

bulletin of the
Texas Archeological Society

Volume 51 Published by the Society Lubbock, Texas 1980



TEXAS ARCHEOLOGICAL SOCIETY

The Society was organized and chartered in pursuit of a literary and scientific undertaking: the study of man's past in Texas and contiguous areas. The *Bulletin* offers an outlet for the publication of serious research on history, prehistory, and archeological theory. In line with the goals of the Society, it encourages scientific collection, study, and publication of archeological data.

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Bulletin of the
TEXAS ARCHEOLOGICAL SOCIETY
Volume 51/1980

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Cover design by Gerald Urbantke

PUBLISHED BY THE SOCIETY AT LUBBOCK, TEXAS
1980



Table of Contents

Papers

Archeological Investigations at the Thomas F. McKinney Homestead, Travis County, Texas: An Experiment in Historical Archeology Part I Michael McEachern and Ronald W. Ralph	5
Appendix A — A General Introduction to the Vegetation and Dominant Plant Communities of the McKinney Homestead, Travis County, Texas David H. Riskind	128
Appendix B — Gastropods of the McKinney Homestead (41TV289), McKinney Falls State Park, Travis County, Texas Raymond W. Neck	136
Appendix C — Investigations at the Horse Trainer's Cabin (41TV307), McKinney Falls State Park Art Black	140
Appendix D — Texas Parks and Wildlife Department Excavations at the McKinney Homestead (41TV289): Description of House Artifacts and Recommendations for Architectural Reconstruction Michael McEachern and Ronald W. Ralph	146
Appendix E — Chemical Analysis of Sediments Elaine Burleigh	162
Appendix F — Texas Archeological Society Field School Excavations at the McKinney Homestead Norma Hoffrichter	164
Appendix G — Cistern One Glass Nancy Boice	168
Hypothesis Testing and Historic Preservation at Bear Creek Shelter, Hill County, Texas Mark J. Lynott	209
Marks Beach, Stratified Paleoindian Site, Lamb County, Texas: Preliminary Report Kenneth Honea	243
The Material Evidence of Texas History Daniel E. Fox	271

Notes

- Attributes of Experimental Folsom Points and Channel Flakes
J.B. Sollberger and L.W. Patterson 289
- Notes on Trace Element Analysis of Obsidian from Hutchinson
and Roberts Counties in the Texas Panhandle
Jimmy L. Mitchell, Thomas R. Hester, Frank Asaro, and Fred Stross 301
- The Significance of Dart Point Stem Breakage
L.W. Patterson 309
- Transport of Cultural and Non-Cultural Materials by Texas
Woodrats: Examples and Archeological Implications
Thomas R. Hester and T.C. Hill Jr. 317

Reviews

- A Travel Guide to Archaeological Mexico*, Robert D. Wood
Eunice Barkes 325
- Ethnographic Notes on Indian Groups Associated with Three
Nations in Guerrero, Coahuila*, Thomas N. Campbell
Kathleen K. Gilmore 325
- Documentary Sources for the Wreck of the New Spain Fleet
of 1554*, David McDonald and J. Barto Arnold III
T.N. Campbell 327

- Authors** 329

Archeological Investigations at the Thomas F. McKinney Homestead, Travis County, Texas: An Experiment in Historic Archeology Part I

Michael McEachern and Ronald W. Ralph

ABSTRACT

The Thomas F. McKinney homestead and mill complex represents an upper class Anglo rural occupation dating after the Texas Republic Period (1850's) with subsequent occupation by rural blacks. Pedestrian survey, archeological prospecting, and excavation by the Texas Archeological Society Field School and Texas Parks and Wildlife personnel defined prehistoric occupations and historic structures along with background, historical, and environmental data. Some prospecting techniques revealed probable additional archeological features. Survey and excavation data helped minimize site damage during development of McKinney Falls State Park.

INTRODUCTION

Early in 1974, the Texas Archeological Society approached the Texas Department of Parks and Wildlife about the possibility of conducting one of their annual field schools in a state park. The Department responded favorably and suggested that the field school be conducted at McKinney Falls State Park located about 7 mi southeast of Austin, Texas, in Travis County. The park, named after an important hero of the Texas Revolt, was not yet open to the public and under development. Park planners considered the investigation, preservation, and interpretation of the historic McKinney homestead and mill ruins a primary objective of the interpretive program. This objective became the focus of activity at the field school.

The 1974 Texas Archeological Society field school at McKinney Falls State Park was envisioned as experimental. It was a social experiment which attempted to demonstrate that teaching, professional archeology, and amateur archeology could be combined to provide a viable service for the Texas Parks and Wildlife Department. It also was a series of experiments in historical archeology. The field school was divided into several sections, each with its own research design and objectives. These goals were set forth in a guide distributed at the beginning of the field school (Ralph and McEachern, 1974).

The first experiment, prospecting, explored the relationship between several methods of detecting archeological features without resorting to excavation. The second experiment, house excavation, was conventional excavation with a sample predictive model. The third experiment, cistern excavation, attempted to explore the value of recent faunal collections from historic sites. The fourth experiment, mill excavations, was a duplicate of the second on a different structure. The fifth experiment, Cistern Two, started a long term study of the rate of environmental processes. Other sections of the field school (mapping, photography, laboratory, and site survey) provided necessary services and additional background information.

ENVIRONMENTAL NOTES

Geology

Geological information on McKinney Falls is based on work by Young (1977). Various members of the Austin Formation can be recognized in a geological section through the lower falls (Young et al., 1975: 5A). Starting at the bottom of the section at stream level and proceeding upward, three members, pyroclastic, McKown, and Pflugerville, are overlaid by about 1 m of Quaternary gravel. The pyroclastic member consists primarily of green clay (an iron bearing montmorillonite); it does not have formal nomenclatural status. The pyroclastic materials were deposited as volcanic ash falling into marine waters. Of the six known separate explosion craters, Pilot Knob, located 2 mi to the southeast, produced the greatest amount of pyroclastic material.

The McKown Member type locality, an old quarry 2 mi downstream from the lower falls, is composed primarily of beds of calcarenitic limestone. This member represents the beach facies around the old Pilot Knob volcano. An old beach berm was preserved and exhumed just above the lower falls. The Pflugerville Member type locality (Pflugerville, Texas) consists of limestones deposited under shallow marine conditions as shown by the numerous oysters present. The member contains one of the finest foraminiferal faunas in the Texas Cretaceous.

The geology forms the framework of the physiographic setting and provided resources which attracted man to the area. The montmorillonites of the pyroclastic member consist of alumina and silica sheets stacked with opposing oxygen layers, forming a weak bond with distinctive cleavage where water causes expansion (Shepard, 1965:375-377). As a result, pyroclastic rocks weather more rapidly than the McKown Member limestones, leaving the limestones as the basic structure of the falls.

The montmorillonites probably were exploited by the Indians who used it as a diet supplement (Newcomb, 1961:42). Experiments showed that montmorillonite is easily carved and could have been used to fashion artifacts. However, due to the weak bond in montmorillonite, which expands when wet, such artifacts could not be expected to preserve in most archeological sites.

Numerous chert nodules, found in the park, are eroded out of the Edwards Formation limestone located west of the park. The chert is of exceptionally fine quality which can be readily flaked. The McKown Member limestones provide an excellent building material which can be sawed or

handchiseled. The McKinney House and Mill are constructed of this material.

Faunal Checklist

A checklist of animals (Table 1) which may occur at McKinney Falls State Park or occurred there during historic times is based on actual faunal records from Travis and surrounding counties (Kutac and Caran, 1976). The presence of *Eurycea latitans* is from the BITE file (Biological Investigation of Troglitic Eurycea) of the Texas Speleological Survey (Austin). The bird checklist (Table 2) is taken from actual sightings in the park (Kutac and Riskind, 1977).

Faunal Observations

A faunal observation sheet was posted at the field laboratory for participants of the field school to record their sightings. An effort was made to collect specimens, bring them to the lab where they were keyed to species, and then released (Table 3). Several species were observed indirectly. *Meleagris gallopavo* (turkey) and *Canis latrans* (coyote) were heard vocalizing; skunk was identified by its distinctive odor. *Cryptotis parva* (least shrew) and *Procyon lotor* (raccoon) were identified by recent skeletal remains.

Vegetation and Snail Fauna

Plant communities and snail fauna of the McKinney Homestead are discussed in appendices A and B.

CULTURAL SETTING

By the 1750's, travelers on the San Antonio to Nacogdoches road, the Camino Real, were passing about 15 mi southeast of the park; but these Spanish travelers never settled the land. It was not until the 1830's when land was available to Anglo colonists that the area began to be settled. Bastrop in 1837 was the largest town east of the frontier (Roberson, 1972:35), being a settlement of only a few families. By 1840, communities were established in Austin and Comanche (at the mouth of Onion Creek). In August, 1840, the battle of Plum Creek decimated the Comanches, and pushed them westward beyond the Balcones Escarpment (Webb and Carol, 1952:307).

Travis County was created in 1840 and had sufficient population to organize in 1843 (Texas Almanac, 1978:355). A population increase occurred between 1840-50, which resulted in Hays County being created out of the southern part of Travis County in 1848. Population has reached 3,138 by 1850 in Travis County. Bastrop County had 3,099 and the newly created Hays County boasted 387 inhabitants. The small communities of Driftwood, San Marcos, Manchacha Springs, and Wimberley were established by 1850. Austin was the capital of Texas and the closest large town to McKinney's homestead (Texas Almanac, 1978:185-187).

The 1850 U.S. Census for Travis County lists McKinney as a stock raiser was \$10,000 worth of real estate (Schedule 1, Roll 915). At this time, McKinney had 14 slaves on his homestead. His brother James, a nearby farmer, was holding 10 slaves (Schedule 2, Roll 918).

By 1860, six free inhabitants (Thomas and Anna McKinney, his mother

Table 1
Checklist of McKinney Falls State Park Fauna

Species	Common Name	Local Status
AMPHIBIANS		
<i>Ambystoma texanum</i>	Small-mouthed Salamander	uncommon
<i>Ambystoma tigrinum</i>	Tiger Salamander	rare or uncommon
<i>Plethodon glutinosus</i>	Slimy Salamander	common
<i>Eurycea neotenes</i>	Texas Salamander	common
<i>Eurycea latitans</i>	Cave Salamander	rare
<i>Scaphiopus holbrooki</i>	Eastern Spadefoot	common
<i>Scaphiopus couchi</i>	Couch's Spadefoot	common
<i>Hylactophryne augusti</i>	Barking Frog	rare
<i>Syrnhophus marnocki</i>	Cliff Frog	common
<i>Bufo woodhousei</i>	Woodhouse's Toad	uncommon
<i>Bufo valliceps</i>	Gulf Coast Toad	abundant
<i>Bufo speciosus</i>	Texas Toad	common
<i>Bufo punctatus</i>	Red-spotted Toad	common
<i>Bufo debilis</i>	Green Toad	common
<i>Acris crepitans</i>	Cricket Frog	abundant
<i>Hyla cinerea</i>	Green Treefrog	common
<i>Hyla chrysoscelis</i>	Southern Gray Treefrog	common
<i>Pseudacris clarki</i>	Spotted Chorus Frog	common
<i>Pseudacris streckeri</i>	Strecker's Chorus Frog	common
<i>Gastrophryne olivacea</i>	Great Plains Narrow-mouthed Toad	common
<i>Rana catesbeiana</i>	Bullfrog	common
<i>Rana berlandieri</i>	Rio Grande Leopard Frog	abundant
<i>Rana utricularia</i>	Southern Leopard Frog	abundant
REPTILES		
<i>Alligator mississippiensis</i>	American Alligator	rare or historic
<i>Chelydra serpentina</i>	Common Snapping Turtle	common
<i>Sternotherus odoratus</i>	Stinkpot	abundant or common
<i>Kinosternon subrubrum</i>	Mississippi Mud Turtle	uncommon or rare
<i>Kinosternon flavescens</i>	Yellow Mud Turtle	common
<i>Terrapene carolina</i>	Eastern Box Turtle	uncommon
<i>Terrapene ornata</i>	Western Box Turtle	common
<i>Graptemys versa</i>	Texas Map Turtle	uncommon
<i>Chrysemys scripta</i>	Red-eared Turtle	abundant or common
<i>Chrysemys concinna</i>	River Cooter	uncommon or rare
<i>Trionyx spiniferus</i>	Spiny Softshell	common
<i>Hemidactylus turcicus</i>	Mediterranean Gecko	rare, introduced
<i>Anolis carolinensis</i>	Green Anole	abundant
<i>Crotaphytus collaris</i>	Collared Lizard	uncommon
<i>Holbrookia texana</i>	Greater Earless Lizard	common
<i>Holbrookia lacerata</i>	Spot-tailed Earless Lizard	uncommon or rare
<i>Sceleoporos olivaceus</i>	Texas Spiny Lizard	abundant
<i>Sceleoporos undulatus</i>	Fence Lizard	uncommon
<i>Urosaurus ornatus</i>	Tree Lizard	common
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	common
<i>Cnemidophorus gularis</i>	Spotted Whiptail	common
<i>Cnemidophorus sexlineatus</i>	Six-lined Racerunner	uncommon
<i>Leiopisma laterale</i>	Ground Skink	common
<i>Eumeces obsoletus</i>	Great Plains Skink	rare ?
<i>Eumeces tetragrammus</i>	Short-lined Skink	uncommon
<i>Ophisaurus attenuatus</i>	Slender Glass Lizard	uncommon or rare
<i>Gerrhonotus liocephalus</i>	Texas Alligator Lizard	common
<i>Leptotyphlops dulcis</i>	Texas Blind Snake	common

Species	Common Name	Local Status
<i>Natrix rhombifera</i>	Diamondbacked Water Snake	common
<i>Natrix erythrogaster</i>	Yellowbellied Water Snake	common
<i>Natrix fasciata</i>	Broad-banded Water Snake	common
<i>Storeria dekayi</i>	Texas Brown Snake	common
<i>Thamnophis sirtalis</i>	Texas Garter Snake	uncommon
<i>Thamnophis marcianus</i>	Checkered Garter Snake	common
<i>Thamnophis cyrtopsis</i>	Black-necked Garter Snake	common
<i>Thamnophis proximus</i>	Western Ribbon Snake	abundant or common
<i>Tropidoclonion lineatum</i>	Lined Snake	uncommon
<i>Virginia striatula</i>	Rough Earth Snake	common
<i>Virginia valeriae</i>	Smooth Earth Snake	uncommon or rare
<i>Heterodon platyrhinos</i>	Eastern Hognosed Snake	common
<i>Diadophus punctatus</i>	Ringnecked Snake	uncommon or rare
<i>Coluber constrictor</i>	Racer	common
<i>Masticophis flagellum</i>	Coachwhip	common
<i>Masticophis taeniatus</i>	Striped Whipsnake	common
<i>Ophiodrys aestivus</i>	Rough Green Snake	common
<i>Salvadora grahamiae</i>	Texas Patch-nosed Snake	common
<i>Elaphe guttata</i>	Great Plains Rat Snake	common
<i>Elaphe obsoleta</i>	Rat Snake	common
<i>Pituophis melanoleucus</i>	Bullsnake	uncommon
<i>Lampropeltis getulus</i>	Kingsnake	rare or uncommon
<i>Lampropeltis triangulum</i>	Milk Snake	uncommon or rare
<i>Lampropeltis calligaster</i>	Prairie Kingsnake	uncommon
<i>Rhinocelchus lecontei</i>	Texas Long-nosed Snake	uncommon
<i>Sonora episcopa</i>	Ground Snake	common
<i>Tantilla gracilis</i>	Flat-headed Snake	common
<i>Micrurus fulvius</i>	Texas Coral Snake	common
<i>Agkistrodon contortrix</i>	Copperhead	common
<i>Agkistrodon piscivorus</i>	Western Cottonmouth	uncommon
<i>Crotalus atrox</i>	Western Diamondback	
	Rattlesnake	common
<i>Crotalus molossus</i>	Black-tailed Rattlesnake	uncommon or rare

MAMMALS

<i>Didelphis marsupialis</i>	Opossum	abundant
<i>Notiosorex crawfordi</i>	Desert Shrew	possible
<i>Cryptotis parva</i>	Least Shrew	possible
<i>Blarina brevicauda</i>	Shorttailed shrew	historic
<i>Scalopus aquaticus</i>	Eastern Mole	uncommon
<i>Mormoops megalophylla</i>	Leafchin Bat	possible
<i>Myotis velifer</i>	Cave Myotis	uncommon
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	possible
<i>Pipistrellus subflavus</i>	Eastern Pipistrel	uncommon
<i>Eptesicus fuscus</i>	Big Brown Bat	possible
<i>Lasiurus borealis</i>	Red Bat	common
<i>Lasiurus seminolus</i>	Seminole Bat	uncommon or rare
<i>Lasiurus cinereus</i>	Hoary Bat	rare
<i>Lasiurus intermedius</i>	Eastern Yellow Bat	rare
<i>Nycticeius humeralis</i>	Evening Bat	uncommon
<i>Tadarida brasiliensis</i>	Mexican Freetailed Bat	abundant
<i>Dasyypus novemcinctus</i>	Nine-banded Armadillo	common
<i>Sylvilagus floridanus</i>	Eastern Cottontail	abundant
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	uncommon or rare
<i>Lepus californicus</i>	Black-tailed Jack Rabbit	abundant
<i>Sciurus niger</i>	Fox Squirrel	abundant
<i>Spermophilus mexicanus</i>	Mexican Ground Squirrel	abundant
<i>Spermophilus variegatus</i>	Rock Squirrel	common

Species	Common Name	Local Status
<i>Glaucomys volans</i>	Southern Flying Squirrel	rare
<i>Geomys burarius</i>	Plains Pocket Gopher	uncommon
<i>Perognathus merriami</i>	Merriams' Pocket Mouse	possible
<i>Perognathus hispidus</i>	Hispid Pocket Mouse	abundant
<i>Castor canadensis</i>	Beaver	uncommon or rare
<i>Reithrodontomys montanus</i>	Plains Harvest Mouse	common
<i>Reithrodontomys fulvescens</i>	Fulvous Harvest Mouse	common
<i>Peromyscus maniculatus</i>	Deer Mouse	uncommon
<i>Peromyscus leucopus</i>	White-footed Mouse	abundant
<i>Peromyscus boylei</i>	Brush Mouse	possible
<i>Peromyscus pectoralis</i>	White-ankled Mouse	common
<i>Baiomys taylori</i>	Pygmy Mouse	uncommon
<i>Sigmodon hispidus</i>	Hispid Cotton Rat	abundant
<i>Neotoma floridana</i>	Eastern Woodrat	rare
<i>Microtus pinetorum</i>	Pine Vole	historic
<i>Rattus norvegicus</i>	Norway Rat	common, introduced
<i>Rattus rattus</i>	Black Rat	abundant, introduced
<i>Mus musculus</i>	House Mouse	abundant, introduced
<i>Erethizon dorsatum</i>	Porcupine	rare
<i>Myocastor coypus</i>	Nutria	uncommon, introduced
<i>Canis latrans</i>	Coyote	uncommon or rare
<i>Canis lupus</i>	Gray Wolf	historic
<i>Canis niger</i>	Red Wolf	historic
<i>Vulpes vulpes</i>	Red Fox	rare
<i>Urocyon cinereoargenteus</i>	Gray Fox	common
<i>Ursus americanus</i>	Black Bear	historic
<i>Bassariscus astutus</i>	Ringtail	common
<i>Procyon lotor</i>	Raccoon	abundant
<i>Mustela frenata</i>	Long-tailed Weasel	rare
<i>Mustela vison</i>	Mink	rare
<i>Taxidea taxus</i>	Badger	historic
<i>Mephitis mephitis</i>	Striped Skunk	abundant
<i>Spilogale putorius</i>	Eastern Spotted Skunk	rare
<i>Conepatus mesoleucus</i>	Hog-nosed Skunk	uncommon
<i>Lutra canadensis</i>	River Otter	rare or historic
<i>Felis onca</i>	Jaguar	historic
<i>Felis pardalis</i>	Ocelot	historic
<i>Felis concolor</i>	Mountain Lion	rare or historic
<i>Lynx rufus</i>	Bobcat	rare
<i>Pecari tajacu</i>	Collared Peccary	historic
<i>Odocoileus virginianus</i>	White-tailed Deer	common
<i>Antilocapra americana</i>	Pronghorn	historic
<i>Bison bison</i>	Bison	historic

and his aunt, John Van Hagan [the horse trainer], and Minerva Fannin) and 21 slaves (Schedule 1, Roll 1306 and Schedule 2, Roll 1312) were living on the property. McKinney's personal wealth was \$40,900, while his real estate value had risen to \$48,000.

McKinney had an assortment of structures and rock fence enclosures on his land. A map of the Santiago del Valle grant, drawn in 1952 by Reynolds Lowry, a McKinney heir, shows the location of many structures as Lowry remembered them (Fig. 1). The following description of the cultural setting is keyed to these numbers as the structures seem to be in approximately the proper location.

Table 2
Checklist of McKinney Falls State Park Birds

Scientific Name	Common Name
<i>Podilymbus podiceps</i>	Pied-billed Grebe
<i>Pelecanus erythrorhynchos</i>	White Pelican
<i>Phalacrocorax auritus</i>	Doubled-crested Cormorant
<i>Ardea herodias</i>	Great Blue Heron
<i>Butorides virescens</i>	Green Heron
<i>Branta canadensis</i>	Canada Goose
<i>Anser caerulescens</i>	Snow Goose
<i>Anas acuta</i>	Pintail
<i>Anas crecca carolinensis</i>	Green-winged Teal
<i>Anas discors</i>	Blue-winged Teal
<i>Anas clypeata</i>	Northern Shoveler
<i>Aix sponsa</i>	Wood Duck
<i>Aythya affinis</i>	Lesser Scaup
<i>Cathartes aura</i>	Turkey Vulture
<i>Coragyps atratus</i>	Black Vulture
<i>Ictinia mississippiensis</i>	Mississippi Kite
<i>Accipiter cooperii</i>	Cooper's Hawk
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Buteo lineatus</i>	Red-shouldered Hawk
<i>Buteo platyptenis</i>	Broad-winged Hawk
<i>Buteo swainsoni</i>	Swainson's Hawk
<i>Circus cyaneus</i>	Marsh Hawk
<i>Caracara cheriway</i>	Caracara
<i>Falco sparverius</i>	American Kestrel
<i>Colinus virginianus</i>	Bobwhite
<i>Meleagris gallopavo</i>	Turkey
<i>Grus canadensis</i>	Sandhill Crane
<i>Fulica americana</i>	American Coot
<i>Charadrius vociferus</i>	Killdeer
<i>Pluvialis squatarola</i>	Black-bellied Plover
<i>Capella gallinago</i>	Common Snipe
<i>Bartramia longicauda</i>	Upland Sandpiper
<i>Actitis macularia</i>	Spotted Sandpiper
<i>Tringa melanoleucus</i>	Greater Yellowlegs
<i>Tringa flavipes</i>	Lesser Yellowlegs
<i>Calidris minutilla</i>	Least Sandpiper
<i>Larus delawarensis</i>	Ring-billed Gull
<i>Larus pipixan</i>	Franklin's Gull
<i>Columba livia</i>	Domestic Pigeon (introduced)
<i>Zenaida macroura</i>	Mourning Dove
<i>Columbina passerina</i>	Ground Dove
<i>Scardafella inca</i>	Inca Dove
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo
<i>Geococcyx californianus</i>	Roadrunner
<i>Tyto alba</i>	Barn Owl
<i>Otus asio</i>	Screech Owl
<i>Bubo virginianus</i>	Great Horned Owl
<i>Strix varia</i>	Barred Owl
<i>Asio flammeus</i>	Short-eared Owl
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow
<i>Caprimulgus vociferus</i>	Whip-poor-will
<i>Chordeiles minor</i>	Common Nighthawk
<i>Chaetura pelagica</i>	Chimney Swift
<i>Archilochus colubris</i>	Ruby-throated Hummingbird
<i>Archilochus alexandri</i>	Black-chinned Hummingbird

Scientific Name	Common Name
<i>Megaceryle alcyon</i>	Belted Kingfisher
<i>Chloroceryle americana</i>	Green Kingfisher
<i>Colaptes auratus</i>	Common Flicker
<i>Centurus carolinus</i>	Red-bellied Woodpecker
<i>Centurus aurifrons</i>	Golden-fronted Woodpecker
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker
<i>Dendrocopos scalaris</i>	Ladder-backed Woodpecker
<i>Tyrannus tyrannus</i>	Eastern Kingbird
<i>Tyrannus verticalis</i>	Western Kingbird
<i>Muscivora forficata</i>	Scissor-tailed Flycatcher
<i>Myiarchus crinitus</i>	Great Crested Flycatcher
<i>Sayornis phoebe</i>	Eastern Phoebe
<i>Sayornis saya</i>	Say's Phoebe
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher
<i>Empidonax virescens</i>	Acadian Flycatcher
<i>Contopus virens</i>	Eastern Wood Pewee
<i>Nuttallornis borealis</i>	Olive-sided Flycatcher
<i>Riparia riparia</i>	Bank Swallow
<i>Stelgidopteryx ruficollis</i>	Rough-winged Swallow
<i>Hirundo rustica</i>	Barn Swallow
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow
<i>Progne subis</i>	Purple Martin
<i>Cyanocitta cristata</i>	Blue Jay
<i>Corvus brachyrhynchos</i>	Common Crow
<i>Parus carolinensis</i>	Carolina Chickadee
<i>Parus bicolor</i>	Tufted Titmouse
<i>Sitta canadensis</i>	Red-breasted Nuthatch
<i>Certhia familiaris</i>	Brown Creeper
<i>Troglodytes aedon</i>	House Wren
<i>Troglodytes troglodytes</i>	Winter Wren
<i>Thryomanis bewickii</i>	Bewick's Wren
<i>Thryothorus ludovicianus</i>	Carolina Wren
<i>Catherpes mexicanus</i>	Cañon Wren
<i>Mimus polyglottos</i>	Mockingbird
<i>Dumetella carolinensis</i>	Gray Catbird
<i>Toxostoma rufum</i>	Brown Thrasher
<i>Turdus migratorius</i>	Robin
<i>Catharus guttata</i>	Hermit Thrush
<i>Catharus ustulata</i>	Swainson's Thrush
<i>Catharus minima</i>	Gray-cheeked Thrush
<i>Catharus fuscescens</i>	Veery
<i>Sialia sialis</i>	Eastern Bluebird
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher
<i>Regulus satrapa</i>	Golden-crowned Kinglet
<i>Regulus calendula</i>	Ruby-crowned Kinglet
<i>Anthus spinoletta</i>	Water Pipit
<i>Bombycilla cedrorum</i>	Cedar Waxwing
<i>Lanius excubitor</i>	Northern Shrike
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Sturnus vulgaris</i>	Starling (introduced)
<i>Vireo griseus</i>	White-eyed Vireo
<i>Vireo bellii</i>	Bell's Vireo
<i>Vireo solitarius</i>	Solitary Vireo
<i>Vireo olivaceus</i>	Red-eyed Vireo
<i>Vireo philadelphicus</i>	Philadelphia Vireo
<i>Vireo gilvus</i>	Warbling Vireo
<i>Miniotilta varia</i>	Black-and-white Warbler
<i>Vermivora peregrina</i>	Tennessee Warbler
<i>Vermivora celata</i>	Orange-crowned Warbler

Scientific Name	Common Name
<i>Vermivora ruficapilla</i>	Nashville Warbler
<i>Parula americana</i>	Northern Parula
<i>Dendroica petechia</i>	Yellow Warbler
<i>Dendroica magnolia</i>	Magnolia Warbler
<i>Dendroica tigrina</i>	Cape May Warbler
<i>Dendroica coronata</i>	Yellow-rumped Warbler
<i>Dendroica virens</i>	Black-throated Green Warbler
<i>Dendroica fusca</i>	Blackburnian Warbler
<i>Dendroica dominica</i>	Yellow-throated Warbler
<i>Dendroica pensylvanica</i>	Chesnut-sided Warbler
<i>Dendroica castanea</i>	Bay-breasted Warbler
<i>Dendroica pinus</i>	Pine Warbler
<i>Seiurus aurocapillus</i>	Ovenbird
<i>Oporornis formosus</i>	Kentucky Warbler
<i>Oporornis philadelphia</i>	Mourning Warbler
<i>Geothlypis trichas</i>	Common Yellowthroat
<i>Icteria virens</i>	Yellow-breasted Chat
<i>Wilsonia pusilla</i>	Wilson's Warbler
<i>Setophaga ruticilla</i>	American Redstart
<i>Passer domesticus</i>	House Sparrow (introduced)
<i>Sturnella magna</i>	Eastern Meadowlark
<i>Sturnella neglecta</i>	Western Meadowlark
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird
<i>Agelaius phoeniceus</i>	Redwinged Blackbird
<i>Icterus spurius</i>	Orchard Oriole
<i>Icterus galbula</i>	Northern Oriole
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird
<i>Cassidix major</i>	Boat-tailed Grackle
<i>Quiscalus quiscalua</i>	Common Grackle
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Piranga rubra</i>	Summer Tanager
<i>Cardinalis cardinalis</i>	Cardinal
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak
<i>Guiraca caerulea</i>	Blue Grosbeak
<i>Passerina cyanea</i>	Indigo Bunting
<i>Passerina ciris</i>	Painted Bunting
<i>Spiza americana</i>	Dickcissel
<i>Carpodacus purpureus</i>	Purple Finch
<i>Carpodacus mexicanus</i>	House Finch
<i>Spinus pinus</i>	Pine Siskin
<i>Spinus tristis</i>	American Goldfinch
<i>Spinus psaltria</i>	Lesser Goldfinch
<i>Pipilo erythrophthalmus</i>	Rufous-sided Towhee
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Pooecetes gramineus</i>	Vesper Sparrow
<i>Chondestes grammacus</i>	Lark Sparrow
<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow
<i>Amphispiza bilineata</i>	Black-throated Sparrow
<i>Junco hyemalis</i>	Dark-eyed Junco
<i>Spizella passerina</i>	Chipping Sparrow
<i>Spizella pusilla</i>	Field Sparrow
<i>Zonotrichia querula</i>	Harris' Sparrow
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow
<i>Zonotrichia albicollis</i>	White-throated Sparrow
<i>Passerella iliaca</i>	Fox Sparrow
<i>Melospiza lincolni</i>	Lincoln's Sparrow
<i>Melospiza georgiana</i>	Swamp Sparrow
<i>Melospiza melodia</i>	Song Sparrow

Table 3

Field School Faunal Observations

Scientific Name	Common Name
FISH	
<i>Ictalurus</i> sp.	Catfish
AMPHIBIANS	
<i>Bufo woodhousei</i>	Woodhouse's Toad
<i>Acris crepitans</i>	Cricket Frog
REPTILES	
<i>Chrysemys</i> sp.	Pond Turtle
<i>Phrynosoma cornutum</i>	Texas Horned Lizard
<i>Masticophis flagellum</i>	Coachwhip
<i>Ophedrys aestivus</i>	Rough Green Snake
<i>Pituophis melanoleucus</i>	Bull Snake
<i>Lampropeltis getulus</i>	Kingsnake
<i>Agkistrodon contortrix</i>	Copperhead
<i>Crotalus atrox</i>	Western Diamond Rattlesnake
MAMMALS	
<i>Meleagris gallopavo</i>	Turkey
<i>Cryptotis parva</i>	Least Shrew
<i>Dasyopus novemcinctus</i>	Nine-banded Armadillo
<i>Sylvilagus</i> sp.	Cottontail
<i>Canis latrans</i>	Coyote
<i>Procyon lotor</i>	Raccoon
<i>Conepatus mesoleucus</i>	Skunk
<i>Odocoileus virginianus</i>	White-tailed Deer

The central structural feature is the two story stone house (1), located on the north bank of Onion Creek just below its confluence with Williamson Creek. Two large cisterns were constructed south of the house. The flour mill (3) and millrace were southeast of these, on the same bank of Onion Creek. A dam was constructed across Onion Creek just above the lower falls (2). Several outbuildings, such as slave quarters (6), a barn, corn cribs, stock pens, and outhouses were probably in proximity to the house. A hog pen was downstream on the north bank of Onion Creek. The McKown quarry was further downstream on the south bank.

The home of Van Hagan (7), McKinney's horse trainer, and stonewalled fields were across Onion Creek to the south. A limestone kiln was reportedly downstream on the south bank of Onion Creek. A race track build by McKinney supposedly was situated in the fork of Onion and Williams on creeks (16). However, traces of this structure do not remain, probably because the area has been disturbed by a gravel quarry and golf course (Fig. 1).

The hardrock bottom of Onion Creek just above the lower falls was a natural crossing point for wagons. Known as McKinney Falls, this crossing was used regularly by settlers in the area and may have connected with an early wagon trail from Austin to the coast. The area around the McKinney home is shown in Figure 2 as it exists today.

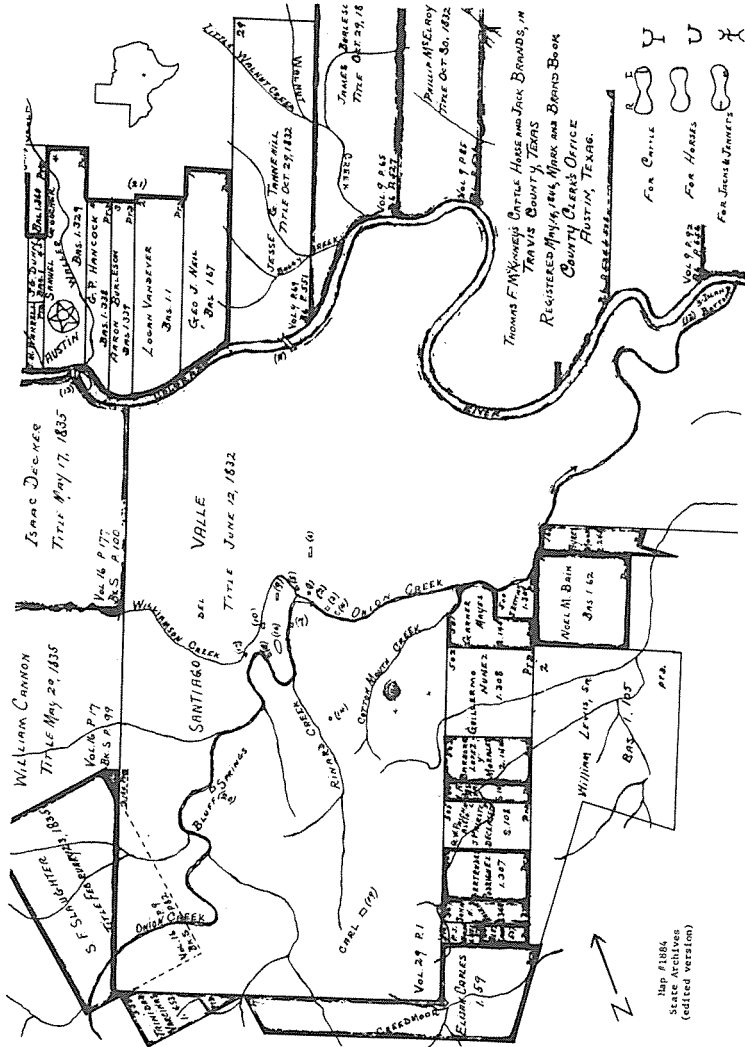


Fig. 1 Map of Santiago del Valle Land Grant.

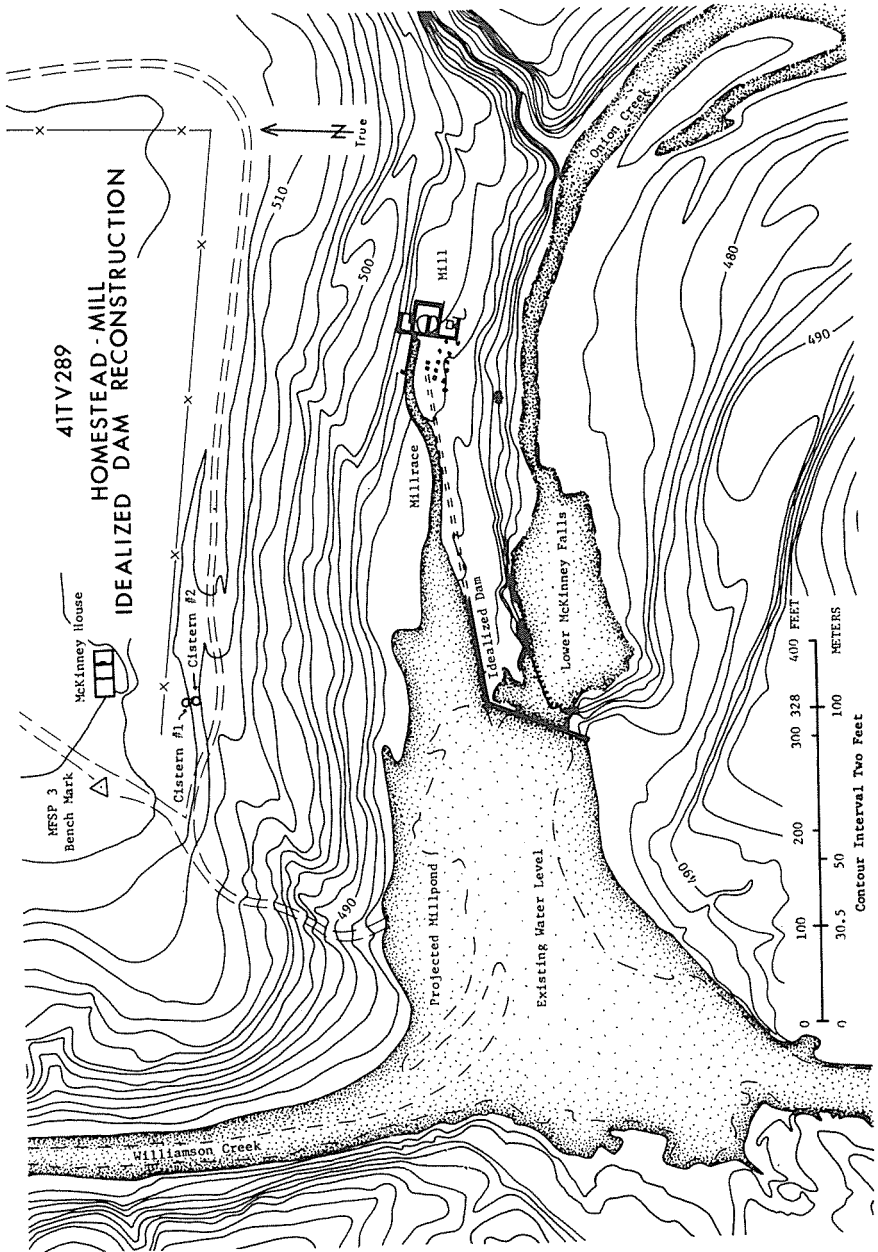


Fig. 2 Map of Homestead, Mill, and Dam (idealized reconstruction).

HISTORY

Thomas F. McKinney: A Biographical Sketch

Thomas F. McKinney, one of the first American colonists of Texas, was an important leader and a hero of the Texas Revolution. Largely ignored in Texas history, information on his early life is sketchy.

Thomas F. McKinney, the man for whom the park is named, was born in Kentucky in 1801. He moved to Missouri in 1821 with his family and there undoubtedly made the connections which affected his later life. As a young man he entered the Santa Fe trade from Missouri to the New Mexican capital, and eventually reached the Chihuahua trade centers.

In the early 1820's he came to Texas as one of Austin's first three hundred colonists. He continued his trade with Chihuahua first from the San Antonio area and then from Nacogdoches. It was in that east Texas town that McKinney reportedly married his first wife. In the early 1830's he had moved to the Galveston vicinity and had ceased his cross country trading ventures (Ralph and McEachern, 1974:1-2).

In 1834, McKinney and Samuel M. Williams entered into a business partnership that was to have profound effects on Texas history (Frantz, 1952). In 1835, McKinney and Williams obtained a charter for the first legally incorporated private bank in Texas, the Banco de Comercia y Agricultura (Frantz, 1952). During the Texas revolt against Mexico, the McKinney-Williams firm was a primary source of men, money, and supplies for the Texas army. It financed over \$150,000 or more than 10% of the total cost of the revolution. The McKinney-Williams ships formed a part of the quickly assembled Texas Navy which defended the coast and later transported volunteers from New Orleans.

With the successful completion of the revolution, McKinney and Williams proved to be the financial underpinnings of the Texas Republic. Texas authorized McKinney and Williams to issue \$30,000 in notes to circulate as money. The bank used Negroes and real estate as collateral. In 1836, McKinney, Williams, Michael Menard, and two other business associates, set up the Galveston City Company; by 1838, they were selling real estate.

In 1836, McKinney was one of the nine men who signed the petition for the first charter granted for a railroad not only in Texas but west of the Mississippi . . . These men—Austin, Archer, Allen, Collingworth, Green, Henderson, Horton, Baker and McKinney—may not be accorded the honour of being called the paternal ancestors of our railroads, but to them is rightly due the credit for the vision to conceive what the New Republic needed (Reed, 1941:22).

The line, called "The Texas Railroad, Navigation and Banking Company," had a short and tempestuous life. It was attacked in its infancy by Anson Jones primarily for its banking provision. In the nationwide financial panic of 1837, it and nearly every railroad project in the United States was wiped out.

The character of McKinney's business partner, Samuel M. Williams, sheds some light on Thomas F. McKinney. Williams, like McKinney, is seldom mentioned in Texas history. Williams may have been the most disliked and distrusted leader of the time. In partnership with McKinney, he was heavily involved in land speculation. Williams maintained distance between the frontiersmen and himself by living in a high aristocratic style, a style of living which apparently was shared by McKinney (Henson, 1976).

Because of the widespread sentiment against banks and paper money, McKinney's and Williams' bank dealings brought them criticism, culminating

in a 10 year lawsuit (1848-1858) and suspension of their bank by the Texas Supreme Court (Webb and Carol, 1952:915). McKinney (1854) may have been referring to this when he wrote to H.L. Kinney of Corpus Christi on March 5, 1854:

I do not however exert myself as I used to do to make money and though it has its charms I can not feel much anxiety to make it for if I do it would do me no good or not much and only serve to help those who would only the more desire my death in proportion to what I was worth and bless me with their curses in proportion to what they received.

McKinney was elected to the 1st, 3rd, and 7th Legislatures. During the 1860's, he was president of the Travis County Racing Association. He also served for several years as a county commissioner. However, he was defeated when he ran for the 9th Legislature in 1861 (Ralph and McEachern, 1974:1-2).

His defeat in the 1861 election may have been due to the recent closing of his bank and his Unionist leanings. "McKinney opposed secession but was not as stubborn an opponent as many Travis County Unionists. He wrote his younger—and fervently Southern—friend, Guy M. Bryan, that he hoped to live out his life in quietude rather than in Revolution" (Bowen, 1974).

McKinney's Unionist leanings do not seem to have stemmed from any humanitarian interests. McKinney was a slaveholder and a slave dealer in the sense that his bank used slaves as collateral. His antisecessionist beliefs perhaps are better explained by his business interest.

The Civil War brought continuing problems for McKinney while he worked as a cotton buyer for the Confederacy. "Cotton trade in Texas and Mexico was chaotic, highly competitive, and purchasing agents and jurisdictions overlapped. McKinney got involved in some personal and political embroglios stemming from the confused cotton situation" (Bowen, 1974).

The cotton business proved to be ruinous for McKinney after the war. He died hopelessly in debt on October 2, 1873 and was buried in the Oakwood Cemetery in Austin, Texas. A chronology of events (Table 4) that took place on McKinney's property was compiled from a variety of sources.

Interviews

When reconstructing the architecture of an historic site, the archeologist is usually confined to excavation data and infrequent written accounts. However, in this case, interviews with former inhabitants and a property owner helped to fill in the sketch work of the archeologist. An interview with Charlie Johns, who now lives in Pilot Knob, was particularly helpful.

The edited text of this interview follows:

Charlie Johns was born in 1885 or 1886, one of 10 children. He worked for James Smith, as his father had before him; he continued to work for him through the 1920's. Johns was a young man when he first lived in the "Old Rock House" (the McKinney House). He continued to live and work the place until he moved to the upper falls. Charlie's grandfather, Felix, was probably a freed slave; his grandmother was Clara Wheeler.

Charlie remembered a flood when he was young that was 2 ft deep on the front porch and wiped out the log crib behind the house. This flood probably happened between 1890 and 1895. Charlie's father grew corn, garden vegetables, and cotton. The cotton was ginned on the home place and taken to Bluff Springs. Only in later years was Smith's cotton taken to Colton to be ginned. The McKinney place was worked by mules which were kept at the "old Smith Home Place." Three to five milk cows usually were kept in pens across the creek.

Table 4
Chronology of Events on the McKinney Property

Date	Event
1832	Land on which McKinney house stands was first recorded in a 10 league grant patented by Santiago del Valle.
1835	Samuel M. Williams, acting for del Valle, sold nine leagues of the land to Michael B. Menard.
1839	Menard sold nine leagues of the land to Thomas F. McKinney.
1849	McKinney moved to Travis County.
1851	Horse trainer's house was built
1852	McKinney's mill was opened.
1853-61	House was built during this period, but construction was stopped by the Civil War.
1864	Important political meetings to resolve conflicting state and Confederate interests in cotton and conscription took place in the house. Dignitaries at the meetings included Guy M. Bryan, representing General E. Kirby Smith who commanded the Confederate Trans-Mississippi Department; Texas Governor Pendleton Murrah; General E.B. Nichols, chief of the Texas Loan Agency (working under Murrah and in conflict with the Confederacy); Judge Thomas Devine of the Confederate District Court of Western Texas; and McKinney (Bowen, 1974).
1869	Mill was destroyed by a flood.
1872	John Van Hagan left McKinney Falls for Long Island.
1873	McKinney died.
1873-81	Lower story was occupied by R.W. Lowry and Margaret Ann Taylor Lowry (greatniece of McKinney).
1874	Anna McKinney Lowry was born.
1876	Reynolds K. Lowry was born.
1878	Mary Nelson Lowry was born.
1881	Lowry family and Anna Gibbs McKinney moved to a new home.
1885	Homestead was sold by Anna Gibbs McKinney to James Woods Smith.
1885-86	Charlie Johns was born and lived in the McKinney house.
1915	Charlie moved to the upper falls area while his mother stayed at the house.
1915	Charlie's daughter, Charlie Mae Johns (Gentry) was born in the old Smith place.
1920's	Mrs. Johns moved out of the house.
1926	Albert Meeks moved into the house.
1936	Charles Darby was born in the "old rock house."
1942	Property was inherited by J.E. and Annie M. Smith; land was in their hands at this time.
1940's	House was abandoned and later burned.
1970	J.E. Smith and his sister Annie donated the land to the people of Texas for use as a park.

Charlie's account of the house covers the period 1900-1920's. The house was build of white stone with white painted plaster on the inside. Outside stairs with a hand rail led from the lower to the upper porch and to the upstairs bedrooms. Both porches were wide enough for sitting; the upper one was surrounded by a hand rail. Since the porch was 2 ft above ground level, one step led from the lower porch to the front yard. To the west of the porch was a dirt floored, wood enclosed room usually vacant, but occasionally used as a smokehouse. The upper and lower fireplaces were functional, but cooking was done on the cookstove in the kitchen (west room). A door opened from the kitchen onto the porch (smokehouse?); the place had two other front doors.

The roof of the house and porch was made of shingles bought by James Smith. Raingutters were on and in good shape, although Charlie did not know if they led to the cistern. The windows had white painted sashes, lead weights, screens, and shutters; the doors also had screens. The yard was fenced off with a gate leading down to the lower falls. A ditch to the east was used to dump ashes from the house.

A road from the house to the mill continued down to the creek. Charlie used to pass by the ruins of the mill when hauling water for the animals from the creek. He used mules and wagons. Water for human consumption came from the cistern which was never used for garbage. While visiting the TAS field laboratory, Charlie mentioned that his mother used snuff as he pointed toward a group of bottles. "Yep, four dots—that's the kind mother used," he said. The snuff bottles were part of the garbage recovered from the cistern (probably deposited after 1920).

Charlie mentioned that hog fences were built of plank and topped with barbed wire. He said that sometime in the 1920's, several houses were built near the house for Charlie's family. Mules were used for corn and cotton cultivation, and the mule barn was located on the "Old Smith place."

Another source of information was Albert Meeks, who was born in 1911 and moved into the McKinney house in 1936 when he was 15 years old. His description of the house was basically the same as that of Charlie Johns'. Albert noted

that the ceilings were made of wood. At one point in the interview, Albert mentioned a mule lot north of the house; at another, he talked about a barn to the northeast. The outhouse was also northeast of the house and a smokehouse (8 x 8 ft) was just 10 m north of the house. It was used to cure two hogs a week. He pointed toward the golf course to the west and said that there used to be an old cemetery over there. When he was plowing the fields, he used to plow to it and turn around.

