it a formal portrait? A snapshot? Documentation of an event (like a newspaper photo)? Photographer's artistic expression?
3. What languages are on the banners on the Charlie Lee grocery store? What does this tell you about Charlie Lee's customers?
4. Even though the photo is black and white, what colors do you think the bunting (drapery) on the front of the store were? Why?
5. What cultures are represented in the dress styles worn by the Chun Wo family. Who is wearing which style? What does this tell you?
6. In what ways do both pictures show that these Chinese immigrants were adapting to an American culture?

Charlie Lee grocery store.
AHS #13298



Chun Wo family portrait
AHS #16532

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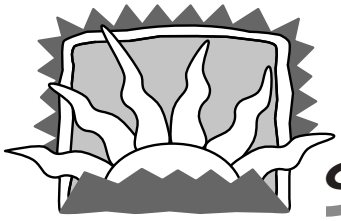
TERRITORIAL TUCSON: WATER RIGHTS

Lesson 11

A water rights trial that took place in Tucson in 1885 highlights how important the Santa Cruz River was to the residents. Students can either conduct a mock trial or perform a play illustrating the actual events.

Tucson's Chinese farmers continued selling fresh produce from the back of their wagons into the early 1900s. Note the fresh turnip the boy is eating. AHS #25728



GETTING STARTED

OBJECTIVE

To develop skills such as:

- Critical thinking
- Questioning
- Listening
- Cooperation
- Oral presentation
- Reading

STANDARDS ADDRESSED

Grades 4–5 1SS-E1 (PO1, PO2), 1SS-E4 (PO2), 3SS-E2 (PO1, PO2, PO4), R-E2 (PO2, PO4, PO5), R-E3 (PO2, PO3), R-P1 (PO2, PO3, PO4), Language Arts Standard 4: Viewing and Presenting Essentials Grades 6-8 R-E2 (PO1, PO2, PO4, PO5, PO7), R-E3 (PO1, PO3), Language Arts Standard 4: Viewing and Presenting Proficiency

KEY WORDS

acequia
agriculture
forage
huerta
irrigation
law of prior appropriation
lawsuit
maize
pithouse
produce
sedentary
storage pits
truck farming
zanjero

MATERIALS

- roles for each student
- copies of trial transcripts
- copy of student handout in **Pass It On!** Section, one per student

TIME

1–3 50-minute class periods, depending on extensions and details

TEACHER'S CORNER

For many years, parts of the Santa Cruz River near Tucson flowed year round. In the late 1880s, however, a combination of human and natural events caused the river to sink out of sight below ground. Territorial Tucson's dramatic increase in population, combined with a change in farming techniques, pumping more ground water, years of drought, overgrazing by cattle, and floods that destroyed some of the irrigation canals, set the stage for significant change.

LESSON SETUP

1. A mock trial should involve every student in the class. Students should be assigned specific roles, regardless of class size. In addition to the characters who are represented in the trial transcripts, other roles include judge and jury, clerk or bailiff, court artist, photographer (if you want to video or photograph the trial), and witnesses.
2. Copy and distribute to all the students the handout that gives the overview of the 1885 court case. This should be a take-home reading assignment in preparation for class discussion. The class discussion should be conducted after every student has had time to complete the reading assignment.
3. The teacher may choose to distribute the direct quotes from Excerpts from Trial Transcripts, or have students develop their own arguments based on the facts of the court case.
4. Students could be a jury and vote on a decision after mock trial is completed. After the vote, the teacher can reveal Judge F. M. Gregg's decision. Gregg decided in favor of the defendants basing his decision on the law of prior appropriation. Mexican American farmers did not document land ownership in the American manner, and therefore, could not produce viable documents in the courtroom to back up their land ownership claims. As a result of Gregg's decision, many Mexican American farmers were unable to continue farming due to lack of irrigation. Many lost their land to Anglos who had money to purchase the land from the struggling farmers.

ADDITIONAL SOURCES

Drake, Charles R. *Papers 1871–1895.* MS 0228, Box 20, Folder 13, Arizona Historical Society Library.

Sheridan, Thomas E. *Los Tucsonenses: The Mexican Community in Tucson, 1854–1941.* The University of Arizona Press: Tucson. 1997.

Sonnichsen, C.L. *Tucson: The Life and Times of an American City.* University of Oklahoma Press: Norman and London. 1987.

Students may also investigate by researching newspapers of this time (May 1885) at the local public library.

LESSON OUTLINE

1. Pass out student handout for take home reading assignment.
2. Lead class discussion about the reading.
3. Questions to consider for class discussion include:
   a. Where were the Chinese voices during the trial?

b. What happened to the Mexican American farmers as a result of this trial?
c. How did local newspapers cover the trial?
d. What does the newspaper coverage say about which side the papers supported?
e. What happened to the river environment as a result of the court's decision?
f. Discuss "law of prior appropriation" versus "tradition and cooperation" as these two terms apply to this trial.
g. Do you agree/disagree with Judge Gregg's ruling? Why or why not? How would you have ruled, and why?

7. Assign roles to each student.
8. Conduct mock trial or play.
9. Wrap up: We know the Santa Cruz River today as a dry riverbed that contains water only after heavy rains. It was not always like this. For centuries, people have been attracted to this area because of the fertile fields in which they planted their crops. It's hard for us to imagine the Santa Cruz River as having enough water to sustain farmland. This court case proves that it was not too long ago when farms flourished along the banks of the river. The water table dropped in very recent history, as a direct result of human actions. Wasteful water management, increased ground water pumping, and overgrazing by cattle, combined with natural occurrences like floods and droughts, led to the depletion of the Santa Cruz River.

PASS IT ON!

The following page(s) should be copied for student handouts.

Boys playing in the Santa Cruz riverbed, around 1900, with Convento Ruins in background. AHS #16532

Name _____

TUCSON WATER RIGHTS TRIAL

Agriculture along the Santa Cruz River is a long story of cooperation. The south-to-north flow of the Santa Cruz River varied from season to season and from year to year. Parts of the Santa Cruz near Tucson flowed ***perennially,*** or year round. A series of irrigation ditches, called ***acequias,*** brought water from the river to farmland. During the winter months, there was usually enough water for the winter crops of wheat and barley. But during the summer months, the Santa Cruz carried only enough water to grow ***fodder crops,*** or crops grown to feed animals. Generally, farmers would plant their main crop in the fall or winter and limit summer plantings to small gardens or fodder crops.

The seasonal patterns of the river caused Tucson area farmers to cooperate with each other so that everyone would receive enough water to grow their crops. All the farmers met each year to elect a ***zanjero*** (sahn HED o), or water judge, who made sure that the distribution of irrigated water was done fairly and equitably. This crop-growing pattern and water regulation system was preserved from the Spanish Colonial Period.

The farming system began to collapse as the population of Tucson grew. Newcomers from other areas of the country and from around the world tried to maintain their former lifestyles. The demand for fruits and vegetables drove farmers to abandon their traditional farming techniques. Vegetables and fruits require more water to produce than did the traditional winter wheat and barley crops. Traditional farmers were pitted against these new entrepreneurial farmers. The fight for control of the water had begun.

For many generations Mexican farmers had ***cultivated*** land, or planted crops, for personal use. They planted their gardens, called ***huertas*** (HWARE tahs), with winter grains, beans, chiles, onions, and melons. Huertas dotted the banks of the Santa Cruz River and were 25 or 30 feet square, with some as large as one acre.

In the early 1880s, a group of Chinese laborers that had been squeezed out of the railroad and mining industries came to Tucson and began ***truck*** farming. Truck farms raise produce for market, instead of for personal consumption. The Chinese had identified an untapped market: cultivating produce, or fruits and vegetables, for the growing Tucson population. Truck farmers sold their ***produce*** from the backs of wagons to restaurants and homes.

Truck farmers leased land mainly from Sam Hughes, Leopoldo Carrillo, and W.C. Davis; three prominent and politically active businessmen in Tucson. These three men were happy to rent farmland to the Chinese farmers. In addition to collecting rent for the land, they received a percentage of the profits that the farmers made selling produce. Although the Chinese gardens were small at first, by 1884 they had encompassed 100 acres along the Santa Cruz. By 1885, the fields covered 150 acres. The larger fields

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produced more crops. This meant more money for the farmers, which made more money for Hughes, Carrillo, and Davis.

Other gardens in the area also required irrigation. Bishop Salpointe and the Sisters of Saint Joseph grew produce for the convent and the hospital. Between the Mexican huertas, the Chinese gardens, and the church gardens, the strain on the water supply created problems and generated arguments among farmers in the Tucson area.

In 1883, Solomon Warner added to the strain on the water supply by building a dam for his flourmill. The dam drastically reduced the flow of water to farmers downstream. The farmers accused Warner of illegally restricting the flow and of wasting water because his irrigation gates leaked. The farmers downstream talked about filing a lawsuit against Warner.