One of the last times he saw the house was in 1944, probably when it was inhabited by Mr. and Mrs. Sandy Nixon. At that time, the floor was weak but the walls were still good. He thought he remembered a flood in 1928 which reached the second floor of the house. J.E. "Pete" Smith was a third informant. According to Smith,

Charlie John's family was the last to live in the McKinney house; he thinks they left in the 1920's. He confirmed that Charlie Johns had indeed lived in the McKinney house and on the old Smith home place where Charlie Johns' daughter was born in 1915. He further commented that both the upper falls house and the old Smith home place are no longer standing, and that the latter is partially burned. Smith indicated that the McKinney house was burned by vandals in the 1940's.

ARCHEOLOGICAL INVESTIGATIONS

Previous Investigations

Two important sites in the area of the park were excavated by Suhm (1955, 1957). The Smith rockshelter (Suhm, 1957), located near the center of the park and included on the Interpretive Trail, contained both Neo-Indian and late Archaic artifacts in a stratified deposit. Artifacts include arrowpoints, dart points, a boatstone, and pottery. From a series of radiocarbon dates from the site, the top of the deposit dates 220 ± 70 B.P. (TX-510; Velastro and Davis, 1970:271) and the lowest layer 1180 ± 210 B.P. (TX-27; Tammers et al., 1969:145-146).

The Collins site (Suhm, 1955), located just off the park property, is an open site deeper than 2 m in places. The site was divided into three levels based on projectile point types. Pedernales, Bulverde, and Nolan points occur in the lowest levels; the upper levels complement and overlap the Smith rockshelter data. These two sites provide a chronological sequence for the park for the last 4,000-5,000 years. A few scattered finds indicate that the park may have been occupied much earlier.

Additional investigation of the archeological resources of the park property was undertaken after the property was acquired by the State. Kegley (1972) conducted a brief survey of the park. Sites were plotted directly on a map for use in the master plan. Site numbers were not assigned and

diagnostic artifacts were not recovered. The survey was hampered by grass cover and severe time limitations.

Another archeological survey of the area was conducted (Ralph and Lov-ing, 1973) which included minor testing of several sites. The survey was limited primarily to stake lines which marked planned road, house, and utilities construction. The heavy vegetation cover present at that time of the year effectively prevented the locating of all but the most conspicuous archeological features. It was recommended that an archeologist be present during earth moving operations to prevent unnecessary destruction of archeological resources.

TAS Investigations

The 1974 investigations were carried out under a State of Texas Antiquities Committee Permit for Archeological Investigation, Number 53. The permit originally was granted for "testing for all lines, excavations at the 'McKinney Homestead' and mill site, testing for associated sites around homestead and mill." However, due to the widespread destruction of archeological features within the park by construction activities, the investigation was expanded to include emergency archeology at prehistoric sites.

Extensive research was conducted by the Texas Archeological Society (June 8-15, 1974) around the McKinney house and mill. Additional work done by the Texas Parks and Wildlife Department (September 23 and October 11, 1974) was compatible with the research design established for the TAS investigations (Ralph and McEachern, 1974).

Archeological excavations were conducted at the horse trainer's cabin (41TV307) during a five day period in July, 1974. A collection of artifacts belonging mostly to the first quarter of this century was recovered (Appendix C). Additional results of Texas Parks and Wildlife Department investigations at the McKinney house and mill are in Appendix D.

Emergency archeological investigations took place (January 20-29, 1975) at 41TV314, a large prehistoric locality, after a significant portion of the site was destroyed during construction activities. Several additional sites were located during this time (Hudson, ms.) Additional surveys of the park attempted to relate various fences to historic structures and updated site survey forms (Medlin, ms.)

PROSPECTING

Research Design

Prospecting is used to mean the exploration of archeological deposits without damaging the nonrenewable resources; the goal being to teach the exploration of possibilities, not the excavation of probabilities. Two remote sensing techniques and two chemical techniques were employed during the TAS field school in an effort to prospect for traces of man. As stated in the research design:

Archeological prospecting using the proton magnetometer, metal detectors, pH and phosphate sampling are expected to define the kitchen area and outlying buildings without disturbing the site. The primary results of the prospecting are expected to be locating archeological features. Their definition will depend on future excavations . . .

The prospecting crew will attempt to locate archeological features through several physical and chemical methods. These methods include proton magnetometer, metal

detectors, pH and phosphate testing. They will construct maps showing the results of various techniques and try to appraise the value of the different techniques (Ralph and McEachern, 1974:3-4).

Grid System and Provenience

A grid system was established for the house and surrounding areas using true north. True north was established by setting up a transit over a permanent bench mark buried in concrete (M.F.S.P. 3) and shooting a back sight to another such bench mark (M.F.S.P. 4) located 589 m away at an angle of $16^{\circ}42'18''$ (angles and distances computed by Texas Parks and Wildlife Department Engineering Branch). Ninety degree angles were turned and points were established along these lines using a cloth tape for measuring distances. After large reference blocks were established, stakes were placed at 1 m, 4 m, and 5 m intervals, depending upon the type of investigation to take place, i.e., excavation or surface survey.

The bench marks have known elevations which were changed to metric. Secondary elevation points were established where needed, such as at window sills, southeast corner stakes, and the cistern. An arbitrary grid direction was chosen for the mill to correspond to the wall lines at the structure. These lines were extended to cover an area to be used for prospecting. The grid was in 1 m units; when tied to the bench marks by a running survey, the lines were found to run $N 9^{\circ}12'E$. The survey also brought a known elevation to the mill to replace the arbitrary datum used for the first five days of the field school.

All units were called or named by their southeast corners. The permanent bench mark for the house was N100W100 and all units corresponded to this arbitrary designation. The mill system utilized letter designations for the north-south lines which progressed from the west. The starting point H15 is the outside southwest wall corner of the main mill room. This room straddled both the penstock and the wheel pit.

Proton Magnetometer Survey

A Varian proton magnetometer (M-50) with the sensor mounted atop an aluminum pole 1.38 m long was used to detect underground features. Two "in-site" surveys were run. The term "in-site" means a controlled systematic survey that completely covers an archeological site. The first survey utilized a 4 m and 5 m grid pattern established by staking a transit and tape grid about the house. The other used a 4 m grid just west of the mill shaft. It became apparent that setting up the grid took longer than recording the data.

The results of the survey are presented in three overlay maps. The first map (Fig. 3) delineates an old road west of the house which runs in a north-easterly direction. As the survey progressed from west to east, large magnetic artifacts such as automobiles, tents, and trailers began to influence the magnetometer. These artifacts were plotted rather than moved and the resulting contours show the bias of the survey. The magnetometer was influenced by the above ground artifacts while reading the area thought to have been the site of an outbuilding (barn?).

The second (Fig. 4) and third (Fig. 5) maps show two versions of the same data taken west of the mill. The contours dramatically focus on the hollow wheel pit and the vertical iron king shift. The third map (Fig. 5) is a

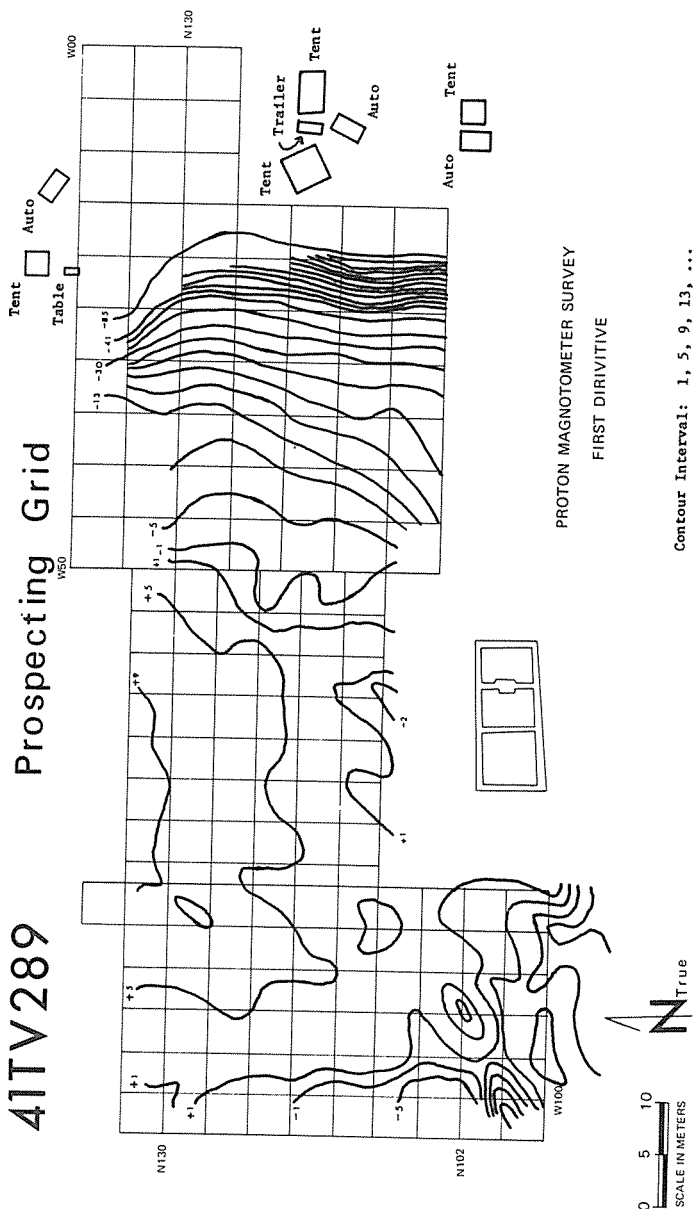


Fig. 3 House prospecting grid and proton magnetometer survey (first derivative).

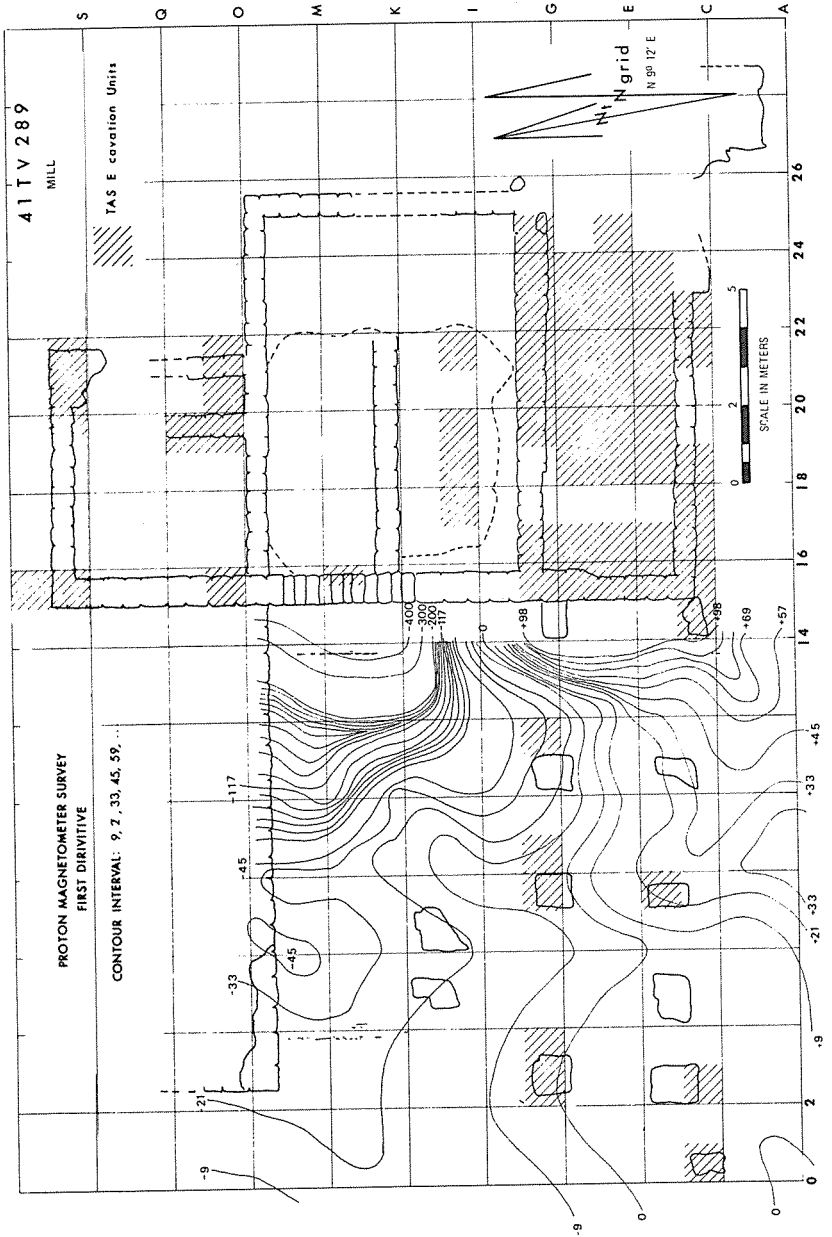


Fig. 4 Mill prospecting grid and proton magnetometer survey (first derivative).

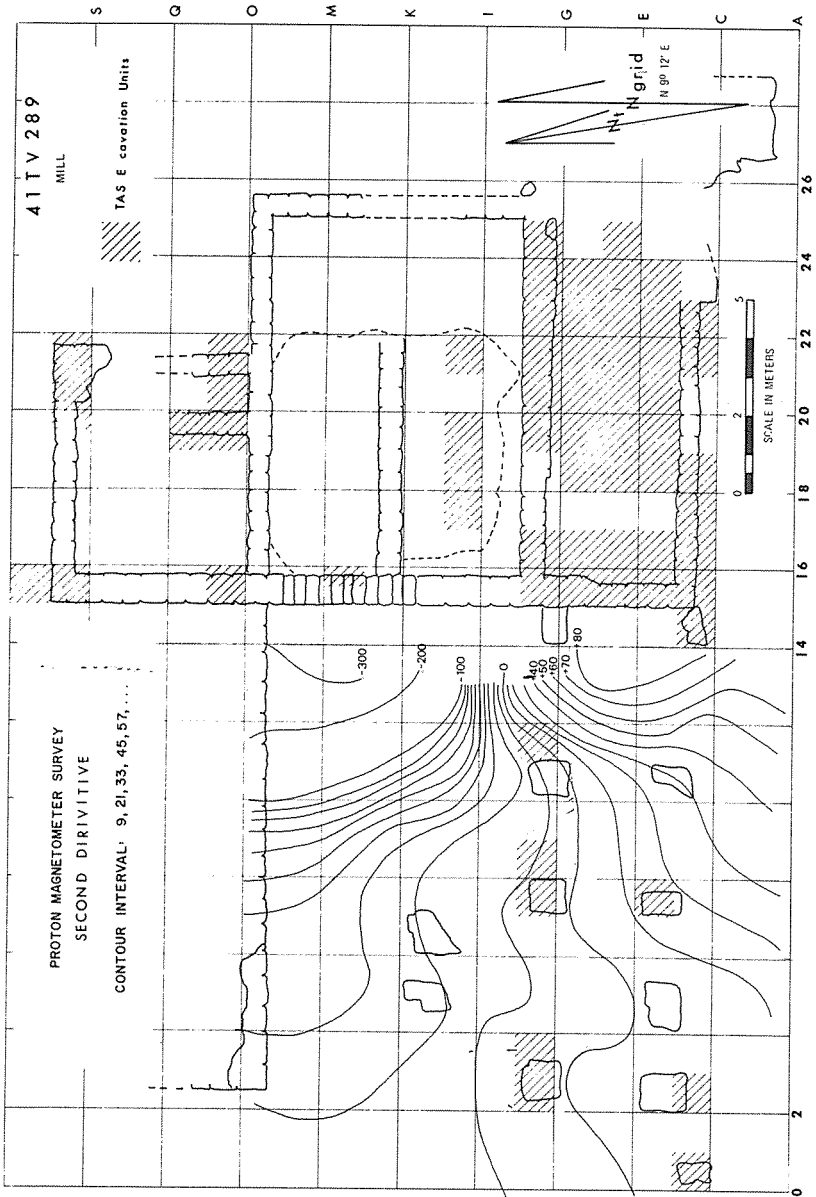


Fig. 5 Mill prospecting grid and proton magnetometer survey (second derivative).

second derivative contour which uses a mathematical approach to "smooth out" massive readings by averaging the four corners of a grid unit and plotting this average in the center of the unit.

Someone experienced in magnetic surveying should be present during a survey (Arnold, 1980:8). Magnetometer data can be interpreted only by experts. However, a few notes, especially concerning the grid pattern, are applicable for those contemplating a survey.

The size of the grid is determined by two factors: the above surface interference and the subsurface features. The survey must stay at least 20 m from interference items, such as automobiles. If above ground features are present, their locations should be recorded so that the bias is understood.

Ideally, the grid used should be 1/3 to 1/5 the size of the expected anomaly. Grids that are too small are adversely affected by statistical or random readings. The depth of the reading is approximately 1/3 the grid space, e.g., a 4 m grid will read 1 1/3 m deep. A grid must be large enough to give a good regional trend of contours unaffected by anomalies. Anomalies should be surrounded by readings.

When contouring the data, a contour interval should be chosen that will show the local density of magnetic variation, but which will not crowd together, as contour lines do when approaching an anomaly. Machine contouring and second derivative mapping are best for showing data collected during an "in-site" survey. Conventional contouring can use the less controlled points used in the search mode survey but results are speculative in nature and the research design must emphasize initial prospecting for anomalies (Arnold, 1980:4).

The second derivative map eliminates the lack of control edges within a mapped area. A conventional contouring using plus and minus contours must be done first and then compared with the second derivative map of the same survey.

Metal Detector

A large crew with many different models of metal detectors did a detailed survey of the 4 m and 5 m grid pattern which surrounded the house and the 4 m grid just west of the mill shaft. Four types of data were given value numbers: surface (4), high intensity (3), medium intensity (2), and low intensity (1). Data were recorded on grid paper; metal rods, each flying a color coded value flag, were placed in the center of each hit (Fig. 6).

House surface artifacts were plotted and cataloged. A contour map was made by totaling the intensity values for each square, but the results were confusing at best. The total number of records per square was contoured (Fig. 7). Areas of concentration stand out in bold relief: the road to the west; the concentration to the north which probably represents the fence described by previous inhabitants; and the "barn" to the northeast.

The mill survey shows concentrations of readings in units G6, C10, and K14 which remain unexplored at present. The eastern edge of the mill is marked by the rapid decrease in readings (Fig. 8). A much larger area around the mill could have been investigated if clearing brush and establishing a grid had not consumed more time than had been allotted. Even so, data from the metal locator survey were more gratifying than had been anticipated.

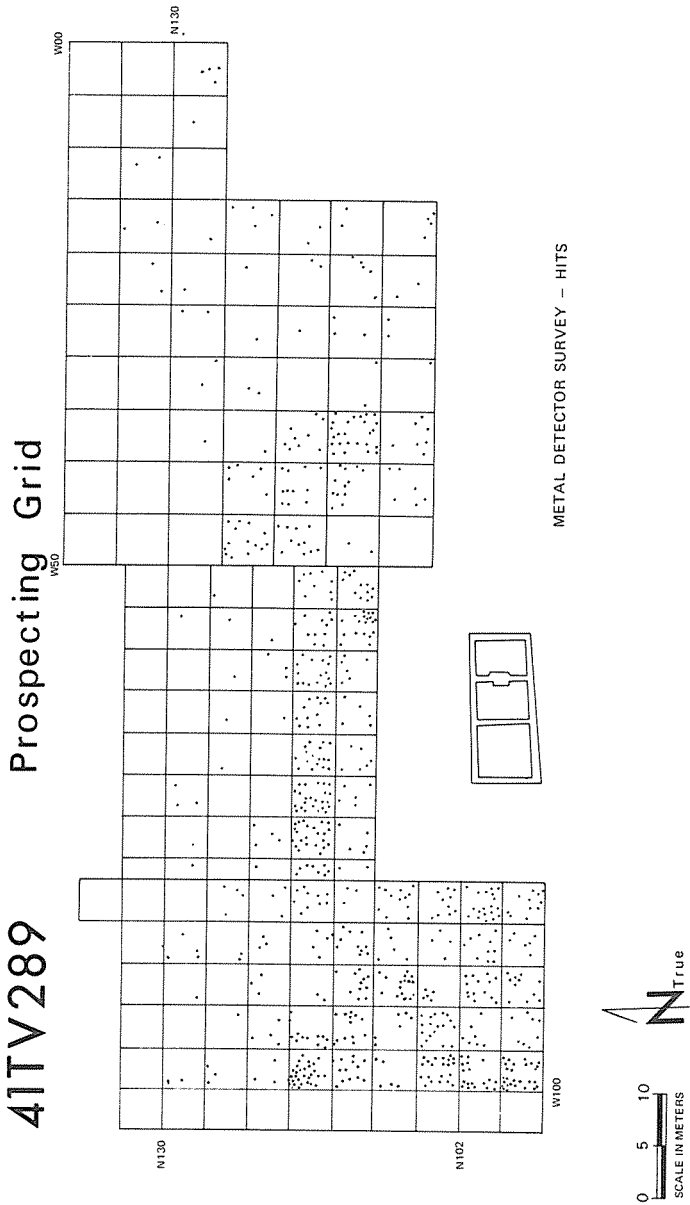


Fig. 6 House metal detector survey - hits.

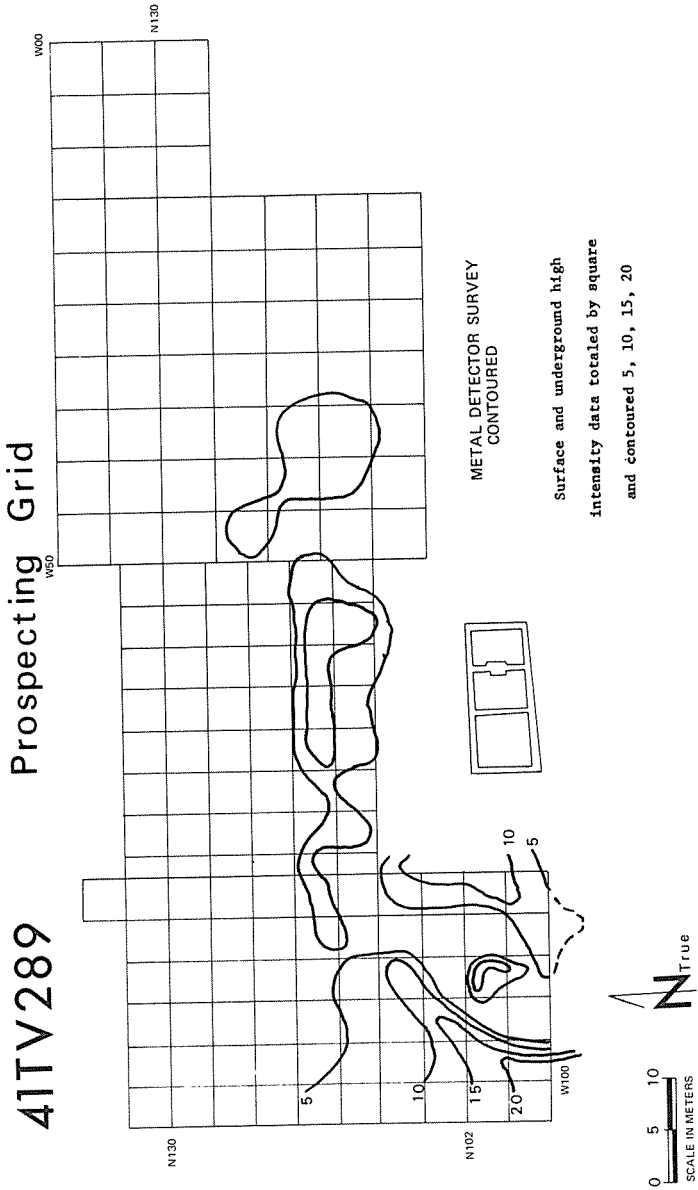


Fig. 7 House metal detector survey - contoured.

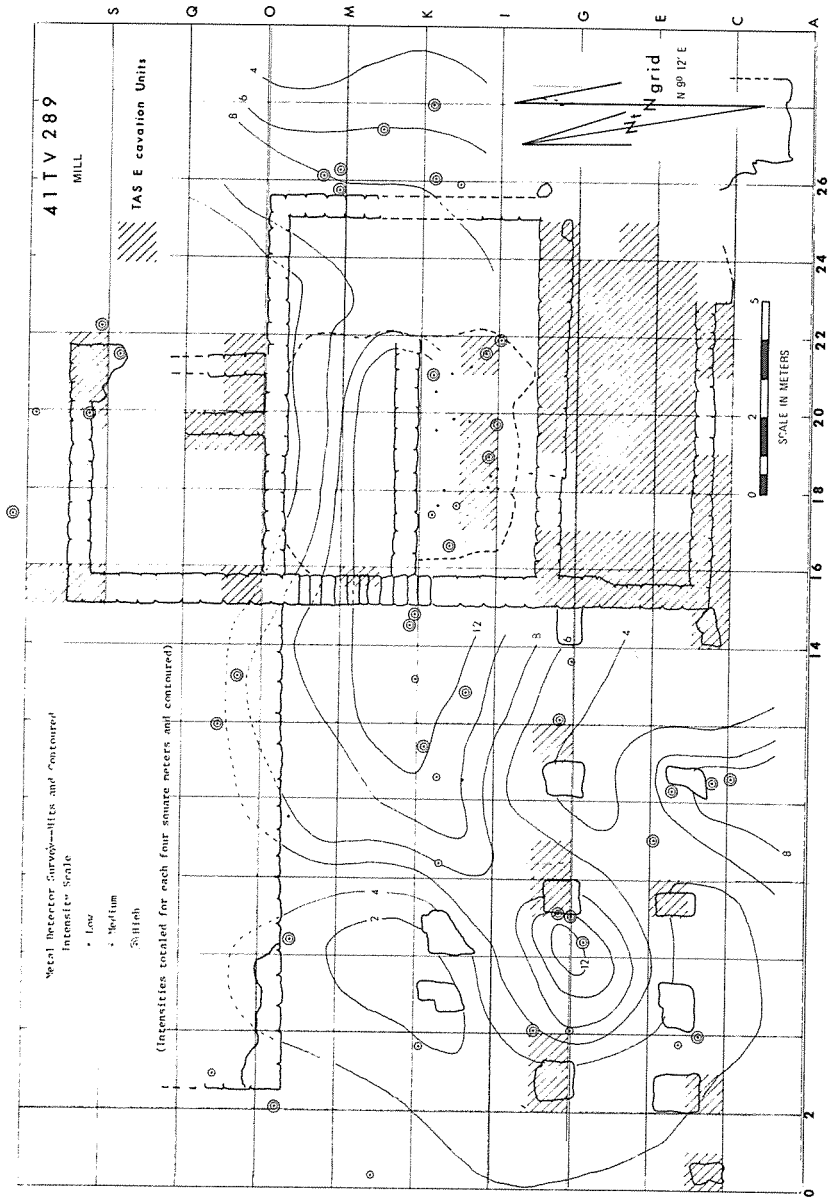


Fig. 8 Mill metal detector survey.

As a result of this study, several recommendations are made for future studies. Only one detector or equally tuned models of the same detector should be used. The map and resulting data should be contoured in a variety of ways. Examples include mapping total readings, total value readings, only one value (such as high intensity), and only concentrations of readings. Different maps should be compared, since each map has its own strengths and weaknesses.

Artifacts

Artifacts recovered from the metal locator survey include 111 metal specimens, which are further classified by function to facilitate description. The categories include fasteners (25), containers (29), miscellaneous identified (37), and miscellaneous unidentified (20). Two ceramic sherds and two glass bottles were found on the surface by surveyors and plotted.

METAL

Fasteners

CUT NAILS

Number of specimens: 9 complete, 11 fragments

Provenience: Various units (Table 5)

Description: Machine cut nails are divided into pennyweight and tabulated (Table 5).

WIRE NAIL

Number of specimens: 5

Provenience: Various units (Table 6)

Description: Nails are divided into pennyweights and tabulated (Table 6).

Containers

TIN CANS

Number of specimens: 4

Provenience: N95W88(2), N96W94, N120W30

Description: Two specimens measure 13.5 mm in diameter and may be #303 tin cans.

TIN CAN FRAGMENTS

Number of specimens: 25

Provenience: N92W98, N94W98, N96W98(4), N98W88, N98W98, N100W88, N100W98, N100W94, N100W96, N102W80, N102W96, N106W82, N106W88(2), N110W66, N110W88, N112W98(4), N114W80, N124W98

Description: Fragmentary light gauge metal.

Miscellaneous Metal Artifacts

BAILING WIRE

Number of specimens: 11

Provenience: N90W96, N90W92, N94W82, N96W98, N98W98(2), N102W98, N104W96, N104W98, N108W82, N114W94

Description: Fragmentary except for specimen N108W82 which has one strand joined with four clockwise twists for a two wire bale.

Discussion: All specimens were located west of the house along the dirt road where previous owner had been feeding cattle.

BARB WIRE

Number of specimens: 3

Provenience: N100W84, N110W88, N116W98

Description: Two-stranded wire, 2.5 mm in diameter, with machine cut single barbs; two with single turns and one with a double turn-around.

Discussion: Although the house was flanked on the south and west by barbed wire fences, only three fragments were found within the prospecting grid.

Table 5
Cut Nails from Metal Locater Survey

Size	Number of Specimens	Provenience	Remarks
3d	1	N96W98	common
5d	1	N116W98	finishing
6d	3	N96W98, N98W84, N114W84	common
7d	1	N100W96	common
12d	3	N96W98, N100W98, N104W98	common
fragments	11	N96W88, N96W98(2), N98W98, N100W88, N100W96, N100W98, N102W92, N100W86, N110W90, N116W98	

Table 6
Wire Nails from the Metal Locater Survey

Size	Number of Specimens	Provenience	Remarks
3d	1	N100W88	common
8d	3	N96W98, N98W98(2)	common
16d	1	N106W92	common

BUCKLE

Number of specimens: 1

Provenience: N94W84

Description: A D shaped steel buckle slightly flattened in the round with a 4 mm movable pin bent around the base of the D. It would accept a 34 mm (1") leather strap.

COAT HANGER FRAGMENT

Number of specimens: 1

Provenience: N110W94

Description: Fragment is 2 mm in diameter.

DOOR LOCK FRAGMENT

Number of specimens: 1

Provenience: N110W50

Description: Cast iron fragment is 7.8 cm wide and measures 8.5 cm to the broken end. This 2.5 mm thick plate covers the lock box, is aligned by 11 x 3 x 1 mm protrusion, and fastens using a 6.5 mm countersunk flathead screw. It accepts an old-fashioned key with a 5 mm shank and 23 mm protrusion to turn the bolt.

NUT

Number of specimens: 1

Provenience: N92W98

Description: A 7.5 mm hole on a square nut 16.5 mm across with obliterated threads.

PIN

Number of specimens: 1

Provenience: N77W79

Description: Steel pin, 19.5 cm long; shank, 21 mm in diameter; head, 45 mm in diameter and 9 mm thick. A slot 20 mm long and 6 mm wide is located 9 mm from the small end (Fig. 9a). This slot accepted a large retainer or keeper which is usually associated with attaching a large piece of agricultural machinery to a tractor.

PLOW TINE

Number of specimens: 1

Provenience: N116W80

Description: A hooked shank 12 mm in diameter flattens out into a steel-cupped tine or hoe which is reinforced by a central rib along the bank. This specimen is a replaceable farm equipment tool.

POT OR KETTLE

Number of specimens: 7 fragments

Provenience: N94W84, N94W98, N96W96, N106W98, N108W86, N116W82, N124W98

Description: Cast iron fragments, two of which show shoulders 10 mm wide to support a lid about 30 cm in diameter which fits over the contracting rim. The body flares to an unknown diameter. Thickness is uniform at 3 mm.

Discussion: The specimens are unlike those in the Sears, Roebuck, and Co. Catalog (1902:582-584) or those recovered from the Arkansas Post Branch (Walker, 1971:99-103).

RING (WITH BROKEN TAB)

Number of specimens: 1

Provenience: N104W90

Description: Steel ring, 17 mm in inside diameter, 25.5 mm in outside diameter and 2 mm thick, with a broken protrusion 19 mm wide extending from one side of the ring. It is reminiscent of a pop-top.

STANDARD FLATHEAD SCREW

Number of specimens: 1

Provenience: N102W96

Description: 63 mm long, tapering to a point. Threads 2.5 mm center to center extend 36 mm up from the point. Shank is 7 mm in diameter at the thickest point, while the flat-head is 12.5 mm across.

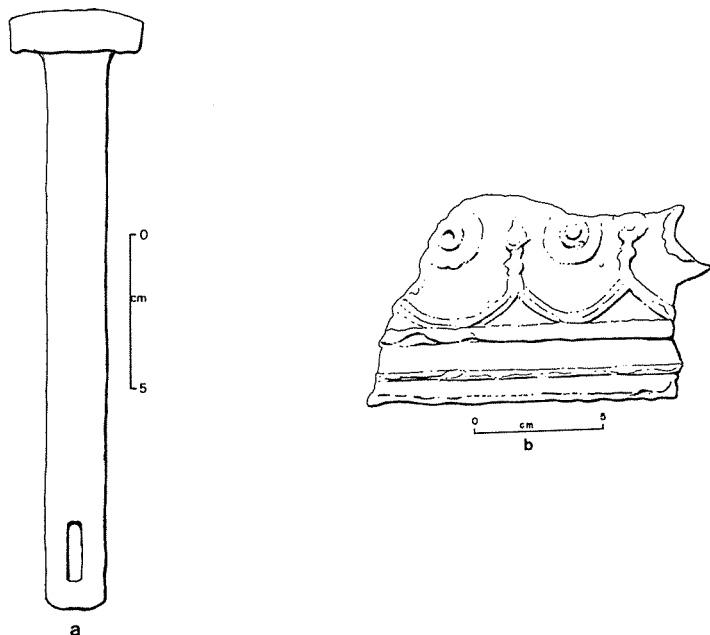


Fig. 9 Metal detector survey artifacts: a. Pin; b. Stove fragment.

STOVE FRAGMENT

Number of specimens: 1
 Provenience: N108W80

Description: Cast iron fragment of decorated wood burning stove, 2-4 mm thick; slightly curved along one edge; lacks identifying marks (Fig. 9b).

TINFOIL CIGARETTE PACKAGE

Number of specimens: 1
 Provenience: N108W80

Description: A plastic and tinfoil remnant of a Tareyton 100 cigarette package.

TOY TRAIN

Number of specimens: 2
 Provenience: N100W54, N87W93

Description: Cast iron fragment of a passenger or observation car and double wheel assembly for a toy train. This car was once 32 cm long and was made in one mold so that any two halves (split in the middle) would fit together and be fastened by one rivet 58 mm long in the center. Each half has eight windows, 10 upper observation windows, a platform (with two descending stairs) at each end, the name "CHICAGO ROCK ISLAND & PACIFIC . . ." in a zone above the main windows, and the number "62" or "82" straddling the center of the car below the main windows. Each car would have had four axles (rivets) and eight wheels, but none were recovered. The car stood about 8.5 cm tall and 7.3 cm wide at the protruding stairs.

Discussion: The other half of this car and the locomotive to match were found in Level 303 of the cistern. Specimens were cleaned and stabilized and are on display at McKinney Falls State Park Visitor Center.

WASHERS OR SHIMS

Number of specimens: 4
 Provenience: N92W98, N96W98, N100W98, N102W96
 Description: (Table 7)

Unidentified Metal Artifacts

CAST IRON FOOT (?) FRAGMENT

Number of specimens: 1
 Provenience: N100W90

Description: 29 mm wide and 8 mm thick with an 8 mm hole in the center.

Discussion: This artifact is perhaps a foot for a machine part.

CAST IRON FRAGMENT

Number of specimens: 1
 Provenience: N98W94

Description: 9.3 cm long, 1.8 cm wide tapering to a blunt point. Thickness at the edges is 2 mm, but a keel or thickening runs the length at the center which is 8 cm thick at the broken end. The upper surface is slightly dished.

UTENSIL FRAGMENT

Number of specimens: 1
 Provenience: N118W54

Description: 78 mm long and 16 mm wide at the rounded end that tapers to 12 mm at the broken end.

Discussion: Although identifiable markings are not present, this fragment is thought to be a fragment from an eating utensil.

Straps (classified by width)

44 MM STRAP

Number of specimens: 1
 Provenience: N110W96

Description: 68 mm long and 1.7 mm thick.

39 MM STRAP

Number of specimens: 1
 Provenience: N130W20

Description: 40 mm long and 1.5 mm thick.

32 MM RIVETED STRAP

Number of specimens: 1

Provenience: N114W94

Description: Strap stock, 2 mm thick, drilled and countersunk; three holes 4 mm in diameter each. Another piece of strap is riveted to the first. The second smaller strap is 15 mm wide and 2 mm thick. The rivet head is 4.5 mm in diameter and is on the side opposite from the countersunk holes.

29 MM STRAP

Number of specimens: 1

Provenience: N130W20

Description: 58 mm long and 3 mm thick.

26 MM STRAP

Number of specimens: 3

Provenience: N110W85(2), N110W88

Description: One fragment, with two nail holes 2.5 mm in diameter punched from the same side, is 1.5 mm thick. Another is bent into a question mark shape with three countersunk holes, 4 mm in diameter, placed at the base. The matching strap fragment (N110W88) is broken at the third hole.

20 MM STRAP

Number of specimens: 6

Provenience: N94W96, N108W86, N110W86, N110W88, N114W96, N128W86

Description: All fragments are 1 to 1.5 mm thick and vary from 25 to 150 mm in length except N108W86 which is 3 mm thick and 283 mm long. This latter piece has a hole 5 mm in diameter drilled and countersunk on each end and a 30° bevel on the upper edges. A hole 7 mm in diameter was punched into the fragment from N114W96.

Discussion: N108W86 is well made and may be part of a machine.

19-MM STRAP

Number of specimens: 1

Provenience: N94W96

Description: Fragment, 1 mm thick, with edges rolled 4 mm to form a channel, and 50 mm long.

11.5 MM STRAP

Number of specimens: 1

Provenience: N92W98

Description: 1.5 mm thick and 25 mm long.

8.6 MM STRAP

Number of specimens: 2

Provenience: N90W98, N94W92

Description: Fragments are 1.5 mm thick. One is 40 mm long and has a 2.2 mm hole drilled 4 mm from one end. The other is 55 mm long.

Table 7

Washers or Shims from the Metal Locater Survey

Provenience	Inside Diameter	Outside Diameter	Thickness
N92W98	10.5 mm	21.0 mm	0.3 mm
N96W98	10.0 mm	3.5 mm	1.0 mm
N100W98	10.0 mm	35.0 mm	2.0 mm
N102W96	36.0 mm	58.0 mm	0.7 mm

CERAMICS

WHITEWARE SHERD WITH MAKER'S MARK

Number of specimens: 1

Provenience: N114W82

Description: From a vessel of undetermined form with the following maker's mark impressed on the surface: "WED . . . BEST CO . . ."

CROCKERY SHERD

Number of specimens: 1

Provenience: N126W84

Description: From a vessel of undetermined size and shape; sherd is unglazed on one side and painted brown and salt glazed on the other.

GLASS

WATKINS PANEL BOTTLE

Number of specimens: 1

Provenience: N74W84

Description: Clear rectangular base with beveled corners (Fig. 10a); beveled basal edge, straight sides, curved shoulders, tapering neck, and metal screw-on cap attached to rim (Fig. 10b). Measurements: 214 mm high, 73 mm wide, inside diameter of the mouth undetermined. Front panel embossed with "THE J.R. WATKINS CO." Bottom embossed "1" inside a diamond and semicircles on either side with numbers "12", "8," and "4."

VETERINARY PHARMACEUTICAL BOTTLE

Number of specimens: 1

Provenience: N108W84

Description: Circular amber colored base (Fig. 11a); straight sides, curved shoulders, tapering neck, metal ring with stopper covers the rim (Fig. 11b). Measurements: 160 mm high, 51 mm in diameter, inside diameter of the mouth undetermined. Side embossed with calibrations from "50" to "250" mils. Bottom embossed "1" inside a circle with numbers "7," "0," and "4."

Chemical Prospecting

A chemical analysis of sediments was conducted in different areas of the park. The main purpose was to test this method of prospecting and to determine its value for subsurface investigation. The results are in Appendix E.

THE MCKINNEY HOUSE

Research Design

Teaching and the logistics of handling a large number of field workers provided the framework on which the research design was based. The primary problem was splitting the excavations in such a way that the workers would not be in each other's way while at the same time concentrating personnel in such a manner that adequate supervision could be provided by crew chiefs. Based on these factors, the research design was explained in the field manual (Ralph and McEachern, 1974:3).

Excavation in the McKinney house will be limited to the east room of the house. Most of the house is protected by wall fall and the east room is the most vulnerable to unauthorized excavation. Excavations are expected to yield small artifacts (which could slip between the floorboards) and architectural features.

Two trenches extending from the house are planned to explore the nature of the occupation deposit. The occupation deposit is expected to be thickest close to the house and diminish rapidly as it approaches the cultivated field. Evidence of the 1921 flood is also predicted in this area.

Since excavation is a destructive process, care was taken to select methods which would minimize destruction and at the same time yield maximum information. Excavation was conducted in 1 m² units and carefully trowled in 10 cm levels. The excavated matrix was dry screened through 1/4 in mesh screen and all cultural and fauna material was saved. Notes for each excavation level were recorded on forms specifically designed for the field school. General notes were taken by crew chiefs; at the completion of excavations, summaries were prepared on all excavation areas.

Grid System and Provenience

Excavations were conducted within the master grid described in the metal survey; all units were designated by that system during the field school. However, to facilitate analysis and make the grid system easier to visualize, another method of designating the excavation units is used in this report. All units in the north trench are designed by the letter "N" and units in the east trench by "E." Units in the east room are designed by "R", while the two units in the northwest corner of the house are referred to by "NW" (Fig. 12).

Both R and N units are numbered from south toward north starting with "1." Units from the east trench are numbered from west toward east. The letter "s" refers to the surface, while "I" means the first level (0-10 cm), "II," the second level (10-20 cm), etc. Thus, the entry "N1s(2)" under Provenience in the artifact description refers to the surface of the first southernmost unit of the north trench. The number in parentheses means that two

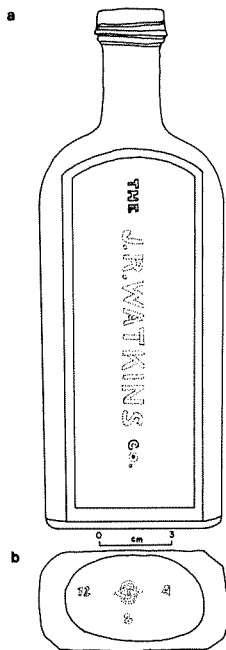


Fig. 10 Metal detector survey artifacts:
a. Watkins Panel Bottle; b. bottle base.

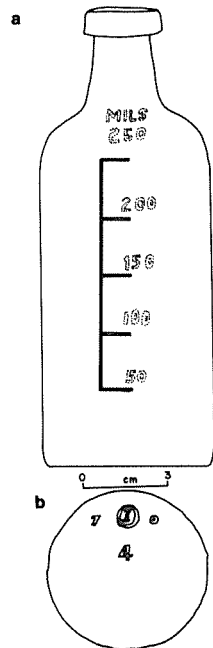


Fig. 11 Metal detector survey artifacts:
a. Veterinary Pharmaceutical Bottle;
b. bottle.

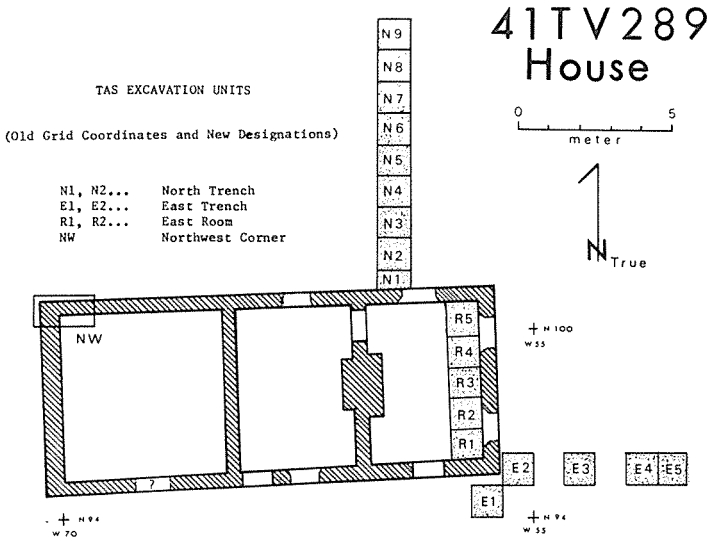


Fig. 12 Texas Archeological Society excavation units at McKinney House.

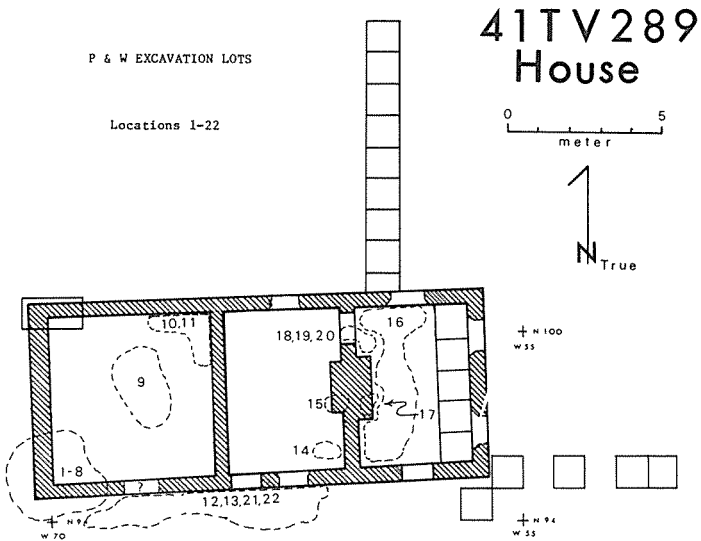


Fig. 13 Texas Parks and Wildlife excavation lots at McKinney House.

specimens were recovered from the unit. If a number is not present following the unit and level designation, only one specimen was recovered.

Excavations

Twenty one units were excavated in and around the house by the Texas Archeological Society (Fig. 12). Additional work was carried out by the Texas Parks and Wildlife Department after the completion of the field school (Fig. 13). The later work consisted of removing rubble from the house and is described in detail along with recovered artifacts in Appendix D. The architectural information gained in the rubble removal is incorporated in the following section. The TAS excavations at the house are described in Appendix F.

Architecture

The old McKinney House (41TV289) was a two story, cut stone building with three downstairs rooms (east, west, and middle), a front porch, and supposedly a built-on smoker/kitchen (Fig. 14). The metal locator study indicates the possibility of piping from the front porch to the two cisterns and a structure (probably the historic barn) perhaps 30 m to the northeast. Figure 15 shows the floor plan of the house after removal of rubble. Photographs of the McKinney House (Figs. 16-20) were taken in 1943 by Reynolds Lowrey, an heir of Thomas F. McKinney (Courtesy of Texas Memorial Museum, The University of Texas at Austin).

East Room

The east room is 2.7 m east-west and 5.15 m north-south. It contains a door opening south onto the porch, a door opening west into the middle room to the northwest corner, two windows facing east, and one facing north (Fig. 16). A fireplace and hearth is in the middle of the west wall; above this were the second floor fireplace and joist pockets. A burned floor lies between 157.17 m and 157.23 m elevation. A wooden sill still in place but in poor condition is below the burned surface in the doorsill area between the east and middle rooms. The sill is resting on several limestone slabs; the south end of the sill is butted against 1 x 4 in vertical blank.

Middle Room

The middle room is 3.7 m east-west and 5.2 m north-south. It has a door opening onto the porch to the south, a door common with the east room, a window to the south (east of the door), and a window facing north (Figs. 17, 18). A fireplace in the center east wall shares a common chimney with the fireplace in the east room. Although smaller than its counterpart in the east room, the fireplace is built of the same rock faced native limestone. A small chimney or flue can be seen to the right of the main chimney in Figure 17. This flue is in the middle of the west wall, but evidence of a fireplace or stove parts was not found along the west wall of the middle room.

A burned floor was encountered at 157.27 m elevation by the fireplace and at 157.25 m by the south door, the same elevation as the door sill. A cache of nails, presumably fallen from the second floor or the attic, was found in the southeast corner of the room on top of the burned floor. Remains of plaster were uncovered in the room corners and where the limestone wall was scarred deeply enough to give the plaster a good hold.