Other people pointed to the truck farmers as the cause of Tucson's water problem. Many farmers felt that the Chinese fields had grown too large for the amount of water available. Chinese produce needed more water than traditional wheat and barley. The truck farmers also wanted to irrigate their fields more often than was customary, asking for water on a daily basis instead of just on weekends. Truck farmers were even accused of stealing water when they did not receive the amount for which they asked.

The final insult to downstream farmers came in 1885 when Hughes, Davis, and Carrillo appointed themselves water commissioners and gained complete control of water distribution. The new commissioners erected a stone-and-brush fence at the same site where a fence had previously existed. The first fence had been built only to keep animals and people out of farmland, and had nothing to do with water control. The original fence had been built so long ago that only the oldest residents of Tucson could remember it.

Zanjero W. A. Dalton quit his job when he heard about the impending lawsuit. Lorenzo Rentería became the new zanjero and, at the request of the water commissioners, notified farmers north of the fence that there would be no more water for them. As a result, downstream farmers filed their lawsuit to stop Warner, the Chinese farmers, Hughes, Davis, and Carrillo from using more than their share of the water supply.

During the trial, the defendants invoked the ***law of prior appropriation,*** which stated that older fields should receive water before the more recent fields. This rule was based on the principle of "first in time, first in right." The plaintiffs, on the other hand, relied on the traditional custom of water distribution. For generations, farmers had cooperated with each other. Water was distributed fairly, with each farmer receiving the same amount. When water was scarce, it went to the fields that needed it most. The trial lasted three days.

Name _____

EXCERPTS FROM TRIAL TRANSCRIPTS

SUIT OVER WATER RIGHTS ON THE SANTA CRUZ RIVER.

Drake, Charles R. Papers, 1871–1895, Box 20 Folder 13. MS 0228

Characters:

a. Mr. Stephens: attorney representing the plaintiffs (the ones filing the lawsuit)
b. Mr. Lovell: attorney representing the defendants (the ones the lawsuit was brought against)
c. W.A. Dalton: previous zanjero who had quit the job when the lawsuit was filed
d. Pedro Higuerra: one of the plaintiffs, a Mexican farmer
e. Francisco Munguía: one of the plaintiffs, a Mexican farmer

The portion of the transcript begins with Mr. Stephens (representing the plaintiffs) questioning W.A. Dalton (the previous zanjero).

Stephens Do you know whether any fields were irrigated above Lee's Mill?
Dalton There are fields irrigated above Lee's Mill, but not exactly from those same waters that we use.

Stephens Where did they get the water?
Dalton From the river up above.

Stephens Have those lands of yours any other source of supply of water except from the acequia?
Dalton No sir.

Stephens Can you raise crops on that land without irrigation?
Dalton NO [sic] sir.

Stephens Were you deprived of the water from these ditches on these lands?
Dalton I was told that I could not have any water unless there was a surplus; if there was any surplus available it would be turned down to any person to make it available.

Stephens Who told you that?
Dalton Leopoldo Carrillo.

Stephens What did Leopoldo tell you when you talked to him about the water?
Dalton Some days ago Mr. E.N. Fish and myself called upon him...to see him about this water. We had been informed by the water-overseer that there was no more water.

Stephens Who was the water-overseer?
Dalton The acting over seer was Rentería; Lorenzo Rentería.

Stephens Go on...
Dalton That there was no more water for the land below. We had a meeting and appointed a committee composed of Fish, C.S. Leon, and myself to wait on Mr. Hughes and Mr. Carrillo to see if we could get the water. We waited on him and we were told that the orders of the commissioners to the officer was "not to allow any water below the Lane unless there was a surplus, that

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when there was a surplus to turn the water down the ditch, and let the first get it that could." I told Mr. Carrillo that we were not begging for charity, that we only wanted what was our own, and if we could not get it by fair means, we would go to law.

Stephens Do you know the lands of Emilio Carrillo, Joaquín Ramon Telles, E.N. Fish, Lauderio Acedo, Pacheco, Cerilio S. Leon, and all the other plaintiffs as described in the complaint?

Dalton I do.

Stephens Where do these lands lie?

Dalton North of Sister's Lane. [presently St. Mary's Road]

Stephens I will ask you if any of them can be cultivated without water.

Dalton No sir.

Stephens What would happen to these lands without irrigation?

Dalton Complete failure.

Stephens What about priority of claim?

Dalton Some few claimed the prior right, three or four; and as I see could not determine which had the first right, I would tell the person that there was a provision or law in regard to when there was a scarcity of water, that the oldest should have it and I demanded them to show some official document and he who showed the oldest should be preferred.

Stephens Nobody showed you documents?

Dalton Mr. Hughes showed me a document dated 1817.

Stephens Do you know, Mr. Dalton, whether prior to this year, people living north of the land had a right to do equally with the people living south of the Lane?

Dalton Yes sir.

Stephens My object in introducing these notes is to show that there was no differences [sic] made between the parties living in the north of the hospital road and the people living south of it. I am offering this evidence to show that at that time, that it was an afterthought...I shall follow that up by showing that since these Chinese gardens have come to the front, that recently they have held meetings and have not called any of the people from the north side of the lane.

Stephens What was the trouble about the Chinese gardens?

Dalton They were getting too much water.

Stephens Where are these gardens?

Dalton On the southern side of Sister's lane [St. Mary's Road].

Stephens How long have they been in existence?

Dalton Some...two years and some only one.

Stephens What was the objection to the gardens?

Dalton They consumed too much water.

Stephens How much more did they use than an acre of wheat?
Dalton Over twice as much.

Stephens I am going to show that the gardens have been increased nearly every year; they are owned by these defendants, lying on the south of the road, and I will use that to show why the water is cut off, in my argument. I now offer an agreement signed by some of those land owners, not dated, signed by E.N. Fish, W.C. Davis, J. Telles, Cerilio Leon, Romero and various others to show that they banded themselves together for the purpose of objecting to the abuses of the Chinese gardens. I offer this agreement as tending to show the action of these people on that proposition, and also on the proposition of what became of the water.

Stephens I will ask from your experience in water matters whether there is sufficient quantity of water to irrigate the entire 1439 acres, if it is managed judiciously?

Dalton There has been within the last few months, and is now at present, sufficient water with proper management to more than make all the crops of wheat and barley, now growing on all of these lands. Last year, during my administration as water overseer, during the month of April, I irrigated all those lands then growing in wheat and barley, and there was not a single crop lost for want of water, and besides that, I irrigated all the Chinese gardens, and chili pepper patches on Sunday: sometimes one would be left, but when the hot weather comes on, it is not sufficient, because the supply diminishes, and the best management could not do it.

Stephens How often did the Chinese gardens require water?
Dalton Every week: they are wanting it every day and continuously, but they should have it once a week for the purpose of irrigating.

Stephens Do you know who the owners of the Chinese gardens are?
Dalton Mr. Leopoldo Carrillo . . . Mr. Davis, Mr. Samuel Hughes, Mr. Solomon Warner, and Mr. John Warner, and the Sisters of St. Joseph occupy a small patch, and the bishop owns a small patch occupied by a Mexican producing some kind of vegetables.

SECOND DAY (MAY 9, 1885)

Cross-examination by Mr. Lovell, the defendants' attorney. Mr. Lovell questions W.A. Dalton.

Lovell Did he [Leopoldo Carrillo] tell you that they [people north and south along the river] were equally entitled to it?

Dalton He made an objection to assisting all those lands equally; and I said, because you are old [Carrillo's farmlands are older] and we are young you claim the privilege. The only privilege that I admit you have is in your geographical position, you get the water first, but if you say that because we are young we should pay more, I said, as far as I am concerned, I will pay double, treble, five times as much, but let us have the water.

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Name _____

Redirect by Stephens

Stephens I want to ask you if you know, Counsel, talked to you about gardens, what is the difference, if you know, between a Chinese garden, such as it is cultivated in this valley and a Mexican garden?

Dalton The difference is this; the Chinaman raises cabbages, garlic, and in fact everything in the vegetable line from an artichoke to the biggest cabbage, and the Chinaman makes it a matter of business and he produces all he possibly can, and as often as he possibly can. The Mexican garden produces a few chili peppers, onions, garbanzo beans, water melons, &c. [etcetera] The gardens are from about 25 or 30 feet square to as much as an acre. They are called gardens or huertas.

Stephens Does the Mexican cultivate his garden as much as the Chinaman does?

Dalton No sir.

Stephens Is the Mexican garden merely an adjunct to his house or a matter of gain?

Dalton It is an adjunct to his home generally.

Testimony of Pedro Higuerra [plaintiff, Mexican farmer] when questioned by Mr. Stephens on May 11, 1885.

Stephens What was the custom as to water as far as you know?

Higuerra Well, the custom was to always divide the water wherever there was a necessity of it, if the parties below needed water it was sent down, if those from above needed it, it was stopped from above.

Testimony of Francisco Munguía [plaintiff, Mexican farmer] when questioned by Mr. Stephens on May 11, 1885.

Stephens How long have you been farming these lands?

Munguía For the last 20 years.

Stephens Have you or have you not raised crops every year on those lands down there?