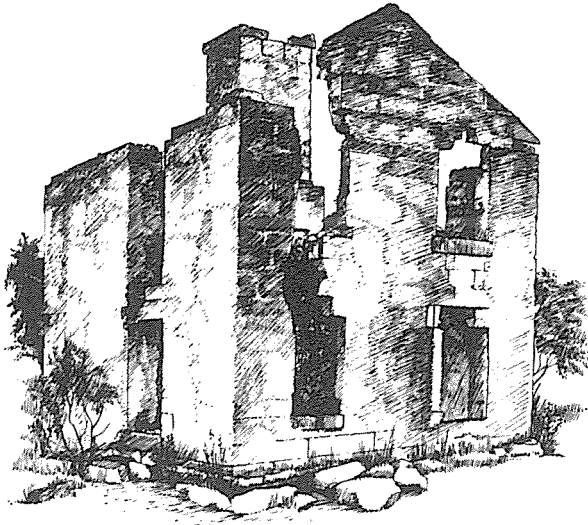


Fig. 14 Drawing, looking northwest, of McKinney House.

41TV289 HOUSE PLAN

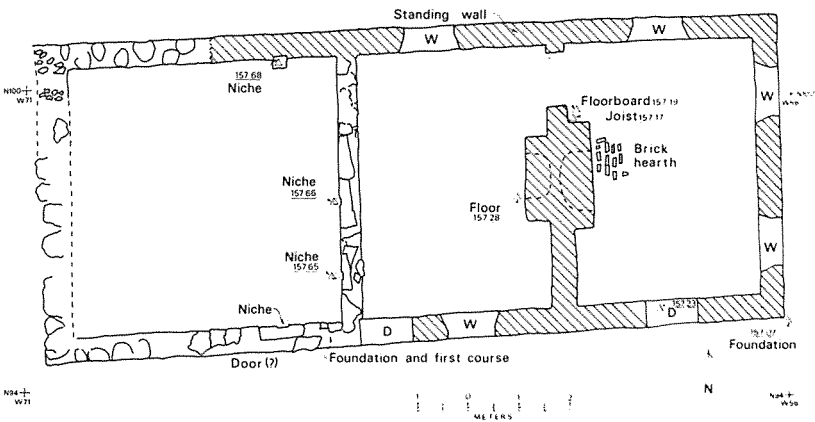


Fig. 15 Plan of House foundations.



Fig. 16 Photograph of McKinney House, looking southwest (Courtesy of Texas Memorial Museum, The University of Texas at Austin).



Fig. 17 Photograph of McKinney House, looking south (Courtesy of Texas Memorial Museum, The University of Texas at Austin).

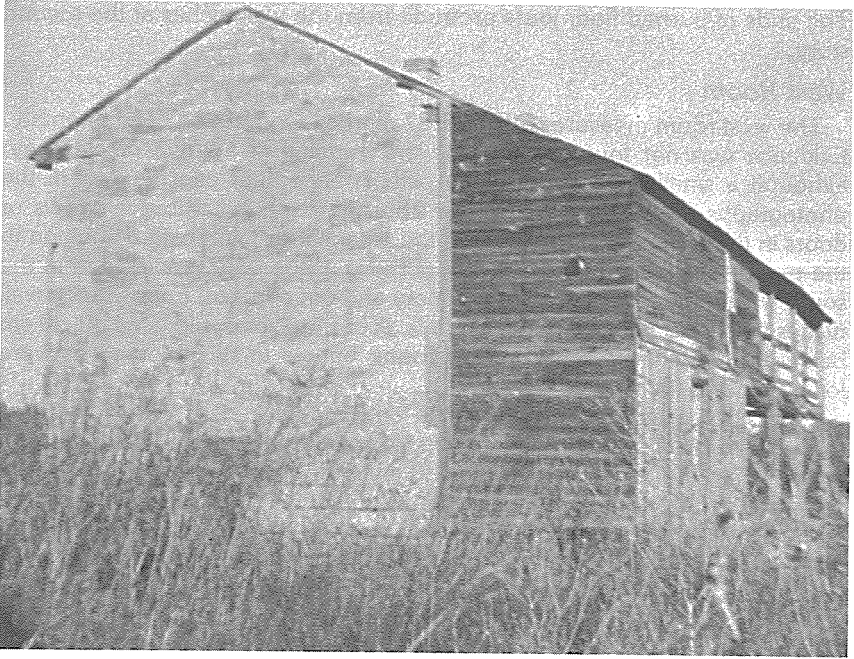


Fig. 18 Photograph of McKinney House, looking northwest (Courtesy of Texas Memorial Museum, The University of Texas at Austin).

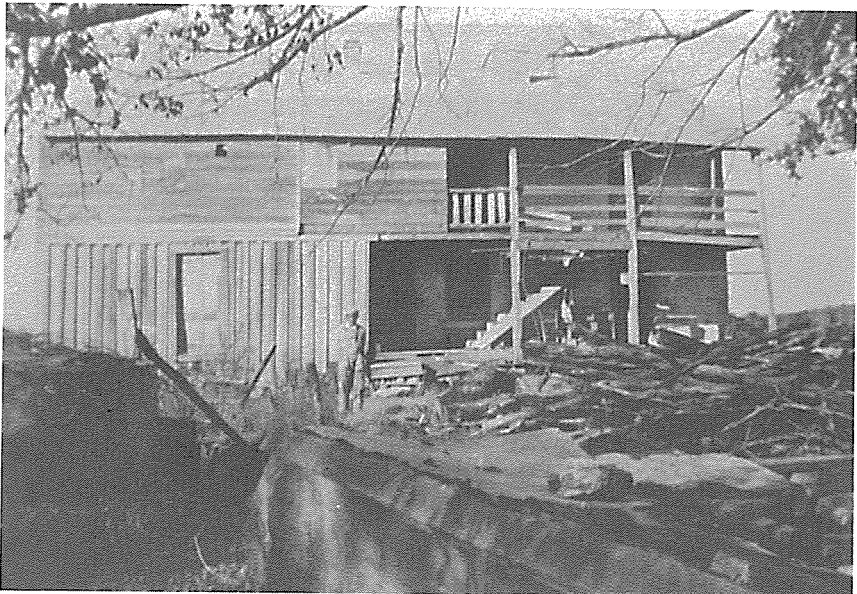


Fig. 19 Photograph of McKinney House, looking north (Courtesy of Texas Memorial Museum, The University of Texas at Austin).

The ends of burned floor joists protrude from the wall niches at the second story.

West Room

The west room measures 5.27 x 5.27 m and is something of an anomaly. Evidence was not found to indicate the remains of a stove or chimney, although a small chimney or stove pipe arrangement can be seen in the photographs (Figs. 17, 19). Figures 18 and 19 do not show windows or doors in the stone facade because of the recent board and batten addition to the porch. Excavation suggests that perhaps a doorway was located in the south wall, but the doorsill is fragmentary and out of place. Four strange wall niches were found in the standing walls. A burned zone is located 30-50 cm below the floor level in the middle room, but no *in situ* floorboards were located in the fill.

From the evidence, the floor rested on large floor joists, probably larger than the second story floor joists (ca. 15 cm wide and 11 cm thick) and smaller than the largest wall niche, 20 cm wide and 30 cm thick; the floor was dimensional lumber no greater than 2 x 8 cm; the floor was cypress (see construction materials section), and it probably stood between 157.85 m and 157.98 m elevation. Furthermore, small test indications in the northwest corner show typical kitchen midden (knife blade, meat hook, eggshells) 50 cm into the deposit (below the floor) where excavation was halted. This material indicates the possibility of a root cellar or basement. If future excavation proves this hypothesis, then access must have been through the floor, since no outside access was demonstrable.

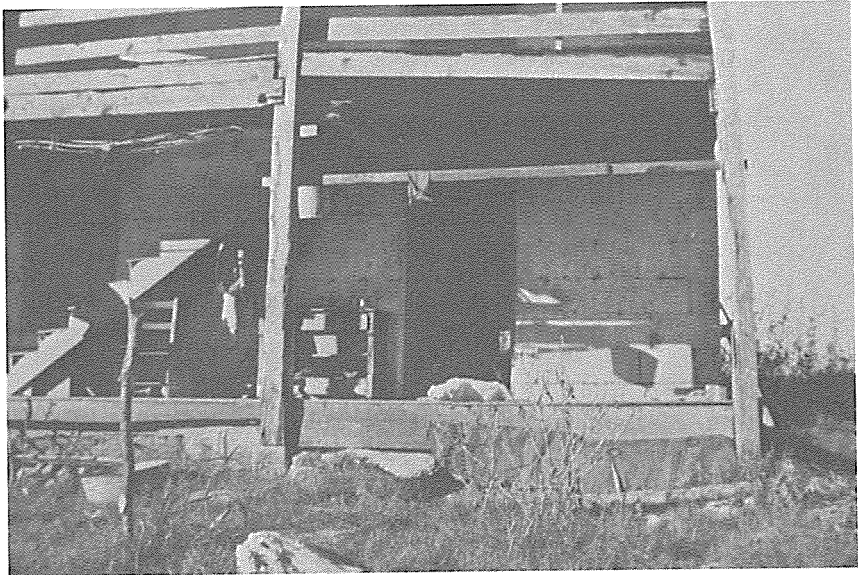


Fig. 20 Photograph of McKinney House, looking north (close-Up) (Courtesy of Texas Memorial Museum, The University of Texas at Austin).

Front Porch

A partially enclosed front porch once spanned the entire front of the house (14.5 m) and extended south approximately 3.15 m into the front yard (Figs. 19, 20). Excavation was not attempted in this area when the larger fallen wall stones were removed. TAS unit E1, excavated 20 cm in the sub-porch fill, did not reveal any architectural features.

Construction Materials

STONE

A native soft fossiliferous limestone was used in the construction of the house. The material was supposedly from the McKown quarry about half a mile downstream on the left bank (Young, 1977:2-43). However, the exact source has not been located; on going quarry operations may have removed all evidence. The stone was cut with a circular saw 96-111 cm in diameter and 4-10 mm wide, depending on the number of blades used at one time. Large rectangular pieces were cut to be used as a capping stone on the pediment of a two pitched roof. These pieces also were incorporated into the construction as the facade using limestone rubble as fill.

Rock faced stone was formed with chisel and axe. The stone seems to have weathered well, except in the fireplace, and appears well cemented with mortar. An axe or pointed pick was used successfully to prepare the interior for plastering; plaster is still present in the corners and at various spots on the walls of the middle room. Foundation stone is uniformly rock faced stone blocks which were set into a builder's trench, probably at a uniform depth, and coursed up to a 157.07 cm elevation where the walls, inset about 5 cm, began their first course. The east room fireplace has a native (non-hewn) limestone and modern brick spark arrester.

WOOD

Cedar (juniper), cypress, and pine were used, although it is difficult to say which was used originally. The second story joists are cedar, rough cut one or two sides (more commonly one side) and 11-15 cm thick. The east room floor is shiplap 1 x 4 in pine; the middle room, 1 x 4 in tongue-in-groove; the upstairs, dimension or milled cypress, 8 x 2 cm, length unknown. Roof or rafters could not be discerned and Figures 17 and 19 show a corrugated tin roof.

IRON

Hardware consisted of nails and hand-forged fireplace crane supports. When the fireplace burned through between the two rooms, a metal shield was placed in the back to separate the two fires. Both cut nails and wire nails were recovered. A third of the cut nails were 4-penny or smaller. They were used for finish work on doors, windows, and trim; one example was recovered in a wooden wedge that was used to plumb and true a door or window frame. About the same percentage of wire nails are present, indicating ongoing repair in later times.

Almost half the cut nails were 8-penny, which were commonly used in framing and flooring. Over half the 8-penny nails were recovered from the excavations in the east room. In later times, about 37% of the wire nails were 8-penny and fewer finishing nails were used. This corresponds with

the introduction of roofing nails. The artifact section describes nail size and number.

A few odd hardware fragments, such as door lock plates, door handles, and strap hinges were recovered. However, their relationship to the house temporally and spatially is not clear.

Fauna

Thirteen species of animals were recovered in the house excavations: *Bufo* sp. (toad), *Gallus gallus* (chicken), *Didelphis marsupialis* (opossum), *Myotis* sp. (mouse-eared bat), *Sciurus niger* (fox squirrel), *Neotoma* sp. (pack rat), *Sigmodon hispidus* (cotton rat), *Sylvilagus* sp. (cotton-tail), *Dasyurus novemcinctus* (armadillo), *Sus scrofa* (domestic pig), *Capra* sp. (goat), *Odocoileus virginianus* (white-tailed deer), and *Bos tarus* (cow).

The faunal assemblage seems typical for a farm or country dwelling, with a few exceptions. The absence of *Mus musculus* (house mouse) and *Rattus novegicus* (Norway rat) is interesting; it is assumed that these species introduced from Europe had not yet become established around the house. The presence of a burned *Myotis* (bat) is also of interest. *Myotis* is a frequent inhabitant of abandoned buildings. It was apparently living in the house when it was burned. The house may have burned during the day while the bat was roosting or perhaps during the winter while it was hibernating. Charred mud dauber nests were recovered from the east room. They were originally placed against the ceiling since there are impressions of coarse wood grain on their flat sides. Table 8 provides more details.

Artifacts

A total of 3,215 artifacts was recovered from the house during the field school. Another 23 lots (uncounted) of wood, plaster, and coal are discussed since they are direct by-products of man's habitation.

Seventy percent of the artifacts are metal (2,239); the largest categories are nails (1,364) and unidentified tin cans and scrap metal (654). Another 16% are ceramics (715); the remaining 14% are glass, lithics, buttons, and miscellaneous. Window glass was weighed rather than counted to attempt total numbers of panes. Miscellaneous bottle glass was not analyzed as the sample was too large for the study time frame. Specimens are classified first by material and then by function.

CERAMICS

Ceramics from the McKinney House consisted of 706 sherds of domestic utensils plus a pipe stem, two doll parts, and six sherds from a toy tea set. An attempt was made to classify the ceramics into earthenware, stoneware, and porcelain, based on paste hardness (Durrenberger, 1965). However, this attempt failed to divide the sherds into desired categories. The division between earthenware and stoneware was made by arbitrarily sorting the collection into tableware and crockery. The earthenware category consists of whiteware, yellowware, blueware, and lead glazed ware. The earthenware category is further subdivided into decorated and undecorated.

In general, the ceramic collection was an expectable one. Examples of early style ceramics include transfer printing, featheredge, and banded decorations. The rather large amount of porcelain (20%) appears unusually

Table 8
Faunal Remains from McKinney House

Provenience	Species	Elements
E1I	10 unidentified fragments <i>Neotoma</i> sp.	2 pelves, 2 tibiae, 2 femora, 10 vertebrae, calcaneum, metatarsal
E1II	4 unidentified fragments <i>Bufo</i> sp. <i>Neotoma</i> sp. <i>Sylvilagus</i> sp.	humerus 2 ulnae, humerus, vertebra vertebra, humerus
E2I	15 unidentified fragments <i>Gallus gallus</i> <i>Didelphis marsupialis</i> <i>Sylvilagus</i> sp. <i>Bos tarus</i>	bill fragment mandible tibia (juvenile) tooth
E3I	7 unidentified fragments <i>Sylvilagus</i> sp. <i>Bos tarus</i>	maxilla pelvic fragment
E3II	2 unidentified fragments 1 unidentified bovid-size animal 1 round steak bone <i>Sus scrofa</i>	canine
E4I	1 unidentified fragment <i>Capra</i> sp.	tooth
E5I	12 unidentified fragments	
E5II	6 unidentified fragments <i>Sus scrofa</i>	tooth
N1II	1 unidentified fragment	
N2I	20 unidentified fragments 1 round steak bone <i>Capra</i> sp.	tooth
N2II	14 unidentified fragments <i>Sus scrofa</i>	tooth
N3I	5 unidentified fragments	
N6II	33 unidentified fragments <i>Odocoileus virginianus</i> <i>Capra</i> sp.	antler fragment 2 teeth fragments
N7II	4 unidentified fragments	
N8II	4 unidentified fragments	
N9I	4 unidentified fragments	
NWs	3 unidentified fragments	
NWI	13 unidentified fragments <i>Sigmodon hispidus</i> <i>Sus scrofa</i>	femur tooth
NWII	2 unidentified fragments <i>Neotoma</i> sp. <i>Sus scrofa</i>	scapula, pelvis metapodial
NWIII	27 unidentified fragments <i>Neotoma</i> sp. <i>Sylvilagus</i> sp. <i>Capra</i> sp. <i>Bos tarus</i> <i>Sus scrofa</i>	femur calcaneum carpal scapula fragment (juvenile) 19 foot elements (juvenile)
NWIV	6 unidentified fragments <i>Dasypus novemcinctus</i> <i>Sciurus niger</i>	vertebra maxilla

Provenience	Species	Elements
	<i>Capra</i> sp.	3rd phalange
	<i>Bos tarus</i>	2 carpals, 2 phlanges
R11	<i>Gallus gallus</i>	femur
R3I	<i>Sciurus niger</i>	humerus
R5I	<i>Myotis</i> sp.	humerus
	<i>Sigmodon hispidus</i>	tibia, femur

high (Fig. 21). However, when the McKinney wealth and status are considered, the marked presence of fine porcelain tableware is not surprising.

Earthenware (Tableware)

WHITEWARE (FIG. 22)

Undecorated Wash Basins

Number of specimens: 12 sherds (from 2 vessels)

Provenience: N1I(6), N1II, N2I, N2II, N3I, N6II, N8II

Description: Three sherds from N3II, N6II, and N8II are rim fragments from a large vessel. The remaining sherds fit together to form about 1/8 of a wash basin which was approximately 35 cm in diameter and 10 cm deep.

Undecorated Cup Sherds

Number of specimens: 10 sherds (from at least 2 cups)

Provenience: E5I(2), N1I(3), N3I(2), N4I(2), N8I

Description: Three rim sherds, two basal sherds, and five handle sherds from at least two cups.

Undecorated Rim Sherds (Plates, Saucers, and Serving Dish)

Number of specimens: 51 sherds (from at least 18 vessels)

Provenience: E2I, E3II, E3III, E4I(9), E4II, E5s, E5I(20), N1I, N2I(7), N2II(2), N3I(2), N3II(3), N4I, N7I

Description: There are 36 sherds from at least 15 plate sized vessels; 13 sherds from at least two saucer sized vessels; and two sherds from a possible serving dish.

Whiteware Bases (Plates, Saucers, and Platter)

Number of specimens: 34 sherds (from at least 15 vessels)

Provenience: E3I, E4I(11), E4II, E5I(9), E5II(4), N1I, N3II, N4I(3), N7I, N8I(2).

Description: There are 27 sherds from at least 11 plate sized vessels; six saucer sized basal sherds from three vessels; and a single sherd from a platter.

Whiteware Body Sherds

Number of specimens: 276

Provenience: E2I(4), E3I(5), E3II(5), E3III, E4I(62), E4II(21), E5I(61), E5II(7), N1I(7), N1II(3), N2I(19), N2II(5), N3I(26), N3II(11), N4I(11), N5I(8), N6I(10), N6II(2), N7II(2), NWI(5), R3II

Description: Miscellaneous body sherds.

Printed Maker's Marks

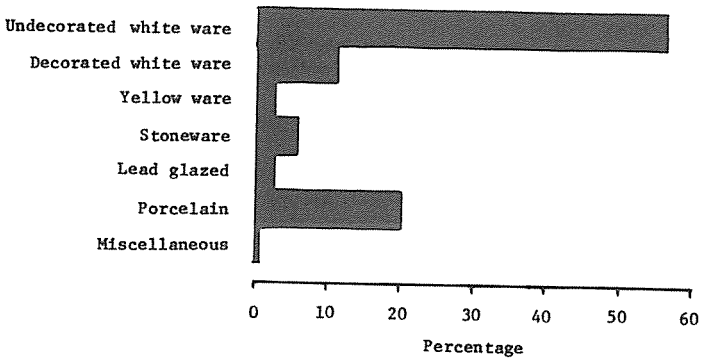
Number of specimens: 15 sherds (from at least nine vessels)

Provenience: E4I(4), E5I, N1I, N2I, N3I(2), N3II(4), N4I, N7I

Description: Identified marks are from A. Villeroy and Boch (four sherds from a cup or small bowl) and B. M & S (one sherd) (Fig. 23c).

Unidentified marks: Three sherds from one vessel have the name " . . . VIN M. KNOWLES CHINA CO." and "U.S.A." around a ship (Fig. 23b). One sherd has most of the word "CHINA" and the monogram "S.G.E." (Fig. 23d). Six sherds from at least three vessels are too incomplete to be readily identified. One of them has part of a lion and the letters "IRO" (Ironstone) on it (Fig. 23a). Another sherd has "AMERIC." in green transfer print.

Discussion: Villeroy and Boch were in Mettlach (Germany) in 1842 (Kovel and Kovel, 1953:136). Godden (1964:407) assigns the M & S monogram to Maddock and Seddon, Newcastle Street, Burslem, England, dating 1839-1842.



Relative Frequency of Ceramic Wares

Fig. 21 Relative frequency of House ceramic wares.

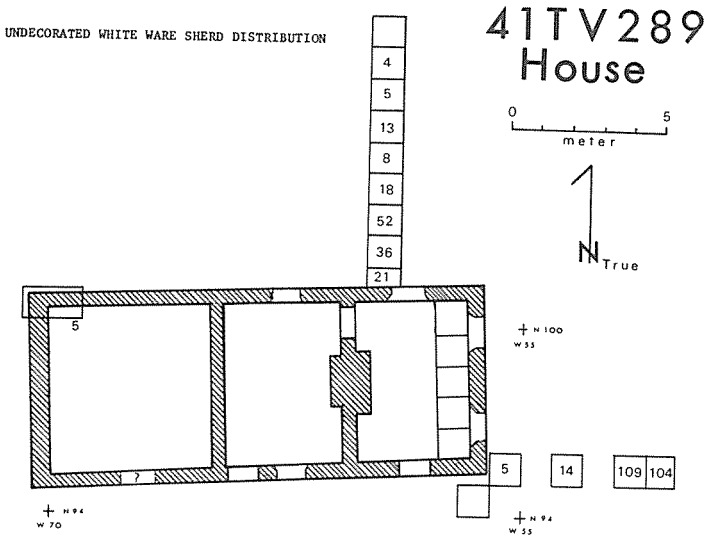


Fig. 22 Undecorated Whiteware sherd distribution at McKinney House.

Featheredge Plate

Number of specimens: 1 rim sherd

Provenience: E5II

Description: One fragment from a plate with a scalloped rim that is edged in blue.

Discussion: Featheredge was most popular in the United States between 1790 and 1840 and commonly occurs in early 19th Century sites; it is rare after 1850 (Walker, 1971:108-109).

Monochromatic Transfer Printed Cup and Saucer

Number of specimens: 9 fragments (5 from 1 cup and 4 from 1 saucer)

Provenience: N2I, N3I(4), N3II, N4I(2), N8I

Description: The sherds are printed in dark blue. Two rim sherds from a cup have a hatched pattern and three body sherds have a floral pattern. The three rim sherds from the saucer are hatched and one has part of a floral pattern.

Monochromatic Transfer Printed Sherds

Number of specimens: 3

Provenience: E1I, E4I, N2I

Description: Two sherds are transfer printed in brown. The other sherd is printed on both sides in a light blue floral pattern.

Discussion: Monochromatic transfer printing was most popular in the United States between 1790-1850 (Walker, 1971:16).

Polychrome Decalcomania

Number of specimens: 15 sherds (from at least 5 vessels)

Provenience: E2I(2), E3I, E3II(2), E4I(3), E4II(3), E5I(2), NWI(2)

Description: Three sherds are from a plate with a gilded edge and a floral pattern of pink, red, blue, green, and yellow. Five sherds are from a bowl or dish with a floral pattern of green, blue, red, and brown. Two sherds have a flower-and-diamond pattern in red, green, yellow, and black along the edges; one is from a platter and the other from a bowl. Five sherds are from a cup and saucer with a

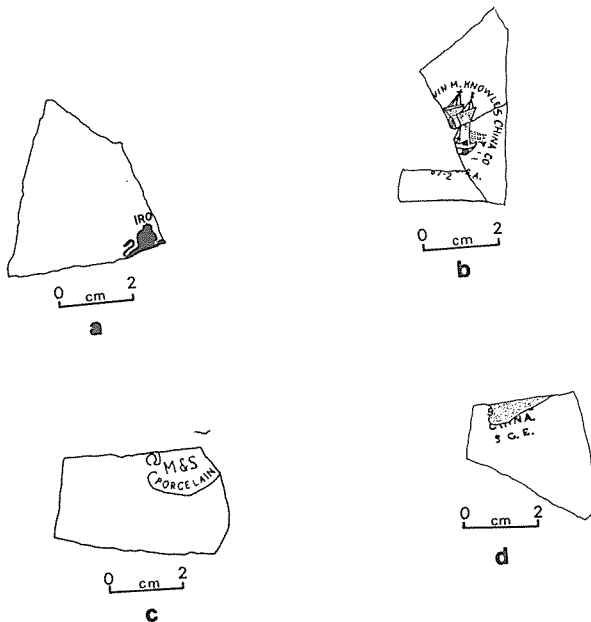


Fig. 23 Printed maker's marks on sherds recovered from McKinney House.

repousse edge and band on the cup with a floral and bird pattern in blue, green, red, yellow, and black.

Discussion: The manufacture of polychrome decalcomania was started in England by 1845 and was fashionable by the mid-1800's (Walker, 1971:121).

Banded Ware

Number of specimens: 1

Provenience: N1I

Description: The sherd has an applied blue slip band and is too small to determine vessel type.

Discussion: Banded ware was used throughout the 19th Century but was popular mainly between 1800-1850 (Walker, 1971:133).

Painted line

Number of specimens: 3 sherds (from 2 vessels)

Provenience: E4I(2), N7I

Description: Two specimens (E4I) are from a bowl or serving dish with a blue line painted on the edge overglaze. The remaining sherd is a basal fragment from a plate or saucer with a red line underglaze.

Mottled/Painted

Number of specimens: 1

Provenience: N2I

Description: This small rim sherd is painted in blue and red underglaze, producing a mottled red, white, and blue effect. The shape of the vessel was not determined.

Hand painted

Number of specimens: 1

Provenience: N2I

Description: The sherd is hand painted underglaze in red, green, blue, and black. The specimen is too small to determine the pattern but the curvature suggests a bowl.

Gilded

Number of specimens: 16 sherds (from at least 4 vessels)

Provenience: E4I(7), E4II(5), E5I(3), N5I

Description: Seven sherds are from a plate with a gilded band 5 cm wide along the edge. Seven sherds are from a bowl with a repousse edge and gilded geometric pattern. One sherd is from a cup with a repousse edge and gilded flower pattern; while the remainder is from a saucer with a dot repousse pattern and gilded edge.

Repousse edged

Number of specimens: 14

Provenience: E4I, E4II(2), E5I(6), E5II, N2I, N7I, N9I, NWI

Description: Rim sherds are from white plates that have molded or repousse decoration only, consisting of patterns of lines and dots.

Blue specked

Number of specimens: 3

Provenience: N1II, N2II, N3II

Description: The sherds are covered with tiny, irregularly spaced, light blue dots underglaze.

YELLOWWARE

Number of specimens: 22 sherds (from at least 3 vessels)

Provenience: E5I, N1I(2), N1II, N2I(3), N2II, N3I(9), N3II(3), N4I, N7II

Description: Fourteen sherds are plain. One rim sherd has a repousse edge. Another sherd is painted green underglaze in parts. The remaining sherds are banded ware with brown, white, and black bands.

BLUEWARE

Number of specimens: 1

Provenience: E5I

Description: Blue glazed sherd from bowl or vase with repousse rose pattern.

LEAD GLAZED

Number of specimens: 28 sherds (from 2 vessels)

Provenience: E3III(2), E4I(20), E4II(4), E5I(2)

Description: Two sherds are from a bottle that is hand painted polychrome in green, yellow, brown, and black. The remaining sherds are from a small plain bowl glazed on the inside and along the outer edge of the rim.

Discussion: Lead glazed pottery of Mexican manufacture is common in Spanish Colonial sites. Similar ware is presently made in Jalisco (Fox, 1974:55).

MISCELLANEOUS SHERDS

Number of specimens: 3

Provenience: E5II(2), N2I

Description: Unidentified sherds.

PIPE STEM

Number of specimens: 1

Provenience: N6II

Description: The specimen is fragmentary, including the stem and a small part of the bowl. The beige paste is fine textured and slightly porous. Identified markings on the specimen are lacking.

Stoneware (Crockery)

The house yielded a total of 43 sherds from at least six crocks or jugs. The sherds vary from soft to medium paste, beige in color, and coarser in texture than the white ware. Most of the sherds exhibit wheel marks and the majority are salt glazed. The sherds are typed on the basis of interior and exterior finish.

BROWN GLAZED EXTERIOR/BROWN GLAZED INTERIOR

Number of specimens: 12 sherds (from at least 2 vessels)

Provenience: E5II, N2II(2), N3I(5), N4I(2), N5I(2)

Description: Eleven sherds appear to come from large crocks with one sherd from another smaller vessel. Two fragments of an applied shaped handle were recovered.

WHITE GLAZED EXTERIOR/WHITE GLAZED INTERIOR

Number of specimens: 13 sherds (from at least 1 vessel)

Provenience: E2I, E3s, E4I(2), E5I(4), E5II, N3I(4)

Description: Sherds are from a large crock that was salt glazed on the exterior and interior. One sherd is a rim fragment from a lid.

CREAM GLAZED EXTERIOR/BROWN GLAZED INTERIOR

Number of specimens: 11 sherds (from at least 2 vessels)

Provenience: E5II, N1I(3), N2I(2), N2II, N2III, N3I, N3II, N4I

Description: Sherds are from large crocks that were salt glazed on the exterior and interior. Five of the sherds have a blue paint underglaze on the exterior.

GRAY GLAZED EXTERIOR/GRAY GLAZED INTERIOR

Number of specimens: 2 sherds (from 1 vessel)

Provenience: N3I, N5I

Description: Sherds are from a straight walled vessel with a salt glazed interior and exterior.

YELLOW GLAZED EXTERIOR/YELLOW GLAZED INTERIOR

Number of specimens: 1

Provenience: N4I

Description: Rim sherd from large crock.

UNFINISHED EXTERIOR/GLAZED INTERIOR

Number of specimens: 2 sherds (from 2 vessels)

Provenience: E5I, N1I

Description: Specimens are both basal sherds. One has a white salt glazed interior; the other a brown glazed interior.

GLAZED EXTERIOR/UNFINISHED INTERIOR

Number of specimens: 1

Provenience: NWs

Description: A crock lid sherd with blue and white splatter painted under a salt glaze.

Porcelain (Sherd distribution Fig. 24)**UNDECORATED RIM SHERDS (PLATES AND SERVING DISH)**

Number of specimens: 22 sherds (from at least 3 vessels)

Provenience: N1I(5), N1II(2), N2I(5), N2II(3), N4I(2), N6I, N7I, N8I, NWII(2)

Description: Most of the rims are too incomplete to be typed, but at least two plates and one serving dish are represented.

UNDECORATED BASE SHERDS (PLATES AND SAUCER)

Number of specimens: 11 sherds (from at least 4 vessels)

Provenience: E4I(3), N1II, N2I, N2II(2), N3II, N6I, N9I, N9II

Description: Sherds appear to belong to two plates and two saucers.

UNDECORATED BODY SHERDS

Number of specimens: 81 sherds (from undetermined number of vessels)

Provenience: E2I(2), E3I, E3II, E4s, E4I(16), E4II(4), E5I(5), E5II(3), N1I(4), N1II(2), N2I(5), N2II(2), N3I(4), N3II(2), N4I(4), N5I(3), N6II(5), N7I(4), N7II(7), N8I, N8II(2), N9I(3), N9II, NWI

Description: Miscellaneous unidentified body sherds.

UNDECORATED CUP SHERDS

Number of specimens: 14 sherds (from at least 3 cups)

Provenience: E2I, E4I(7), E4II, E5II(2), N2I, N9I, NWI

Description: Miscellaneous rim, basal, and handle fragments.

POLYCHROME DECALCOMANIA (CUP, SAUCER, AND VASE)

Number of specimens: 11 sherds (from 3 vessels)

Provenience: E3I, E4s, E4I(6), E4II, E5I, N4I

Description: Five sherds from a cup with a red, yellow, blue, and green floral pattern. One sherd appears to be from a saucer with the same pattern. Three sherds appear to be from a vase with a green and red floral pattern.

HAND PAINTED SAUCER

Number of specimens: 1

Provenience: E5I

Description: Sherd appears to be from a saucer hand painted in green overglaze.

GILDED BOWL

Number of specimens: 2 sherds (from one vessel)

Provenience: E4I, E5I

Description: Sherds seem to come from the same bowl which apparently had the entire outside in gilded overglaze.

MAKER'S MARKS

Number of specimens: 3 sherds (from 2 vessels)

Provenience: E4II(2), N3I

Description: Two sherds fit together and have ". . . MADE IN . . ." printed in green overglaze. The remaining sherd is apparently a saucer and has the letters "IN Y" printed in green overglaze.

TOY TEA SET

Number of specimens: 6 sherds (from 5 vessels)

Provenience: E4I(3), E4II, E5I, N3I

Description: Two of the sherds are from a miniature saucer; one from a miniature bowl; three from a miniature teacup; one, the spout from a miniature teapot; and the remaining sherd from a lid.

DOLL PARTS

Number of specimens: 2

Provenience: E4I(2)

Description: Sherds are painted in black overglaze and from the size and shape are assumed to have come from a doll.

GLASS

Bottles

One whole specimen was recovered along with 18 necks, 20 bottle bases, and eight jar necks. A bottle base was dated between 1904 to 1907 (Table 10). One neck is hand applied. Necks are illustrated as rim types and not described.

GEBHARDT CHILI POWDER PANEL BOTTLE

Number of specimens: 1

Provenience: E4II

Description: Clear, rectangular base with beveled corners, beveled basal edge, straight sides, slanted shoulders, straight neck, wire rim, and threads for a screw-on cap (Fig. 25). Measurements are 83 mm high, 39 mm wide, 19 mm inside diameter of the mouth. Side panels are embossed "GEBHARDT EAGLE, CHILI POWDER"; bottom embossed with an "I" inside the diamond.

Discussion: Manufactured by Illinois Glass Company between 1916-1929 (Toulouse, 1971:264).

BOTTLE NECK AND BASE

Number of specimens: 1

Provenience: E2I

Description: Clear, rectangular base, rear beveled corners, straight sides, straight neck, wire rim, screw-on cap still attached (Fig. 26). Measurements are 127 mm high (estimated), 43 mm wide. Bottom embossed with a "W" inside a diamond and "USA 40 18."

BOTTLE NECKS

Number of specimens: 17

Provenience: E4I(2), E5I(6), E5II(2), N2I, N3I, N4I, N7I(2), N7II, N8II

Description: Table 9. Rim types are illustrated in Appendix G, Figure 1.

BOTTLE BASES

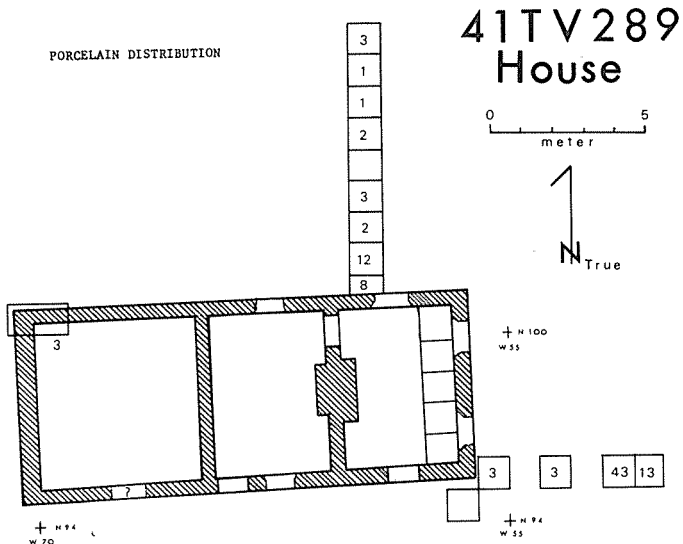


Fig. 24 Porcelain distribution at McKinney House.

Table 9
Bottle Neck Sherds from McKinney House

Provenience	Color	Rim Type	Inside Diameter of Mouth	Remarks
E4I	aquamarine	U	15 mm	
E4I	purple	DD	12 mm	
E5I	purple	neck with wire rim	undetermined	embossed "UNCES"
E5I	purple	C	undetermined	embossed "2 1/2 FL"
E5I	purple	G	11 mm	
E5I	purple	F	13 mm	
E5I	clear	neck with wire rim	undetermined	
E5I	clear	EE	undetermined	
E5II	clear	C	11 mm	
E5II	green	T	12 mm	
N2I	purple	BB	10 mm	
N3I	clear	C	21 mm	
N4I	clear	neck with wire rim	undetermined	
N7I	clear	F	undetermined	
N7I	purple	D	undetermined	
N7II	purple	T	undetermined	
N8II	amber	CC	12 mm	applied neck

Number of specimens: 19

Provenience: E3I, E3III, E5I(4), N2s, N2I(2), N3I(3), N5s, N6I, N7I, N8II, N9I, NWI, R1s

Description: Table 10.

EMBOSSSED BOTTLE SHERDS

Number of specimens: 14

Provenience: E2I, E4I(2), N2I(3), N3I(2), N4I(4), N7II, NWIV

Description: Table 11.

Jars and Lids

JAR NECKS

Number of specimens: 8

Provenience: E3III, E4I(3), E5I, E5II(2), R1I

Description: Clear jar neck fragments, with undeterminable measurements, threads for screw-on caps. R1I is a clear, melted jar with continuous thread for a screw-on cap, embossed "TRADE MARK VASELINE CHESEBROUGH NEW (YORK)."

JAR LID

Number of specimens: 1

Provenience: E5II

Description: White milk glass, circular base, undetermined diameter, embossed "JARS."

Discussion: It is possibly a Boyd cap for a Mason jar.

EMBOSSSED BODY SHERDS

Number of specimens: 1

Provenience: N2I

Description: Clear, jar sherd, embossed "SEAL."

Table 10
Bottle Base Sherds from McKinney House

Provenience	Color	Shape of Base	Diameter	Remarks
E3I	amber	square	62 mm	embossed with 2 dots; Garrett snuff bottle
E3III	clear	circular	undetermined	
E5I	clear	circular	undetermined	embossed "MISTS"
E5I	clear	circular	undetermined	
E5I	clear	circular	undetermined	
E5I	clear	circular	undetermined	
N2s	clear	circular	undetermined	
N2I	amber	circular	undetermined	
N2I	aquamarine	rectangular	undetermined	inset panel
N3I	purple	circular	42 mm	embossed "FAI DEC 22 JULY 15 23"
N3I	clear	circular	undetermined	
N3I	purple	circular	undetermined	embossed "1908"
N5s	purple	circular	39 mm	embossed "172"
N6I	purple	circular	undetermined	
N7I	amber	rectangular	undetermined	possible panel bottle
N8II	clear	circular	undetermined	embossed "MILLVILLE"
N9I	clear	circular	undetermined	
NWI	aquamarine	square	63 mm	beveled corners, circular concave depression in base
R1s	aquamarine	circular	undetermined	embossed "AB J L "; manufactured by Adolphus Busch Glass Mfg. Co., 1904-1907 (Toulouse, 1971:26)

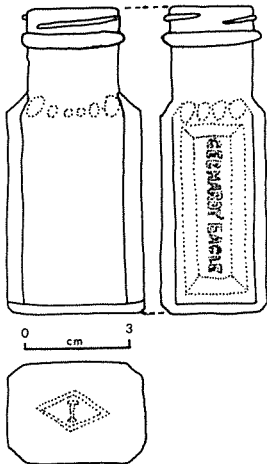


Fig. 25 Gebhart Chili Powder Panel Bottle,
front and back view and base.

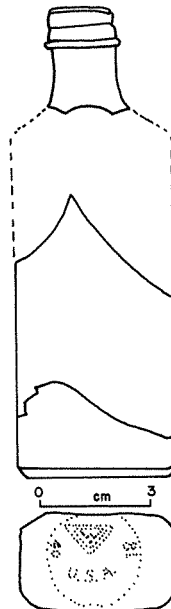


Fig. 26 Unidentified bottle neck and base.

Table 11
Embossed Bottle Sherds from McKinney House

Provenience	Color	Remarks
E2I	clear	panel bottle, front panel embossed "B CAL RUP"
E4I	clear	embossed "G T"
E4I	clear	embossed "E B"
N2I	amber	snuff bottle basal sherd, embossed with 2 dots
N2I	purple	embossed "LA"
N2I	purple	embossed "NL SK"
N3I	purple	panel bottle, side panel embossed with decoration of lines in rectangular pattern
N3I	purple	panel bottle, side panel embossed-with decoration of lines in rectangular pattern
N4I	clear	embossed "T"
N4I	aquamarine	embossed "81"
N4I	clear	embossed "IS"
N4I	amber	embossed "B DRUG"
N7II	purple	embossed "N FR"
NWIV	clear	panel bottle, side panel embossed "CAS"

Pressed Glass

LID

Number of specimens: 1

Provenience: N91V

Description: Frosted, clear lid sherd with lip; geometric pattern.

Discussion: It is probably a bowl lid.

PRESSED GLASS SHERDS

Number of specimens: 17

Provenience: E4I, E5I(9), E5II(2), N3I(5)

Description: Five purple sherds, two milk glass sherds, ten clear sherds. Patterns include five basket weave, eight geometric, and four undetermined. Vessel forms are not discernible.

Window Glass

Weight of specimens: 4.275 kg

Provenience: Table 12.

Description: Thickness of sherds varies between 2.5-3.5 mm but seems to be of two basic sizes.

Discussion: Window glass was the most common artifact from the house. Panes were not reconstructed. However, photographs (Figs. 15, 17, 19, 20) and dimensions of the window enclosures indicate the size and amount of glass to be expected. Total window glass should be 48 kg for the house based on 4.8 kg per window. Nine percent was recovered by excavating about 20% of the area of distribution (308 m²). If most of the windows are to the north and east, as the photographs and architecture indicate, the percentage of recovery is approximately correct.

The largest quantity of glass came from just outside the windows. The quantity becomes less as one goes down and out from the house (Fig. 27). The window glass is outside the structure and not inside. This distribution is to be expected when a house burns with closed windows.

Table 12
Distribution of House Window Glass (by gm)

	S	I	Level II	III	IV	Totals
Unit						
E1		85				85
E2		310				310
E3		188	698			886
E4		362	?			362
E5		?	41			41
N1		537	236	?	15	788
N2		637	112	33		782
N3		272	?			272
N4		115	?			115
N5		44				44
N7		5				5
R1		169				169
R2	20	?				20
R3		46				46
R4		36				36
R5		148				148
NW	<u>13</u>	<u>55</u>	<u>33</u>	<u>55</u>	<u>10</u>	<u>166</u>
Totals	33	3009	1120	88	25	4275

The glass data are incomplete for two reasons: many lots were mixed with plain bottle glass sherds and time did not allow for separation; much of the interior glass was fused by the fire into lumps (containing metal and charcoal fragments) which could not be tallied.

Miscellaneous Glass

LAMP CHIMNEY

Number of specimens: 9 (from at least 4 chimneys)

Provenience: N2I(4), E4I(2), N3I(3)

Description: Rims are clear; thin glass with knobbed edges; slight differences in knobbed edges.

SYRINGE

Number of specimens: 1

Provenience: N1I

Description: Clear glass; long cylindrical syringe 91 mm long, 14 mm in diameter.

VIAL

Number of specimens: 1

Provenience: R1s

Description: Circular base, straight sides, curved shoulders; 10 mm in diameter.

GLASS LENS

Number of specimens: 2 (fit together)

Provenience: R3I(2)

Description: Oval lens (35.7 x 27 x 2.5 mm) from a pair of eyeglasses.

CAMEO

Number of specimens: 1

Provenience: R3I

Description: Fragment of a pink mold made glass cameo; shoulder for setting the piece into a brooch is present.

UNIDENTIFIED GLASS FRAGMENT

Number of specimens: 1

Provenience: R5I

Description: A domed piece of milk glass measuring 8 x 5.4 mm with a small hole in the center of the flat back.

Discussion: Although it may be the head of a pin, none were found in the reference catalog. It may also be a button fragment.

METAL

Ammunition

CARTRIDGES

Rimfire

Number of specimens: 19

Provenience: Table 13.

Description: Table 13.

Discussion: Of the 19 rimfire cartridges, all but four are .22 caliber. Rimfire .22 caliber cartridges are neglected in the literature. Dates range from 1863 to the present. This range is too late for mill dating and too insensitive for a turn-of-the-century chronology. Distribution (Fig. 28) of rimfire in the house excavations shows the early shells clustered east of the house in a trash dump while the later shells are more surface finds from close to or inside the house. References for Table 13 are Logan (1959:190-191), Amber (1968:92), and Barnes (1969:345).

Center Fire

Winchester Repeating Arms Co. .22 W.C.F.

Number of specimens: 1

Provenience: N6II

Description: Brass case (bottle necked); 35.56 mm long; black powder load.

Discussion: This cartridge was introduced in 1885 and used in the single shot Winchester at the turn of the century. It is now obsolete (Logan, 1959:106-107; Barnes, 1965:239).

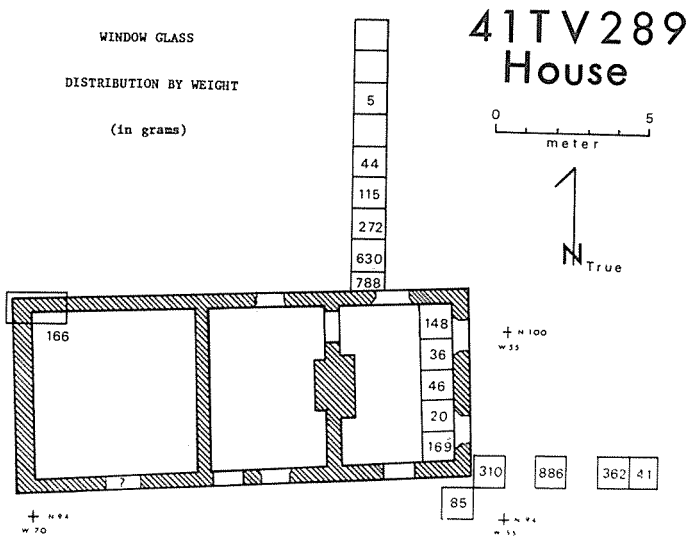


Fig. 27 Window glass distribution at McKinney House.

Table 13

Rimfire Cartridges from the House

Provenience	Maker	Caliber/Type	Material	Case Length	Dates	Remarks
N61	Peters Cartridge Co.	.22 caliber Long or Long Rifle	nickled copper	15.11	1887-present	
R4II, R5II(2), N21	Western Cartridge Co.	same as above	brass	15.11	1898-present	
E51	Union Metallic Cartridge Co.	same as above	brass	15.11	1880-present	
E31	Winchester Repeating Arms Co.	same as above	copper?	15.11	?-present	
E51	Peters Cartridge Co.	.22 caliber Short	brass	15.11	1857-present	
E11	Remington - U.M.C.	same as above	copper?	15.11	1945-present	
E51, E5II	Winchester Repeating Arms Co.	same as above	copper?	15.11	?-present	
E51, E5II(2), N11	United States Cartridge Co.	same as above	brass	15.11	1868-present	Two are crimped to .1718 at neck — blanks? Case length should be 13.49. Patent No. 27,933 by Smith & Wesson, April 17, 1860.
N21, N51(2)	Union Metallic Cartridge Co.	.32 caliber Short?	copper	14.27	1868-1940s	
N21	Winchester Repeating Arms Co.	.38 caliber Short?	brass	19.05	1869-1940s	

Remington U.M.C. 9 mm Luger

Number of specimens: 2

Provenience: E3II(2)

Description: Brass case; 19.05 mm long.

Discussion: The cartridge was perhaps reloaded with a nickel plated copper primer dating post-1902. The cupro-nickel decoy primer makes it post-1940.

Winchester Repeating Arms Co. .32 W.C.F.

Number of specimens: 1

Provenience: N2s

Description: Brass case; 31.75 mm long.

Discussion: The cartridge dates 1882-present, although it is now almost obsolete.

It was originally designed for the Model 73 level action rifle. Most .32-20 rifles will chamber and shoot this cartridge and the .32 Smith and Wesson Long and Short plus other cartridges. Barnes (1969:46) indicates that this cartridge originally was loaded in black powder.