Munguía Yes sir, I have raised gathered crops every year on those lands except this year, I have lost 14 quintals of seed.

Stephens Why have you lost it this year?

Munguía Because the gentlemen from above marked a line and cut the water off from that line; I did not know until they had made the line.

Stephens Do you know who those gentlemen are?

Munguía Leopoldo Carrillo, Samuel Hughes, Mr. Davis, and Rentería.

Stephens What has been the custom for the last 27 years to irrigating in those ditches?

Munguía We have been accustomed to use it, those above as well as those below, under the orders of a commission to be divided equally, impartially; and if any field suffered for water whether above or below that should have the water first.

TIME CAPSULE ACTIVITY

Lesson 12

Time capsules are a great way in which to bring together all the archaeological concepts and historical information gathered from the manual.

GETTING STARTED

OBJECTIVES

- concludes manual lessons
- provides a wrap-up for archaeological and historical concepts

MATERIALS

Turning Points in Tucson's History timeline or layered dessert handout from Lesson 2.

TIME

60 minutes

Photograph taken by Carlton Watkins from Sentinel Peak ("A" Mountain) in 1880, shows the agricultural fields that filled the bottomlands of the Santa Cruz River. The Convento and granary are visible near the center of the photo.

TEACHER'S CORNER

Historians and archaeologists work side by side to reconstruct the story of Tucson's past. Sometimes historical documents provide the clues that point archaeologists in the right direction. Other times, archaeologists uncover information missing from the historical record. On the occasions where the archaeological and the historical records differ, it is up to the history detectives to search for more evidence to discover the truth. The optimum situation occurs when both records coincide. To make the future historian's job easier, it is up to us to accurately document history as it happens.

LESSON SETUP

1. Divide the class into groups of three or four students.
2. Have each group select six objects to be put into a time capsule not to be opened until the year 3000. The goal of each group is to explain Tucson's history to people in the future. Students are to agree, as a group, on what are the most significant aspects for future historians to know.

LESSON OUTLINE

1. Begin a class discussion by reviewing the timeline of Tucson's history. Teachers may also opt to reproduce the "layers of Tucson history" transparency from Lesson 2 to use for review purposes.
2. What are the most important turning points in Tucson's history, in your opinion? Why?
3. What aspects of Tucson's history would you include in the Rio Nuevo Project?
4. Once the Rio Nuevo project is complete, what do you believe people in the future will think of it?
5. Imagine that all the historical records of Tucson have disappeared and that Tucson is abandoned for 1,000 years. What might people in the future think they have found if archaeologists uncover the Rio Nuevo buildings?
6. Do you think they might misinterpret some things? What might they misinterpret?
7. How would people reconcile having modern buildings of the 2000s among mission buildings of the 1700s and pithouses of the 1300s?
8. We are going to document our community's history to help future historians and archaeologists interpret Tucson history.
9. Break students into their groups.
10. Explain that they must come up with six items to include in a time capsule that will explain Tucson history to future generations.
11. Once the groups have decided on their six items, have each group select a spokesperson who will reveal the group's choices in front of the class. They must explain their choices and why they made them.
12. Once time capsules are completed, the class must decide what to do with them. Have the class investigate possibilities.

a. Consider burying the time capsules on your school property with instructions to future students on where they are buried and when they should open them.

b. What other ideas might the class have about where to store a time capsule?

PASS IT ON!

There are no handouts for this lesson plan.

A modern view of Tucson.

ARIZONA STATE STANDARDS ADDRESSED

SOCIAL STUDIES: HISTORY

Essentials

GRADES 4–5

1SS-E1. Understand and apply the basic tools of historical research, including chronology and how to collect, interpret, and employ information from historical materials.
PO 1. Place key events on a timeline.
PO 2. Identify primary and secondary sources historians use to construct an understanding of the past, including archaeological evidence.

1SS-E2. Describe the legacy and cultures of prehistoric American Indians in Arizona, including the impact of, and adaptations to geography, with emphasis on:
PO 1. How archaeological and anthropological research gives us information about prehistoric people.
PO 3. Development of agriculture with the domestication of plants.
PO 4. The distinctive cultures of Hohokam, including where they lived, their agriculture, housing, decorative arts, and trade networks.
PO 5. How prehistoric cultures adapted to, and altered, their environment, including irrigation canals and housing.
1SS-E3. Describe Spanish and Mexican colonization and economic, social, and political interactions with the first inhabitants of Arizona with emphasis on:
PO 1. The location and cultural characteristics of the O'odham and Apaches during the Spanish period.
PO 3. The reasons for Spanish colonization, including establishment of missions, presidios, and towns, and impact on native inhabitants.
PO 4. The contributions of Father Kino.
PO 5. The creation of unique, strongly held cultural identities from the Spanish and Indian heritage.
PO 6. The change of governance from Spain to Mexico.

1SS-E4. Describe the economic, social, and political life in the Arizona Territory and the legacy of various cultural groups to modern Arizona, with emphasis on:
PO 1. How Arizona became a part of the United States through the Mexican Cession and the Gadsden Purchase.
PO 2. The lives and contributions of various cultural and ethnic groups, including American Indians, Hispanics, and newcomers from the United States and other parts of the world [including Chinese].

SOCIAL STUDIES: GEOGRAPHY

Essentials

GRADES 4–5

3SS-E2. Describe the impact of interactions between people and the natural environment on the development of places and regions in Arizona, including how people have adapted to and modified the environment with emphasis on:
PO 1. The reasons for migration to, and the settlement and growth of Tucson, including mining, ranching, agriculture, and tourism.
PO 2. How places are connected by movement of people, goods, and ideas

including the connection of Mexico to Arizona.
PO 4. How people have depended on the physical environment and its natural resources to satisfy their basic needs, including the consequences of Arizona's adaptation to, and modification of the natural environment.

SCIENCE STANDARD 1: SCIENCE AS INQUIRY

Essentials

GRADES 4–5

1SC-E1. Identify a question, formulate a hypothesis, control and manipulate variables, devise experiments, predict outcomes, compare and analyze results, and defend conclusions.
PO1. Distinguish between a question and a hypothesis
PO2. Describe the functions of variables in an investigation
PO3. Predict an outcome based on experimental data
PO4. Draw a conclusion based on a set of experimental data
1SC-E3. Organize and present data gathered from their own experiences, using appropriate mathematical analyses and graphical representation.
PO1. Organize and present data into an appropriate format
PO2. Construct a representation of data (e.g., bar graph, line graph, frequency table, Venn diagram)

GRADES 6–8

PO1. Construct a representation of data(e.g., histogram, stem-and-leaf plot, scatter plot, circle graph, flow chart)
PO2. Interpret patterns in collected data

SCIENCE STANDARD 2: HISTORY AND NATURE OF SCIENCE

Essentials

GRADES 4–8

2SC-E2. Describe how science and technology are interrelated

GRADES 4–5

PO1. Describe how science has helped technology change over time
PO2. Describe how technology has helped science change over time

GRADES 6–8

PO1. Describe a technological discovery that influences science
PO2. Describe a scientific discovery that influences technology
PO3. Determine scientific processes involved in a technological advancement

2SC-E4. Identify characteristics of scientific ways of thinking

GRADES 4–5

PO1. Describe a variety of ways scientists generate ideas

GRADES 6–8

PO1. Describe the following scientific processes: observing, communicating, comparing, organizing, relating, inferring, and applying.

2SC-E5. Explain how scientific theory, hypothesis generation and experimentation are interrelated.

GRADES 4–5

PO1. Explain the role of a hypothesis in scientific inquiry
PO2. Explain the role of experimentation in scientific inquiry
PO3. Describe how a scientific theory can be developed and modified

GRADES 6–8

PO3. Explain how experimental results may affect a hypothesis and a theory
2SC-E6. Demonstrate how science is an ongoing process of gathering and

evaluating information, assessing evidence for and against theories and hypotheses, looking for patterns, and then devising and testing possible explanations.

GRADES 4–5

PO1. Explain how a scientific theory changed over time

PO2. Explain how a hypothesis changed over time

SCIENCE STANDARD 6: EARTH AND SPACE SCIENCE

Foundations

GRADES 4–8

6SC-F5. Identify major features of natural processes and forces that shape the earth's surface, including weathering and volcanic activity.

PO1. Identify natural forces (e.g., water, ice, wind) that shape the earth's surface

PO2. Identify natural processes (e.g., weathering, erosion, global warming) that gradually shape the earth's surface.

6SC-F8. Describe how fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at the time.