United States Cartridge Co. .38 S & W

Number of specimens: 2

Provenience: N3s(2)

Description: Copper case, unknown length.

Discussion: The revolver cartridge was designed by Smith and Wesson in 1877 for their hinged frame revolvers. U.S. Cartridge Co. was sold to National Lead Co. in 1911 and cartridges may have been produced into the 1920's (Amber, 1968:92). Both cartridges use a U.S. copper primer. The revolver was out of time judging from the firing pin indentation.

Union Metallic Cartridge Co. .38 S & W, solid head

Number of specimens: 1

Provenience: E5I

Description: A copper case too fragmented for measurement.

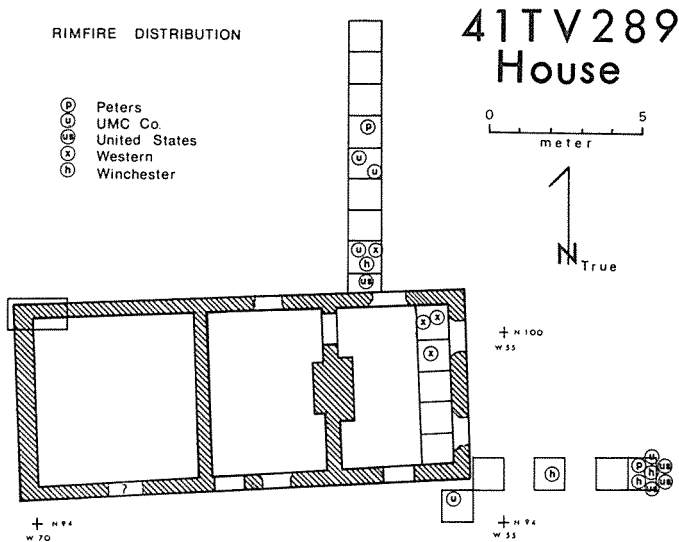


Fig. 28 Rimfire cartridge distribution at McKinney House.

Discussion: The cartridge dates probably 1880-1902 when Remington bought out U.M.C. The solid head denotes that the primer pocket protrudes into the powder chamber of the cartridge (Logan, 1959:104). This cartridge is a balloon head, shot in a revolver with a fixed, well worn firing pin.

Shotgun

W.R.A. Rival

Number of specimens: 1

Provenience: R111

Description: Winchester Repeating Arms Co. 10-gauge, brass case, 7.95 mm long.

Discussion: This cartridge dates late 1870's-early 1900's. It was changed to black powder in 1894 (Amber, 1968:91). The cartridge (Fig. 29a) was found on charred earth beneath the burned wood floor of the house.

Winchester Leader

Number of specimens: 1

Provenience: N51

Description: Smokeless 12-gauge, steel case, 24.64 mm long.

Discussion: It is a high base express load but a battery cup primer is not present. It dates 1894-? and is offered in the 1909 Winchester Catalog (Amber, 1968:91).

The lack of a battery cup primer is something of an anomaly as all other shells from this period use this type primer.

U.M.C. Co. New Club (Star Pattern)

Number of specimens: 1

Provenience: Lot 16

Description: A Union Metallic Cartridge Co. 12-gauge, black powder load with a case length of 8.763 mm.

Discussion: It dates to 1867-1910 (Fontana and Greenleaf, 1962:82).

Remington Express

Number of specimens: 2

Provenience: Lot 1, Lot 9

Description: Remington Arms Co. 12-gauge; 21.44 mm case length.

Discussion: It is probably a recent high base with a black powder load and a battery cup primer (Fig. 29b). It dates in the 1930's.

Remington U.M.C. Arrow

Number of specimens: 1

Provenience: R51

Description: A 12-gauge shell, 26.19 mm case length.

Discussion: The cartridge dates to 1910-1960 (Amber, 1968:92). It is from a battery cup primer shot in a pump action or slide action shotgun. The shotgun was in bad shape (Fig. 29c).

Remington.U.M.C. Shurshot

Number of specimens: 1

Provenience: Lot 1

Description: A late model 12-gauge, black powder load with a case length of 12.7 mm.

Discussion: This shell (Fig. 29d) was listed in the 1936 Remington U.M.C. price list and must be later than the 1901 merger of Remington Arms Co. and Union Metallic Cartridge Co. (Amber, 1968:91).

BULLETS AND SHOT

Number of specimens: 4

Provenience: Table 14.

Description: Table 14.

Discussion: The ball suggests the presence of a percussion revolver in the McKinney household. The lack of distortion suggests that this ball was never fired.

Fasteners

Fasteners include nails, tacks, staples, rivets, screws, bolts, barb wire, buckles, hooks, padlocks, snaps, and hinges. Nails were the second most

Table 14

Bullets and Shot from the House

	R4I	R5I	E1I	E5II
.22 caliber Long or Long Rifle	1	1		
.44 caliber ball			1	
#2 buckshot (Eastern classification)				1

common artifact recovered from the house excavation, with more than 1,397 complete and fragmentary specimens in the collection. The total number of wire nails is almost double that of cut nails, but complete specimens were evenly divided between the two classes.

Complete specimens were classified as to pennyweight (d). Various U.S. standards were tried, but the overlap of sizes through the years and the variations in range found in the manufacturing process nullified efforts to use a set standard. Nails were laid out and divided visually into close types. Type distribution is plotted in Tables 15 and 16 and Figures 30 and 31.

The relative percentages of complete cut nails and wire nails are given and the most common sizes used in the house are noticeable. Fifty-three percent of the cut nails and 44% of the wire nails were recovered from within the east room. The predominant types of cut nails are 2d and 3d

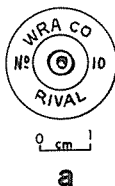


Fig. 29 Shotgun cartridges: a W.R.A. Rival; b. Remington Express; c. Remington -UMC Arrow; d. Remington - UMC ShurShot.

Table 15

Distribution of Cut Nails from the House

Type & Size	Provenience																Total by Type	% by Type									
	Level	E1	E2	E3	E4	E5	N1	N2	N3	N4	N5	N6	N7	N8	N9	NW			R1	R2	R3	R4	R5	R6	R7		
Common	I	1	3			5	3	2	2	2				1			5										
	II					4			3																	48	14.2%
3d	s					1											2										
	I	3		1		5	4	2	1	2							6	3									
	II				1	1	2	2						1	2												
	IV					1																				50	14.7%
4d	I	1				1	2										2										
	II					4	3																			13	3.8%
5d	I				1	1																					
	II					1								1												4	1.2%
6d	I					1		1	1	1	1	2															
	II					1																				8	2.4%
7d	I		1			1																					
	s					1											2	1								3	0.9%
8d	I		1			1	2	1		2							16										
	II					1	1	2						1												104	30.8%
	s					1																				1	0.3%
9d	I					1																					
	II					1				1																3	0.9%
12d	s					1																					
	I		5			6	5										4										
	II					1																				34	10.0%
16d	I					1																					
	II					1																				1	0.3%

Table 15

Distribution of Cut Nails from the House (Continued)

Type & Size	Level	Provenience																Total by Type	% by Type				
		E1	E2	E3	E4	E5	N1	N2	N3	N4	N5	N6	N7	N8	N9	NW	R1			R2	R3	R4	R5
Finishing																							
2d	I	1																				1	0.3%
3d	II																					1	0.3%
6d	I																						
	II				2																	1	1.2%
8d	S		1																				
	I	4	9				9	1															
	II																						
L Head	I																					62	18.3%
Horseshoe																							
	I																					1	0.3%
	II																					338	99.9%
Fragments																							
	I	9	25	11	38	38	25	21	7	7	5	2	6	5	3	9	1	2	1				
	II	3	10	7	15	10	23	11								9	23	65	73	72			
	III		3				4																
	IV																						
																					553		
																					TOTAL	896	

Table 16
Distribution of Wire Nails from the House (Continued)

Type & Size	Level	E1	E2	E3	E4	E5	N1	N2	N3	N4	N5	N6	N7	N8	N9	NW	R1	R2	R3	R4	R5	Total by Type	% by Type
20d	I			1	2																	3	0.9%
30d	s																1					1	0.3%
Finishing																							
2d	I				2																	2	0.6%
3d	s																	1				1	0.3%
4d	I			1																		1	0.3%
6d	I	1	1																1	1		4	1.2%
Roofing																							
12/43	I		1					1	2								1					20	
14/43	I									1								6	7	2			
	II																	1	3	1			
13/35	I		1										1									7	8.6%
	I																					2	
Concrete Form																							
7d	I																					339	100.0%
Fragments																							
	s																						
	I	1	1	1	10	19	5	1									1						
	II			3	1	6	5		2								2						
	III			1													4						
TOTAL																						123	
TOTAL																						463	

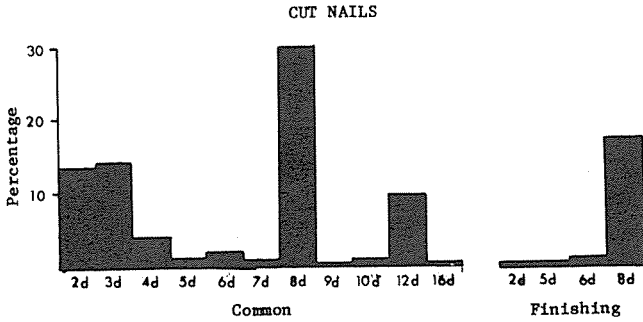


Fig. 30 Cut nails at McKinney House, graph of size by percent.

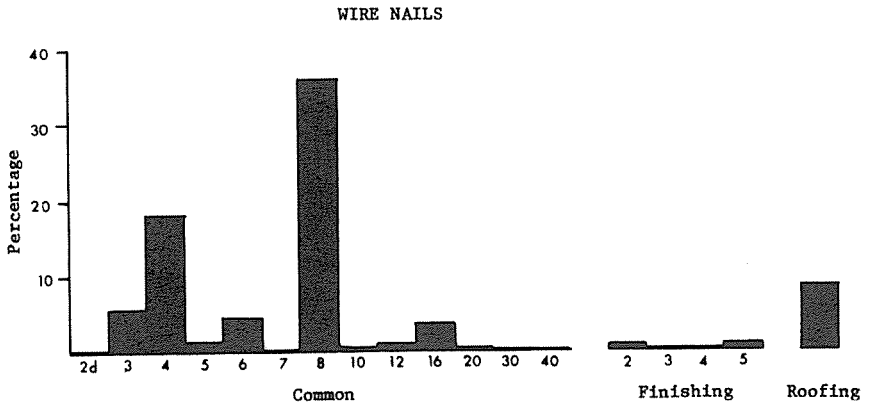


Fig. 31 Wire nails at McKinney House, graph of size by percent.

(29%) and 8d (49%); the most common wire nails are 3d and 4d (39%), 8d (36%), and roofing nails (8%). The function of nails is discussed in the architecture section. Distribution of nails shows the relative late age of the dump in E4-E5 with 2% cut and 15% wire nails.

NAILS

Cut Nails

Number of specimens: 896

Provenience: Table 15.

Description: Table 15, Figure 30.

Discussion: Two lots, E2I and N2I, were mixed in analysis. They are divided arbitrarily with the odd specimens placed in N2I.

Wire Nails

Number of specimens: 463

Provenience: Table 16.

Description: Table 16, Figures 31, 32.

Discussion: Two lots, E2I and N2I, were mixed in analysis. They are divided arbitrarily with the odd specimens placed in N2I.

Tacks

Number of specimens: 5

Provenience: E1I(2), E3I, E4II, N1II

Description: Specimens from E1 have shanks 24 and 29 mm long. Shank lengths of specimens from E4 and N1 are 21 and 14 mm. The upholstery tack from E3I has a shank 13 mm long.

Staples

Number of specimens: 33

Provenience: Table 17.

Description: U shaped wire staples of four different sizes (Table 17).

MISCELLANEOUS FASTENERS

Rivets

Pants Rivets

Number of specimens: 4

Provenience: N3I, N1I(2), N9I

Description: Three 17 mm diameter pants buttons. One has the inscription "Union made." Another is encrusted with rust and is 14.8 mm in diameter. The rivet buttons used on Levi Strauss pants today have these same dimensions.

Copper Rivets

Number of specimens: 1

Provenience: N1IV

Description: Fragment of a copper rivet, male part, 11.2 mm in diameter.

Discussion: Slightly larger than those used today by Levi Strauss Co.

Screws

Iron Screw

Number of specimens: 5

Provenience: E5I, N1I, N1II, N3I, R4I

Description: Fragments of flathead wood screws with head diameters of 15.5, 13.3, 13.1, and 8 mm. A distal fragment came from R4I.

Eye Screw

Number of specimens: 1

Provenience: N8II

Description: 26 mm long and 13 mm in diameter (outside to outside of the eye).

Bolts

Carriage Bolts

Number of specimens: 2

Table 17
Distribution of Staples from the House (By Length)

Provenience	21 mm	28-33 mm	36-39 mm	48 mm	Fragment
N2I		1		1	1
N2II		1			
N3I			1		
N4I		1			
NWI				1	
N8I		2			
N8II			1		
E1I		1		1	
E3I		1	1		
E3II			1		
E4I	1	3			
E5I		6	3		2
R1I			1		
R3I			1		
R4I		1			
Totals	1	17	9	3	3

Provenience: E5I, N2I

Description: Two bolts measure 66 and 76 mm long with 11 and 12.3 mm diameter shanks; the longer has a square nut 20.5 mm across.

U Bolts

Number of specimens: 1

Provenience: E3I

Description: Round stock 9.7 mm in diameter with 40 mm of threads and a 44 mm diameter (inside) across the base.

Chain

Chain, lightweight

Number of specimens: 1

Provenience: N1I

Description: Eighteen rounded links of 4 mm stock.

Chain, link

Number of specimens: 1

Provenience: E2I

Description: Heavy machine roller chain part, 59.5 x 29 x 9.6 mm with two holes 8.7 mm in diameter (Fig. 33.)

Nuts

Number of specimens: 4

Provenience: E3II, E4I, E5I, N2I

Description: Square nuts with outside measurements of 19, 15.5(2), and 11 mm.

Washers

Number of specimens: 5

Provenience: Table 18.

Description: Circular washers of two types: flat and locking.

Rod and Washer

Number of specimens: 1

Provenience: E5I

Description: A rod 5 mm in diameter, 27.5 mm long; threads on one end, split on the other. A fixed washer is attached 9.5 mm from the threaded end and two loose washers 34 mm in diameter are between it and the split end.

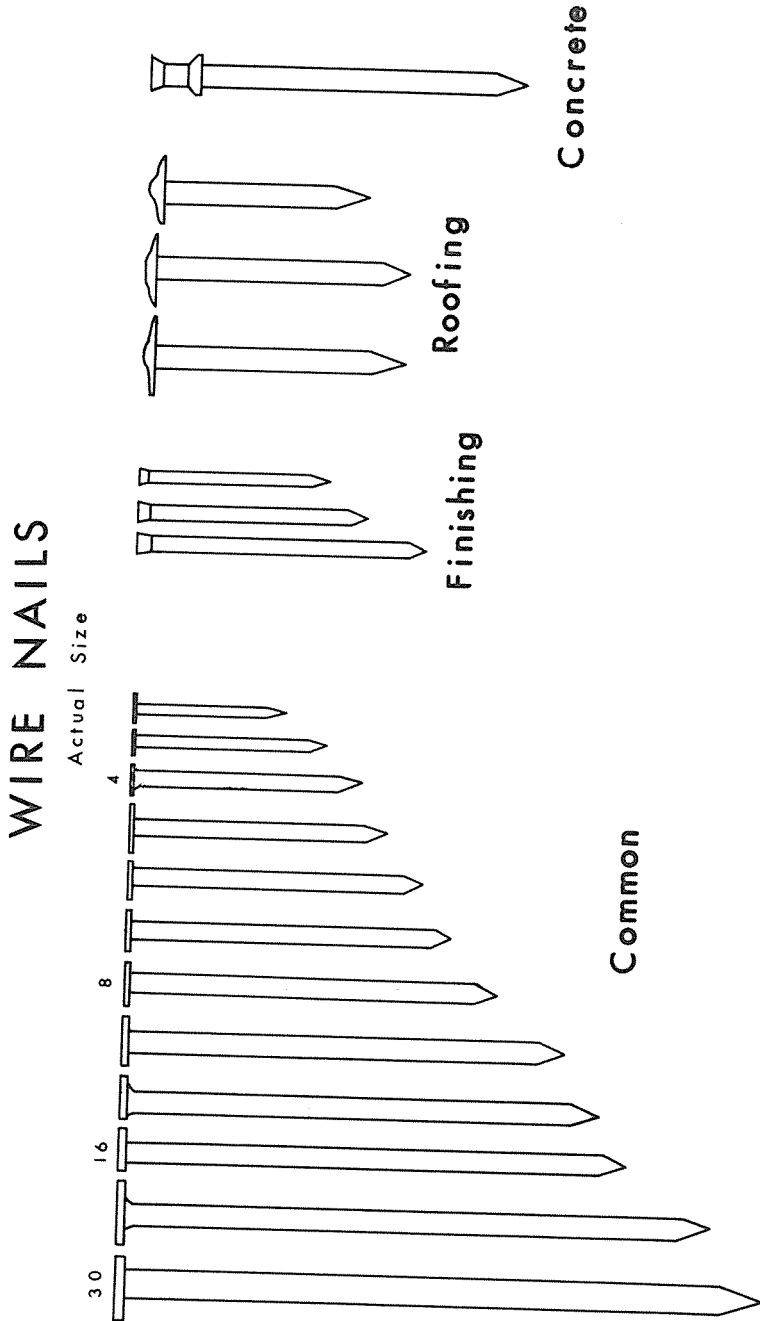


Fig. 32 Illustration of wire nails from McKinney House.

Table 18

Washers from the House

Provenience	Inside Diameter	Outside Diameter	Type
E2I	15.5 mm	45.5 mm	flat
E3I	6.0	13.0	locking
E5I	6.3	18.5	flat
N2I	4.0	12.0	flat
N5I	10.2	20.0	locking

Table 19

Iron Buckles from the House

Provenience	Length	Width	Stock	Strap Size	Remarks
E3I	45 mm	22 mm	rectangular	14	
E4I	25.5	21	round	13	
E4II	36	39	rectangular & round	32	D shaped for a light belt or shoe
E4II	22	25.2	round	19	
E5I	57	39.5	rectangular & round	23	for a hame strap buckle
E5I	47	28	rectangular & round	19	
E5I	—	—	—	25.5	fragment

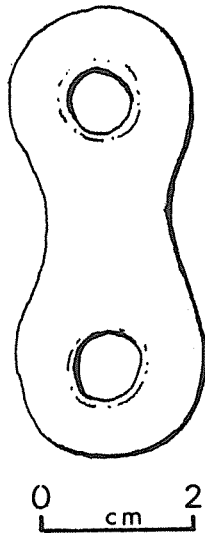


Fig. 33 Chain link from McKinney House.

Barbwire

Number of specimens: 1

Provenience: E4s

Description: A single strand fragment of wire with double wrapped barbs; wire diameter is 3 mm; barbs are of 2 mm stock and machine sheared to a point.

Buckles

Iron Buckles

Number of specimens: 7

Provenience: E3I, E4I, E4II(2), E5I(3) (Table 19)

Description: Clasp type buckles with single, double, and triple bars for use with belts and harness (Table 19; Fig. 34).

Discussion: Buckles from the house came from the east trench toward the trash dump. One type of buckle was used on a hame strap to keep a horse from jumping its traces.

Overshoe Buckle

Number of specimens: 1

Provenience: N8II

Description: Four hole overshoe buckle with a split rivet attachment: measures 47 x 14 x 1.3 mm, bent longitudinally for reinforcing.

Solid Buckle

Number of specimens: 1

Provenience: E4I

Description: Three bars, 25 x 20 mm, of light rectangular stock for a light strap 13 mm wide (Fig. 35).

Suspender Buckle

Number of specimens: 2

Provenience: E2I, E4I

Description: Round stock 3.4 mm in diameter, bent to attach shoulder strap to a bib overall; accepts a 3 mm strap (Fig. 36).

Garter

Number of specimens: 1

Provenience: E4I

Description: Round stock 2.2 mm in diameter, bent to attach stockings to a garter belt.

Grommet

Number of specimens: 5

Provenience: E4I(3), E5I, N3I

Description: Table 20.

Hooks

Iron Hook

Number of specimens: 2

Provenience: E4I(2)

Description: Hook at right angles to the eye of a 9 mm stock, 65 mm overall length (Fig. 37).

Brass Hook

Number of specimens: 1

Provenience: E4II

Description: A bent brass piece 1.5 mm thick and tapering from a width of 21 mm. This rounded end artifact, 56 mm in overall length, has two rivets holding on another thin brass fragment; function unknown.

Adjustable Hook

Number of specimens: 1

Provenience: NW4

Description: Triple rectangular bars accepts a 79 mm strap not thicker than 4 mm. A semicircular protrusion with a 14 mm wide hook protrudes from the front for quick attachment (Fig. 38).

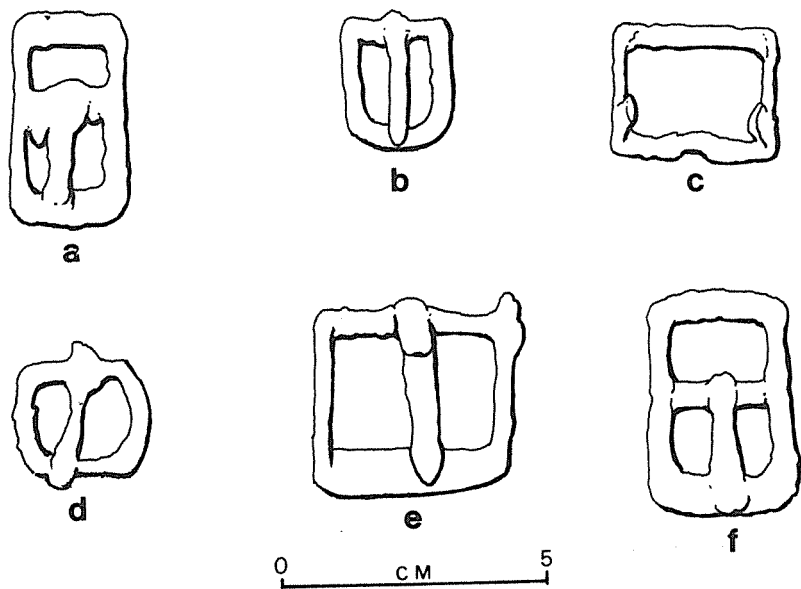


Fig. 34 Iron buckles from McKinney House.

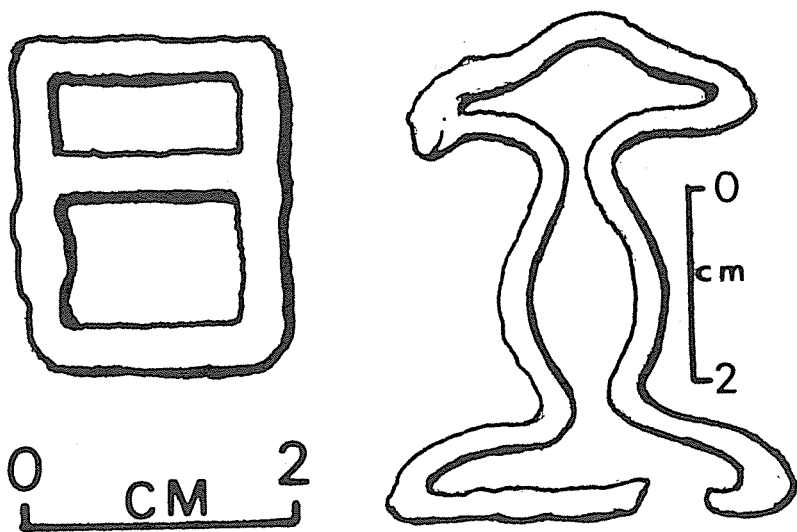


Fig. 35 Solid buckle from McKinney House.

Fig. 36 Suspender buckle from McKinney House.

Table 20

Grommets from the House

Provenience	Inside Diameter	Outside Diameter	2 specimens
E4I(2)	13 mm	6.0 mm	2 specimens
E4I	10	4.5	fragment
E5I	12	5.0	fragment
N3I	12	5.0	fragment

Padlock

Number of specimens: 2

Provenience: NWI, NWII

Description: One (NWI) is a fragment (38.4 mm wide) from a small "Bull Dog" padlock made of brass (Fig. 39a). The other specimen is 77 x 60 mm (NWII) with a spring drop over the keyhole (Fig. 39b).

Discussion: The large specimen is similar to No. 9R2830 in the Sears, Roebuck & Co. catalog (1902:546) for railroads, jails, etc. Cost was 58¢.

Rings

Ring

Number of specimens: 1

Provenience: E4I

Description: 38 mm inside diameter, 49 mm outside diameter (Fig. 40).

D Ring

Number of specimens: 1

Provenience: N9I

Description: Nickel D shaped ring, 23.5 mm outside diameter of 3 mm stock; accepts a 15.5 mm strap (Fig. 41).

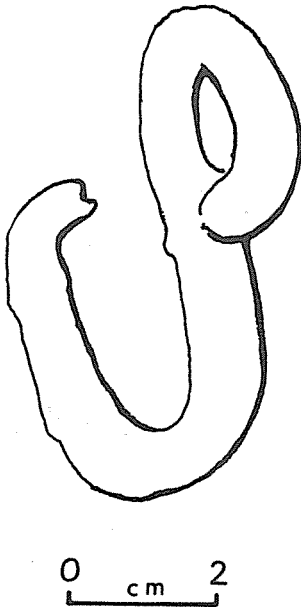


Fig. 37 Iron hook from McKinney House.

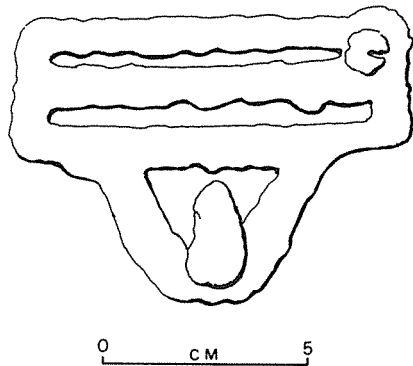


Fig. 38 Adjustable hook.

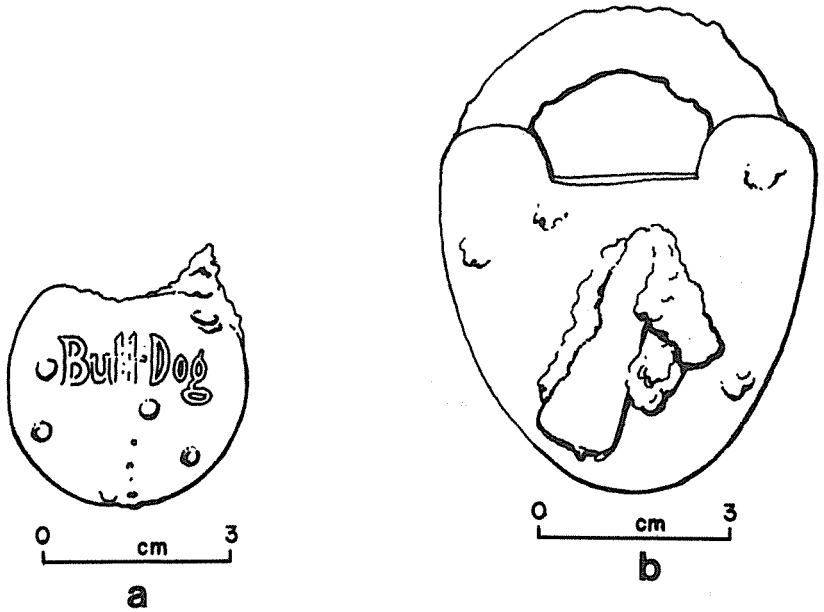


Fig. 39 Padlocks: a. Bulldog; b. unidentified.

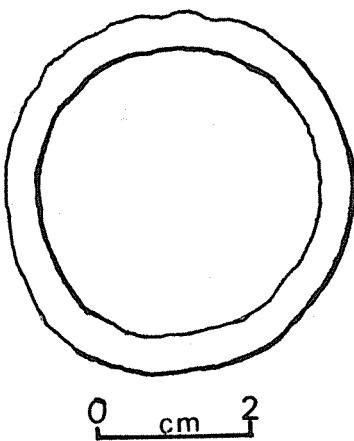


Fig. 40 Ring from McKinney House.

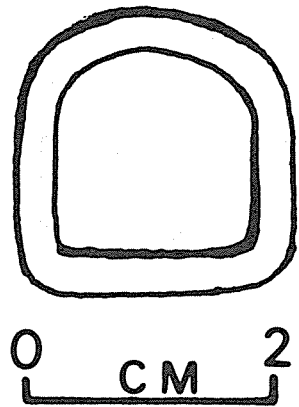


Fig. 41 D ring from McKinney House.

Safety Pin

Number of specimens: 4
 Provenience: E4I, E5I(2), R1I
 Description: Two small fragments and a complete specimen from the southeast corner of the east room. The complete specimen, 52 mm long, is made of brass stock 1.6 mm in diameter.

Shoe Eyelets

Number of specimens: 9
 Provenience: E4I(4), E4II(3), NEI, N3II
 Description: Outside diameter of eyelets is 9 mm; inside diameter is 14.5 mm.

Strap Hinge

Number of specimens: 1
 Provenience: E3I
 Description: Fragment has two drilled and countersunk 6 mm holes.

Shirt Snaps

Number of specimens: 5
 Provenience: E3I, E4I(4)
 Description: Male and female shirts snaps 11 mm in diameter with 32 dots around the collar of the protruding member of the male. These are fragmentary.

Containers

CANS

Open-the-top Cans

Number of specimens: 6
 Provenience: N4I, N8II, N9II(3), R5s
 Description: Rolled seam, open-the-top cans in fragmentary condition were found about the house. Another 300 small unidentified fragments also were recovered from almost every unit opened.
 Discussion: Areas of concentration or patterning could not be discerned from the distribution.

Powder Can

Number of specimens: 1
 Provenience: R1I
 Description: Top section of a talcum powder can with a revolving lid with holes in it; specimen is burned.

Can Fragments

Number of specimens: 278 fragments
 Provenience: E1I(30), E3I(21), E4s, E5I(3), N2I(30), N2II(23), N3I(28), N6I(38), NIII(8), N8II(20), N9II(13), NWs(2), NWII(6), R1I(30), R3I(3), R5s, R5I(48).
 Description: Tin can or light metal fragments were recovered from almost every unit open at the house. Areas of concentration or patterning could not be discerned from distribution.

CLOSURES

Can Closure

Number of specimens: 1
 Provenience: N9II
 Description: Large cap (ca. 65 mm inside diameter) for a tin; rolled edge and lacking threads, using 2 mm stock.
 Discussion: May close a tea can such as offered by Sears, Roebuck & Co. (1902:14).

Wire Closures

Number of specimens: 4
 Provenience: E4I, N2II, NWII(2)
 Description: Wire twists and loops from bottle closures (Fig. 42).

Crown Cap

Number of specimens: 4
 Provenience: E1I, E5I(3)
 Description: Same type presently used on pop bottles.

*Miscellaneous Metal Artifacts***BICYCLE PARTS—SPOKE AND TUBE VALVE**

Number of specimens: 2

Provenience: E5I(2)

Description: Valve is 35 mm long, 8 mm in diameter at the threads; stem still inside; spoke is fragmentary.

CAN KEY

Number of specimens: 1

Provenience: E5I

Description: Proximal fragment of a can opener (sardine) using 4 mm round stock (Fig. 43).

CARRIAGE PARTS

Number of specimens: 2

Provenience: E4I(2)

Description: Two stake irons, 19 x 3.5 mm stock, chamfered edges with two holes in each; overall length 77 mm.

Discussion: Cost was 5¢ in 1902 (Sears, Roebuck & Co., 1902:630).

COTTER KEY

Number of specimens: 1

Provenience: N3II

Description: 57.5 mm long of stock 5 mm in diameter.

DISK

Number of specimens: 1

Provenience: E3II

Description: 37 mm in diameter and 1.3 mm thick; slightly burned and corroded; stamped in fancy letters "Luxor"; extremely light metal.

DOOR HANDLE

Number of specimens: 1

Provenience: N2II

Description: Fragment for a lock set, which might accept a glass knob. A 6.5 x 6.5 mm shaft extends 52 mm to a break at a drilled hole (Fig. 44).

EYED SPIKE

Number of specimens: 1

Provenience: E5I

Description: Hand wrought spike 140 mm long, pointed on one end and beaten into a flat eye; 13 mm inside diameter x 23 mm outside diameter (Fig. 45).

FISHING WEIGHT

Number of specimens: 2

Provenience: E2s, N9III

Description: Lead fishing weight with iron wire core terminating in a 3.5 mm eye. Although broken on the distal end, weight was originally 86 grams (3 ounces). The specimen from the north trench is a 20 mm lead disk; the line is threaded through a center hole.

FORK

Number of specimens: 1

Provenience: R5I

Description: Similar to fork #28R100 in the Sears, Roebuck & Co. Catalog (1902:281). Discussion: The catalog fork was the first offered and the least expensive at 37¢ for a set of six knives and six forks.

GUSSET

Number of specimens: 1

Provenience: E2I

Description: A subrectangular plate of 4 mm stock, bent 90°; five drilled and countersunk holes about 5 mm in diameter (Fig. 46).

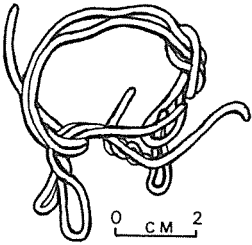


Fig. 42 Wire closure from McKinney House.

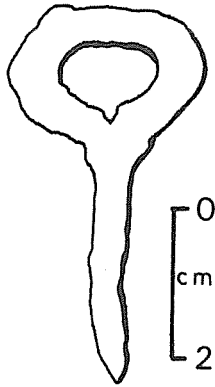


Fig. 43 Can key from McKinney House.

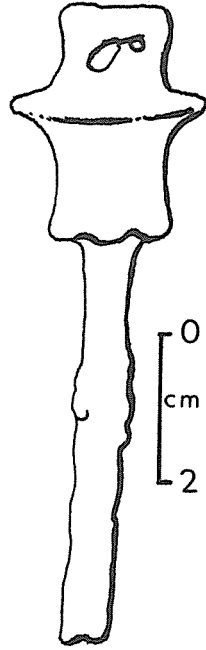


Fig. 44 Door handle from McKinney House.



Fig. 45 Eyed spike from McKinney House.

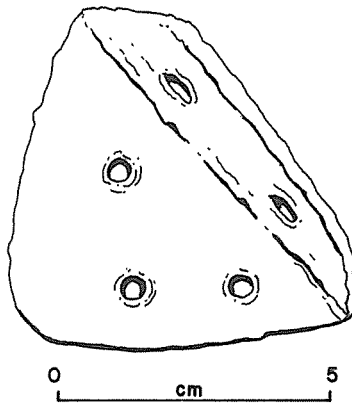


Fig. 46 Gusset from McKinney House.

HARMONICA PART

Number of specimens: 1

Provenience: E5I

Description: Brass harmonica reed plate with 10 holes; measures 94 x 25 x 1.4 mm.

HORSESHOE FRAGMENT

Number of specimens: 1

Provenience: E2I

Description: End fragment.

JACK

Number of specimens: 1

Provenience: N3I

Description: Cast iron; fragment of a piece used in a child's game of jacks.

KEY

Number of specimens: 1

Provenience: E4I

Description: Proximal fragment of an old fashioned front door key.

KNIFE PART

Number of specimens: 1

Provenience: R1s

Description: Center divider for a double bladed steel pocket knife.

LAMP FIXTURE

Number of specimens: 1

Provenience: R1I

Description: Brass collar with threads for lamp socket.

MEAT HOOK

Number of specimens: 1

Provenience: NWIII

Description: S hook is 5.3 mm in diameter and 150 mm in overall length; could hang on a 35 mm rod.

MILL PICK

Number of specimens: 1

Provenience: NWII

Description: 200 x 35 x 31 mm; tapers to a chisel edge on each end with a 29 x 15 mm hold for a handle. The chisel edge is at right angles to the handle (Fig. 47).

Discussion: The specimen is a Richmond pick illustrated in Wimberly (1965:22) and in the *Descriptive Pamphlet of the Richmond Mill Furnishing Works* (1873). Richmond picks were constructed of imported English steel by "pick masters that know their business . . ." (Richmond Mill Furnishing Works, 1873:89).**PENCIL LEAD AND ERASER ENDS**

Number of specimens: 4

Provenience: E1I, E1II, E5I, R1I

Description: Pencil leads 2.6 mm in diameter, one still stuck into an eraser holder. One eraser holder is 20 mm long and has an 8 mm outside diameter; it has five crimp marks near the top.

POCKET KNIFE

Number of specimens: 1

Provenience: N9III

Description: Double bladed knife with handle 85.7 mm long; blades rusted shut. The knife has a rounded butt, four rivets, and an unsharpened round back large blade (Fig. 48). It is very similar to item #28R830 in the Sears, Roebuck & Co. Catalog (1902:487).

Discussion: The catalog (1902:487) advertises the knife: "no. 28R830—Our cheapest Sears, Roebuck, and Company pocket knife . . . not as heavy and strong as it should be for rough usage, but makes an excellent jack knife for a boy, or for ordinary purposes. Price each 23¢ (if by mail, postage extra, 4 cents)."

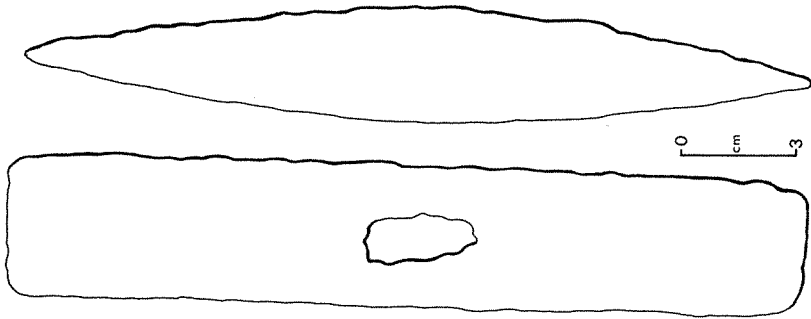


Fig. 47 Richmond Mill pick from McKinney House.

SHRINK-ON COLLAR FOR GLASS LAMP

Number of specimens: 1

Provenience: E5I

Description: Light gauge (0.5 mm) brass stock bent and crimped to fit over a glass lamp. The collar has a 44.5 mm outside diameter constricting to a threaded hold 30.5 mm in diameter. Threads are 0.9 mm center to center.

Discussion: There were three burners (Gem, #1 Sun, and #2 Sun) listed in the Sears, Roebuck & Co. Catalog (1902:801). Data could not be found to size this collar.

SPRING

Number of specimens: 1

Provenience: N4I

Description: Fragment with an outside diameter of 18 mm and inside diameter of 12 mm.

TIN ROOFING FRAGMENTS

Number of specimens: 10 fragments

Provenience: R5s(10)

Description: Pieces of tin roofing too fragmentary to obtain dimensions. Charcoal and pieces of rusted iron are attached to the down turned side.

Discussion: These fragments represent the roof or, more likely, patches on a wooden roof at the time when the structure burned. Small nail holes appear randomly along the edges.

WATCH BACK

Number of specimens: 1

Provenience: E4I

Description: Specimen has a central 30 tooth gear 12.9 mm in diameter; made of copper. The back is 40 mm in diameter and made of 0.8 mm stock. Small clips hold it to the watch while a 1.8 mm hole provides access for the winding key.

Unidentified Metal Artifacts

BRASS CLASP

Number of specimens: 1

Provenience: N7II

Description: Small clasp or snap part made of 1 mm brass stock.

CAST IRON BASE

Number of specimens: 1

Provenience: E3I

Description: A fragment 54 mm in diameter with an 11.5 mm expanding hole in the center; 4 mm hole along the edge used for attachment.

COPPER PLATED DECORATIONS

Number of specimens: 2

Provenience: E3III, N1I

Description: Oval concho 59.5 x 30 x 1 mm silvered front with a zigzag fine line border about 2.8 mm from the edge on this otherwise flat, plain artifact. A 7.5 x 1 mm strap 29 mm long is soldered to the back, center to center. The free ends are bent to attach to a square.

DISKS*Copper Disk*

Number of specimens: 1

Provenience: E2s

Description: Elliptical, 25 x 32 mm of 1.4 mm stock with a 1.6 mm uniaxially drilled hole in the center.

Metal Disk

Number of specimens: 1

Provenience: E3II

Description: Tin foil, 21 mm in diameter and about 0.1 mm thick.

Discussion: Marks are not present and it may be a bottle cap seal.

DRILLED FOOT

Number of specimens: 1

Provenience: E3I

Description: Iron foot fragment, perhaps from a machine, drilled 10 mm in the center of a piece of steel 28 mm in diameter.

HANDLE FRAGMENT

Number of specimens: 1

Provenience: N2I

Description: Specimen is of 2 mm stock.

LEAD FRAGMENT

Number of specimens: 1

Provenience: E3I

Description: Specimen is a fragment of a poured disk of lead.

PATCH

Number of specimens: 1

Provenience: E5I

Description: Specimen is of lead stock 1 mm thick, cut pie shaped (quarter circle) with a 2.8 mm rolled edge.

Discussion: Markings or use marks are lacking; function is unknown.

SCRAP METAL

Number of specimens: 374

Provenience: Table 21.

Description: Unidentified fragments of scrap metal included in this category are tin can, strap, cast iron, steel, and wire of various gauges. Specimens were not recovered from units N9 or R2.

STOVE PARTS

Number of specimens: 3

Provenience: E5s, N2s, N5I

Description: Cast iron fragments. One piece is decorated with the mark "81 . . ." on the inside; another is an upper piece flange for a stove lid 200 mm in diameter, and the third is a leg or foot rest with two screwdriver headed (11.5 mm head diameter) bolts still in place. Cast metal varies in thickness from 4 to 8 mm, even thicker for leg supports.

Discussion: A No. 8 stove lid is 200 mm (8 in) in diameter.

TOY UTENSIL

Number of specimens: 1

Provenience: R2s

Description: Fragment is 31 mm long, with a zoned dot pattern decoration on each side.

Table 21

Distribution of Scrap Metal from the House

	N1	N2	N3	N4	N5	N6	N7	N8	E1	E2	E3	E4	E5	R1	R3	R4	R5	NW	TOTALS
Tin Cans & Scrap																			
Surface	1	3			20								1					2	27
Level I	11	6	29	7	11	4		4	15	38			37	15	4	33		3	217
Level II		9				3	7				7		11					6	43
Level III		5									5							3	13
Cast Iron																			
Surface		4		1															2
Level I				3									1					1	9
Level II													2						2
Level III																		2	2
Wire																			
Surface		4	1		1									1					7
Level I												6	18	1		2	2		46
Level II													2					4	6
Totals	16	28	46	11	32	7	7	4	15	38	12	6	73	16	4	2	35	22	374

UNIDENTIFIED OBJECT

Number of specimens: 1

Provenience: N9IV

Description: A small, light lump of a black substance, perhaps anthracite coal.

BUTTONS

MILK GLASS

Number of specimens: 15

Provenience: Table 22.

Description: Thirteen buttons and two shirt studs ranging from 17.4 to 9 mm in diameter; dished fronts and beveled back edges of a uniform nature.

CLEAR GLASS

Number of specimens: 1

Provenience: E5I

Description: A 17.9 x 4.8 mm two hole button; front dished out in the center while front and back edges beveled.

FACETED GLASS

Number of specimens: 1

Provenience: E4II

Description: Burned, with a domed head and back slotted for a horizontal buttonhole; measures 8 x 5.2 mm.

MOTHER-OF-PEARL

Number of specimens: 19

Provenience: Table 23.

Description: 8.3-19 mm in diameter; fragmented specimens appeared burned.

METAL

Number of specimens: 7

Provenience: Table 24.

Description: Two piece or composite buttons; front piece cups over the rear piece, the rear portion having a metal loop attached for fastening. Specimens vary between 12.7-17.6 mm in diameter (Table 24; Fig. 49a,b).

MISCELLANEOUS

Brass and Mother-of-Pearl

Number of specimens: 3

Provenience: E4I, E5I, N3I

Description: Centrally pierced mother-of-pearl shoe buttons 8.5 x 3.1 mm, with protruding brass loop; specimens appear burned.

Vulcanized Rubber?

Number of specimens: 1

Provenience: E4I

Description: A 17.8 x 5 mm black, two hole button with a flat back and a trilobed design from which six lines radiate.

Wood

Number of specimens: 1

Provenience: E4I

Description: Fragment of a two hole (?) button with a dished (?) front and flat back.

LITHICS

Ninety seven chert artifacts were recovered in house excavations; 96 are modified and unmodified flakes; one is a projectile point fragment. The flakes are divided into three major categories: heavy percussion, light percussion, and pressure. The categories reflect the various steps in rendering a chert nodule into a projectile point or other tool. All steps in the biface manufacturing process are reflected in the collection. Production of thin bifaces can be inferred, although thin bifaces were not recovered. The

Table 22
Milk Glass Buttons and Shirt Studs from the House

Provenience	Diameter (mm)	Thickness (mm)	Remarks
E2I	10.3	3.0	Four hole, white agate buttons as offered by Sears, Roebuck & Co. (1902:940).
E3I	11.9	2.9	Same as E2I.
E3I	13.7	3.8	Same as E2I.
E5I	9.6	-	Shirt stud, ball top; front has center indentation.
E5I	13.7	3.7	Same as E2I.
E5I	16.0	4.2	Same as E2I.
E5I	11.9	3.0	Four hole, fancy white button (Sears, Roebuck & Co., 1902:940; Roberson, 1974:Fig. 61M).
N2I	9.0	2.7	Same as above.
N2II	11.9	2.9	Same as E2I.
N3II	11.9	6.0	Single hole, horizontal to the plane of the button.
NWII	17.4	5.0	Same as E2I.
NWIII	11.9	3.2	Same as E2I.
R1I	12.5	-	Shirt, stud, fragment; front has center indentation and concentric circles (Roberson, 1974:Fig. 61U).
R3I	15.2	3.7	Same as E2I.
R4I	13.7	3.5	Same as E2I.

Table 23
Mother-of-Pearl Buttons from the House

Provenience	Diameter (mm)	Thickness (mm)	Front	Back	Remarks
EII	10.5	2.4	countersunk	flat	two hole
E1I	19.0	3.0	slot	flat	two hole
E3II	19.0	3.0	slot	flat	two hole
E4I	16.5	3.0	countersunk	flat	four hole
E4I	11.2	2.0	countersunk	flat	two hole
E4I	11.2	2.2	countersunk	flat	four hole fragment
E4I	10.4	1.9	countersunk	flat	two hole
E5I	8.2	2.0	slot	flat	two hole
E5I	10.4	1.8	countersunk	flat	two hole
E5I	10.4	2.4	countersunk	flat	two hole, beveled edge
E5I	10.4	1.5	countersunk	flat	four hole
E5I	10.5	1.4	countersunk	humped	two hole
E5II	11.2	2.0	dished	flat	two hole
N3I	14.2	2.5	countersunk	flat	two hole
N3I	8.3	-	parallel	rounded	single hole, horizontal to plane of button
N6I	14.2	2.0	line decoration		two hole fragment
NWII	16.5	3.0	dished	flat	two hole fragment
R1s	-	-	countersunk	flat	four hole fragment
R1I	14.2	2.5	countersunk	flat	two hole fragment

Table 24

Metal Buttons from the House

Provenience	Diameter (mm)	Thickness (mm)	Front	Back	Remarks
E2I	17.6	4.0	raised design	flat	back stamp cut and bent to form attaching loop; design is a bird (bobwhite?) standing on a limb (Fig. 49a).
E5I	14.1	2.5	extreme dish	thickened and stamped	Four-hole; inscription "P.B. Co. Patented Dec. 9, 1924."
N1I	14.1	3.0	countersunk with zigzag pattern zoned about edge.	thickened	Four hole.
N1I(2)	17.2	3.0	extreme dish	thickened	Fragmentary backs; design is a locomotive with three driving wheels, two 5 pointed stars below and a 5 pointed star above locomotive (Fig. 49b).
N2II	17.2	3.0	extreme dish	thickened	Same as above.
N3I	12.7	4.0	flat and cloth-covered	flat	Brass attaching loop protrudes from the rear; faint cloth pattern may exist on front.