PO1. Identify how fossils provide evidence about plants that lived long ago

PO2. Identify how fossils provide evidence about animals that lived long ago

PO3. Explain how fossils of plants and animals provide evidence about the nature of the environment at that time

ESSENTIALS

6SC-E3. Describe the composition (including the formation of minerals, rocks, and soil) and the structure of the earth

GRADES 4–5

PO1. Describe the layers of the earth and their compositions

6SC-E4. Provide evidence of how life and environmental conditions have changed

GRADES 4–5

PO1. Describe how life has changed over time (geologic and recent)

PO2. Describe how environmental conditions have changed over time (geologic and recent)

6SC-E5. Explain how earth processes seen today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past

GRADES 4–5

PO1. Identify earth processes

PO2. Compare the processes which affect the earth today with those that occurred in the past

6SC-E6. Describe the distribution and circulation of the world's water through ocean currents, glaciers, rivers, ground water, and atmosphere

GRADES 6–8

PO1. Describe the role water plays within the operation of the earth

PO2. Describe the movement of water on the earth

LANGUAGE ARTS STANDARD 1: READING

Essentials

GRADES 4–8

R-E2. Use reading strategies such as making inferences and predictions, summarizing, paraphrasing, differentiating fact from opinion, drawing conclusions, and determining the author's purpose and perspective to comprehend written selections

GRADES 4–5
PO2. Distinguish fact from opinion
PO4. Compare and contrast the text (e.g., characters, genre, cultural differences, fact, fiction)
PO5. Determine cause-and-effect relationships
PO6. Identify the text in chronological, sequential or logical order
PO7. Make an inference using contextual clues

GRADES 6–8
PO1. Identify the main ideas; critical and supporting details; and the author's purpose, feelings and point of view of the text
PO2. Distinguish fact from opinion
PO4. Compare and contrast the text (e.g., characters, genre, cultural differences, fact, fiction)
PO5. Determine the cause-and-effect relationships
PO6 Summarize the text in chronological, sequential or logical order
PO7. Predict outcome of text

R-E3. Analyze selections of fiction, nonfiction and poetry by identifying the plot line (i.e., beginning, conflict, rising action, climax, and resolution); distinguishing the main character from minor ones; describing the relationships between and motivations of characters; and making inferences about the events, setting, style, tone, mood, and meaning of the selection

GRADES 4–5
PO1. Distinguish the main characters from the minor characters
PO2. Summarize the plot line to include cause and effect
PO3. Explain the interaction of major and minor characters in a selection

GRADES 6–8
PO1. Describe the setting and its relationship to the selection
PO2. Describe the motivation of major and minor characters in a selection
PO3. Draw defensible conclusions, based on stated and implied information according to style, meaning, and mood.
PO5. Identify the theme

Proficiency

GRADES 9–12
R-P1. Apply reading strategies such as extracting, summarizing, clarifying, and interpreting information; predicting events and extending the ideas presented; relating new information to prior knowledge; supporting assertions with evidence; and making useful connections to other topics to comprehend works of literature and documents
PO2. Summarize the main points
PO3. Make predictions based on evidence presented
PO4. Extend ideas presented in text

STANDARDS 2: WRITING

Essentials

GRADES 4–8
W-E1. Use correct spelling, punctuation, capitalization, grammar and usage, along with varied sentence structure and paragraph organization, to complete effectively a variety of writing tasks

GRADES 4–5
PO1. Spell correctly
PO2. Punctuate correctly (e.g., sentence endings, commas in a friendly letter's greeting and closing, commas in a series, abbreviations, quotations in dialog, apostrophe)
PO3. Apply rules of capitalization (e.g., sentence beginnings, titles, abbreviations, proper nouns)
PO4. Apply standard grammar usage (e.g., subject-verb agreement, simple and compound sentences, appropriate verb tense, plurals)

PO5. Organize paragraph with a variety of sentence structures (e.g., simple, compound)

GRADES 6–8

PO1. Spell correctly

PO2. Punctuate correctly (e.g., sentence endings, commas in a series, commas in compound sentences, abbreviations, quotation marks, colon in a business letter greeting, apostrophes)

PO3. Apply rules of capitalization (e.g., sentence beginnings, titles, abbreviations, proper nouns, direct quotations)

PO4. Apply standards grammar and usage (e.g., subject-verb agreement; simple, compound and complex sentences; appropriate verb tense; plurals; prepositions)

PO5. Organize paragraphs with a variety of sentence structures (e.g., simple, compound, complex)

W-E2. Write a personal experience narrative or creative story that includes a plot and shows the reader what happens through well-developed characters, setting, dialog, and themes, and uses figurative language, descriptive words and phrases

GRADES 4–5

PO2. Write a story

- develop a story line in a sequence that is clear
- develop the characters
- describe the setting
- use dialog when appropriate
- use descriptive words and phrases

GRADES 6–8

PO2. Write a story

- develop a story line in sequence that is clear
- develop the characters
- describe the setting
- use dialog when appropriate
- use simile, metaphor or descriptive words and phrases

W-E4. Write an expository essay that contains effective introductory and summary statements and fully develops the ideas with details, facts, examples, and descriptions

GRADES 6–8

PO1. Write an expository essay that begins by stating the thesis (purpose) with an effective introductory statement or paragraph; provides smooth transitions; and ends with either a paragraph concluding the development of the thesis, a summary, or a clincher statement

PO2. Use own words (except for quoted material) to develop ideas accurately and clearly with supporting details, facts, examples or descriptions

PO3. Use personal interpretation, analysis, evaluation or reflection to evidence understanding of a subject

W-E5. Write a report that conveys a point of view and develops a topic with appropriate facts, details, examples, and descriptions from a variety of cited sources

GRADES 4–5

PO1. Write a report in own words that states, develops, and provides a concluding statement for a point of view (perspective) about a topic that is narrow enough to be adequately covered

PO2. Use logical sequence (including transitional words and phrases such as first, next, then)

PO3. Provide support through facts, details, examples, or descriptions that are appropriate, directly related to the topic and from a variety of cited sources

GRADES 6–8

PO1. Write a report in own words (except for materials quoted) that states, develops

and provides a concluding statement for a point of view (perspective) about a topic that is narrow enough to be adequately covered

PO2. Organize a report with a clear beginning, middle, and end including use of smooth transitions

PO3. Provide support through facts, details, examples, or descriptions that are appropriate, directly related to the topic, and from a variety of cited sources

PO4. Use personal interpretation, analysis, evaluation, or reflection to evidence understanding of subject

W-E6. Write formal communications, such as personal or business letters, messages, directions, and applications, in an appropriate format and for a specific audience and purpose

GRADES 4–5

PO1. Write a formal communication in an appropriate format for a specific audience and purpose

PO3. Express ideas that are clear and directly related to the topic

GRADES 6–8

PO1. Write a formal communication in an appropriate format for a specific audience and purpose

PO3. Express ideas that are clear and directly related to the topic

STANDARD 3:
LISTENING AND SPEAKING

Essentials

GRADES 4–8

- Prepare and deliver an oral report in a content area and effectively convey the information through verbal and nonverbal communications with a specific audience
- Interpret and respond to questions and evaluate responses both as an interviewer and interviewee

STANDARD 4:
VIEWING AND PRESENTING

Essentials

GRADES 4–8

- Analyze visual media for language, subject matter, and visual techniques used to influence opinions, decision making and cultural perceptions

Proficiency

GRADES 9–12

- Analyze and evaluate visual media for language, subject matter, and visual techniques used to influence attitudes, decision making, and cultural perception

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ADDITIONAL RESOURCES

TUCSON FIELD TRIP DESTINATIONS

Arizona Historical Society Main Museum
949 East Second Street
Tucson, AZ 85719
(520) 628-5774
Arizona history tours. Special hands-on exhibit featuring 1870s Tucson

AHS Downtown History Museum
Wells Fargo Building
140 North Stone
(520) 770-1473
History of downtown and neighborhoods

AHS Fort Lowell
2900 North Craycroft
(520) 885-3832
Local military history

AHS Sosa-Carrillo-Fremont House
151 South Granada
(520) 622-0956
Historic house museum

Arizona State Museum
University of Arizona Campus
(520) 621-9434
Call late afternoon, leave message
Paths of Life exhibit features Native American groups of the Southwest.
Prehistory tours also available.

Casa De Cordoba
Tucson Museum of Art
140 North Main Avenue
Tucson, AZ 85701
(520) 624-2333
Historic house museum tours

Museum of the Horse Soldier
6541 East Tanque Verde Road
(520) 296-4551
History of Calvary

Old Pueblo Archaeology Center
1000 East Fort Lowell
Tucson, AZ 85717
Classroom excavations

Tohono Chul Park
7366 North Paseo Del Norte
Tucson, AZ
(520) 575-8468
Nature trails, demonstration gardens, exhibits

Tucson Botanical Gardens
2150 North Alvernon Way
Tucson, AZ
(520) 326-9255
Sonoran Desert plants

SPEAKERS

Arizona Historical Society
"History to Go"
949 East Second Street
Tucson, AZ 85719
Contact: Education Department
(520) 628-5774
Spanish Settlement in Arizona, Women in Early Arizona, Territorial Children, Mountain Men, Apaches in Arizona

Daniel Preston
Native American Consultant For Cultural Resources
2380 West San Xavier Road
Tucson, AZ 85745
Fax: (520) 578-3402; Cell: (520) 444-3290
Tohono O'odham history, archaeological issues from Native American perspective

ARCHAEOLOGY FIRMS

THAT CAN PROVIDE FIELD TRIPS AND SPEAKERS

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