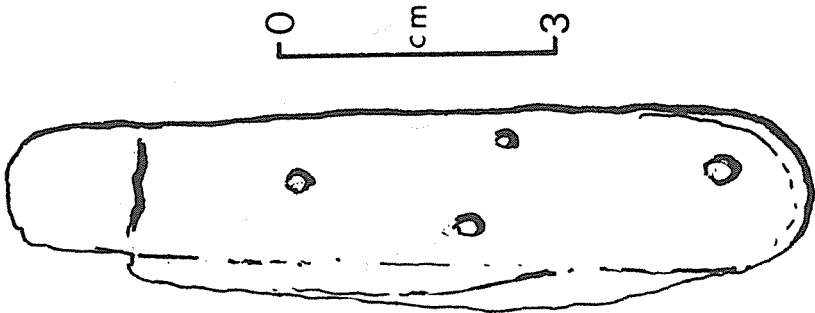


Fig. 48 Pocket knife from McKinney House.

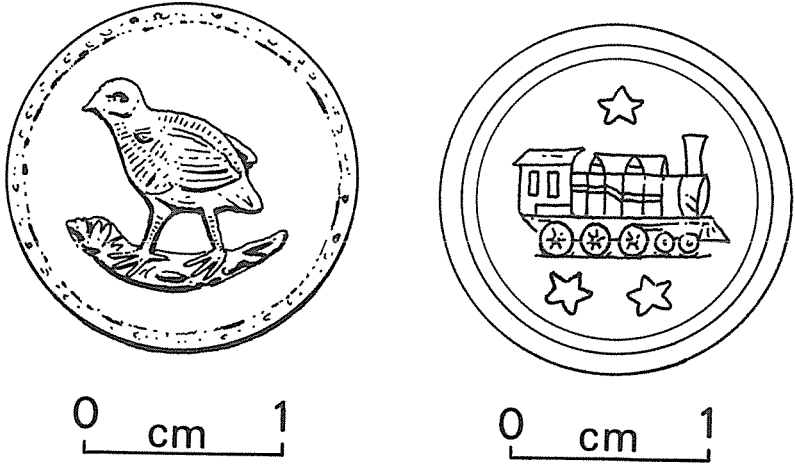


Fig. 49 Metal buttons from McKinney House.

presence of a burin blow on one of the flakes suggests microliths may have been manufactured at the site. However, microflakes or blades were not recovered since 1/4 in mesh hardware screen was used in excavation. Some of the collection appears heat treated. Flake provenience is shown in Figure 50.

HEAVY PERCUSSION FLAKES

Number of specimens: 5

Provenience: E3II(2), E5I, N1II, R4s

Description: Flakes with prominent bulbs of percussion produced by striking the core near the edge with a hammerstone or possibly a billet. One edge of the flake from R4s was retouched by scraping against another object.

LIGHT PERCUSSION FLAKES

Number of specimens: 17

Provenience: E1I, E2II(3), E3I, E3II, E5I, E5II, N2II, N2III, N6II(2), N8I(2), N9I(2), NWIII

Description: Flakes with sinuous and long, lenticular platforms readily manufactured with a billet. The flakes are lighter in weight and smaller than heavy percussion flakes.

PRESSURE FLAKES

Number of specimens: 6

Provenience: E5II, N3II(4), NWIII

Description: Small, thin flakes ranging in length 11-24 mm and 10-16 mm wide; thickest specimen 2 mm. Flakes have thin, lenticular platforms, the largest of which is 5 x 2 mm. A ridge runs from the central portion of the edge of the platform toward the distal end of the flake on the dorsal side. Flakes of this type are made by applying pressure directly behind a ridge created by the intersection of facets.

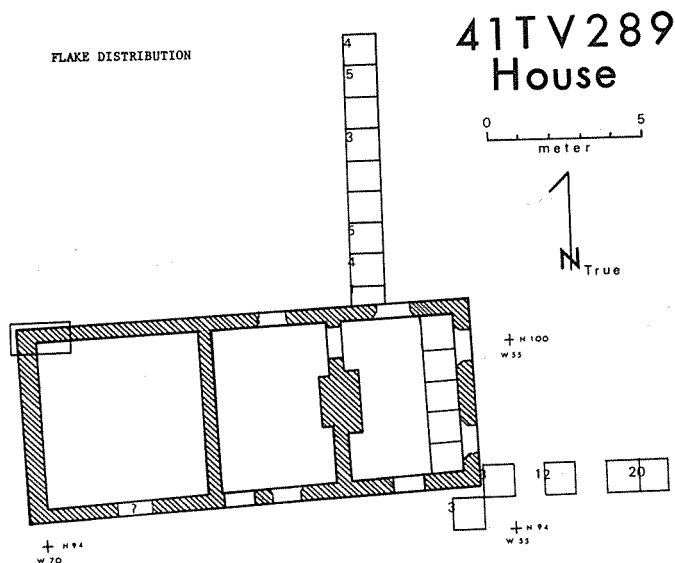


Fig. 50 Lithic distribution in McKinney House.

FLAKE BLADE

Number of specimens: 1

Provenience: N3II

Description: Flake is twice as long as it is wide (Fig. 51a). The specimen has a slightly sinuous platform indicating that the flake was percussion struck while thinning a biface.

FLAKE FRAGMENTS

Number of specimens: 61

Provenience: E1II(3), E2II(3), E3I(5), E3II(2), E3III(5), E5I(8), E5II(12), N1II, N2III(4), N3II(5), N6II(3), N8I(5), N9I(4), NWV

Description: This category includes flakes which lack striking platforms, i.e., distal ends or crushed platforms. Twenty-seven of the flakes (44%) have a sheen or pink tint that is often considered a result of heat treating.

Discussion: Experiments in heat treating Texas cherts indicate that not all heat treated material exhibit diagnostic changes (Hester and Collins, 1974). Actual instances of heating may be higher than indicated in the analysis.

NONDESCRIPT CHERT SPALLS

Number of specimens: 2

Provenience: E5I(2)

Description: Irregularly shaped pieces which result from faults in the material or lack of control on the part of the knapper.

REJUVENATION FLAKE

Number of specimens: 1

Provenience: N8I

Description: A heavy percussion flake which was used to prepare a new set of platforms after the previous platform was destroyed by a poorly executed blow which step fractured when struck with too little force (Fig. 51b).

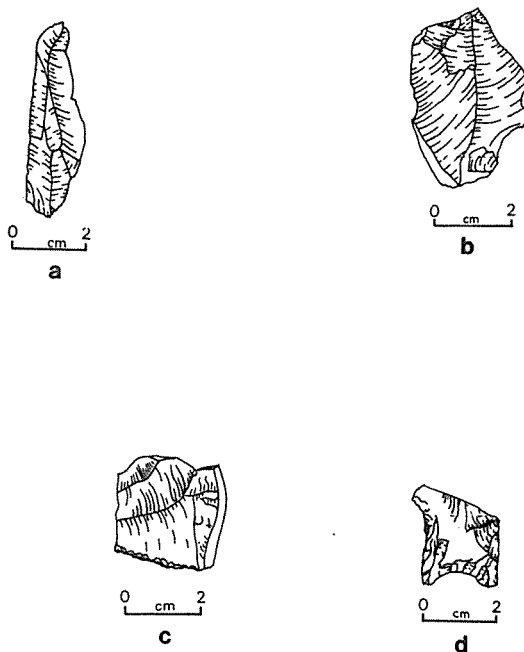


Fig. 51 Illustrated lithics: a. flake blade; b. rejuvenation flake; c. flake core; d. Perdenales point base.

FLAKE GEOMETRIC

Number of specimens: 1

Provenience: E5II

Description: A section from a thinning flake which was struck near the center on the dorsal side breaking the flake into sections. Part of the negative cone is present on the specimen.

FLAKE TOOL

Number of specimens: 1

Provenience: E1I

Description: A heavy percussion flake that was retouched by pressure flaking along distal and proximal ends and lateral edge.

CORE

Number of specimens: 1

Provenience: NWI

Description: A light percussion flake which was retouched along a lateral edge and had microblades or burins removed from the distal end (Fig. 51c).

PROJECTILE POINT BASE

Number of specimens: 1

Provenience: E3I

Description: Base (Fig. 51d) of a Pedernales point (Suhm and Jelks, 1962).

MISCELLANEOUS HOUSE ARTIFACTS

Beads

PLASTIC TEARDROP

Number of specimens: 1

Provenience: N3I

Description: A teardrop shaped, pink, plastic, translucent bead measuring 16 x 10 x 5 mm with a small hole through the top.

BLUE GLASS

Number of specimens: 1

Provenience: R11

Description: A round, faceted, glass bead measuring 5.5 mm in diameter; translucent blue with one central hole.

RED GLASS

Number of specimens: 1

Provenience: N21

Description: An opaque, red, faceted glass bead with one hole through the 6 mm diameter.

BLUE/BLACK GLASS

Number of specimens: 2

Provenience: N31(2)

Description: Blue and black, faceted, glass beads, each 7.5 mm in diameter. The black one is opaque and may be a burned blue bead.

*Miscellany***COAL, ANTHRACITE**

Number of specimens: 4 lots

Provenience: E3I, E3II, E5I, E5II

Description: Small chunks of coal were located in the area described by Charlie Johns as the area for fireplace ash (trash dump).

Discussion: Coal burning stoves probably were used in the later phase of the house occupation. Coal was not used by McKinney, since it was not available from Pennsylvania until 1871 when rail service began in Austin (Roberson, 1974:55).

LEATHER

Number of specimens: 2

Provenience: E4I, N3I

Description: Boot heel fragments.

PERISHABLES

Number of specimens: 2

Provenience: R11(2)

Description: One bundle of fine, Z twist threading and a piece of tightly woven fabric; both charred and recovered from the southeast corner of the house.

PLASTER

Number of specimens: 2 lots

Provenience: R4s, R5I

Description: Two bags of charred plaster were saved from the excavation.

Discussion: The plaster is the same as samples from the wall and fill of the middle room.

PLASTIC COMB

Number of specimens: 1

Provenience: E3II

Description: Toothless fragment of a plastic pocket comb.

PLASTIC FURNITURE DECORATION

Number of specimens: 4

Provenience: E2I(4)

Description: Fragments of a flower pattern decoration for wooden furniture.

PLASTIC STOPPER

Number of specimens: 1

Provenience: R5I

Description: An artifact with the inscription "Pat. pending" on one side 15.5 mm in diameter with horizontal ridges for reinforcement.

Discussion: It may be a fragment of a stopper for a small medicine container.

RUBBER TRICYCLE TIRE

Number of specimens: 2

Provenience: E5I(2)

Description: Fragments were recovered from the trash dump east of the house. Both pieces are 17 mm wide and have three parallel ridges on the inside.

SLATE

Number of specimens: 2

Provenience: E5II(2)

Description: Two small pieces of blackboard slate, both 2.9 mm thick and smoothed on both faces.

SPHERE

Number of specimens: 1

Provenience: N3I

Description: A sphere 7.4 mm in diameter which has a small filled hole that does not penetrate the diameter. It may be the plastic or ivory head of a hat pin.

WOOD

Number of specimens: 12 lots

Provenience: E2s, E2I, E3II, E3III, E4I, E5II, N2II, NWI, NWV, R1I, R4I, R5I

Description: Miscellaneous pieces of charred wood and charcoal. Pieces were not large enough to give dimensions. One wedge shaped fragment has a charred end with a cut nail fragment in place.

CISTERN ONE

Research Design

The two cisterns appeared to be an ideal locality for recovering small animal remains and provide an excellent opportunity to demonstrate the technique of fine wet screening. Cistern One was selected for excavation. The predicted results were expressed in the field guide (Ralph and McEachern, 1974:3):

The upper portion of the cistern is expected to yield post 1940 artifacts representing debris tossed into the cistern after it was abandoned. The lower portion of the deposit is expected to contain fine sediments and the remains of small animals which worked their way into the cistern while it was being used. Between the post 1940 deposit and the lower deposit, a silt deposit representing the 1921 flood is expected. The lack of this deposit would indicate the cistern was re-excavated (cleaned) after the flood.

Description

Two cisterns, located south of the McKinney House, were arbitrarily assigned Cistern One (northern-most) and the other, Cistern Two. The description is based on field notes.

It appears that the cisterns were dug about 5 m into the alluvial deposit. Uncut (hand chiseled) stone was used to pave the bottom and sides; a rough, grainy mortar holds the small limestone chinking. A plaster, which appears to have a greater content of lime than the mortar, was then applied to the walls and floor (Fig. 52). The bottom of Cistern 1 is slightly rounded. Wall thickness varies, judging from the slightly collapsed Cistern 2. The walls of Cistern 2 are a single course of limestone about 30 cm wide, 10-30 cm long, and 5-15 cm thick.

It does not appear that the cisterns were connected to each other in any way. Filling procedures are unknown, but several possibilities are offered: 1) the cisterns were filled simultaneously from gutters and piping at each end of the house; 2) a three way valve was used to shuttle water from a single pipe to the house to the cistern which needed the water most; or 3) it is remotely possible that water was pumped from a spring with no input from the house.

It is doubtful that the cisterns were ever completely sealed. A wooden cover probably was used. This cover would allow periodic cleaning and repair. There is some evidence that patching had been done as large areas were covered with additional puddles of plaster.

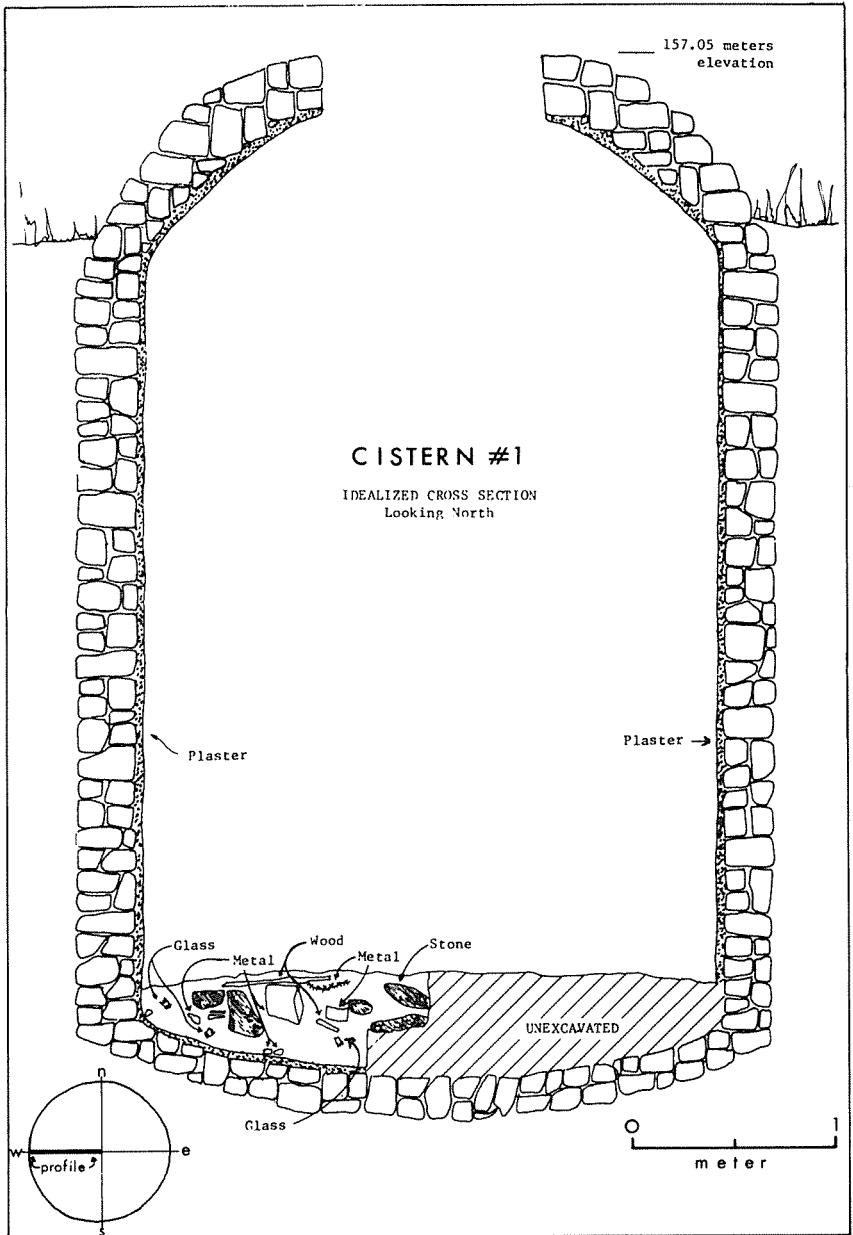


Fig. 52 Cistern One, cross-section.

Excavation Methods

In preparation for excavation, a wooden platform was constructed over the cistern to prevent walking on the cistern walls and dislodging rock on workers 5 m below. Access was gained by a cable ladder; people were belayed by a standard 7/16 in nylon climbing rope. Standard climbing signals and knots were used. People working in the cistern wore hard hats at all times.

A datum stake was placed in the center of the cistern and the deposit divided into quadrants with grid lines running magnet north-south and east-west. The southwest quadrant was carefully excavated in 10 cm levels using a trowel. The matrix was placed in buckets and hauled to the surface with a rope. On the surface, the matrix was dry screened; large artifacts and faunal material were removed. After dry screening, the matrix was wet screened through window mesh; remaining artifacts and fauna were collected and sorted.

After sorting, the material was taken to the field lab where it was cataloged in lots with one catalog number for each level. The catalog numbers are: 300—surface; 301—01-10 cm; 302—10-20 cm; 303—20-30 cm; 304—30-40 cm.

The Deposit

The surface of the deposit was covered with miscellaneous debris which was removed and discarded. The matrix was homogeneous reddish brown and soft with the characteristics of compost. The deposit apparently was derived of decomposed organic matter with iron oxide from metal artifacts giving it a rust color. The deposit extended 40 cm in depth and remained homogeneous, with bottles, glass sherds, ceramics, bits of metal, and bone scattered throughout the deposit.

Fauna

The cistern deposit yielded an extensive faunal collection which included the remains of more than 400 identifiable individuals. Thirty two species are represented (Table 25). The large number of species recovered is due to wet screening the matrix through a fine screen. It is estimated that dry screening with 1/4 in mesh would have resulted in a 60% loss of available information.

Artifacts

More than 500 complete artifacts were recovered from the cistern. Included were: 17 ceramic vessels, more than 100 bottles and jars, 13 glass vessels, 15 cartridges, 74 complete nails, 78 miscellaneous fasteners, 50 metal miscellaneous artifacts. The artifacts are classified first on the basis of material and then by function. Buttons are an exception. They are classified first by function and then by material to avoid splitting them into several categories and making them difficult to locate. Glass artifacts are treated separately in Appendix G.

CERAMICS

Earthenware (tableware)

WHITEWARE

Table 25
Faunal Remains from Cistern One (Number of Individuals by Species and Level)

Species	301	302	303	304
FISH				
<i>Lepisosteus</i> sp.	4-6	10-12	6-9	15-17
<i>Ictalurus</i> sp.	6-7	7-8	4	1
<i>Micropterus</i> sp.	4	3	6-8	
<i>Lepomis</i> sp.	10-12	9-11	7-9	
<i>Plodinotus grunniens</i>	1	2		
Unidentified fish	10-12	17-21	15-20	33-38
AMPHIBIANS				
<i>Rana</i> sp.	8-9	7-10	6-8	11-13
<i>Bufo</i> sp.	4-5	4-5	6-8	8-9
REPTILES				
<i>Chrysemys</i> sp.			1	
<i>Terrapene</i> sp.			1	
<i>Trionyx</i> sp.	1	1	2	
<i>Elaphe</i> sp.	6-7	5	4	3
<i>Pituophis melanoleucus</i>		1		
<i>Agkistrodon</i> sp.		1	1	1
<i>Crotalus</i> sp.	3-4	4	2	3
<i>Phrynosoma</i> sp.				1
Unidentified lizard				1
BIRDS				
<i>Gus</i> sp.				1
Unidentified				1
MAMMALS				
<i>Didelphis marsupialis</i>	2	3	2	3
<i>Canis latrans</i>	1			
<i>Sciurus niger</i>	1		1	
<i>Perognathus</i> sp.	1			
<i>Reithrodontomys</i> sp.	1	1	1	2
<i>Peromyscus</i> sp.	2	2	2	1
<i>Neotoma</i> sp.	1	4	1	1
<i>Sigmodon hispidus</i>	8	25	8	5
Unidentified rodent	11-13			7
<i>Sylvilagus</i> sp.	4		4	2
<i>Lepus californicus</i>			1	
<i>Odocoileus</i> sp.				1
<i>Ovis</i> sp.				1
<i>Bos tarus</i>	1	1	1	1
<i>Sus scrofa</i>			2	

Cream Colored Ware Pitcher

Number of specimens: 38 sherds (fit together)

Provenience: 301(7), 302(29), 303(2)

Description: Off white, clear glazed, crazed pitcher with molded handle. The base is oval in shape and has part of a maker's mark showing part of a bird or eagle and the letters "PRE . . ." (Fig. 53). The vessel is about 25 cm high, 21 cm long, and 18 cm wide. Only a small portion of the rim remains.

Graniteware Pitcher

Number of specimens: 11 sherds (base reconstructed of seven sherds from one vessel)

Provenience: 301, 302(4), 303(6)

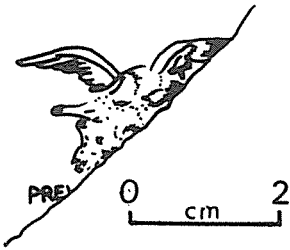


Fig. 53 Creamware colored pitcher design fragment from Cistern One.



Fig. 54 Polychrome Decalcomania plate design fragment from Cistern One.

Description: White, clear glazed vessel base with an oval shape about 17 x 14 cm and of unknown height. The base has part of a maker's mark below which appear the initials "K. T & M" with the word "Granite" underneath.

Repousse Edge Cup

Number of specimens: 5 sherds (from one vessel)

Provenience: 303(5)

Description: White, clear glazed cup with a line, series of dots, and a second line repousse pattern running around the edge. The cup is 93 mm in diameter and 61 mm high. The portion of the cup containing the handle is missing.

Monochromatic Decalcomania Cup

Number of specimens: 15 sherds (from one vessel)

Provenience: 303(13), 304(2)

Description: White, clear glazed cup with a blue monochromatic decalcomania floral pattern on the inside and outside. The cup was slightly more than 4 cm in diameter and of unknown height. The part of the cup with the handle is missing.

Polychrome Decalcomania Serving Dish

Number of specimens: 14 sherds (five of which fit together)

Provenience: 302(7), 303(7)

Description: White, clear glazed serving dish with polychrome decalcomania floral design in pink, green, and blue. The dish was 34 cm high, about 26 cm wide, and of unknown length.

Undecorated Whiteware Bowl

Number of specimens: 2 sherds (fit together)

Provenience: 301(2)

Description: White, clear glazed, shallow bowl without decoration. The bowl was about 9 cm in diameter and 3.5 cm high.

Repousse Edge Plate

Number of specimens: 22 sherds (fit together)

Provenience: 301(17), 302(5)

Description: Off white, clear glazed plate, with wavy line repousse decoration around the edge; 23 cm in diameter. An illegible name appears below a blurred crown design maker's mark.

Polychrome Decalcomania Plate

Number of specimens: 5 sherds (from one plate)

Provenience: 303(5)

Description: White, clear glazed plate fragments with polychrome decalcomania in a pink, green, and blue floral pattern and a repousse edge. The plate was about 9 cm in diameter. A printed green maker's mark under glazed with what appears to be an illustration of an effigy vessel enclosed in a circle is on the bottom. Around the edge of the circle are the words "SEMI-VITREOUS CHINA" (Fig. 54). The pattern is similar to the pattern on the polychrome decalcomania serving dish.

Gilded edge Plate Sherds

Number of specimens: 3 sherds (from three vessels)

Provenience: 302(2), 303

Description: Rim sherds from white, cleared glazed plates decorated with gilding. Two of the specimens also have repousse edges.

Undecorated Plate Sherds

Number of specimens: 3 sherds (from one plate)

Provenience: 302(3)

Description: Rim sherds from an undecorated, white, clear glazed plate.

Miscellaneous Undecorated Sherds

Number of specimens: 44 sherds

Provenience: 301, 302(10), 303(25), 304(8)

Description: These sherds are too small to determine vessel form.

Hand painted Plate or Serving Dish

Number of specimens: 1

Provenience: 300

Description: Bottom of a plate or serving dish which is hand painted in an orange, yellow, and green floral pattern. The following is printed in black underglaze on the reverse of the sherd:

Blue Pledge
Hand Painted
Underglaze
—horn Potteries
MADE IN U.S.A.

BLUEWARE*Repousse Pitcher(?)*

Number of specimens: 3 sherds (from one vessel)

Provenience: 302, 303(2)

Description: Fragments of a blue glazed pitcher (?) which has a repousse floral pattern.

Stoneware*Two Gallon Jar*

Number of specimens: 24 sherds (reconstructed of 17 sherds from one vessel)

Provenience: 301(4), 302(19), 303

Description: Buff colored jar that is salt glazed on the interior and exterior but unglazed on the bottom. It is 19.5 cm in diameter and more than 27 cm high. The number "2" is printed in light blue underglaze on the side (Fig. 55).

Miscellaneous Crockery Sherds

Number of specimens: 14 sherds (from at least two vessels)

Provenience: 301, 303, 304(12)

Description: Miscellaneous sherds from jugs or jars which are salt glazed on both sides.

Porcelain*Gilded Lid*

Number of specimens: 1

Provenience: 303

Description: A gilded and repousse knob from the center of a cover or lid of a vessel.

The knob is 38 mm in diameter and 21 mm high.

Miscellaneous Sherds

Number of specimens: 4

Provenience: 301, 302, 304(2)

Description: One of the sherds is from a cup or small vessel. Another has the number "4" incised in it. The remaining sherds are plain.

Doll Parts

Number of specimens: 2

Provenience: 303(2)

Description: Sherds are irregular in shape and painted underglaze. One sherd has an eye painted on it.

Brick

Number of specimens: 4

Provenience: 301(2), 302(2)

Description: Four fragments of unmarked buff colored brick, pitted and burned; some retain bits of mortar. They are uniformly fine grained with occasional pieces more angular, temper (ca. 6.5 mm diameter) of a light green color and hardness of 7 on the Mohs scale. Incomplete measurements are in Table 26.

Discussion: These fragments are similar to hearth bricks in front of the fireplace of the east room encountered in subsequent investigations by the Texas Parks and Wildlife Department (Appendix D).

METAL

Cartridges

Stratified nature of the cistern is supported by the distribution of the shotgun shells (Table 27).

Rimfire

Number of specimens: 1

Provenience: 304

Description: Peters Cartridge Co., .22 caliber Short, with a brass case 10.74 mm long; dating 1857 to present (Logan, 1959:189).

Shotgun (Table 27)

Winchester New Rival

Number of specimens: 1

Provenience: 303

Description: Winchester Repeating Arms Co., 12-gauge, 7.9375 case length (Fig. 56a); available from 1875-1930 (Amber, 1968:91).

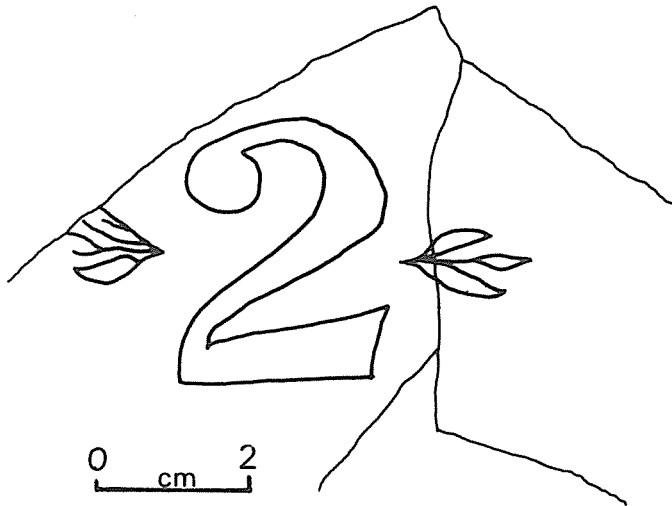


Fig. 55 Stoneware jar design fragment from Cistern One.

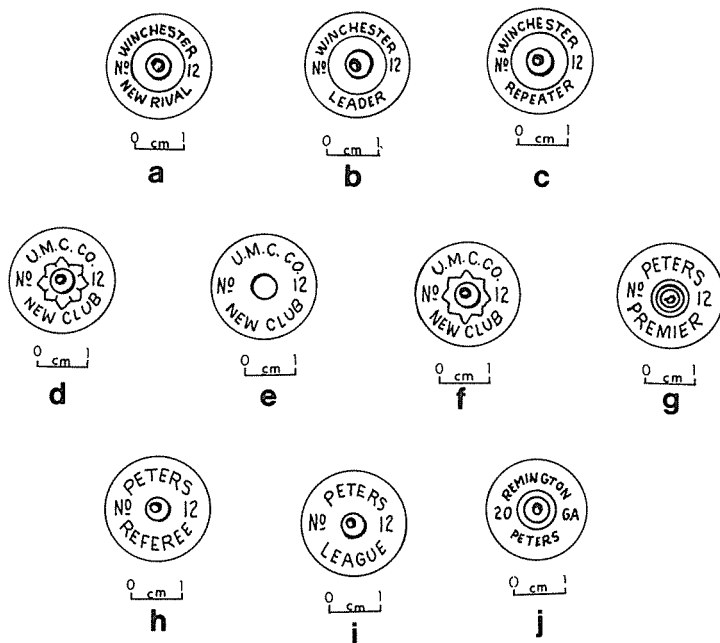


Fig. 56 Shotgun shells from Cistern One: a. Winchester New Rival; b. Winchester Leader; c. Winchester Repeater; d. U.M.C. Co. New Club; e. U.M.C. Co. New Club; f. U.M.C. Co. New Club; g. Peters Premier; h. Peters Referee; i. Peters League; j. Remington Peters.

Winchester Leader

Number of specimens: 1

Provenience: 303

Description: A smokeless, 12-gauge load with a broken case; dating 1894 and offered in the 1909 Winchester Catalogue (Amber, 1968:91) (Fig. 56b). This cartridge was shot in a worn out, pump action shotgun.

Winchester Repeater

Number of specimens: 1

Provenience: 304

Description: Case length 11.1 mm, 12-gauge; date unknown (Fig. 56c).

U.M.C. Co. New Club

Number of specimens: 2

Provenience: 304(2)

Description: Union Metallic Cartridge Co., 12-gauge, black powder load with a case length of 8.763 mm (Fig. 56d, f); dated 1867-1910 (Fontana and Greenlead, 1962:82).

U.M.C. Co. New Club (plain)

Number of specimens: 2

Provenience: 304(2)

Description: A 12-gauge, black powder load, 7.9375 mm case length (Fig. 56e).

Peters Premier

Number of specimens: 4

Provenience: 302(4)

Description: The shell is 12-gauge with an extremely long case, 27.76 mm (Amber, 1968:91) (Fig. 56g).

Discussion: Peters Cartridge Co. (Kings Point, Ohio) produced shotgun shells from 1897-1934 when it was sold to Remington-U.M.C.

Peters Referee

Number of specimens: 1

Provenience: 303

Description: A 12-gauge, 7.9375 mm case length, with a semismokeless load; referred to as an older type (Amber, 1968:91) (Fig. 56h).

Peters League

Number of specimens: 1

Provenience: 302

Description: A 12-gauge with a case length of 7.137 mm (Fig. 56i). Referred to as an older type with a range of 1897-1934 (Ambler, 1968:91).

Remington Peters

Number of specimens: 1

Provenience: 300

Description: The 20-gauge, plastic case length is 12.7 mm and carried #6 shot (Fig. 56j).

Discussion: This shell dates after the 1935 Remington-Peters merger.

Fasteners

NAILS

Cut Nails

3d Common

Number of specimens: 7

Provenience: 302(2), 303(2), 304(3)

Description: Four complete specimens have shank lengths of 1 1/4 in.

6d Common

Number of specimens: 2

Provenience: 304(2)

Description: Specimens are in poor condition; shank length of complete specimen is 1 15/16 in.

8d Common

Number of specimens: 7

Provenience: 302(2), 303(4), 304

Description: Three complete specimens; shank length of best specimen is 2 3/8 in.

10d Common

Number of specimens: 2

Provenience: 303, 304

Description: Shank length of the one complete specimen is 2 7/8 in.

Wire Nails

3d Common

Number of specimens: 5

Provenience: 302, 303(2), 304(2)

Description: Shank length varies from 1 1/2 in to 1 1/4 in and head diameter is 4-5 mm.

4d Common

Number of specimens: 6

Provenience: 302(4), 304(2)

Description: Shank length varies from 1 3/8 in to 1 1/2 in; shank diameter is 2-3 mm.

5d Common

Number of specimens: 3

Provenience: 302(3)

Description: Shank length is 1 3/4 in.

6d Common

Number of specimens: 2

Provenience: 303(2)

Description: Shank length is 1 13/16 in.

7d Common

Number of specimens: 3
Provenience: 303(3)
Description: Shank length varies from 2 1/6 to 2 1/4 in.

8d Common

Number of specimens: 23
Provenience: 302(9), 303(13), 304
Description: Shank lengths are about 2 1/2 in.

10d Common

Number of specimens: 3
Provenience: 302, 303, 304
Description: Shank length is 3 in.

12d Common

Number of specimens: 2
Provenience: 303(2)
Description: Shank length is 3 1/4 in.

16d Common

Number of specimens: 2
Provenience: 303(2)
Description: Shank length is 3 3/8 in.

20d Common

Number of specimens: 2
Provenience: 302, 303
Description: Shank length varies from 3 3/4 to 3 15/16 in.

60d Common

Number of specimens: 3
Provenience: 300, 302, 303
Description: Shank length is 5 7/8 in. The surface specimen (300) is a distal fragment.

6d Finishing

Number of specimens: 1
Provenience: 302
Description: Shank length is 2 in.

10d Double Head

Number of specimens: 1
Provenience: 302
Description: Shank length is 3 in.

Fragments

Number of specimens: 66
Provenience: 302(18), 303(33), 304(15)
Description: Fragments of cut and wire nails (Table 28).

Tacks

Number of specimens: 2
Provenience: 302(2)
Description: Wire tacks with shanks 15 to 19 mm long.

Horseshoe Nail

Number of specimens: 1
Provenience: 302
Description: 49 mm long.

Staples

Galvanized Staples

Number of specimens: 8
Provenience: 302(3), 303(4), 304
Description: U shaped staples of three different sizes (Table 29).

Copper Staples

Number of specimens: 25

Provenience: 303(17), 304(8)

Description: Rectangular copper stock, 4 x 1.3 mm, is sheared to a point at each end of a piece cut 37 mm long. This material is bent into a flaring U shape. Fragments of leather are attached to most of the specimens from 303.

RIVETS

Rivet

Number of specimens: 2

Provenience: 303(2)

Description: One used rivet (15 x 6.8 mm, 10 mm head); the other unused (12.2 x 5.4 mm, 8 mm head).

PINS

Bobby Pin

Number of specimens: 1

Provenience: 302

Description: Fragment

Brass Straight Pins

Number of specimens: 2

Provenience: 302(2)

Description: Length is 29 mm; shanks are 1 mm in diameter.

SCREWS

Screw

Number of specimens: 2

Provenience: 302, 303

Description: The specimen from 303 is 19 mm long with a head 6 mm in diameter. The other specimen is 30 mm long and a 11 mm diameter head.

BOLTS

Carriage Bolts

Number of specimens: 2

Provenience: 303, 304

Description: A bolt 75 mm long with a 17.5 mm diameter shank and 31 mm diameter head. Specimen 303 is a fragment.

U bolt

Number of specimens: 1

Provenience: 304

Description: Fragment of flat base U bolt with 11 mm diameter head.

MISCELLANEOUS FASTENERS

Automobile Door Lock

Number of specimens: 2

Provenience: 300(2)

Description: Specimens consist of lock cover, latch shaft for knob, and associated mechanical parts. Specimens are mirror images of each other. Dimensions are 178 x 156 x 93 mm (Fig. 57).

Barn Door Lock

Number of specimens: 1

Provenience: 301

Description: Lock is a large, single eye hook of 5 mm thick stock. It has a washer 35 mm in diameter and 5 mm thick; a carriage bolt 49 mm long (43 mm without head); and a 16.7 mm nut (Fig. 58).

Buckles

Number of specimens: 4

Provenience: 301, 302, 303, 304

Description: Buckle from 301 is a belt buckle for a 31 mm strap (Fig. 59a). Buckle from

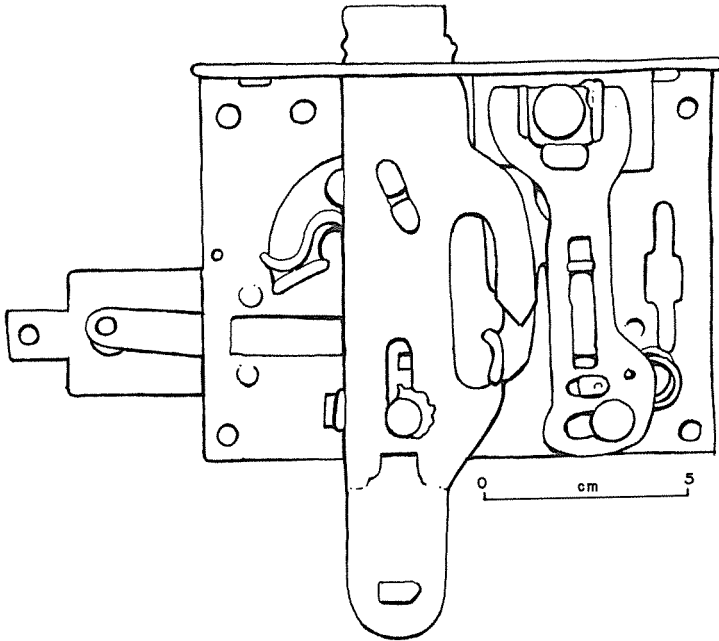


Fig. 57 Automobile door lock from Cistern One.

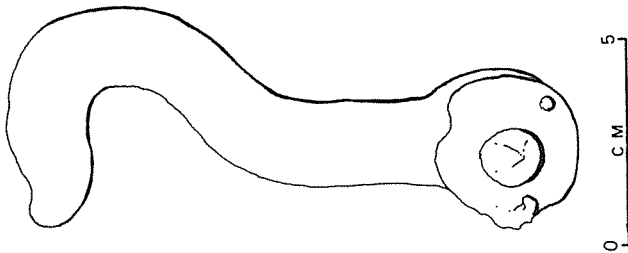


Fig. 58 Barn door lock from Cistern One.

302 is a clasp type suspender for a 40 mm strap (Fig. 59b). Buckle from 303 is a clasp type belt buckle (Fig. 59c). Buckle from 304 is also a clasp type buckle made from round stock (Fig. 59d).

Chain Cow Tie

Number of specimens: 1

Provenience: 303

Description: Piece of metal chain approximately 280 mm long with a metal handle 123 mm long attached to one end (Sears, Roebuck & Co., 1902:554).

Eyelets and Lace Hooks

Number of specimens: 30

Provenience: 301(2), 303(28)

Description: Small eyelets (4 mm diameter hole); some still attached to the leather uppers. Four lace hooks for lacing the tops of boots and shoes.

Ring with Threads

Number of specimens: 1

Provenience: 303

Description: Teething ring shaped artifact with 10.5 mm diameter protrusion, 21 mm long. Ring diameter is 34 mm (inside) and 48 mm (outside) (Fig. 60).

Containers

CANS

Rolled Seam Cans

Number of specimens: 4

Provenience: 301(3), 302

Description: Cylindrical cans with rolled seams of the type in common use today (Table 30). Three cans of open top variety; can from 302 is threaded for a screw-on cap (Fig. 61).

Hole-in-top Can

Number of specimens: 3

Provenience: 302, 304(2)

Description: Cans that were made with a filler hole that was soldered in place after the can was filled. The specimen from 302 is a top, 75 mm in diameter with a 45 mm hole. One of the specimens from 304 is 101 mm in diameter and 123 mm high; hole in the top is 57 mm in diameter. The other specimen from 304 is a top, 66 mm in diameter with a 34 mm hole.

Soldered Can

Number of specimens: 2

Provenience: 302, 303

Description: Specimen from 302 is crushed almost beyond recognition; specimen from 303 is a bottom with a soldered seam.

Pressed-on-lid Can

Number of specimens: 1

Provenience: 302

Description: Fragment of a rolled seam can, designed to take a press-on lid. Approximate diameter of the can is 80 mm.

Sardine or Seafood Cans

Type 1

Number of specimens: 2

Provenience: 302, 303

Description: Three piece, soldered, rectangular can 105 x 75 x 24 mm.

Type 2

Number of specimens: 1

Provenience: 302

Description: Two piece, rolled seam, rectangular can, 105 x 75 x 23 mm.

Type 3

Number of specimens: 1

Table 26

Brick from Cistern One

Level	Width (cm)	Thickness (cm)
301	10.0	5.9
301	9.2	6.1
302	9.8	5.8
302	9.5	5.5

Table 27

Shotgun Shells from Cistern One

Type	Level	300	301	302	303	304	Total
Remington-Peters		1					1
Peters League				1			1
Peters Premier				4			4
UMC New Club (star pattern)				1	2		3
Peters Referee					1		1
Winchester Leader					1		1
Winchester New Rival						1	1
Winchester Repeater						2	2
UMC New Club (plain)						3	3
Total		1	0	6	5	3	15

Table 28

Nail Fragments from Cistern One

Level	Cut	Wire	Unidentified	Totals
302	5	11	2	18
303	11	17	5	33
304	8	5	2	15
Totals	24	33	9	66

Table 29

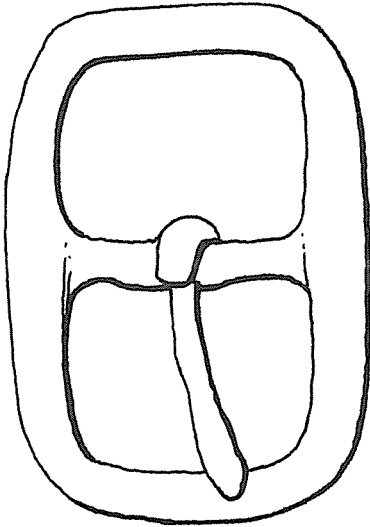
Galvanized Staples

Level	24 mm	28 mm	29 mm
302	1		2
303		4	
304			1

Table 30

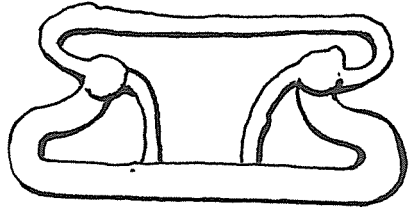
Rolled Seam Cans from Cistern One

Level	Diameter (mm)	Height (mm)	Comments
301	86	117	Complete
301	72	77	Complete
301	67	?	Top
302	37	107	Complete



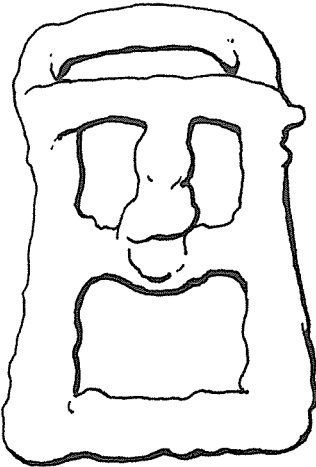
0 cm 3

a



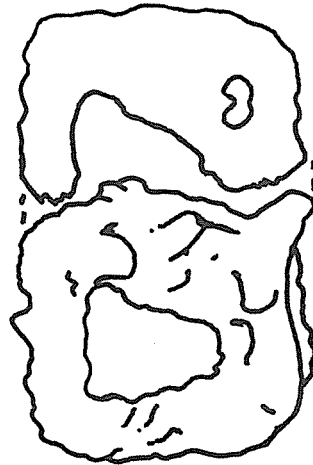
0 cm 3

b



0 CM 2

c



0 cm 3

d

Fig. 59 Buckles from Cistern One.

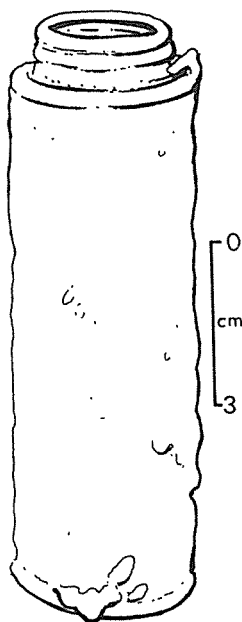
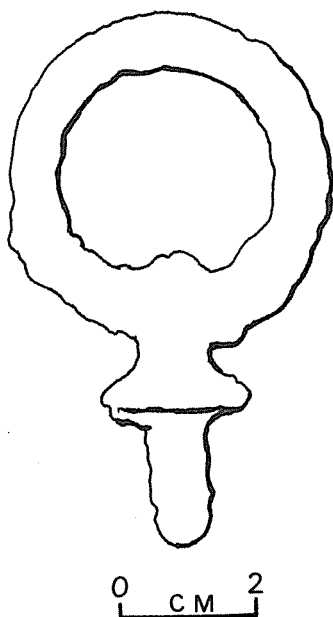


Fig. 60 Ring with threads from Cistern One. Fig. 61 Rolled seam can (threaded) from Cistern One.

Provenience: 302

Description: Bottom of oval, soldered can 109 x 71 mm; bottom indentation for a key.

Type 4

Number of specimens: 1

Provenience: 301

Description: Two piece, oval, seamed can, 167 x 108 x 39 mm.

Spice Cans

Number of specimens: 7 (minimum)

Provenience: 301(2), 302(5)

Description: Small, rectangular cans with rolled seams and sliding perforated tops; seven bases and four tops. None of the specimens are complete; lengths and widths of the cans cannot be determined. Three sizes are present: 59 x 49 mm, 61 x 34 mm, and 54 x 29 mm.

Tobacco Can

Number of specimens: 2

Provenience: 302, 304

Description: Top and base fragments of flip top tobacco tin. The specimen is 78 mm long and 23 mm wide, height undetermined.

Black-and-White Ointment

Number of specimens: 1

Provenience: 303

Description: Round can, 47 mm in diameter and 17 mm high, with press-on lid. Base of can is white with directions printed in black letters.

Paint Cans or Buckets

Number of specimens: 3

Provenience: 302(3)

Description: Large diameter cans with side protrusions for handles; 11 fragments from at least three specimens.

Paint Can Handles

Number of specimens: 3

Provenience: 303(3)

Description: Semicircular piece of wire with a hook to fit on the side of a paint can; fragmentary.

Handles

Number of specimens: 4

Provenience: 302(2), 303, 304

Description: Handles or bails for cans made from wire of various gauges. The two handles from 302 seem to be from the same object.

CLOSURES

Press-on Lids

Type 1

Number of specimens: 2

Provenience: 302(2)

Description: Lids are designed to press into the top of the can. Five fragments of at least two lids were found. The lids were approximately 145 mm in diameter and are the size of a one gallon paint bucket.

Type 2

Number of specimens: 3

Provenience: 301, 302, 303

Description: The lids are designed to fit over the top of the can. The lid from 301 is 76 mm in diameter and 21 mm high. The specimen is labeled "CALUMET BAKING POWDER ABSOLUTELY PL. . .". The lid from 302 is 73 mm in diameter and 14 mm high; specimen from 303 is 49 mm in diameter and 9 mm high.

Sardine Can Lid

Number of specimens: 1

Provenience: 302

Description: Lid to a sardine can twisted around key; specimen is 83 mm long and 14 mm in diameter.

Can Closure

Number of specimens: 1

Provenience: 303

Description: Fragment of copper band 19 mm inside diameter, broken at the threads.

BUCKETS

Plain Bucket

Number of specimens: 2

Provenience: 300, 303

Description: Common buckets: specimen from 300 is 67 x 51 mm; the one from 303 is 57 x 36 mm.

Galvanized Bucket

Number of specimens: 1

Provenience: 300

Description: The bucket is incomplete with only the crushed upper portion remaining. The original diameter of the bucket was approximately 260 mm; rolled seams on opposite sides; handle missing.

POTS

Aluminum Pot

Number of specimens: 1

Provenience: 300

Description: Partially crushed aluminum pot approximately 230 mm in diameter and 150 mm high; two handles on opposite sides.

Enameled Metal Chamber Pot

Number of specimens: 1

Provenience: 301

Description: The specimen is 128 mm high with an inside diameter of 88 mm and a flared lip extending 22 mm from the side. The sides of the pot curve gently to a 118 mm diameter, flat base; handle on one side.

Enameled Metal Washbasin

Number of specimens: 1

Provenience: 302

Description: This incomplete specimen originally was approximately 310 mm in diameter and 90 mm high.

Buggy and Wagon Parts

BUGGY AXLE

Number of specimens: 1

Provenience: 300

Description: Steel buggy axle, narrow tract with an obscure stamp on the square part of the shaft. The axle is 1600 mm long and the wheel tract is 1422 mm (Fig. 62).

Discussion: Sears, Roebuck & Co. (1902:362) shows this item as their standard 15/16 in gear, narrow track (4 ft 8 in).

BUGGY JACK

Number of specimen: 1

Provenience: 301

Description: This item is an unidentified heavy steel artifact, 520 mm long and 39-65 mm wide, made of machine drilled, rectangular stock, 43 x 11 mm (two pieces) and 26 x 15 mm (one piece). A riveted foot spaces the two 43 x 11 mm parallel bars which flare toward the opposite end to accept a wooden handle which is held by two 95 mm carriage bolts. A pivot point (rivet) where the 26 x 15 mm bar is attached is about 200 mm from the foot. This bar terminates in an eye which has a 130 mm carriage bolt. It appears that a 93 mm wooden block was attached here due to the nut pattern. Odd holes are drilled in the bars to change the pivot point.

Discussion: A description of this artifact could not be found in the literature; but the heavy foot, pivot, and handle suggest that it was used to lift heavy objects.

BUGGY TOP BRACE

Number of specimens: 1

Provenience: 300

Description: Brace for convertible top of buggy which consists of movable arms and pivots. The specimen is 918 mm long when fully extended.

CARRIAGE STEP

Number of specimens: 1

Provenience: 300

Description: Fancy, grooved carriage stop supported by a leg which trisects halfway up into three smaller arms that terminate in 8 mm diameter drilled feet. Two carriage bolts, 6.5 mm in diameter and 14.5 mm long, are in place. Both bolts retain nuts which indicate the artifact was bolted to a board 21.5 mm thick.

Discussion: This specimen is unlike Sears, Roebuck & Co. steps (1902:362-379).

DRIVE CHAIN

Number of specimens: 2

Provenience: 300, 302

Description: There are two sizes of drive chain, both of 5 mm diameter stock. The surface specimen (300) is for a 17.4 x 14.4 mm sprocket; the other for about a 10.5 x 9.3 mm sprocket.

Discussion: The "Kenwood Endgate Broadcast Seeder" offered by Sears, Roebuck & Co. (1902:682) was chain driven by "no. 34 link belting, 10 feet long, running onto a sprocket wheel . . ." Many farm implements used link belting, an example being the Sears "disk harrow and feeder attachment."

LEAF SPRING

Number of specimens: 1

Provenience: 301

Description: The specimen is made from a metal bar stock measuring 39 x 7 mm. The bar

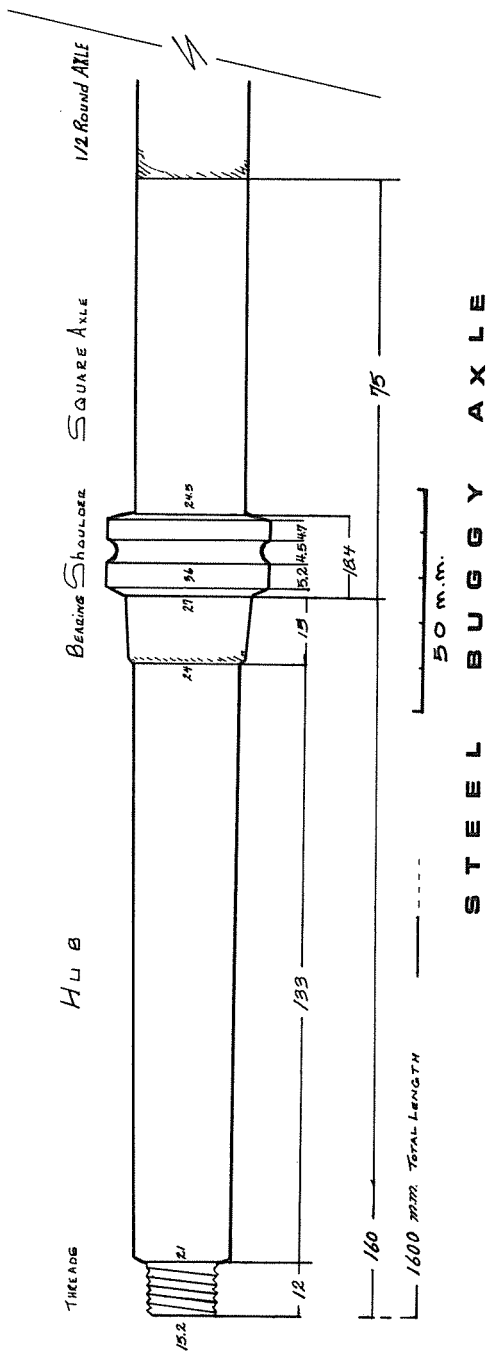


Fig. 62 Buggy axle from Cistern One.

has rounded ends and is curved. It is 886 mm long and has a single hole which is centrally located.

WAGON WHEEL HUB

Number of specimens: 1

Provenience: 301

Description: The hub is 196 mm long and 112 mm in diameter (Fig. 63).

Miscellaneous Metal Artifacts

BARREL OR KEG HANDLE

Number of specimens: 1

Provenience: 300

Description: Two straps, 79 x 23 x 1.5 mm, each bent to accept a wire handle and joined by two rivets to form an approximate 220 mm hoop. The 3.4 mm diameter wire is bent into a flaring U shape and threaded through a 86 mm long wooden handle.

Discussion: The handles fits a small barrel, probably no greater than three gallons.

BUTT HINGE

Number of specimens: 1

Provenience: 303

Description: Half of a hinge with three countersunk holes for flat wood screws; dimensions are 81 x 56 x 16 mm.

CHANGE PURSE METAL RIM

Number of specimens: 1

Provenience: 303

Description: U shaped specimen is 87 mm long; for a two compartment change purse (Fig. 64).

COWBELL

Number of specimens: 1

Provenience: 302

Description: Bell is 133 x 114 x 52 mm with a metal loop extending 18 mm from the top; clapper is missing (Fig. 65).

FISHHOOKS

Number of specimens: 5

Provenience: 301(3), 302, 304

Description: Specimen from 302 is a 3/0 limerick hook; one from 304 is a tip fragment from a larger size hook. Three limerick hooks, sizes #8, #6, and #4 were found in 301.

Discussion: The limerick hook sold for 9¢ a box (100 count) in 1895 (Montgomery Ward Catalogue, 1969:493).

FORK

Number of specimens: 1

Provenience: 301

Description: Heavily corroded, this specimen is 192 mm long; half of one of the tines is missing.

GEAR

Number of specimens: 1

Provenience: 303

Description: Fragment of a ring gear, 280 mm in diameter, with teeth 22 mm long, 6 mm deep; flaring 8-9.5 mm center to center; beveled outward at 10°.

HOE SHANK

Number of specimens: 1

Provenience: 300

Description: Metal shank for hoe; blade missing. Specimen is 199 mm long with a socket 33 mm in diameter at one end.

HORSESHOES

Number of specimens: 10

Provenience: 301, 302(2), 303(5), 304(2)

Description: Worn horseshoes of various sizes, all of which appear to be commercially made.

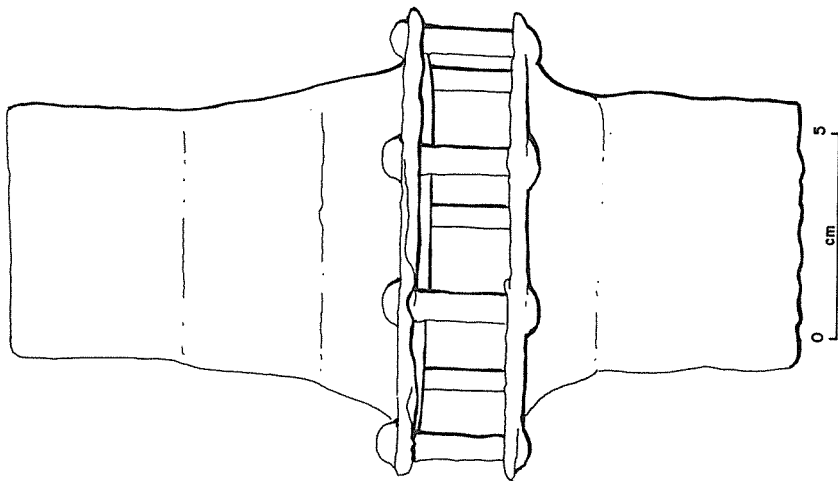


Fig. 63 Wagon wheel hub from Cistern One.

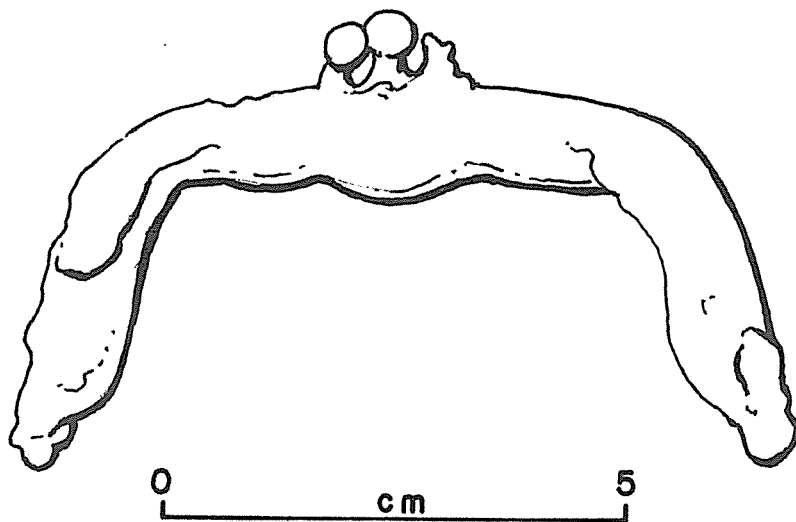


Fig. 64 Change purse metal rim from Cistern One.

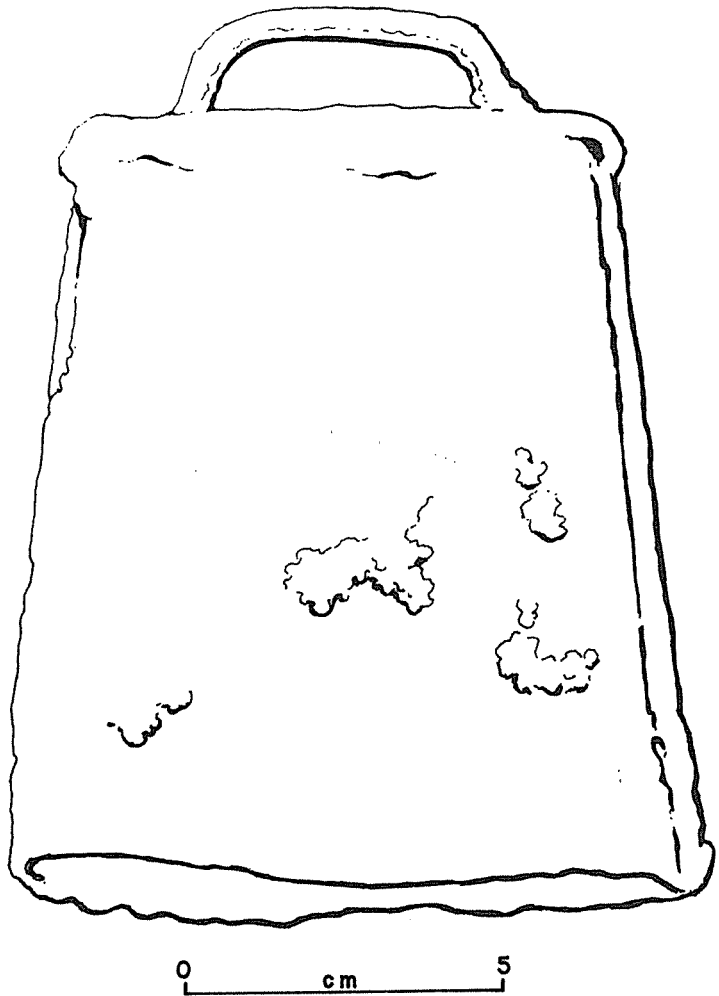


Fig. 65 Cowbell from Cistern One.

OIL LAMP BURNER

Number of specimens: 1

Provenience: 303

Description: Burner for a kerosene lamp which accepts a 19.5 x 1.5 mm wick; fits a 71 mm diameter lamp hole.

SAD IRON

Number of specimens: 1

Provenience: 304

Description: Specimen is 160 x 100 x 40 mm; handle broken (Fig. 66).

SPOON

Number of specimens: 1

Provenience: 301

Description: Specimen, probably enameled, is 269 mm long; a portion of the handle is missing (Fig. 67).

STOVE PARTS

Number of specimens: 1

Provenience: 304

Description: Stove base fragment, 4.5 mm thick, with raised letters reading “. . . Y. TROY, N.Y.” Stove bolt diameter is 7.5 mm and the chamfered leg attached by a narrowing slot support.

TOY TRAIN

Number of specimens: 10 fragments (fit together)

Provenience: 303(10)

Description: A cast iron locomotive and 1/4 of a passenger car were recovered. The passenger car is 320 mm long, made in a one piece mold. with the inscription “Chicago, Rock Island & Pacific . . .” (RR or LINE). The locomotive is 245 mm long and 74 mm wide at the widest point. It has four 47 mm diameter drivers, four 24.5 mm carriers in front, three smokestacks, one head lamp, a waving engineering and fireman, and a cow catcher with four horizontal bars. Two rivets (plus the four axles) held the two mirror image pieces together (Figs. 68, 69).

Discussion: The Chicago, Rock Island and Pacific Railroad, or the Rock Island Line, was chartered in 1822 and bankrupted in March 1975 (*Time Magazine*, March, 1975:72). The Rock Island did not enter Texas until 1892. Ten years later, there were four short subsidiary lines, the most important of which was the Rock Island and Gulf Line terminating in Houston.

The toy locomotive and passenger car found at the McKinney Falls Homestead could date to any time within the span. However, the location of the artifacts in the cistern and the similarity of this artifact with the description in the Sears, Roebuck & Co. Catalogue suggest that they were the toys of the Charlie Johns family and not related to Thomas K. McKinney.

TRICYCLE WHEEL

Number of specimens: 3 fragments (from one wheel)

Provenience: 300(3)

Description: Fragments consist of the hub with some spokes and two fragments forming the complete outside rim. The wheel was approximately 400 mm in diameter.

UMBRELLA

Number of specimens: 47

Provenience: 303(47)

Description: Fragments of an umbrella, with steel rod and paragon frame probably of normal diameter (1200 mm). Main rod is 8.5 mm in diameter while extension arms are U shaped; 3.9 mm greatest diameter.

Discussion: The umbrella was closed when found.

Unidentified Metal Artifacts

COMPOSITE BASE

Number of specimens: 1

Provenience: 302

Description: Brass base is 40 mm in diameter, 2.8 mm thick, with two 4.3 mm holes equally spaced between the center and edge of the base. A brass tube 11 mm in diameter protrudes 6 mm up from the center. Inside this is a steel rod, 72 mm long, threaded on the far end (large threads), and protruding 3.4 mm out the other side of the base. A brass collar, 10 mm in diameter, is attached to the steel shank by three small set screws. Two of the set screws hold small rectangular metal fragments.

Discussion: One of the most complicated pieces in the collection, the function is unknown.

FRAGMENTS

Number of specimens: 40

Provenience: 301(3), 302(15), 303(12), 304(10)

Description: Fragments of tin cans, scrap metal, cast iron, and wire. A small, heavy, well rounded lump of iron about 16 mm in diameter and 30 mm long leaves a vermilion streak on a stainless steel file.

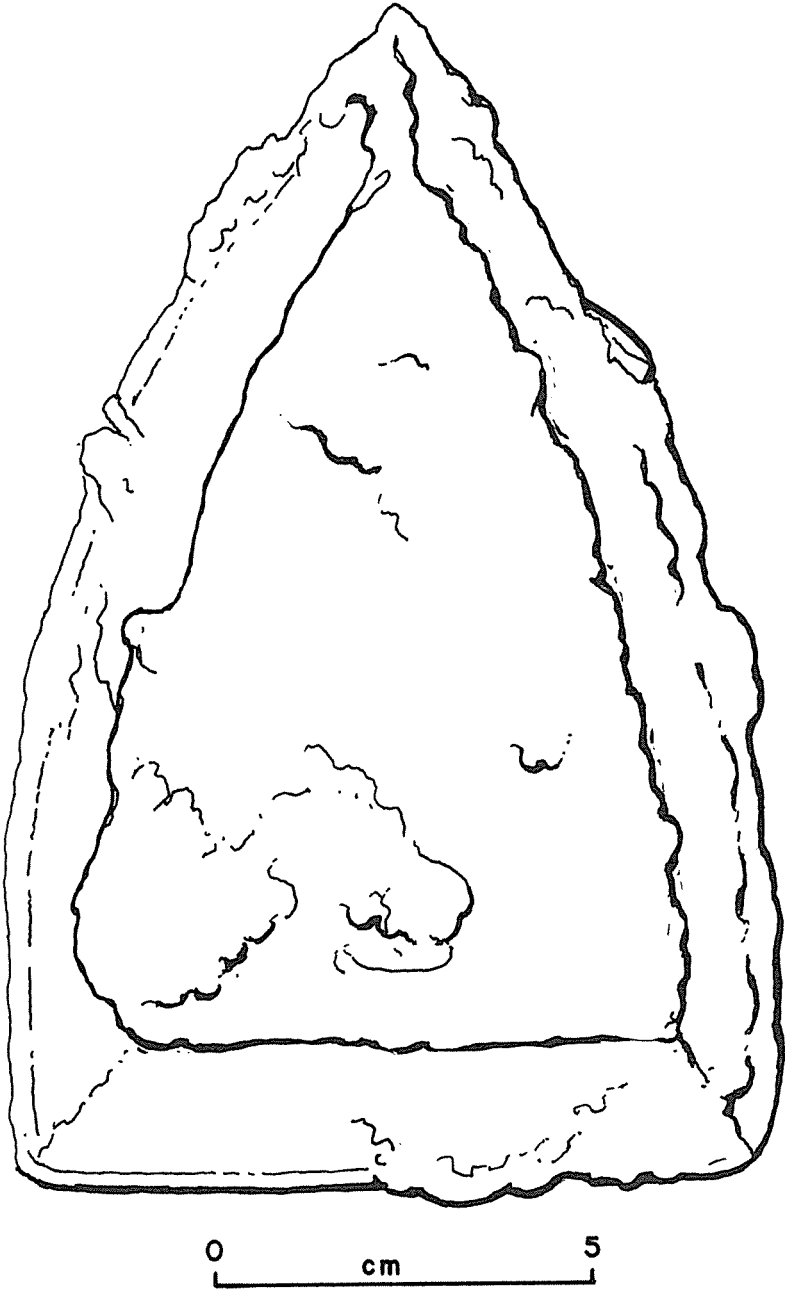


Fig. 66 Sad iron from Cistern One.

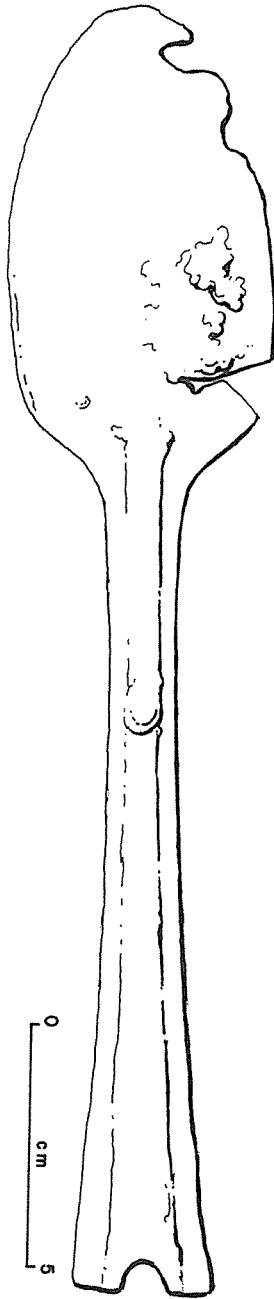


Fig. 67 Spoon from Cistern One.

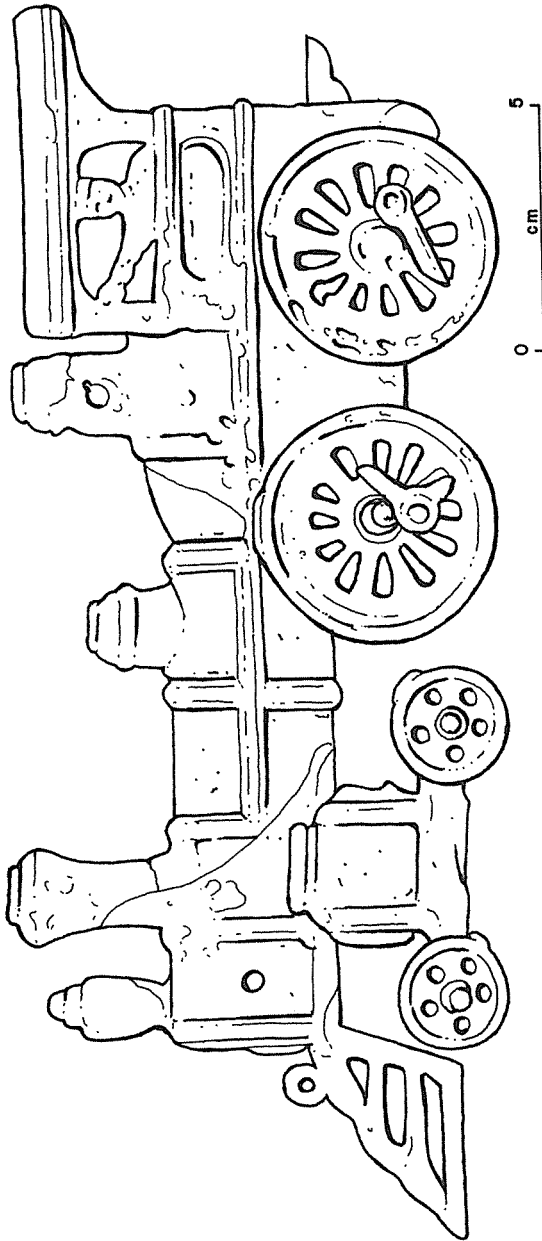


Fig. 68 Toy locomotion from Cistern One.

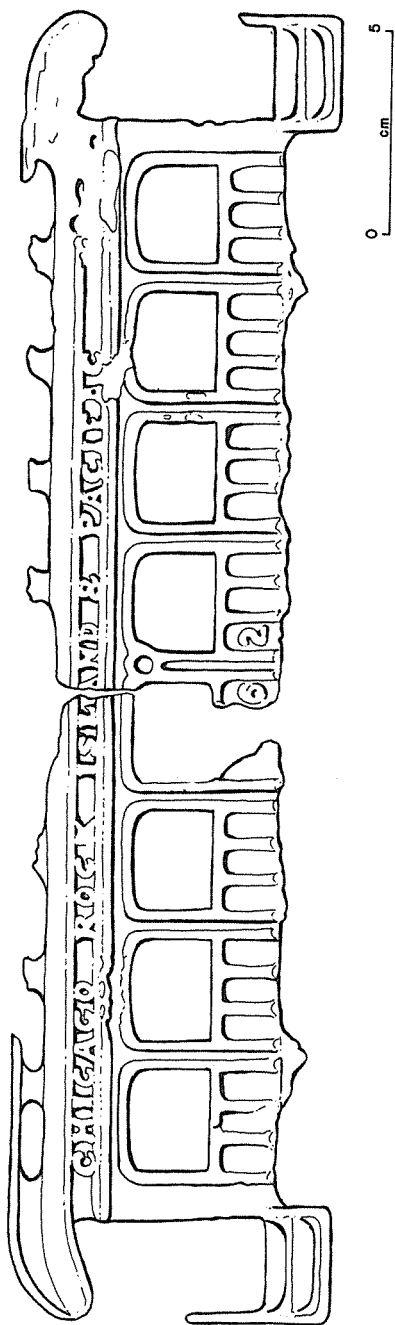


Fig. 69 Toy passenger car from Cistern One.

ROD

Number of specimens: 1

Provenience: 301

Description: Metal rod 11 mm in diameter and 313 mm long.

SEMICIRCLE AND BASE

Number of specimens: 2

Provenience: 302, 304

Description: Items are a footed surround, support, or ring. The ring is of an H channel stock, 12.7 x 9.4 mm, describing a 290° circle. A straight base, 10.7 x 5.4 mm and ca. 30 mm in length, connects the circle. Two beveled feet are attached to the base, each about 14 x 13 mm. The inner surface of the circle base is beveled slightly, about 2° away from obscure stamping on one side of the base. The inscription reads: "REED JUNE 20 71 A" (Fig. 70). The 302 artifact is fragmentary. If there was an inscription on the base, it is now obliterated.

Discussion: Although function is unknown, the items are very well made steel artifacts that are perhaps machine parts.

STRAPS (CLASSIFIED BY WIDTH)**23 mm Strap**

Number of specimens: 1

Provenience: 304

Description: Metal hoop, 191 mm in diameter, made from metal bar, 23 x 6 mm.

20 mm Strap

Number of specimens: 2

Provenience: 300

Description: Specimen is made from metal strap, 20 x 1 mm, which is slightly curved in section and 740 mm long. A rectangular metal fastener is at one end. Near the center, a bent nail with a 53 mm diameter harness ring is attached.

19.5 mm Strap

Number of specimens: 1

Provenience: 300

Description: Curving strap, 19.5 x 3.8 mm, with rounded ends and about 470 mm long. A 4 mm hole is center drilled 6 mm from each end. A 30° dogleg appears 70 mm from one end. Six rivets are equally spaced (70 mm center to center) between the dogleg and the other end (drilled hole). Another piece of 3 mm flat stock projecting 43 mm at right angles to the strap is attached (by two rivets, 38.5 mm center to center) between rivets 4 and 5. This piece is drilled and another subtriangular piece of 3 mm flat stock is attached using a 6.2 mm diameter, round headed bolt, washer, and six sided nut (13.8 mm). The subtriangular piece has four drilled holes: two with rivets (holding on yet another 3 mm strap fragment) and two (3.7 mm diameter) along one edge. Rivet size (head) is: first strap, 8.7 mm; first flat stock, 10.0 mm; second flat stock, 6.5 mm. All rivets are placed from the same side.

Discussion: Function is unknown; pivot points and rivets suggest a cloth attached to bows as in a convertible buggy top.

18 mm Strap

Number of specimens: 1

Provenience: 300

Description: Specimen is 35 mm long with five bolt holes of which three still have bolts and nuts.

14 mm Strap

Number of specimens: 1

Provenience: 301

Description: Specimen is 36 x 14 mm and 652 mm long with rolled edges. Four countersunk holes are present along the central axis.

Discussion: Item is perhaps an automobile window frame.

13.5 mm Strap

Number of specimens: 1

Provenience: 303

Description: Iron strap, 100 x 13.5 x 1.5 mm, with two wire nails, 24.3 mm long, punched through. Wood fragments, with grain running parallel to the strap, surround the nails.

SUPPORT

Number of specimens: 1

Provenience: 303

Description: Forked bracket, 16.5 mm long, of cast iron with four 6.4 mm diameter holes for mounting. The bent bracket terminates in a pod reinforced with a built-up rim. A 10.6 mm hole penetrates this pod (Fig. 71).

Discussion: Specimen may be a piece for attaching a spring to a carriage body.

WIRE

Number of specimens: 69

Provenience: 300, 301(10), 302(25), 303(14), 304(19)

Description: Fragments of wire of various gauges.

BUTTONS

MOTHER-OF-PEARL

Number of specimens: 12

Provenience: 301(6), 302(3), 303(3)

Description: Table 31.

MILK GLASS

Number of specimens: 5

Provenience: 302(3), 303(2)

Description: Four white agate buttons, each with four holes, a dished front, and a beveled back, were recovered. They measure 16 x 4 mm, 14.6 x 4 mm, 18.3 x 3.5 mm (from 302), and 15.9 x 4.1 mm (from 303). One fancy white agate button with a decorated dished front, measuring 10.6 x 2.8 mm, came from 303.

Discussion: Sears, Roebuck & Co. (1902:940) does not specify any particular function.

COMPOSITE METAL

Number of specimens: 2

Provenience: 303(2)

Description: Rolled edge, two piece, metal buttons measuring 19 x 5 mm with flat fronts and metal pins protruding from one back. They may have been cloth covered and appear to have shirt snaps on the back.

LITHICS

Five lithic artifacts apparently of aboriginal manufacture were recovered from the cistern. They were recovered from the same level and assumed discarded at the same time. Similar artifacts are found on the surface around the McKinney home and they likely came from the immediate vicinity. The artifacts are all manufactured from chert nodules which weather out of the local limestone.

SPENT CORE

Number of specimens: 1

Provenience: 303

Description: The core was made from a stream rolled nodule which was probably about 10 x 8 x 8 cm before flaking. Several flakes were removed from one side with a hammerstone to produce a continuous striking platform from which a series of blades (length at least twice the width) was detached. Platforms were crushed in blade removal. Regularity of the first flaking scars suggests the specimen functioned as a blade core. One of the flakes step fractured. Six attempts were made to rejuvenate the core by trying to strike increasingly thicker flakes which resulted in additional step fracturing (Fig. 72a).

SECONDARY FLAKE

Number of specimens: 1

Table 31
 Mother-of-Pearl Buttons from Cistern One

Level	Diameter (mm)	Thickness (mm)	Number of Holes	Front	Back
301	11.0	1.8	4	dished	flat
	11.0	1.8	4	dished	flat
	12.8	1.5	2	plain	flat
	12.8	2.6	2	slot	beveled
	12.8	4.0	4	dished	flat
	15.0	2.5	2	dished	flat
302	11.0	2.0	4	dished	flat
	11.0	2.0	2	dished	flat
	13.4	2.3	2	slot	flat
	16.6	2.3	4	counter-sunk	flat
303	12.7	2.6	4	dished	flat
	10.2	1.4	4	(?)	(?)

Provenience: 303

Description: Flake is 76 x 62 x 23 mm. It was removed from a nodule with a hammerstone striking a platform prepared by a previously removed flake. The earlier flake removal formed a ridge along the junction of the flake scar and cortex on the surface of the nodule.

FLAKE TOOL

Number of specimens: 1

Provenience: 303

Description: The flake, 60 x 60 x 12 mm with a multifaceted platform, was removed with a hammerstone. It is retouched along one lateral edge by percussion flaking.

THINNING FLAKE

Number of specimens: 1

Provenience: 303

Description: The flake, 24 x 19 x 3 mm, is fragmentary with the platform missing. Flake thinness suggests it was probably a thinning flake struck with an antler billet. Absence of a platform precludes positive identification. A slight sheen indicates heat treating.

PROJECTILE POINT FRAGMENT

Number of specimens: 1

Provenience: 303

Description: The specimen is a stem fragment with an indented U shaped base (Fig. 72b).

Discussion: The fragment falls within stylistic range of the Pedernales point, estimated to date within the 4000 B.C. to A.D. 1000 span (Suhm and Jelks, 1962:237).

MISCELLANEOUS

CERAMIC MARBLE

Number of specimens: 1

Provenience: 303

Description: Mottled brown, ceramic marble, 13.2-13.7 mm in diameter.

RHINESTONE WITHOUT SET

Number of specimens: 1

Provenience: 302

Description: Small rhinestone set, 5.8 mm in diameter, with eight faces.

CARRIAGE LAMP LENSES

Number of specimens: 2

Provenience: 302(2)

Description: One specimen is a rectangular, bevel edged lens 8 mm thick with a copper channel surround, measuring 122 x 95 mm. Copper edge surround also holds on a

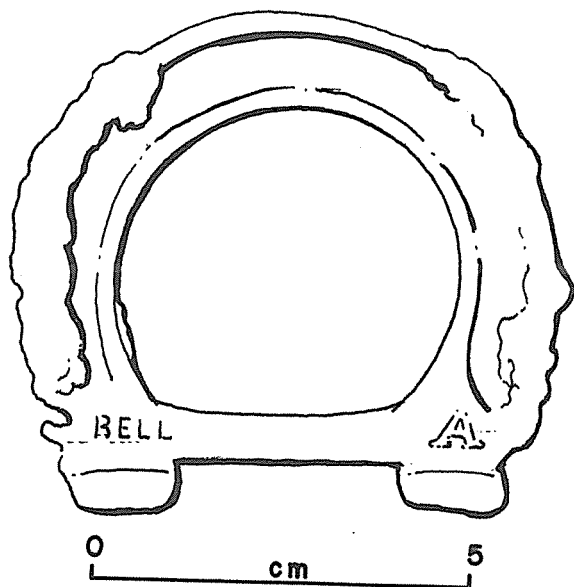


Fig. 70 Unidentified metal fragment from Cistern One.

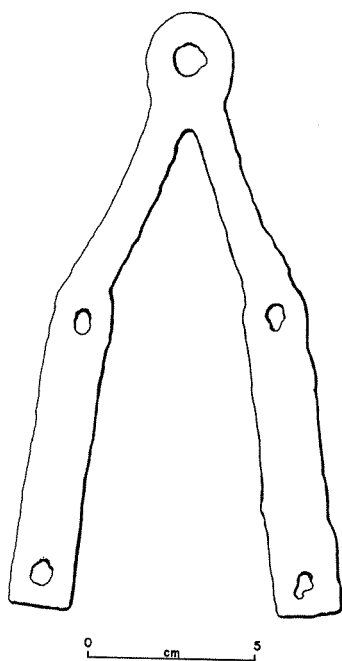


Fig. 71 Cast iron support from Cistern One.

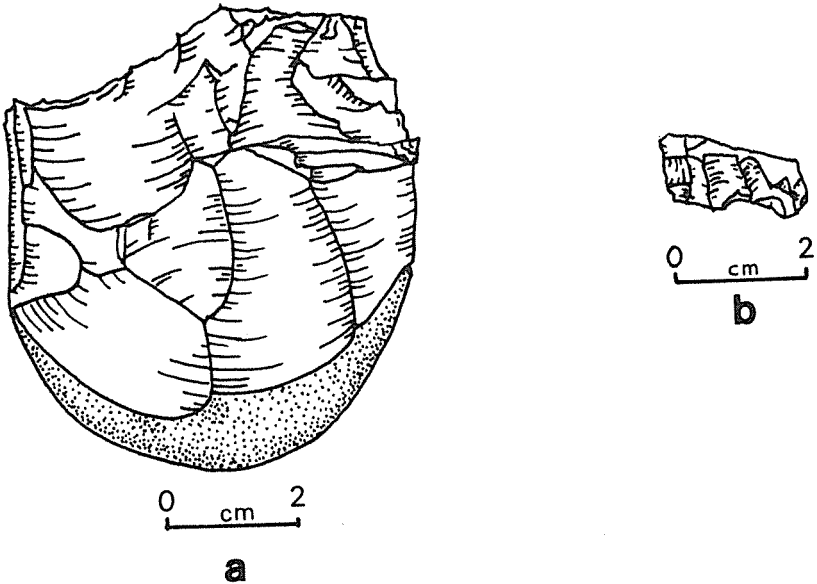


Fig. 72 Lithic artifacts from Cistern One: a. core; b. base of projectile point.

back flange which, when pressed, fits inside an 80 mm diameter lamp. The lens was positioned by the flange 26-28 mm away from the lamp. The other item is a round, bevel edged lens, 7.5 mm thick and 137 mm in diameter.

Discussion: Many Sears, Roebuck & Co. (1902:625) carriage and surrey lamps employ similar lenses. These lamps are of superior quality and design and utilized candle or kerosene.

LEATHER

Number of specimens: 14
Provenience: 301, 302(8), 303(5)

Description: Fragments represent boot heels, vamp and top with cinch, and heel nails in place; very deteriorated condition. One is possibly a rubber heel. The 301 specimen is a leather strap tied with a leather thong.

NYLON SOCK

Number of specimens: 1
Provenience: 302

Description: Fragment of an orange nylon sock with holes in the heel and toe.

PLASTIC ROUGE CASE

Number of specimens: 1
Provenience: 302

Description: A base, 43 mm in diameter, had a mirror glued to the bottom (now gone) and a small container, 25 mm in diameter and 6 mm deep, for rouge, some of which is still in place. A cover lid screws on over this container and has "HR" (Helena Rubenstein) in the center.

POLITICAL PIN

Number of specimens: 1
Provenience: 301

Description: A metal front curls over a wire ring, the ring terminating in a straight pin. A celluloid cover encompasses this fragment of thin metal, but the inscription is gone.

CISTERN TWO

Research Design

The Cistern Two experiment was added to the McKinney Falls agenda after the field manual (Ralph and McEachern, 1974) was completed. The top of Cistern Two had collapsed, creating a hole almost 2 m in diameter and 4 m deep. The collapse created a safety hazard and need for the cistern to be filled. A plan for filling the cistern was developed based on an example of English archeology. Some work had been done on manufacturing archeological sites to provide a means of studying rates of various environmental processes. A barrow had been constructed with the design of excavating small portions every 25 years to examine the development of the soil profile, thus having applications in paleopedology (Underwood, 1969).

Methods

With the help of park personnel and a backhoe, a water heater and some large tree trunks were removed from the surface of the cistern deposit. A front-end loader was used to dump three loads of clean fill into the cistern to seal off the original deposit. Walls were prepared and painted with a white base coat up to 2.3 m from the new floor (3.9 m from the surface). Artists began conveying the message, through a plastic paint medium, that archeologists had been here. At the same time, artifacts were being collected to build the archeological deposit. Artifacts representing a complete array of material types currently in use (1974) were chosen to represent what could feasibly be left after an archeological field investigation. A complete inventory was taken and is on file with the Texas Parks and Wildlife Department.

Clean fill dirt was added to the cistern to bring the level of the deposit up to the middle of the painting to clearly establish the association of the second layer of artifacts with the painting. Additional fill was then added to the deposit to bring it up almost to the top of the cistern.

The deposit, now stable, safe for park visitors, and rendered unattractive to potential vandals, will deteriorate in a fairly uniform medium depending on the rates of decay for each material type and class of artifact. By the year 2024, the upper deposit will be 50 years old and eligible for inclusion in the National Register for Historic Places (as currently defined). A much older remnant will be preserved below and directly comparable to data derived from the excavation of Cistern One. A portion of the original site was preserved for future generations of archeologists, a new mode of studying artifact decay initiated, and a material culture sample of a Texas Archeological Society field school encapsulated.

ACKNOWLEDGMENTS

The 1974 TAS field school was held June 8-15 and directed by Michael McEachern and Ronald W. Ralph. Parks and Wildlife personnel, professional archeologists, and approximately 175 amateur archeologists combined their expertise and efforts in an integrated study of the park's archeological resources.

The successful completion of the 1974 field school and subsequent report were due to the efforts of many members of the Texas Archeological Society as well as the efforts of many other individuals. We wish to thank the numerous individuals who contributed to this study and recognize special efforts by certain people in parentheses after their name:

Barto Arnold III (lecture), Vickie Atkins, Pete Billae, Art Black (report), Nancy Boice

(report), Dick Bowen, Gregg Bowen, Nancy Bowen (history), Fred Brezik, Alton Briggs (proton magnetometer), Rebecca Brooks, Don Broussard, Gus (Radar) Bugnitz (philosophy), Billy Bunch, Barbara Burger (supervision), Elaine Burleigh (report), Bob Burleson, Runi Burnett, Jim Calvert (report), T.N. Campbell (lecture), Christopher Caran (modern fauna), Charles Carr, Chris Carson, June Carter, Maureen Cavanaugh.

C.K. Chandler, Virginia Chandler, Jo Clifton, J.B. Colharp, Rick Curtis, Billy Davidson (fauna identification), Helen Davis, Les Davis, Marguerete Davis, Dolores Dickinson, Roy Dickinson, Dawn East, Anna Ericson, Ruth Ann Ericson, Bransford Eubank, Martha Eubank, Mike Forester (drafting), Anne Fox (laboratory), Dan Fox, Jean Fullen.

John Fullen, Lou Fullen (politics), Marge Fullen, Dolly Ferguson, Norman Flagg, Loreen Fredlund, Ray Fredlund, Susan Fredlund, Taffie Fredlund, Kathy Freydenfeldt (editor), Jesse Graham, Doyle Granberry, Joanne Gavin, Kathleen Gilmore, Dick Green, Jane Green, Terri Green, Gene Griffin, C.N. Hall, Mark Hall.

Alice Hamilton, Elizabeth Hamilton, Nan Hampton, Ann Hanna, Susan Hanna, Charles Harris, Ann Harrison, Blake Harrison, R.K. Harrison, Bert Helm, Mark Helm, Robert Hemperly, Jane Hendrix, Angie Herbert, Beth Herbert, Dianne Herbert, Joan Herbert, Shirley Herbert, James Herschberger (lecture), Thomas R. Hester (politics).

Tommy Hicks, Betsy Hill, Brenda Hill, Doris Hill, Mack Hill, Richard Hill, Floy Lee Hoelscher, Rose Hoelscher, Norma Hoffrichter (report), Gerald Humphreys (supervision), Berry Hutcheson (history), Jesse Graham, David Ing, Dailey Jones, George Kegley (politics), Barbara Klatt, Jack Klatt, Mary Lou Klatt, Orion Knox (lecture and politics), Barbara Koeppel.

Paul Koeppel, Colleen Lamb (drafting), Shari Larason, Charles Locke, Miles Locke, Adrian Lorrain, Dessamae Lorrain, Paul Lorrain, Dino Lowry (art work), Pam Lynn (typing and inspiration), Cynthia Martin, Rachelle Martin, Marianne Mayfield, Pam Mayfield, Cynthia McCown, Linda McCown, Pamela McCown, Daylon McCreeles, William McIntosh, Jim McMichael.

Logan McNatt, Thomas Medlin, Marsha Meridith, Joyce Meyers, Carolyn Mierzwa, Freda Miller, Julia Mosley, Laurie Mosley, Marie Mosley, Mike Mosley, Sue Moss, Colleen O'Brien, David O'Brien, E.T. O'Brien, Jennifer O'Brien, John O'Brien, Mark O'Brien, Mike O'Brien, Thomas O'Brien.

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Joyce Warren, T.E. Warren, Wade Warren, John Wayland, Rex Wayland, Sarah Wayland, Doug Waylane, Norman Wehrli, Peggy Wehrli, Dale Wells, Pam Wheat, Gary Wiggins, Wallace Williams, Jane Wilson, Mike Wilson (park staff support), Dorothy Word, Jim Word, Keith Young, Steve Zeman.

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APPENDIX A

***A General Introduction to the
Vegetation and Dominant Plant
Communities of the McKinney
Homestead, Travis County, Texas***

David H. Riskind

INTRODUCTION

The immediate environs of the McKinney Homestead may be described in terms of five polymorphic and somewhat intergrading plant communities. The contemporary plant communities at McKinney Falls State Park have been significantly altered from the natural prehistoric vegetation. Nevertheless, the landscape is characterized in terms of potential natural vegetation. Anthropogenic influences upon the plant communities, however, are briefly mentioned.

The McKinney Homestead is included within the Blackland Prairies Vegetational Area (Tharp, 1952; Kuchler, 1964; Thomas, 1969). Such small scale vegetation mapping has obvious and understandable limitations. Detailed analysis of a grassland relict was published by Lynch (1962, 1971) for an area several kilometers to the west of the McKinney Homestead. Anderson (1904) presented the only detailed map of the plant associations in the immediate vicinity of the McKinney Homestead. He classified the area as: Chalk Prairie (including a Chalk Hill type) of the Grand Prairie Society; Black Prairie of the Black Prairie Society; and a riparian community subsumed within the Colorado Drainage System Society (including the Stream Margin, Gravel Terrace, and Alluvial Bottom Associations).

Lynch (1968) developed a checklist of the flora for the region but did not include community type descriptions. Collins et al. (1975) recently described the community types of the Blackland Prairie north of the Colorado River. Their discussion applies to the McKinney Homestead as well.

The Homestead is located east of the Balcones fault and the Edwards Plateau, within the Balcones fault zone. The physiography is reminiscent of the hilly, dissected margins of the Edwards Plateau. In large measure, the site is ecotonal between the true prairie grasslands of the Western Gulf Coastal Plains and the evergreen woodlands of the Edwards Escarpment.

East and north of Onion Creek, the relatively level uplands are characteristic of the southern and western portion of the Blackland Prairies.

Blacklands also occupy approximately 40% of the upland terrain west and south of Onion Creek. The permanently flowing Onion and Williamson creeks and their associated geomorphological features add a third major dimension to the biotic communities of the area. This dimension is a riparian woodland (or forest if the overstory canopy is closed).

DOMINANT PLANT COMMUNITIES

The dominant plant communities of the site can best be discussed and delineated within the framework of the recently completed soils survey of Travis County (Werchan et al., 1974). A generalized soils and potential vegetation type map is presented in Figure 1.

Houston, Lewisville, Altoga, and Heiden clayey soils of the level to gently rolling uplands (0-8% slope) surrounding the McKinney Homestead supported climax plant communities which can be included within the Blackland Prairie. The binding dominant for this variable true prairie community was little bluestem (*Schizachyrium scoparium*). Co-dominants were such species as big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum avenaceum*), Canada wildrye (*Elymus canadensis*), Texas wintergrass (*Stipa leuchtolica*), tall dropseed (*Sporobolus asper*), silver bluestem (*Bothriochloa saccharoides*), side oats grama (*Bouteloua curtipendula*), and numerous other less conspicuous grasses and forbs. In prehistoric times, woody plants would have been unimportant community components.

Most of these upland soils were highly productive, relatively deep, and arable. The native prairie vegetation was grazed off at an early date and replaced either by pasturage or by food or fiber crops. Most of the former prairielands are heavily invaded by: mesquite (*Prosopis glandulosa* var. *glandulosa*), especially on deeper soils; cacti (*Opuntia* spp.), Ashe juniper (*Juniperus ashei*); broomweed (*Xanthocephalum* sp.); seepwillow (*Baccharis neglecta*); annual grasses and forbs; and weedy perennial grasses such as Texas wintergrass, Johnson grass (*Sorghum halapensis*), purple threeawn (*Aristida purpurea*), buffalo grass (*Buchloe dactyloides*), curly mesquite (*Hilaria belangeri*), hairy grama (*Bouteloua hirsuta*), and silver bluestem. They can be categorized as old field, successional communities.

The large alluvial terrace adjacent to the McKinney Homestead is included within this community. Due to a more favorable moisture regime, this site may have been an open cedar elm woodland. The slope due east of the McKinney Homestead is badly eroded and choked with dense stands of mesquite, snakewood (*Colubrina texensis*), algerita (*Berberis trifoliolata*), Texas persimmon (*Diospyros texana*), prickly ash (*Zanthoxylum hirsutum*), lotebush (*Zizyphus obtusifolia*), prickly pear, and pencil cactus (*Opuntia leptocaulis*). Ashe juniper is included as a faciation of the Blacklands community. However, in former times, a woody component was probably well represented on this site, especially on the steep slopes (>10%).

Shallow, rocky uplands generally characterized as having Tarrant soils were vegetated by open savannahs (with up to 20-30% canopy cover) with live oak (*Quercus fusiformis*), cedar elm (*Ulmus crassifolia*), and netleaf hackberry (*Celtis reticulata*) as overstory dominants and with mid and tall grasses as the dominant ground cover. Cedar, bumelia (*Bumelia*

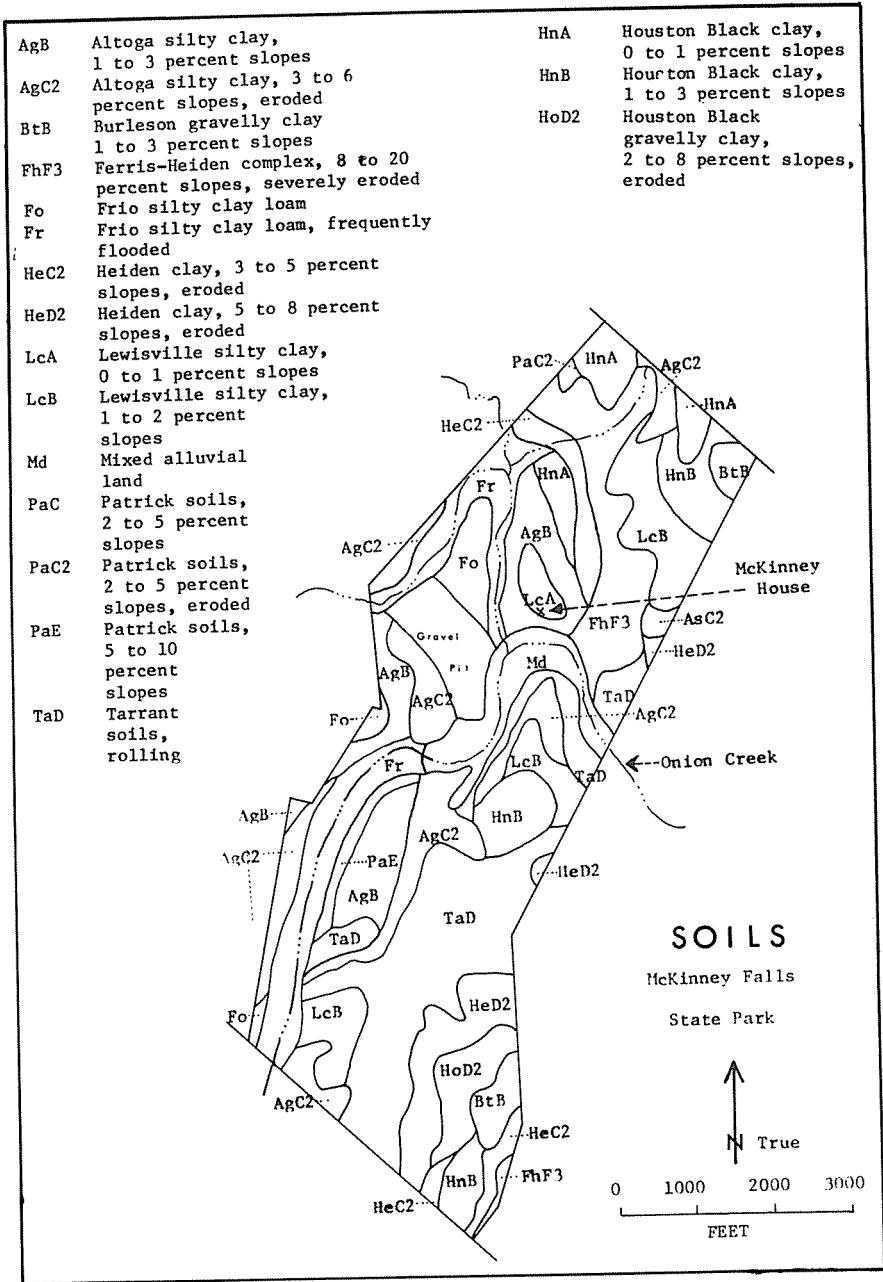


Fig. 1 Soil and vegetation types at McKinney Falls State Park (base map and soils courtesy of USDA).

lanuginosa), netlead hackberry, hog plum (*Prunus rivularis*), shin oak (*Quercus sinuata* var. *breviloba*), persimmon, spring herald (*Forestiera pubescens*), fragrant suma (*Rhus aromatica* var. *flabelliformis*), poison ivy (*Rhus toxicodendron*), soapberry (*Sapindus saponaria* var. *drummondii*), Virginia and plateau creeper (*Parthenocissus virginiana* and *heptaphylla*), mustang grape (*Vitis mustangensis*), greenbrier (*Smilax bona-nox*), turk's cap (*Malva viscus drummondii*), and others would have been and are present in this community.

Due to heavy exploitation of the grasses in this upland community and subsequent overgrazing, the woody plants, especially the brushy species, have migrated onto sites formerly dominated by the perennial grasses. The contemporary landscape, formerly open savannah, is composed of thickets with spring herald, algerita, *Mimosa borealis*, snakewood, lotebush, prickly pear, pencil cactus, netleaf hackberry, and greater densities of live oak and cedar elm and of woody vegetation in general. What was formerly savannah is now a woodland with a dense, brushy understory.

Upland areas of Tarrant soils where the woody vegetation has been entirely removed in order to increase grazing potential is also within this community type (in terms of potential vegetation). These grassland openings are dominated by grasses such as buffalograss, side oats grama, curly mesquite, tall dropseed, Johnson grass, and silver bluestem. Prickly pear, pencil cactus, twisted-leaf yucca (*Yucca rupicola*), and numerous annual and perennial forbs are conspicuous. The majority of this upland plant community is located south of the McKinney Homestead on the south side of Onion Creek.

Adjacent to Onion Creek, especially to the east of the creek on the upper slopes upstream from the upper falls, there is a distinct plant community which occupies the shallow Patrick soils of the chalky ridges. Formerly, this location was occupied by a savannah community with plateau live oak and mid and tall grasses as dominant (little bluestem, Indiangrass, big bluestem, etc). Today, Ashe juniper is dominant as is a brushy component including the rare Texas peach bush (*Prunus minutiflora*).

This community is typical of the Edwards Plateau. Twisted-leaf yucca, a plateau endemic, is a conspicuous component of the chalky ridge plant community. Juniper and live oak are considered indigenous as should Texas kidneywood (*Eysenhardtia texana*), algerita, snakewood, skunkbush, spring herald, Texas persimmon, and *Prunus rivularis*. Contemporary densities of these species, particularly Ashe juniper, have increased manyfold as a consequence of exploitative land use practices. Little bluestem and side oats grama formerly dominated the grassy vegetation, whereas today Texas needlegrass (*Stipa leucotricha*) is dominant. This community is considered as aspect of the uplands savannah.

Upland gravel deposits, usually mapped as Quaternary gravel terraces, are represented due west of the McKinney Homestead. Soil designation has not been assigned to the deposit since the soil along with the gravel has long since been removed. Anderson (1904) includes the gravel terraces within his Colorado Drainage System Society. However, the distinctly upland community was vegetated with post oak (*Quercus stellata*), cedar elm, and hackberry as the overstory dominants of an open woodland. *Bumelia* was

also a component of the overstory in this community.

In the climax potential, mid grasses, especially little bluestem, would have dominated the herbaceous community. Included would have been species such as purpletop (*Tridens flavus*), big bluestem, Indian grass, and a variety of forbs and other grasses. In climax conditions, this community was, most likely, the least diverse of all community types represented in the environs of the McKinney Homestead.

The remaining dominant plant communities can best be described within a generalized and broadly interpreted riparian category. The riparian community fluctuates in composition and physiognomy along a gradient of available moisture, substrate depth and texture, and exposure. Minimum development of this community is found within intermittent drainages on the uplands. Maximum development occurs along the banks, floodplain, and lower talus slopes of the entrenched Onion, Rinard, and Williamson creeks. It is delineated on soils maps as either Frio soils or as Mixed Alluvial lands (Werchan et al., 1974). Soils of small, intermittent drainages are not mapped due to limitations of the graphic scale.

Intermittent upland drainages can best be described as cedar elm-hackberry-live oak-woodlands. Facies of this community include hackberry woodlands and/or cedar elm woodlands. As the available moisture, soil depth (fertility), and/or stream gradient increases, the density and species diversity of the woodland increases to the point that a closed canopy develops and more mesic species are included.

These species include: American elm (*Ulmus americana*); pecan (*Carya illinoensis*); Arizona walnut (*Juglans major*); red mulberry (*Morus rubra*); elderberry (*Sambucus canadensis*); Eve's necklace (*Sophora affinis*); cottonwood (*Populus deltoides*); Mexican plum (*Prunus mexicana*); deciduous holly (*Ilex decidua*); mustang grape; roughleaf dogwood (*Cornus drummondii*); Virginia creeper (*Parthenocissus quinquefolia*); plateau creeper; hawthorne (*Crataegus* sp.); redbud (*Cercis canadensis* var. *texensis*); bumelia; Texas ash (*Fraxinus texensis*); eastern red cedar (*Juniperus virginiana*); red haw (*Viburnum rufidulum*); buckeye (*Aesculus pavia* var. *pavia*); Mexican buckeye (*Ungnadia speciosa*); wafer ash (*Ptelea trifoliata*); poison ivy; dewberry (*Rubus trivialis*); clematis (*Clematis texensis*). Other mesic indicators are: green dragon (*Arisaema dracontium*); white avens (*Geum canadense*); and inland sea oats (*Chasmanthium latifolium*).

Osage orange (*Maclura pomifera*), privet (*Ligustrum* sp.), chinaberry (*Melia azedarach*), and Japanese honeysuckle (*Lonicera japonica*) are recent introductions to this community. The dominant species of the intermittent drainage community grade into and are often indistinguishable from the dominants present in the scarp woodland community.

A distinctive variant of the riparian community, a scarp woodland, is found on the slopes of the entrenched drainages, especially Onion and Rinard creeks. Oaks (*Quercus texana*, *Q. fusiformis*), cedar elm, hackberry (*Celtis laevigata*), Texas ash, red buckeye, wafer ash, redbud, beargrass (*Nolina lindheimeriana*), Texas persimmon, Mexican buckeye, roughleaf dogwood, Arizona walnut, beautyberry (*Callicarpa americana*), boneset (*Eupatorium havanense*), and redhaw dominate. Ashe juniper and eastern red cedar occur in this assemblage. Brambles (*Smilax* spp.), plateau

creeper, peppervine (*Ampelopsis arborea*), mustang grape, and poison ivy are conspicuous members of this community. Dominant grasses found in this community are Canada wildrye, melic (*Melica nitens*), side oats grama, little bluestem, Indiangrass, and occasionally eastern gamagrass (*Tripsacum dactyloides*).

At the more xeric extremes, this community grades into the cedar elm-hackberry-live oak community of the intermittent drainages. At more mesic sites, this community intergrades with the mixed hardwood (cedar elm dominated) floodplain community.

The best development of the riparian community is on the deeper, frequently flooded, floodplain or alluvial soils of Onion Creek (Frio soils) where the community changes slightly to become a cedar elm-hackberry gallery forest. Eastern cottonwood, pecan, bumelia, box elder (*Acer negundo*), American elm, Osage orange, chinaberry, elderberry, redhaw, mustang grape, Virginia creeper, deciduous holly, and roughleaf dogwood are some of the more conspicuous associates. Occasionally, such xeric species as mesquite, Texas persimmon, and Ashe juniper occur, usually in forest openings.

Dominant grasses in the floodplain community, depending on microenvironmental conditions, are Canada wildrye, vine mesquite (*Panicum obtusum*), eastern gamagrass, little bluestem, inland sea oats, bushy bluestem (*Andropogon glomeratus*), several species of *Panicum*, and a variety of other less conspicuous grasses, sedges, and forbs.

The streamside community which occurs along the margins of Onion Creek is perhaps the central feature of the McKinney landscape. This bald cypress (*Taxodium distichum*) community occupies only a narrow band along Onion Creek. Green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and black willow (*Salix nigra*) are the dominant overstory associates. Buttonbush (*Cephalanthus occidentalis*) and lead tree (*Amorpha fruticosa*) are dominant in the shrub stratum. In terms of importance, the community is characterized as *Fraxinus-Salix-Taxodium-Platanus* although at any one point *Taxodium* or others may be dominant. Substrate variation accounts for dominance variation.

The streamside community extends a short distance up Rinard Creek but, for the most part, is lacking along the lower portion of Williamson Creek. Switchgrass (*Panicum virgatum*) and eastern gamagrass are potential tall grass associates of the streamside riparian community. Only relict stands remain at present.

The remaining aspect of the riparian community is mapped as mixed alluvial land (Fig. 1). In the site area, this zone is confined to the very lowest portion of the entrenched Williamson Creek and to Onion Creek downstream from the upper falls. From the upper falls downstream, the valley fill is composed of transported limestone gravels; there are situations wherein typical floodplain terraces with deep alluvial (Frio) soils and associated vegetation have developed.

Deep gravel deposits support a distinctive, and, for the most part, seral community which is characterized not only by species composition but by large areas of bare gravel and open canopy. This community is composed of a plant assemblage capable of adapting to dynamic, oftentimes destructive, tur-

bulent flooding, i.e., severe environmental/habitat stresses. The degree of turbulent flooding and the extent and dimension of the gravel deposits have probably increased in recent years. This increase is due, in large measure, to an increase in water runoff and subsequent increased stream discharge associated with urbanization. Nevertheless, the environment within which the contemporary plant communities exist was present, probably to a lesser extent, in earlier times.

Dominant arborescent species in the mixed alluvial mapping unit are sycamore, green ash, bald cypress, black willow, and pecan. The community may be characterized as *Plantanus-Fraxinus-Taxodium*. Few trees or shrubs survive to maturity. Continual regeneration and even aged stands of saplings are expected. Both cedar elm and American elm are unimportant community components of the tree stratum.

Dominant shrubs are those species best adapted to the harsh, dynamic habitats of the gravel shoals. Little walnut (*Juglans microcarpa*), buttonbush, indigobush (*Amorpha fruticosa*), seepwillow (*Baccharis neglecta*), leafy brickellbush (*Brickellia dentata*), and sesbanias (*S. drummondii* and *S. macrocarpa*) occur.

Conspicuous vines, brambles, and subshrubs include mustang grape, peppervine, dewberry, and orange xexmenia (*Xexmenia hispida*). Important grasses and forbs include switchgrass, maximilian sunflower (*Helianthus maximiliani*), American waterwillow (*Justicia americana*), frogfruit (*Phyla incisa*), and numerous other grasses, forbs, and sedges. Johnson grass, chinaberry, and Jerusalem thorn (*Parkinsonia aculeata*) are exotics which are now community components but which were absent in former times.

As vegetation stabilizes the gravel bars and as sediments accumulate, the successional trend proceeds toward the development of a more mesic floodplain community. Scouring floods that erode as well as deposit gravel bars maintain a dynamic successional community.

It is difficult to evaluate the prehistoric plant community composition at the streamside because the community was continually disturbed by flooding (a natural agent) as well as by harvesting of bald cypress and hardwoods during historic (industrial) times. There remain few analogues for comparison.

SUMMARY

Notwithstanding several additional minor plant communities not described, the McKinney Homestead is generally characterized in terms of the dominant terrestrial plant communities. All of the communities except those found on the steep slopes were influenced and profoundly modified by humans (particularly the once productive grasslands) to the extent that the community composition and infrastructure was changed to a remarkable degree. Although both the prehistoric and historic Amerindians did their part to modify their environment, it was not until the time of McKinney and his Anglo precursors of the 19th Century that environmental modifications could be described as deleterious to environmental quality.

The McKinney site is juxtaposed upon a varied and, in former times, a highly productive natural environment. The site is ecotonal between the Edwards Plateau to the west and the Blackland Prairies to the east. A distinc-

tive streamside/riparian community traverses the site adding a diverse mesic component to the environmental setting. Anthropogenic influences from prehistoric times to the present, but most remarkable during McKinney's era, have dramatically changed the composition, structure, and distribution of the dominant plant communities at the McKinney Homestead.

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APPENDIX B

**Gastropods of the McKinney
Homestead (41TV289), McKinney
Falls State Park,
Travis County, Texas**

Raymond W. Neck

INTRODUCTION

The excavation lots examined totaled 2,451 land snail shells representing 14 species (Table 1). In addition, three aquatic snail shells representing an additional two species were found. All of the macrosnails found living at this site today are represented in this sample. These species are to be expected in a riparian woodland bordered by grassland in the ecotonal area of central Texas where the Blackland-Grand Prairies meet the Texas Hill Country. The scarcity of freshwater gastropods (three specimens all in the lower terrace) indicates that these did not result primarily from flood debris but are samples of natural assemblages.

SPECIES COMMENTS

All species are native except *Rumina decollata*, a native of the Mediterranean areas of northern Africa and southern Europe. This species is extremely common in Central Texas today. This species was recorded from Travis County by Strecker (1935). Specimens of *R. decollata* obtained "from the campus of the University of Texas" were utilized in the fall of 1923 for experimental purposes by Garth and Mitchell (1926).

The time of initial introduction into Travis County is unknown, but it is probably no earlier than the late 1880's. Singley (1893) did not record this species from the state. Introduction probably came later as Pilsbry (1905) reviewed the world range of this snail but did not list any collections from Texas. The first Texas report was by Camp (Ferriss, 1914) from Brownsville; other Texas localities were not mentioned although Ferriss (1914) compared the specimens to those from Louisiana and South Carolina. The scarceness of *R. decollata* in the house area samples (0.4%) in comparison to the mill site (4.5%) indicates that this snail entered the area via downstream transport and was not introduced inadvertently by actions of the McKinney family.

Archeological investigations such as this are potentially important sources to pinpoint when *R. decollata* became established in various areas.

Table 1

Gastropods from 41TV289

	Species
Helicindiae	
	<i>Helicina orbiculata</i> (Say)
Succineidae	
	<i>Succinea luteola</i> Gould
	<i>Catinella vermeta</i> (Say)
Zonitidae	
	<i>Glyphyalinia paucilirata</i> (Morelet)
	<i>Mesomphix friabilis</i> (Binney)
	<i>Zonitoides arboreus</i> (Say)
Spiraxidae	
	<i>Euglandina singleyana</i> (Binney)
Achatinidae	
	<i>Rumina decollata</i> (L.)
Bulimulidae	
	<i>Rabdotus dealbatus dealbatus</i> (Say)
	<i>Rabdotus mooreanus</i> (Pfeiffer)
Polygyridae	
	<i>Polygyra mooreana</i> (Binney)
	<i>Polygyra texasiana texasiana</i> (Moricand)
	<i>Practicolella berlandieriana berlandieriana</i> (Moricand)
	<i>Mesodon roemeri</i> (Pfeiffer)
Planorbidae (aquatic)	
	<i>Helisoma trivolvis</i> (Say)
	<i>Biomphalaria obstructa</i> (Morelet)

However, there is an inherent problem. Even if the layer from which the deepest shells are found could be dated accurately, the burrowing habit of this snail would complicate the situation. In Travis County, this species has been found in several archeological excavations of pre-European sites. These include the Smith Rockshelter, (Suhm, 1957), just across Onion Creek from the McKinney house, and the Barton Spring site (Reddell, 1965). Estimates of time of arrival of this snail would most likely be on the early side. Arrival in Travis County would most likely be after 1915 and no later than 1923.

Two *Rabdotus* species are present in these samples: *R. dealbatus* Say and *mooreanus* Pfeiffer. The former is characteristic of riparian woodlands while the latter occurs most commonly in prairies. These species occur together in many areas and hybridize. Both species and hybrids are present in the sample examined.

Aged shells are difficult to determine to species because of staining and an apparent fading of markings. Experiments were conducted in an attempt to make the markings more distinct. Although some snails could not be determined, most could be assigned to one or the other taxon. The figures indicate that *dealbatus* is more common on the lower terrace while *mooreanus* is more common on the upper terrace. The same relationship exists today. Detailed examination of *Rabdotus* from archeological sites

should provide essential information on the history of hybridization of these two species.

The McKinney House apparently allowed an expansion of the area colonized by *Mesodon roemeri*. This species is well represented in the mill (lower terrace) area but is less common in the house (upper terrace) area. All snails found in the upper terrace are from very near the surface; in the lower terrace, this species is found at least down to the third layer. The McKinney House and associated materials (boards, stone, etc.) provided retreats which protected the snail from dessication by solar radiation. The same phenomenon can be observed today in Austin.

Several remarks need to be made concerning standard methods of obtaining molluscan samples. Samples in this study were sifted through 1/4 in mesh screen. Thus, all minute snails are lost. Many of these, particularly various species of *Gastrocopta* (Pupillidae), could give important clues to paleoenvironmental conditions. These data are not as essential at this site as in older pre-European sites. In prehistoric sites, such specimens would be essential for paleoenvironmental reconstruction.

Utilization of a smaller screen size also would retain fragments of larger shells. Collections from deeper levels tended to contain only *Rabdotus* spp. The shells of other medium sized species, e.g. *Polygyra texasiana*, apparently fragment at some point in time and depth. *Helicina orbiculata* composed about 30% of the total sample but few were found in deeper levels. There is no reason not to expect these species in such assemblages.

SUMMARY

All snails to be expected in a riparian woodland bordered by grassland in central Travis County are represented in the excavated samples. Assemblages are the same as present. Effects of the McKinney family's activities on the snail fauna appear to be minimal with the exception of one species which was able to expand somewhat and utilize cover in the house area. The appearance of the single non-native species was probably not associated with the activities of the McKinney family. Utilizing a smaller screen size would improve the sampling technique.

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APPENDIX C

***Investigations at the Horse Trainer's
Cabin (41TV307),
McKinney Falls State Park******Art Black***

INTRODUCTION

Archeological excavations were undertaken in McKinney Falls State Park at the Horse Trainer's Cabin (41TV307) between July 22 and July 26, 1974. This structure is believed to represent the living quarters of John Van Hagan, Thomas McKinney's horse trainer, during all or some portion of the period 1851 (or 1852) to 1872.

An investigation of the standing structure to recover easily disturbed data was necessary because of possible site disturbance during park development and due to the proximity to proposed camping and picnicking areas. A crew of six from the Historic Sites Branch of the Texas Parks and Wildlife Department carried out limited archeological excavations assisted by several local volunteers. Information on the cabin's structural remains and a representative sample of artifacts, primarily representing the uses of the building during the early 1900's, were recovered.

METHODOLOGY

Initial inspection of the site indicated that park development activities then in progress had already disturbed much of the area immediately adjacent to the structure. However, the structure was still fairly undisturbed except for minimal use by construction workers as a lunch area.

The roof had previously fallen into the structure interior and most of the peripheral walls were collapsed; only the north wall of the building was fairly intact. The remains of the roof were removed by hand and accumulated mulch fill cleaned out. Brush and other debris were removed from around the exterior of the structure.

Cleaning revealed several wooden floor sleepers running north/south and spaced about 3 ft apart. The sleepers were used as natural north/south grid lines for dividing the room into units for excavation, each unit being approximately 3 ft sq (Fig. 1). Selected units along the walls were excavated either partially or completely. Units also were excavated outside the two entrances in the hopes of revealing possible porches or door steps. Other units to the south and north of the structure were excavated to check for rock walls such as the one abutting the southwest corner. Two crossing trenches

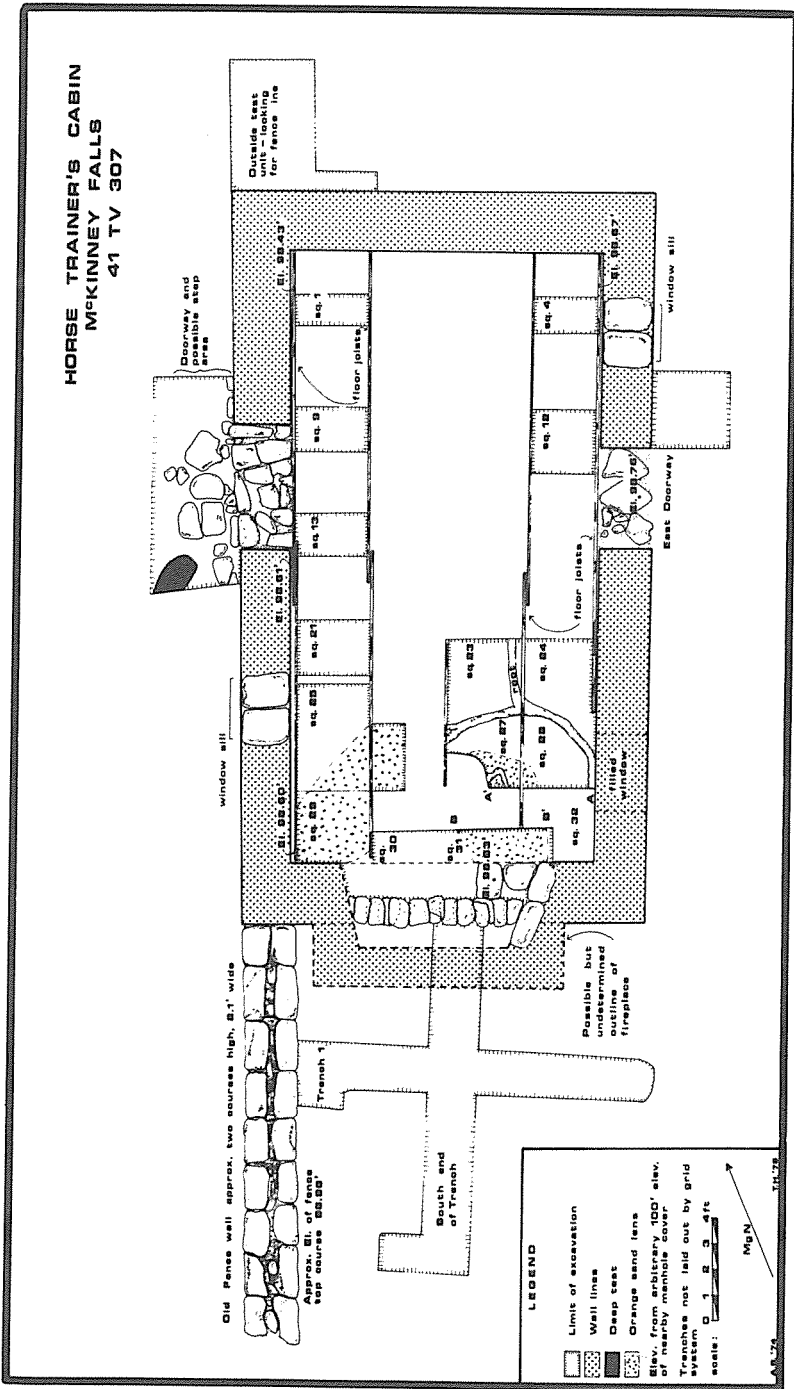


Fig. 1 Plan of foundation showing excavation units.

were excavated outside the south wall to test a scattered rock mass thought to be the remains of a fallen chimney or a possible second room.

Fill was passed through $\frac{1}{4}$ in screen and collections were bagged by unit and returned to the Parks and Wildlife Department Archeology Lab for cleaning and cataloging. Relative elevations were calculated on the basis of an arbitrary elevation of 100 feet established on the surface of a nearby manhole cover.

STRUCTURAL REMAINS

The cabin's exterior dimensions were approximately 28 ft 10 in by 16 ft 9 in. The two foot thick walls were built of rough shaped limestone blocks forming separate interior/exterior faces and laid with a mud mortar. Occasional tie stones spanning the width of the wall hold the two faces together. The interior cavity of the wall contained rubble fill set in a mud mortar. Some lime/sand mortar pointing is still visible on the interior of the north wall and traces of a scoring line can be seen in the surfaces of the mortar joints.

The only known early photograph of the cabin is one taken in 1942 by Reynolds Lowry (Fig. 2). This photograph shows the cabin gabled at both the north and south ends with a shingled roof later covered over by corrugated metal roofing. The cedar shingled roof was constructed of cut wooden beams using cut (square) nails in the construction. The later metal roofing was attached with wire nails.

Windows and doors details are almost unknown as artifacts from these features were not recognized. Figure 2 shows that the east door was constructed of vertical boards and probably hinged on the right hand or north side with large strap hinges. The single window in the photograph is covered by a piece of corrugated metal; details are not visible.

The archeological remains of the cabin revealed little data. Two doorways of different widths are present in both the east and west walls. Traces of three window openings are found in the same walls: one to the south of the door in the west wall; and two, one to either side of but at different distances from the door, in the east wall. The window to the south of the east door was filled with stone and concrete sometime before 1943.

A single fireplace of unknown dimensions is located in the center of the south wall. Little remains except the opening of the fireplace and a portion of the east coving interior face. The fireplace extruded or extended outside the structure from the exterior of the wall an undetermined distance. The indicated fireplace (Fig. 1) is therefore mainly hypothetical, based on a common plan of extruded fireplaces.

The flooring was modern 1 x 6 to 1 x 8 in tongue and groove pine boards attached to 2 x 10 in sleeper joists with wire nails. The sleepers were approximately 3 ft apart and rested on a prepared surface. The original floor was an uneven packed earth floor at approximately the same level (or slightly lower through compacting) as the first course of the stone wall. Before the wooden flooring was laid, a tan to orange sand was used in the lower spots to provide a level surface for laying the sleepers. Artifacts indicate that this could have occurred at almost any time in the late 19th or early 20th centuries. The hearth of the fireplace was then raised to the level of the flooring by

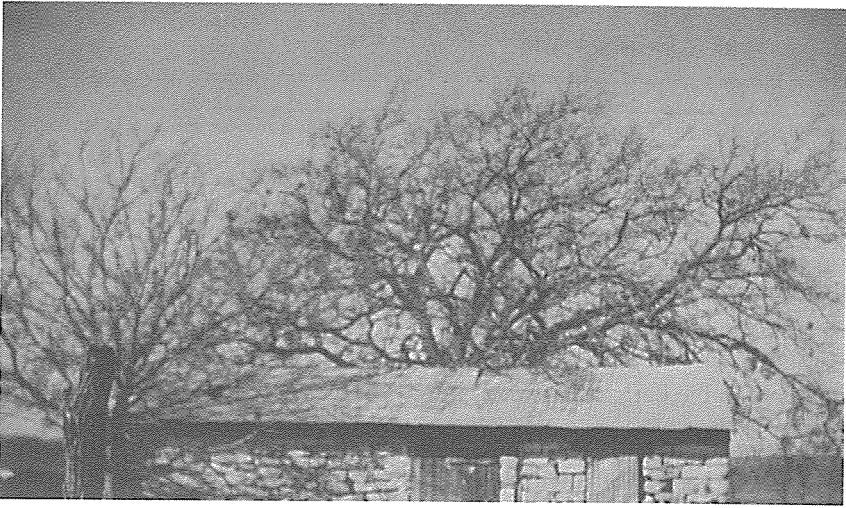


Fig. 2 Photograph of Cabin, looking west (courtesy of Texas Memorial Museum, The University of Texas at Austin).

building it up with flat laid stone. A rough chronology of building events is given in Table 1.

STONE FENCES

Although McKinney's estate was large, only a portion within a large bend in Onion Creek was rock fenced and used for specific types of pasture (perhaps to keep mares and foals separated from the herd). These rock fences were built of dry laid, tabular limestone slabs, starting with a double wide course of larger slabs about 2 ft wide at the base. Successive courses used smaller slabs as the fence narrowed to a truncated pyramid. Some rough field stone occasionally was used in the upper courses. Most of the stone fences have fallen and little remains except for long mounds of rocky rubble. One section of fence near the middle of the park is still standing to the original height of about 5 ft.

A rectangular corral measuring about 80 ft by 260 ft is near the center of the rock fence which forms the south boundary of the state park. The site is overgrown heavily with trees and thick under brush. Exact dimensions could not be taken due to the deteriorated condition of the fence and poor visibility. A low, double wide, single course of dry laid limestone blocks abuts the south side of the southwest corner of the cabin. This one course of stone is the only fence remains near the cabin.

ARTIFACTS

Artifacts reflecting the original occupation of the cabin were not found within the structure. Several cast .36 caliber lead balls found along the interior of the east wall may relate to the early occupation although their uncorroded condition would indicate otherwise. One pink spongware sherd

Table 1

Chronology of Building Events

Events
1850/1870—Original construction of limestock rock and mud mortar structure with shingle roof.
1900/1920—Three events (non-sequential): shingle roof covered with corrugated iron sheeting; repointing and replastering; fireplaces and chimney fell (or dismantled) and opening rebuilt with stone.
Post 1920— Structure used for hay storage at least into the 1940's.
Post 1950— Collapse of roof and general disintegration of walls.

may date to the early occupation, but it was found a short distance west of the structure.

The identifiable artifacts, primarily bottles and glass sherds, date to the late 19th and early 20th centuries. The Mcleans Volcanic Oil Liniment bottle (Fig. 3a) has a manufacturer's mark used by the Illinois Glass Co. between 1916 and 1929 (Toulouse, 1971:264). The manufacturing technique of the Harter's Soothing Drops bottle (Fig. 3b) and dating on the product, indicate a date range from the 1870's to mid-1910's (Devner, 1968:42).

A number of agriculturally related artifacts such as baling wire fragments reflect the building's use as a storage shed or barn at a later date.

SUMMARY

Based on scanty historical data and limited artifactual material, two occupational periods are indicated. The first is the presumed occupancy by Thomas McKinney's horse trainer, John Van Hagan, between 1852 and 1872, as reported by Reynolds Lowry. The second occupation was in the late 1880's, lasting, possibly intermittently, into the 1910's. Afterward, the structure was used as an agricultural or ranching support facility.

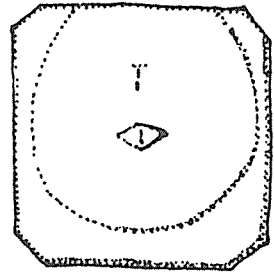
The house originally had a dirt floor or a wooden floor which was later removed. The second floor was modern tongue and groove boards supported by joists. The collapsed roof has rafters with shingles (cedar) and (later) sheet iron. Square 4d nails were used in the roofing; round wire nails in the second floor.

The first building stage was of stone mortared with local sandy sediment. The original walls were later flush pointed or plastered with a lime/sand mortar; scoring gave it the appearance of squared courses. Evidence of plastering was not found on the exterior of the house. The original height from the (dirt?) floor to the underside of the ceiling joists was about 7 ft 7 in; the later height from plank floor to ceiling was about 6 ft 10 in. Evidence of outbuildings was not noted.

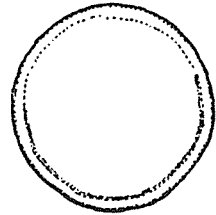
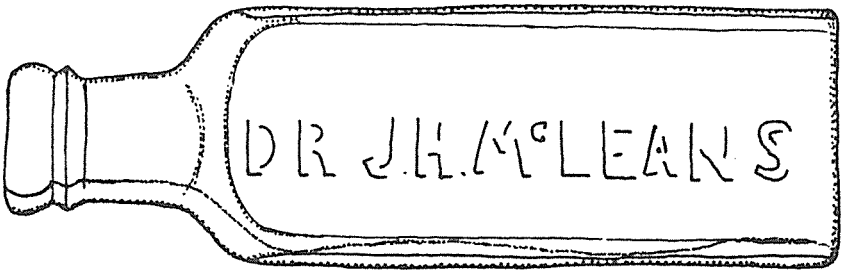
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LINIMENT
OIL
VOLCANIC



1cm
a



1cm
b



Fig. 3 Bottles from the Cabin: a) McLeans Volcanic Oil Liniment bottle; b) Harter's Soothing Drops bottle.

APPENDIX D

**Texas Parks and Wildlife Department
Excavations At The
McKinney Homestead (41TV289):
Description of House Artifacts and
Recommendations for Architectural
Reconstruction**

Michael McEachern and Ronald W. Ralph

INTRODUCTION

This report details excavation, artifacts, and recommendations at the McKinney Homestead and Mill (41TV289) located on the banks of Onion Creek about 7.5 mi southeast of Austin (Travis County, Texas). Over 60 mandays were expended in efforts to remove the rubble overburden (wall fall) from the three room house and explore the deposit of the mill wheel house in an effort to determine the motive power of the mill. About 40 cu m of overburden was removed from the house and 20 cu m of deposit was excavated in the mill wheel house during the months of September and October 1974.

The primary emphasis is to make architectural recommendations to Texas Parks and Wildlife architects and describe those artifacts from the house which were not covered in previous work. Only brief attempts are made to describe the architecture and setting as full descriptions are in the main body.

ARCHEOLOGICAL INVESTIGATIONS

Previous Investigations

Previous investigations within McKinney Falls State Park area concentrated on prehistoric archeological sites (Suhm, 1955, 1957) or surveys and minor testing (Kegley, 1972; Ralph and Loving, 1973) designed to clear areas for park development.

Extensive investigations at McKinney Falls State Park were undertaken by the Texas Archeological Society from June 8 to June 15, 1974 during the Society's annual field school. The TAS work was focused on the historical aspects of the park and concentrated on the McKinney Homestead com-

plex. During the field school, an intensive archeological survey was conducted in the park and a number of historic and prehistoric sites were located and recorded.

Archeological prospecting was conducted around the McKinney house and mill utilizing a proton magnetometer, metal detectors, and pH and phosphate chemical tests. Excavations at the house consisted of a meter wide trench along the inside east wall of the east room, a trench running east from the southeast corner of the house, and a trench north from the north wall or back of the house. Excavations in the east room produced burned flooring, two possible floor joists, and miscellaneous artifacts. The two trenches outside of the house revealed foundation construction features and a shallow occupation layer about 20 cm deep containing numerous artifacts, including pressed glass, medicine bottles, metal artifacts, and ceramics. Over 1300 man days went into this phase of research.

Excavations at the mill consisted of shallow cuts to define architectural features and a deep cut into the wheel pit. The main structure and outlying features were detailed with machinery related artifacts recovered in all locales. The deep cut stopped short of the main turbin machinery due to lack of time.

Emergency archeological investigations were directed by McEachern (Hudson, ms) January 20-29, 1975, at site 41TV314, a large prehistoric site located on park property. A significant portion of the site was destroyed during construction activities. Several additional sites were located during this time.

Archeological excavations were directed by Roberson (Black, Appendix B) at the horse trainer's cabin (41TV307) during a five day period in July 1974, using Parks and Wildlife personnel and local volunteer amateur archeologists. A moderate collection of artifacts belonging mostly to the first quarter of this century was recovered and architectural details were defined.

Additional surveys of the park were conducted by Calvert in an attempt to relate various fences to historic structures; and by Medlin who attempted to update all site survey forms. Field notes are on file at Texas Parks and Wildlife Department.

Texas Parks and Wildlife Investigations

The Historic Sites and Restoration Branch of the Texas Parks and Wildlife Department conducted investigations at the Thomas F. McKinney House and Mill to determine actual needs to stabilize and preserve the house before the park was opened to the public. The field work was conducted between September 23 and October 11, 1974, with a crew of four people and occasional volunteers. Twenty eight mandays went into clearing and mapping the house and 32 mandays (plus 8 mandays of volunteer labor) were utilized in removing fill in the mill shaft. Work was carried out under Antiquities Permit Number 53.

The Parks and Wildlife investigations of the house consisted of clearing the rubble from the house down to the surface of the occupation zone. In addition, two small test units were excavated into the occupation deposit. When surface artifacts were encountered, they were placed in lots which corresponded to general areas of the house (Fig. 1). The excavation grid and elevation were established previously during the field school investiga-

tions and were based on Texas Parks and Wildlife Department monuments. All work was conducted using metric units.

McKINNEY HOUSE ARCHITECTURE

The old McKinney House (41TV289) was a two-story, cutstone building with three downstairs rooms (east, west, and middle), a front porch, and supposedly a built-on smoker/kitchen (Figs. 14-20, main text). Work was accomplished on the main house structure only. The rooms, porch, and construction material were described in the main text.

McKINNEY HOUSE ARTIFACTS

Wood

The wood artifacts consist of fragments of joists and planks used in the construction of the east room of the house. Most of the wood is burned or badly decomposed; in only a few cases could the actual dimensions of the boards be reconstructed.

JOISTS

Number of specimens: 4 fragments

Provenience: lots 6, 7, 8, 12

Description: All fragments covered are remains of second story joists which remained in the joist pockets when the house burned. The joists are manufactured from logs; in one case, finishing cuts occur on two sides at right angles to each other while the remaining logs were finished on only one side. The joists cut on one side are 15 cm thick; the specimen finished on two sides is 11 cm.

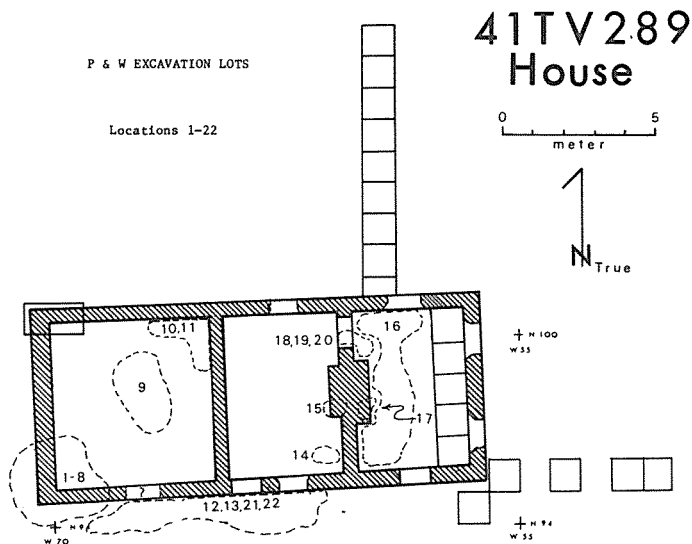


Fig. 1 Texas Parks and Wildlife excavation lots at McKinney Homestead.

BEAMS

Number of specimens: 1 fragment

Provenience: lot 12

Description: A fragment of one beam finished on three sides with the remaining side burned was found in the porch area. Dimension of the intact side is 6.5 cm; the remaining side was greater than 6 cm.

Discussion: The original use of the beam in the construction of the house is unknown but it could have been used as a first story joist.

PLANKS

Number of specimens: 16 fragments

Provenience: lot 12(7), 14(4), 15(2), 16(1), 22(2)

Description: The widest plank is 8 cm in width (not necessarily the actual width of the original planks). Fragments are uniformly 2 cm thick.

Discussion: Plank fragments are assumed to be the remains of the second story floor.

MISCELLANEOUS BOARDS

Number of specimens: 4 fragments

Provenience: lot 4, 9, 15(2)

Description: Cut end fragments of four boards. Three have tapered cuts or tongues; the remaining piece is beveled for use in a corner.

UNIDENTIFIED WOOD

Number of specimens: 16 fragments

Provenience: Lot 2, 3(2), 9(2), 10(2), 12(5), 14(2), 22(2)

Description: Too fragmentary for further comment.

*Metal***NAILS**

Of all the artifacts recovered, nails were the most common and divided into two classes: wire nails and cut nails. Nails were classified as to pennyweight (abbreviated d) when complete enough. There are a variety of different standards for length versus pennyweight (Table 1). Standards include: U.S. 1876, 1897, 1931 (Walker, 1971:69); Simmons (1884); Baldwin (1891); and Unknown (Fontana and Greenleaf, 1962:56). The 1931 U.S. standard was used for wire nails and the 1876 U.S. standard for cut nails. However, the house was constructed before the U.S. standards were established. Lengths given show the variations in range that are normally expected in any manufacturing process (Table 1).

Wire Nails

Wire nails first came into use in the United States during the 1850's (Nelson, 1968). Earlier wire nails were popular in small sizes intended for use in making cigar boxes and other items. These earlier nails had bulbous heads and were generally eccentric in relation to their shanks. It was not until the 1890's that wire nails became the predominate type. They have never completely replaced cut nails which are still used for some purposes. Wire nails from the house are all of the modern type (Table 2).

Cut Nails

Cut nails of the type found in the McKinney House were manufactured from about 1830 to the present (Table 3).

NAIL FRAGMENTS

Number of specimens: 109

Description: All of the nails which were too incomplete for classification are presented in Table 4.

Table 1
Nail Length Standards (Measurements in Inches and Fractions of Inches)

Size	U.S. 1876	Simmons 1884	Baldwin 1891	U.S. 1897	U.S. 1931	Unknown 1876-88?
2d	15/16	1		1	1	1
3d	1-1/8	1-1/4	1-5/16	1-1/4	1-1/4	1-1/4
4d	1-3/8	1-1/2	1-9/16	1-1/2	1-1/2	1-1/4
5d	1-9/16	1-11/16	1-1/16	1-3/4	1-3/4	1-3/4
6d	1-13/16	2	2-1/4	2	2	2
7d	2-1/16	2-3/16	2-9/16	2-1/4	2-1/4	2-1/4
8d	2-5/16	2-1/2	2-3/4	2-1/2	2-1/2	2-1/2
9d	2-9/16	2-3/4		2-3/4	2-3/4	2-3/4
10d	2-11/16	2-13/16	3	3	3	3-1/4
12d	2-15/16	3-1/8	3-3/16	3-1/4	3-1/4	3-1/4
16d	3-7/16	3-11/16	3-3/4	3-1/2	3-1/2	3-1/4
20d	3-3/4	4-1/8	4-1/4	4	4	4
30d	4-3/16	4-1/2	4-5/8	4-1/2	4-1/2	4-1/2
40d	4-5/8	4-15/16	5-1/16	5	5	5
50d	5-1/16	5-7/16	5-9/16	5-1/2	5-1/2	5-1/2
60d	5-9/16	5-15/16	6-1/8	6	6	6

Table 2
Wire Nails From House

Nail Types	Number of Specimens	Provenience (Lots)
Common 16d	27	14, 16
Common 9d	2	15, 18
Common 8d	27	13, 14, 15, 18
Common 7d	1	15
Common 6d	2	13, 15
Common 4d	2	18
Common 3d	1	18
Roofing 3d* (Galvanized)	19	14
Finishing 8d**	1	14
Finishing 5d	13	14
Round Head 9d***	1	17

*The size of head is 9/32 compared to 5/32 for the 3d common nail from lot 18.

**Finishing nails differ from common nails in head size. Finishing nails have a smaller head than the larger common nail heads.

***Round head nails are rounded on the top as opposed to the flat head which is found on common nails.

STAPLES

Number of specimens: 2

Provenience: lots 13, 16

Description: Staples are U shaped and 32 mm in length.

Discussion: Specimens are of the variety commonly used to secure wire to fences.

MISCELLANEOUS METAL ARTIFACTS

BRASS OBJECT

Number of specimens: 1

Provenience: lot 17

Table 3

Cut Nails From House

Nail Types	Number of Specimens	Provenience (Lots)
Common 2d	8	4, 10, 15, 18
Common 8d	10	14, 15, 18, 19
Common 5d	2	12, 14
Common 3d	4	18
Common 2d	7	13, 15, 18
Finishing 8d	7	13, 14, 16, 18

*Finishing nails are distinguished from common nails by a smaller size head.

Table 4

Nail Fragments From House

Provenience	Cut Nails	Wire Nails	Unidentified
14	1	0	0
15	9	6	4
17	26	15	2
18	36	27	1
19	1	7	0
Totals:	64	42	7

Description: Brass plate 60 x 26 x 1 mm has four unequal sides and a triangular hole.

Discussion: Part of an unidentified, unknown, composite artifact.

BUTT HINGE

Number of specimens: 1

Provenience: lot 20

Description: Hinge is rusted closed and measures 95 x 46 mm in the closed position.

There are three mounting holes in each half of the hinge.

BUTTON

Number of specimens: 1

Provenience: lot 19

Description: Button is 23 mm in diameter and was attached by a rivet.

CAN LID

Number of specimens: 1 fragment

Provenience: lot 18

Description: Lid is of the push-on variety and was about 120 mm in diameter.

CARRIAGE BOLT AND NUT

Number of specimens: 1

Provenience: lot 18

Description: Bolt is 61 mm long with attached nut.

CIRCULAR IRON OBJECT

Number of specimens: 1

Provenience: lot 9

Description: Object is 67 mm in diameter and 7 mm thick.

CLAMP

Number of specimens: 1

Provenience: lot 1

Description: Cast iron clamp is in the shape of a half cylinder with one side secured by two metal hooks and another through a hole in a metal plate. Object is 73 by 66 by 5 mm with interior diameter of the cylinder 42 mm.

Discussion: The clamp could have been used to secure a pipe or hold an axle or shaft in place.

COPPER BUSHING

Number of specimens: 1

Provenience: lot 22

Description: A circular copper bushing with an outside diameter of 49 mm and inside diameter of 33 mm; two notches at opposite ends.

COPPER TUBE

Number of specimens: 1

Provenience: lot 1

Description: Collapsed copper tube 143 mm in length with a rolled seam.

CORRUGATED TIN

Number of specimens: 1

Provenience: lot 13

Description: Corrugated tin with a 4d common wire nail in it.

Discussion: This specimen is a type commonly used for roofing.

FASTENERS

Number of specimens: 2

Provenience: lot 18

Description: One of the specimens is a loop; the other is a fragment from the same gauge wire.

Discussion: The complete specimen was used on a garter or girdle to attach nylon stockings and the fragment is assumed to have come from the same garment.

HOOK LATCH

Number of specimens: 1

Provenience: lot 14

Description: Specimen is 60 mm in length.

Discussion: Artifact is the latch portion of the hook and eye latch commonly used on screen doors.

IRON BAR

Number of specimens: 2

Provenience: lot 13

Description: One is 133 x 37 x 7 mm tapered at one end with three holes in it. The other is 335 x 25 x 6 mm and has a hole drilled in one end.

Discussion: The former may be part of a hinge.

JAR LID

Number of specimens: 5 fragments

Provenience: lot 1

Description: Fragments are from a zinc canning jar lid manufactured by Atlas Glass Co.

Discussion: The Atlas Glass Co. was first established in 1896; it was not until after the company combined with the Wheeling Metal Co. in 1901 that Atlas zinc lids were made (Toulouse, 1969:362).

KNIFE HANDLE (?)

Number of specimens: 1

Provenience: lot 2

Description: Fragment is a 49 x 21 x 5 mm piece of steel.

Discussion: It may have been the tang of a knife handle.

MODERN BUTT HINGE

Number of specimens: 1

Provenience: lot 14

Description: Hinge (Ideal #23) is chrome plated and unused.

Discussion: It is an obviously recent addition to the deposit and post dates the burning of the house.

RECTANGULAR METAL PLATE

Number of specimens: 1

Provenience: lot 12

Description: A piece of sheet metal 62 x 31 mm has four holes in it and a rivet in one of the holes.

ROLLER

Number of specimens: 1

Provenience: lot 13

Description: A small wheel 37 mm in diameter and 12 mm wide.

Discussion: It is similar to the type found in coasters.

ROUND HEAD SCREW

Number of specimens: 1

Provenience: lot 14

Description: Specimen is 32 mm in length.

SPOON

Number of specimens: 1

Provenience: lot 5

Description: Spoon was once plated over brass. It has a crown emblem and labeled 24j & C24.

THREE-CORNERED FILE

Number of specimens: 1

Provenience: lot 18

Description: The triangular shaped file is 76 mm long with the width of each side 18 mm.

WASHER

Number of specimens: 1

Provenience: lot 9

Description: Washer is 35 mm in diameter with an 11 mm hole.

WIRE

Number of specimens: 3

Provenience: lots 14, 18

Description: Each specimen consists of two pieces of wire twisted together.

Discussion: Short pieces of wire may have been classified as nail fragments.

WIRE HANDLE

Number of specimens: 1

Provenience: lot 13

Description: Handle is manufactured from 4 mm wire.

Discussion: It is suitable for a bucket or other object 30 to 35 cm across.

UNIDENTIFIED SCRAPS

Number of specimens: 42

Provenience: All lots

Description: 36 scraps of iron, 1 zinc fragment, and 5 bits of copper.

CARTRIDGES

WINCHESTER REPEATING ARMS CO. 38, S&W

Number of specimens: 1

Provenience: lot 4

Description: 38 caliber centerfire cartridge for Smith & Wesson revolver.

Discussion: Smith & Wesson manufactured their first 38 caliber centerfire revolver in 1865 but intense production did not begin until 1876 (Fontana and Greenleaf, 1962:82).

UNION METALLIC CARTRIDGE CO. 12 GAUGE NEW CLUB

Number of specimens: 1

Provenience: lot 16

Description: Shotgun shell primer and base.

Discussion: Fontana and Greenleaf (1962:80) describe a similar cartridge and date it between 1867 and 1910. The cartridge is advertised in the Fall 1900 Sears Roebuck and Company Catalog.

REMINGTON-UMC 12 GAUGE

Number of specimens: 2

Provenience: lots 1, 9

Description: Shotgun shells with plastic casings.
 Discussion: Recent origin.

Glass

BOTTLES

GEBHARDT CHILE

Number of specimens: 1

Provenience: lot 1

Description: Clear panel bottle 99 x 43 x 32 mm with the side panels labeled "GEBHARDT EAGLE and CHILI POWDER." Maker's mark on base is a diamond with an "I" inside.

Discussion: The diamond "I" maker's mark was used by the Illinois Glass Co. from 1916 to 1929 (Toulouse, 1971:264).

MRS. STEWARTS BLUEING

Number of specimens: 17 sherds from 1 bottle

Provenience: lots 2, 4, 8

Description: Bottle neck is seamed with an inside diameter of 16 mm. The circular base is 69 mm in diameter and marked with a diamond "I" maker's mark.

Discussion: Illinois Glass Co. 1916 to 1929 (Toulouse, 1971:264).

BOTTLE FRAGMENTS

BOTTLENECK A

Number of specimens: 1

Provenience: lot 18

Description: Amber seamed neck with a mouth diameter 13 mm and an aluminum screw on lid.

Discussion: Bottle cap is of the same type as ones presently found on inexpensive wines. It is a recent addition to the archeological deposit.

BOTTLE BASE A

Number of specimens: 1

Provenience: lot 13

Description: The brown base is 85 mm in diameter and has the following numbers in the center: 107 over 58.

Discussion: This base probably goes with Bottleneck A and is of recent origin.

BOTTLE BASE B

Number of specimens: 1

Provenience: lot 9

Description: The clear base is approximately 100 mm in diameter and about 6 mm thick. An embossed circle 12 mm in diameter is in the center of the base. The embossed number 6 or 9 is to one side, 18 mm from the circle.

BOTTLE BASE C

Number of specimens: 1

Provenience: lot 10

Description: A clear fragment of base with maker's mark of a diamond "I" within a circle.

Discussion: The maker's mark used by the Owens Illinois Glass Co. from 1929 to 1954 (Toulouse, 1971:403).

BOTTLE BASE D

Number of specimens: 1

Provenience: lot 13

Description: A clear fragment of a base about 90 mm in diameter with the following maker's marks: A circle around the letter J and I32 3/4.

BOTTLE BASE E

Number of specimens: 1

Provenience: lot 9

Description: A clear fragment of base of undetermined size labeled ". . . aglas."

Discussion: The "Duraglas" trademark has been used by the Owens Illinois Glass Co. since 1940 (Toulouse, 1971:403).

BODY SHERDS GROUP 1

Number of specimens: 8
Provenience: lots 10, 11, 19, 18
Description: Specimens are all very light green.

BODY SHERDS GROUP 2

Number of specimens: 13
Provenience: lots 10, 11, 15, 16, 18
Description: Specimens are clear glass. One fragment has the number 16 painted in white.

BODY SHERDS GROUP 3

Number of specimens: 1
Provenience: lot 15
Discussion: Brown fragment, probably goes with Bottleneck A and Bottle Base A.

BODY SHERDS GROUP 4

Number of specimens: 9
Provenience: lots 1, 2, 4, 8, 9, 10, 18
Description: Sherds are slightly opalized and clear.

BODY SHERDS GROUP 5

Number of specimens: 7
Provenience: lots 19, 18
Description: Specimens are all clear and very thin, about 1 mm in thickness. Four of the specimens are melted.

BODY SHERDS GROUP 6

Number of specimens: 8
Provenience: lots 15, 17, 18, 19
Description: Specimens are melted; seven are clear and one is light green. The largest is a 92 mm blob with fused charcoal.

JAR FRAGMENTS

RIM A

Number of specimens: 2 fragments from 1 jar
Provenience: lot 10
Description: The clear fragments represent about 1/3 of the complete rim of the screw on variety. The inside diameter of the mouth is 58 mm, the size of a canning jar.

RIM B

Number of specimens: 2 fragments from 1 jar
Provenience: lots 8, 10
Description: The clear rims are from a jar about 58 mm in diameter with a ridge along the lip and a second ridge 10 mm below the lip. There is a seam through the rim.
Discussion: The rim is for a spring clip type of closure.

RIM C

Number of specimens: 1
Provenience: lot 10
Description: The jar had a screw lid and the body has faceted sides with a slight shoulder.
Discussion: The clear fragment is too small to reconstruct the diameter of the mouth. It may be a pickle jar.

LID A

Number of specimens: 1
Provenience: lot 11
Description: The white lid is 65 mm in diameter and 4 mm thick. It is labeled "GENUINE BOYD'S CAP FOR MASON JAR" around the edge of the jar. The lid has an H over A maker's mark.
Discussion: The H over A maker's mark was used by the Hazel Atlas Glass Co. circa 1920 (Toulouse, 1969:24).

MISCELLANEOUS GLASS

PRESSED GLASS

Number of specimens: 1

Provenience: lot 21

Description: The clear fragment of pressed glass appears to be part of a lid with scalloped edge.

Discussion: The pattern is imitation pressed glass. Examples of this style could not be found in Lee (1931) or Revi (1964). The piece is probably late, i.e., 1930.

GLASS BUTTON

Number of specimens: 1

Provenience: lot 17

Description: The white button is 15 mm in diameter and has four holes.

WINDOW GLASS

Number of specimens: 71

Provenience: Table 5

Description: Clear, dirty yellow, blue, or green fragments of window pane. They vary from 2.5 to 3.5 mm in thickness and are often fused into indistinguishable blobs from fire.

Discussion: Window pane glass distribution followed the pattern established by the TAS excavation (see main text).

Ceramics

Ceramic classification is based on three categories: 1) hardness of paste as reflected by its porosity; 2) color of paste; and 3) decoration. As much as possible, the classification follows the basic rules listed by Powell (1962:34-35). The small size of the collection makes a more refined classification impossible.

The ceramics can be considered earthenwares based on hardness of paste. (Lardner, 1832:67) and tongue test (Durrenberger, 1965:9). Eight of the 10 sherds are of medium paste and considered cream colored wares. The remaining sherds are hard paste of the ironstone type.

CREAM COLORED WARES

PLAIN

Number of specimens: 2

Provenience: lots 5, 17

Description: The sherd from lot 5 is glazed; the other sherd is an unglazed rim fragment from a small cup.

MOLDED

Number of specimens: 3

Provenience: lots 3, 17

Description: White glazed ceramic with raised design.

Discussion: A rim and body sherd from lot 17 appears to be from a washbasin (8.3 cm diameter and approximately 4.8 cm deep). The remaining sherd is from the rim of a plate.

HAND PAINTED, GROUP 1 (UNDERGLAZED)

Number of specimens: 1

Provenience: lot 16

Description: Sherd is hand painted in blue.

Discussion: Specimen is commonly referred to as "blue and white" (Godden 1964:xviii).

HAND PAINTED, GROUP 2 (OVERGLAZED)

Number of specimens: 1

Provenience: lot 5

Description: The sherd is from the side of a cup and decorated with a floral pattern etched into the glaze and hand painted over the glaze in green and red. The rim is gilded in gold. There is a trace of molding remaining near the bottom of the cup.

Table 5

Window Pane From The House

Provenience	Clear	Green	Yellow	Blue	Unid.	Melted	Total
2	1					1	2
4	1						1
10		2					2
11	3	1					4
15	1	4				1	6
16	6	2					8
17	10		4	6		5	25
18	3				12		15
19	3	2		2		1	8
Totals:	28	11	3	8	12	8	71

TRANSFER PRINTED

Number of specimens: 1

Provenience: lot 5

Description: The sherd is printed in brown.

DECALOMANIA

Number of specimens: 1

Provenience: lot 5

Description: Specimen is a rim sherd from a bowl or serving dish decorated along the rim with a red, yellow, green, and black pattern. The rim is molded in scalloped fashion gilded with gold.

MISCELLANEOUS CERAMICS

IRONSTONE

Number of specimens: 2

Provenience: lot 22

Description: Sherds are underprinted with J & G Meakin's "Ironware China" maker's mark which included the name "England."

Discussion: The mark indicates a post 1890 date for the sherds (Godden, 1964:427).

CERAMIC BUTTON

Number of specimens: 1

Provenience: lot 17

Description: Button is white, 11 mm in diameter, and has one central hole

Miscellaneous

LEATHER

Number of specimens: 1

Provenience: lot 9

Description: Specimen is too fragmentary for identification. A line of perforations from sewing are present along one edge of the object.

CORK

Number of specimens: 1

Provenience: lot 17

Description: Cork is 25 mm diameter and 16 mm thick.

GRAPH MARKER

Number of specimens: 1

Provenience: lot 14

Description: Specimen is 11.5 mm in diameter and 31 mm long. It is sharpened on one end and broken on the other.

PLASTIC BUTTON

Number of specimens: 1

Provenience: lot 17

Description: Specimen is 14.5 mm in diameter and has two holes.

PLASTER

Number of specimens: 8

Provenience: lots 18(2), 15(6)

Description: Burned cement-sand mortar.

Discussion: Fragments of mortar which were used to repair the house walls.

McKINNEY HOUSE RECONSTRUCTION

The builder's trench was dug and the foundation of rough cut native limestone was coursed up to grade. The first cutstone course was laid, tied at the corners and cross-walls, and the doorsills were placed. Coursing continued as stone became available, resulting in differing craftsmanship from area to area. Windows, opening inward, were enclosed and lintels placed as the structure grew. Capping stones on the ends and two cross walls climbed to the gabled roof beam. The intricate double fireplace with upstairs heater kept pace with construction and became the stabilizing factor for the structure.

McKINNEY HOUSE RECOMMENDATIONS*East Room*

Set a stone larger than 110 x 15 x 15 cm inside and against the south door. When finished with stabilization and repointing, fill with pea gravel, about 20 cm deep (ca. 3.0 cu m). Scaffolding or booms used during reconstruction must be blocked or placed on plywood to protect the archeological deposit. Excavation may not proceed below 157.19 meters elevation without an archeologist present. If supervision is inadequate or vandalism a problem, hurricane chain link fence can be overlapped on the floor before adding the gravel.

Middle Room

It is recommended that a stone larger than the doorway be set just inside the room as with the east room, and pea gravel (ca. 3.8 cu m) added after stabilization and repointing. The wood floor must be protected from workers and scaffolding by using plywood or blocks. Excavation shall not proceed below 157.28 m elevation without an archeologist present.

West Room

It is recommended that excavation not occur in this room without an archeologist present. The standing walls require stabilization and the south, west, and half of the north walls need rebuilding to at least a m high. Pea gravel should be placed 15 to 20 cm thick in this room after stabilization and rebuilding (ca. 5.5 cu m).

Porch Area

It is recommended that excavation not be attempted below the existing ground surface and that the archeological fill be further protected from man and nature by placing 15 cm of topsoil over the entire front (7.8 cu m) and a cover crop planted to retard erosion.

Cistern

An open cistern immediately south of the house presents a special problem as it is very rich in artifacts and fauna and should not be disturbed. Without disturbing the deposit, a locked grate should be placed over the mouth to protect the public from accidental falls.

General

An archeologist must be present if any excavation is to be attempted within 10 m of the house or mill. This presence is to insure the protection of the known resources (cistern, piping, barn) and the unlocated resources (slave quarters, slave cemetery, and dump). A parameter fence may be necessary to protect the stabilized ruin from vandalism.

McKINNEY MILL

Architectural Summary

The complex consists of a dam, mill race, penstock, wheel house, and tailrace. The superstructure, possibly two story, straddled the penstock/wheel house pit while pilaster (piers) and wall lines indicate additional structures or retaining walls.

Excavation showed that water diverted from Onion Creek to the penstock was channeled via a wooden fore bay which cut through a large crosswall into the wheel house where it turned a 4 ft diameter metal and wood horizontal turbine. The possibility of another turbine being present in the wheel house needs further attention. Spent water exited south back to Onion Creek by way of a tunnel (tailrace) beneath the mill.

Results of Parks and Wildlife excavation and mill artifact descriptions are incorporated into the main body text.

Recommendations

It was intended originally to recommend that the wheel pit and tailrace tunnel be completely excavated and an interpretive trail be placed through the ruins. The flood on November 18, 1974 proved that maintenance could be a costly and on-going expense to the department. Furthermore, when elevations were taken, it became apparent that the water table is above the bottom of the wheel pit and exit tailrace. Rechannelization of Onion Creek would be necessary to keep the wheel pit from ponding. Recommendations are for backfilling the wheel pit to an elevation of 146 m (to preserve the turbine, wood, and odd metal artifacts still in the ground but now exposed to the elements), with clean sand or sandy-loam and further investigation be left to a future date when expertise and funding are more readily available.

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APPENDIX E

Chemical Analysis of Sediments***Elaine Burleigh***

INTRODUCTION

The purpose of doing the chemical analysis of sediments was to test this technique of analysis in the field with application to archeology. A barn and stock pen were believed to have existed northeast of the existing house site. Phosphate and pH determinations were done in an effort to locate and define these areas. These analyses also were conducted on samples from rockshelters submitted by the survey crew.

SAMPLING AND TESTING METHODS

The sampling methods used are as follows. The area of the barn and stock pen were sampled on a grid. The surface was scraped clean with a trowel about 18 in from the southeast corner stake in each unit. A handful of sediment was scooped up with a trowel and placed in a labeled paper bag. A second sample was taken at the 16-18 in level. The sediment was very dry and hard. An auger was used to drill to the 16 in level and a coring tool was used to sample the remaining 2 in. This material was bagged separately. Samples brought in by the survey crew from rockshelter sites were taken at various depths from surface to 90 cm.

The following testing methods were used. PH values were determined on a Beckman model G battery operated pH meter, using a semimicro combination pH electrode (silver/silver chloride internals). The meter was standardized to a pH 7 buffer. Samples, prepared by adding two parts distilled water to one part sediment, were stirred and allowed to settle twice. The electrode was inserted into the liquid portion of the prepared sample and the value read from the meter.

The method used to determine phosphates is described by Eidt (1973). The samples analyzed were very dry, high in organic matter, and high in carbonates. Samples were broken up inside their bags by pounding them with a hammer on a flat surface. About half a teaspoon of pulverized sediment was placed in a small, flat, plastic container and broken up even finer by mashing it with the handle of a stainless steel teaspoon. A couple of drops of distilled water were added and mixed until the sample was of a mealy consistency. Approximately 50 mg of this mixture was placed on the center of the filter paper and test solutions added.

The bubbles formed by the evolution of gas on addition of the acid solution usually carried the lightweight organic matter farther out from the center

of the filter paper than was desirable. This situation tended to mask both the color intensity and density of the color pattern. This problem was solved by turning the filter paper over at the end of the 2 minute developing period and reading the underside. The diameter of the circle of blue color was not measured because a circle was rarely formed. The intensity of the blue color and the percentage of completion of the circular pattern were chosen as the indicators of phosphate concentration. After analyzing six to eight samples, a value scale was established from zero phosphate to strong phosphate.

RESULTS

Very small differences were found in the pH values in the entire area tested. Values for the 16-18 in level were a pH of 8.6 ± 0.3 for the surface, a pH of 8.3 ± 0.2 . PH analysis of sediments were not a useful tool for archaeological site surveying at the McKinney Homestead. The values are subject to too many variables, such as uneven sediment composition, buffering from limey sediments, and past and present vegetation.

The results of the phosphate tests agree with the results of the other tests used on the site (Fig. 1). However, a much larger area should have been sampled and tested to adequately define the different areas. Samples from the rockshelter sites gave good results. Strong phosphate results were obtained on samples from the visible midden area and weak phosphate results were obtained from below the visible midden area. The phosphate test method could be used successfully as an aid to locating and defining sites in the field.

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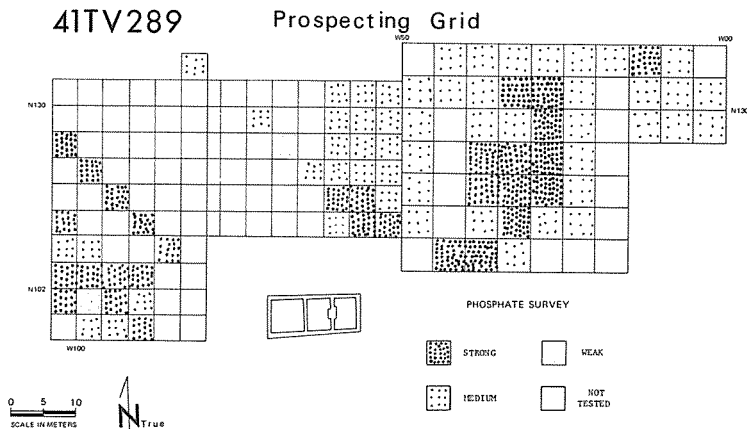


Fig. 1 Results of phosphate testing at McKinney House.

APPENDIX F

***Texas Archeological Society Field
School
Excavations at the McKinney
Homestead***

Norma Hoffrichter

INTRODUCTION

Rock rubble which filled the east room of the McKinney Homestead was sketched in place before its removal away from the east wall (Fig. 1). A 1 m trench was laid out along the east wall and four 1 m squares opened. The goal was to find floor and sub-floor construction details, materials, and associated artifacts. Joist pockets, floor construction, evidence of original charred flooring (6 in shiplap, machine cut), two north south running beams (possibly floor joists) possibly supported by rock piers, plaster rubble (some painted white), pieces of tin roofing, and miscellaneous artifacts (such as square nails, glass, ceramics) were recovered. A fine, thin, brown deposit appearing on top of some of the burned flooring was burned linoleum. The original flooring was not found. It either burned, deteriorated, or was ripped up before the second floor was put in the room.

EAST ROOM

Excavation to the original ground surface under the floor of the east room revealed limestone rubble probably left by stonemasons during house wall building and before floor construction (Fig. 2). A few larger rocks were placed on top of the ground, presumably to hold the floor joists. A sill running along the east wall (inside the house) extends into the interior of the room along the east wall. However, it is not level enough to have been used to hold the easternmost north-south joist.

The original use of this room is unknown. It has a large fireplace which could have been used for cooking. However, significant artifacts were not found to pin down the function of the room. Placement of a test pit on the west side of the room near the fireplace might prove useful.

The original fireplace was made smaller by filling with stones on either side; the opening was lowered, probably to make a more efficient source of heat. Perhaps if the use of the room had changed to that of a bedroom, the fireplace was made smaller.

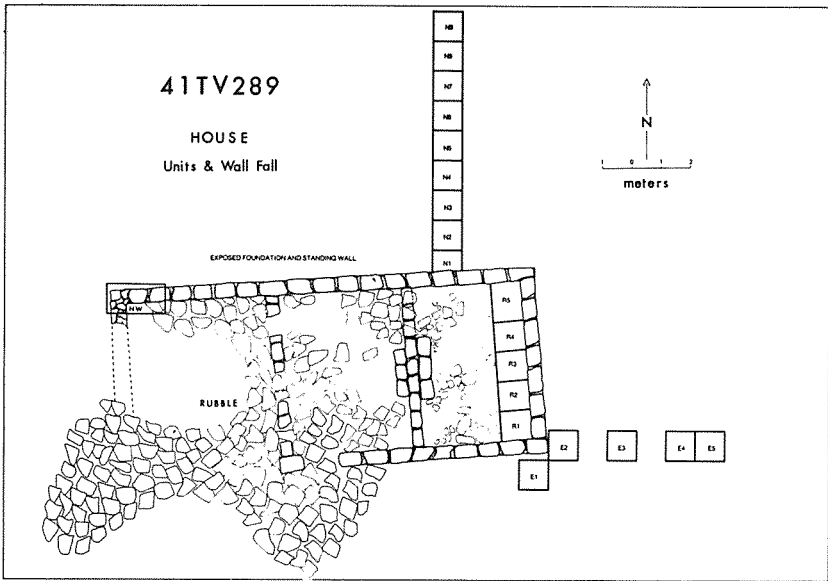


Fig. 1 Rock rubble and TAS excavation units at the McKinney Homestead.

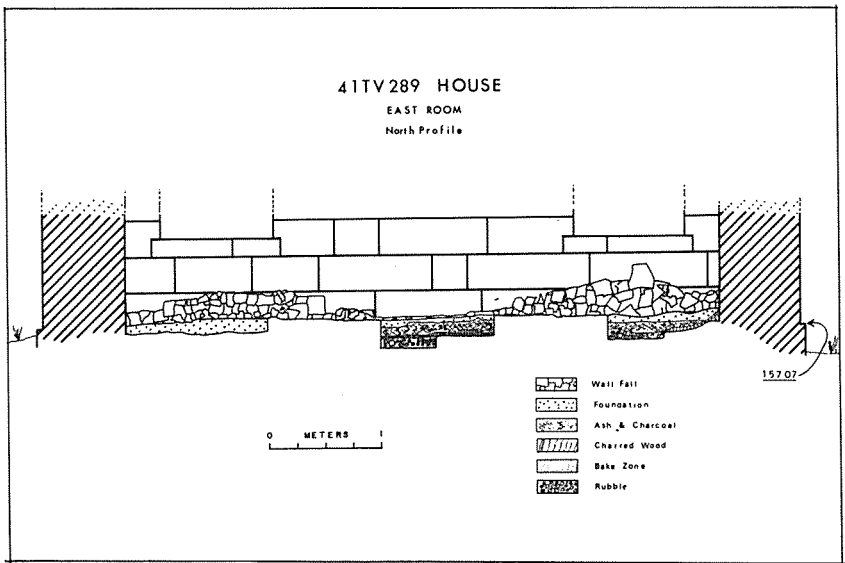


Fig. 2 East room profile at the McKinney Homestead.

The lower east room perhaps was never plastered, except for the ceiling between the beams. Small nails on the walls are about the right distance out from the wall to hold the net backing for wallpaper; if the nails were in plaster, they would be further out from the wall. Remains of plaster on the walls in this east room are lacking. However, plaster is clearly visible on the walls of the room above. Plaster found in the floor rubble could be ac-

counted for by having fallen from the upper room or possibly the ceiling. Charlie Johns, when asked about the house, said he remembered a beautiful beamed ceiling and no plaster in the east room.

Pieces of an old fashioned type of corrugated tin roofing were uncovered in the northernmost square. The 1942 pictures (Figs. 16-18, Main Text) show a corrugated tin roof, but it is not possible to tell what kind of tin. When an old house is covered with a tin roof, the roofers put the tin right on top of the old roof. If there were gutters on the house, the corrugated tin roof would have covered them.

The north/south beams that were uncovered in the east room line up with the location of the second story floor joist pockets. However, they are probably not the original floor joists. They could be the second story joists that have fallen or they could be the replaced joists for the first floor.

SOUTHEAST CORNER TRENCH

A trench 1 m wide was laid out at the southeast corner of the building to look for evidence of other structures and significant artifacts. The foundation at that corner consisted of a block placed on mortar, a building sill added, and then courses of rock laid on top. An attempt was made to find the builders' trench outline (trench dug for the foundation blocks), but it was not seen in the profiles. Medium sized rocks which must have been placed as trench fill were found alongside the foundation blocks.

In the first square of this trench (E2), a lens of gravel or pebbles appears in profile on the north, east, and part of the south walls. The adjacent square where the gravel probably plays out was not excavated. The lens appears to lack structural importance from the standpoint of the building itself.

Three other 1 x 1 m squares were excavated in the east trench. Miscellaneous artifacts include: pressed glass, glass medicine bottles, metal artifacts, and hand painted ceramics. Artifacts were very scarce below 13-15 cm. There was a very definite sediment change at this level. The upper level was clay loam, very hard when dry. The lower level was less compact, a more reddish brown, with some filled in wormholes.

Ash lenses appeared in Units E3, E4, and E5. Charlie Johns said they used to dump trash east of the building in a depression and then let it wash away. That could be close to the building or 20-30 m away.

OTHER UNITS

A 1 x 1 square (E1) was opened south of the building at the southeast corner, which would have been under the porch. Few artifacts were located but the full corner of the foundation was exposed. Original plans were to run the trench far enough out from the house to pick up part of the porch foundation, but this was not done. The remains of pilaster foundations were found next to the house at ground level and perhaps represent some of the rocks on which the front porch posts rested. The imprint of the stairs that served as entry to the second floor porch and upstairs of the house was clearly visible in the soft limestone wall.

A trench was placed north of the house extending out from the window; 8 1/2 1 x 1 m squares were excavated. The house foundation was exposed in the first 1/2 m north. The foundation under the window was much deeper

than the foundation at the southeast corner of the house and a sill was lacking. The measurement from the top of the block in the first course of stones to the bottom of the foundation is the same at both the southeast corner and north wall.

The magnetometer and metal detector survey showed clearly that there was nothing structural in line with the trench. However, had the trench been placed a few meters to the east, the remains of a structure probably would have been intersected.

Two squares were opened at the northwest corner of the building to reveal the corner foundation and part of the west room. Flooring was not found. However, a number of interesting artifacts were recovered which seem to confirm that the room functioned as a smokehouse or kitchen. A meat hook, three pronged fork, large animal bones, eggshells, ceramics, glass, and a lock with a key were found inside the house; eggshells also were found outside the house. These artifacts were different from those found in other areas of the house. A larger sample would reveal more about the function of this room.

APPENDIX G

Cistern One Glass***Nancy Boice***

INTRODUCTION

The Cistern One collection of bottles and jars consists of 34 whole specimens, 65 necks, 68 bases, and a number of glass sherds. The classification system is based on artifact function. It includes the following categories: snuff bottles, wine and spirit bottles, beer bottles, soda/mineral water bottles, panel and patent medicine bottles, pharmaceutical bottles, and bottles with various or unknown uses. The jars were placed into two categories: plain jars and lids; fruit jars and lids. After the remaining glass sherds were sorted by color and excavation level, they were weighed.

Artifact descriptions were kept to a minimum. They read from the bottom of the artifact upward to the rim. Rim types are illustrated (Fig. 1) rather than described. Measurements refer to the overall height of the artifact, the width if it is square or rectangular (measured at the greatest distance across the base), the diameter if it is round; also given is the inside diameter of the mouth.

ARTIFACTS
BOTTLES*Snuff Bottles*

GARRETT SNUFF BOTTLES

Number of specimens: 15 (3 complete bottles, 6 rims, and 6 bases representing at least 9 bottles)

Provenience: 300(4), 301, 302(7), 303(2), 304

Description: Amber colored, square base, straight sides curving inward to the rim, no neck, rim type S. Measurements: 99 mm high, 60 mm wide, 24.5 mm inside diameter of mouth (Fig. 2).

Discussion: Two, three, or four dots in various patterns occur on the bases of these bottles. "These dots do not indicate the strength of the contents but are only maker's marks of piece work bottle blowers" (Vaughan, 1971). The use of snuff appears to have been a commonly accepted practice. "In the early 30s and later the use of snuff was quite general. It was not bad form to indulge in it. Snuff was sold in grocery stores and by druggists as well as at many taverns" (Van Rensselaer, 1926:36). These bottles could have been the property of Charlie Johns' mother as she was a known snuff user.

Wine and Spirits Bottles

OLIVE GREEN WINE BOTTLE

Number of specimens: 2

Provenience: 302(2)

Description: Circular base with a 35 mm deep concave kick up bottom, sides tapering outward to the shoulder, neck tapering inward to rim type W. Measurements: 253 mm

high, 71 mm diameter, 17 mm inside diameter of mouth (Fig. 3).

Discussion: Kick up bottoms are formed when a pointed rod pushes the semifluid glass center upward in the base. "Late 19th century bottle bottoms have low kick-ups or none at all except for champagnes or other spirits that require strong resistance against internal pressure to prevent breakage" (Freeman, 1964:491).

DARK GREEN WINE BOTTLE

Number of specimens: 23 (two bottles)

Provenience: 302(14), 303(17), 304(2)

Description: Circular base with a concave bottom and sides tapering inward to rim type T. Measurements: 244 mm high, 695 mm diameter, 16 mm inside diameter of mouth (Fig. 4a).

LIGHT GREEN WINE BOTTLE

Number of specimens: 1

Provenience: 300

Description: Circular base, sides tapering outward to the shoulder, neck tapering inward to rim type U. Measurements: 293 mm high, 30 mm diameter, 16 mm inside diameter of mouth (Fig. 4b).

WINE BOTTLE NECKS

Number of specimens: 3

Provenience: 302(3)

Description: All have long, slender, tapering necks. Two are olive green with rim type T; 13 mm inside diameter of mouth. One is dark amber with rim type W; 13 mm inside diameter of mouth.

WINE BOTTLE BASE

Number of specimens: 1

Provenience: 303

Description: Small olive green sherd shows circular base and convex bottom with straight sides.

WHISKEY BOTTLE

Number of specimens: 1

Provenience: 301

Description: Amber colored, oblong base, straight sides curving out slightly from the base, curved shoulders, short tapering neck, rim type X. Measurements: 173 mm high, 75 mm wide, 13 mm inside diameter of mouth. Front embossed "FEDERAL LAW FORBIDS SALE" and "HALF PINT." Bottom embossed "D 733 12 73 BALL 44" (Fig. 5).

Discussion: Manufactured by Ball Bros. Co. 1888-1969 (Toulouse, 1971: 66-67).

ROCHESTER DUFFY MALT WHISKEY BOTTLE

Number of specimens: 3 (2 necks, 1 bottom sherd)

Provenience: 302, 303(2)

Description: Amber colored, circular base, straight sides, curved shoulders, short neck, rim type N. Estimated measurements: 260 mm high, 76 mm diameter, 13 mm inside diameter of mouth. Front embossed "THE DUFFY MALT WHISKEY COMPANY ROCHESTER N.Y. USA," with a large elaborated "D" and "C." Bottom sherd embossed "Aug. 24" (Fig. 6).

Discussion: An identical Duffy bottle found at the Custer Road Dump site (Michigan) has the same patent date, Aug. 24, and also has the date "1886" embossed on the bottom (Brose and Rupp, 1967:90).

SPIRIT BOTTLE

Number of specimens: 2 (1 neck, 1 base)

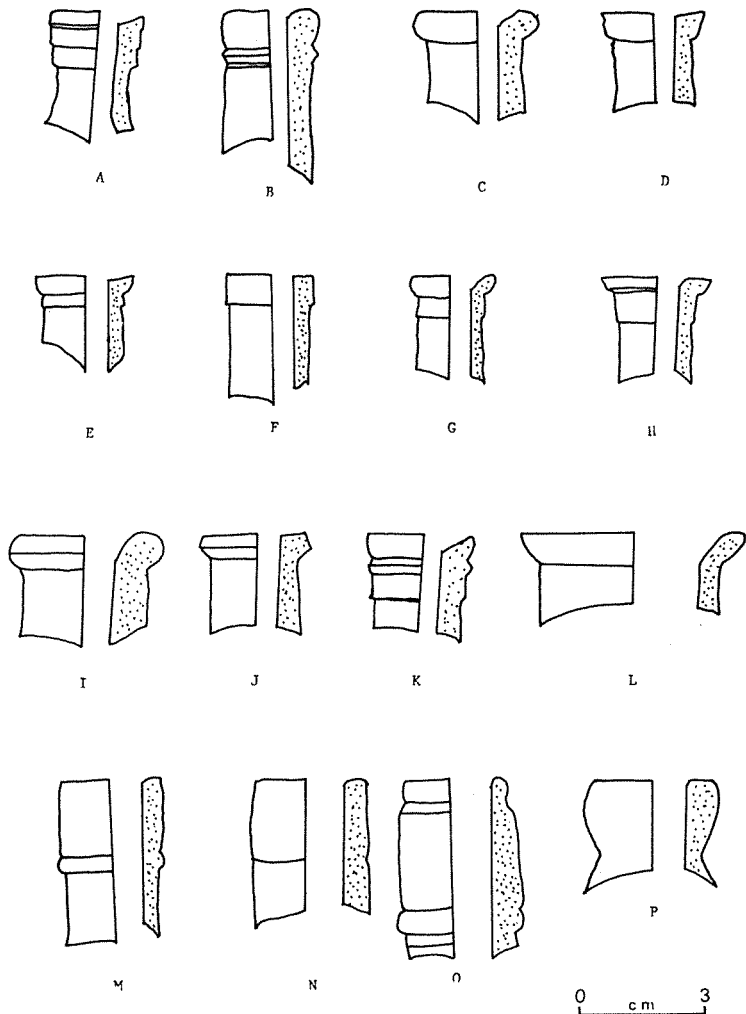
Provenience: 302, 303

Description: Amber colored, circular base, sides tapering outward to curved shoulders, tapering neck, rim type M. Measurements: 261.5 mm high (estimated), 78.5 mm diameter, 20 mm inside diameter of mouth. Neck and base are assumed to be from the same bottle (Fig. 7).

HALF PINT SPIRIT FLASK

Number of specimens: 1

Provenience: 303



BOTTLE NECK TYPES

Fig. 1 Illustrated rim types.

Description: Aquamarine, flattened hexagonal base, slender horseshoe shape, sides tapering outward to curved shoulders, rim type M. Measurements: 148.5 mm high, 60 mm wide, 10 mm inside diameter of mouth (Fig. 8).

Beer Bottles

MODERN NO-DEPOSIT, NO-RETURN QUART BEER BOTTLES

Number of specimens: 5 (3 necks, 2 bases)

Provenience: 300(5)

Description: Amber colored, circular base, sides not present, curved shoulders, tapering neck, rim type V. Measurements: 80 mm diameter, 19 mm inside diameter of mouth.

Bottoms embossed: "15," circle with an "I" inside, "5", "GB-1812" (Fig. 9).

Discussion: Manufactured by Owens Illinois, Inc. in 1958 or 1968 (Toulouse, 1971: 403-406).

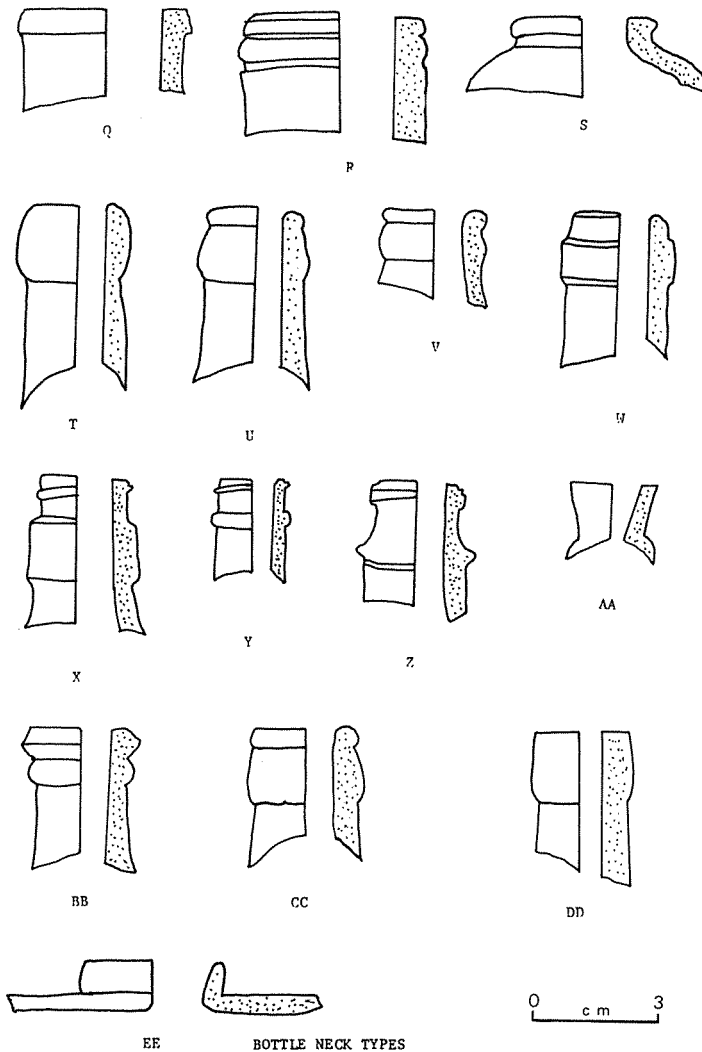


Fig. 1 (con'd) Illustrated rim types.

12 OZ. BEER BOTTLE

Number of specimens: 2 (1 neck, 1 base)

Provenience: 302, 303

Description: Amber colored, circular base, straight sides tapering slightly outward to curved shoulders, tapering neck, rim type U. Measurements: 242 high (estimated), 65 mm diameter, 12 mm inside diameter of mouth. Bottom embossed "1425 8" (Fig. 10).

BEER BOTTLE NECK

Number of specimens: 1

Provenience: 303

Description: Amber colored, rim type U. Measurements: 12 mm inside diameter of mouth.

12 OZ. BEER BOTTLE BASE

Number of specimens: 4

Provenience: 301(2), 303, 304

Description: Circular bases, straight sides tapering slightly outward, curved shoulders.

Specimen 301: Amber; 64 mm diameter; embossed "A 28" and "N" inside a square (Fig. 11a). Specimen 301: Light green; 64 mm diameter; assumed to be a beer bottle.

Specimen: 303: Amber; 64 mm diameter; embossed "1413 23." Specimen 304: Amber; 64 mm diameter; embossed "R & Co K" (Fig. 11b).

Discussion: Manufacturer for specimen 304 unknown, but dated 1880-1900. It is thought that this bottle was made with a post mold and hand finished for cork stoppers; possibly import beer (Toulouse, 1971:439). Specimen 301 (embossed) was manufactured by Obear-Nester Glass Co. from 1915 to present (Toulouse, 1971:373-375).

Soda/Mineral Water Bottles

LIGHT GREEN SODA/MINERAL WATER BOTTLE

Number of specimens: 1

Provenience: 302

Description: Round base, sides straight to the shoulder, neck tapering slightly, rim type

V. Measurements: 230 mm high, 63.5 mm diameter, 16 mm inside diameter of mouth.

Bottom embossed "WF&SMIL 17" (Fig. 12).

Discussion: Manufactured by William Franzen & Son, 1900-1929 (Toulouse, 1971:536).

CLEAR SODA/MINERAL WATER BOTTLE

Number of specimens: 2 (1 neck, 1 base)

Provenience: 300, 301

Description: Circular base, straight sides, tapering neck, rim type U, white swirl design.

Measurements: undetermined height, 70 mm diameter, 12 mm inside diameter of mouth. Bottom embossed "A T."

SODA/MINERAL WATER BOTTLE NECK

Number of specimens: 5

Provenience: 302(4), 303

Description: Light green, tapered necks, rim type U. Measurements: 17 mm inside diameter of mouth. One specimen from 302 has a metal crown cap still attached.

SODA/MINERAL WATER BOTTLE BASE

Number of specimens: 12

Provenience: 300, 302(7), 303(3), 304

Description: Round bases, sides taper outward to the shoulders (Table 1, Figs. 13, 14).

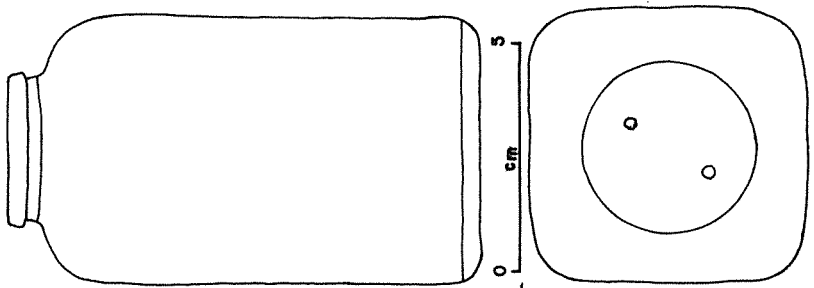


Fig. 2 Garret Snuff bottles.

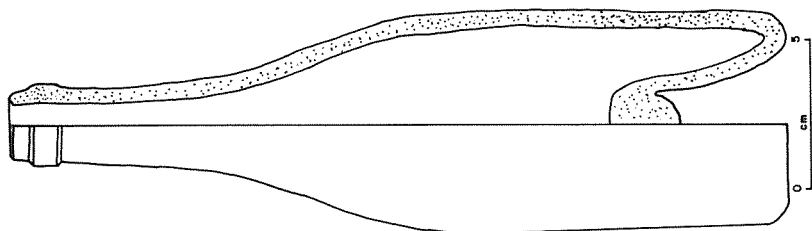


Fig. 3 Olive green Wine bottle.

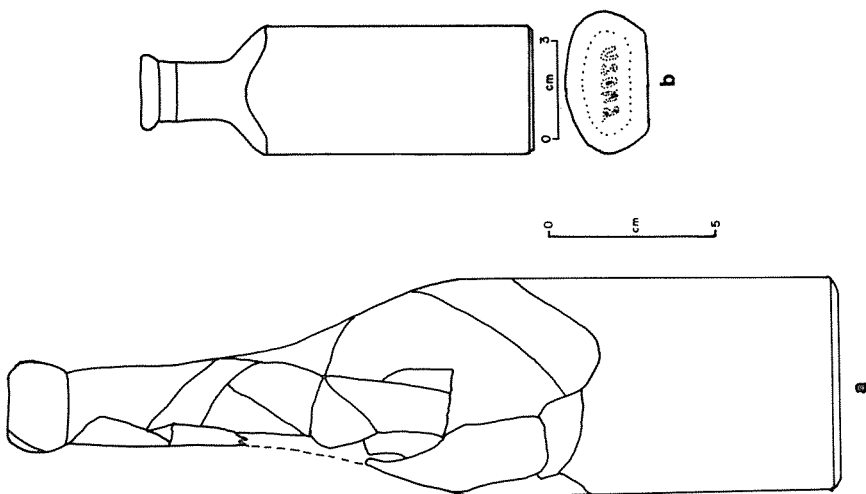


Fig. 4 Wine bottles: a) dark green; b) light green.

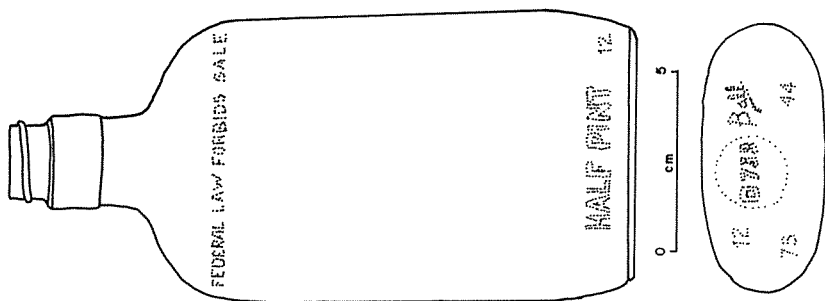


Fig. 5 Whiskey bottle.

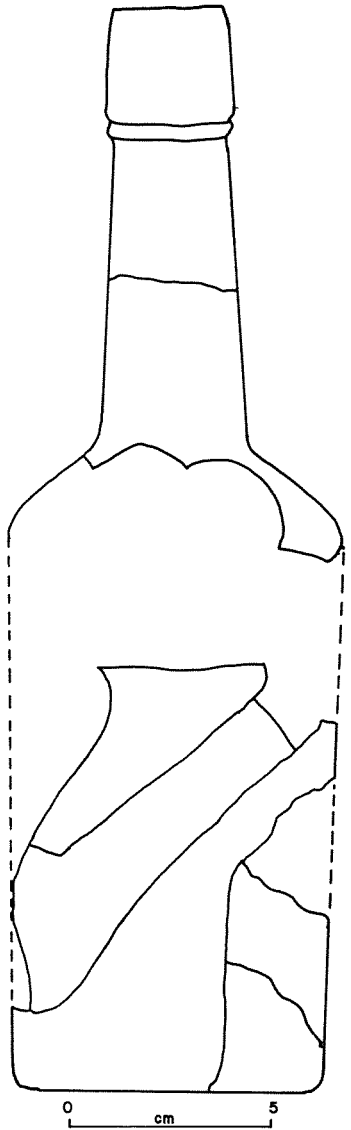
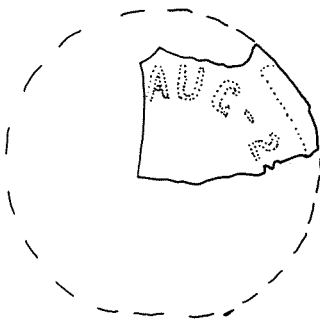
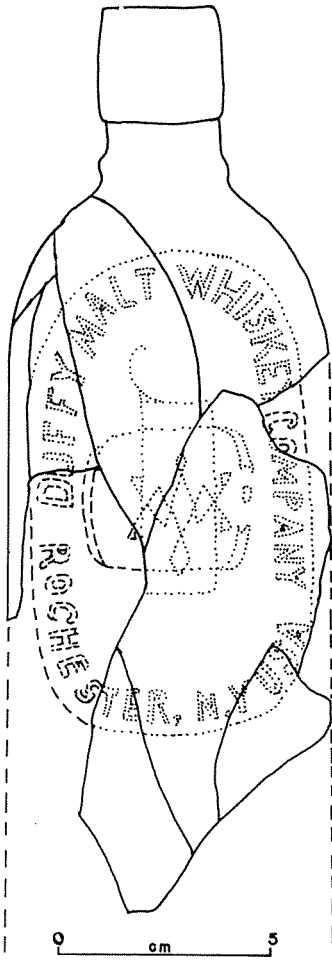


Fig. 6 Rochester Duffy Malt Whiskey bottle.

Fig. 7 Spirit bottle.

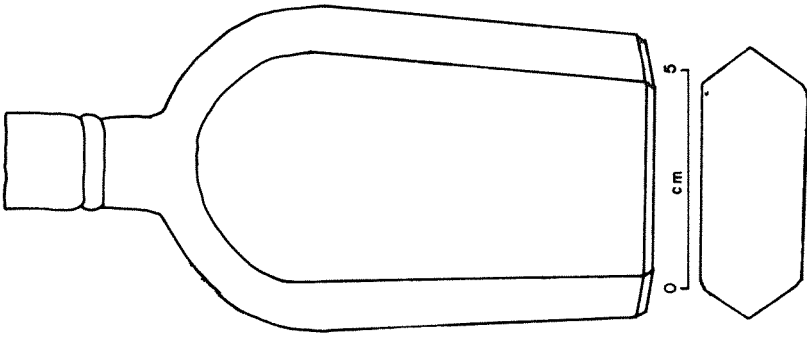


Fig. 8 Half pint Spirit flask.

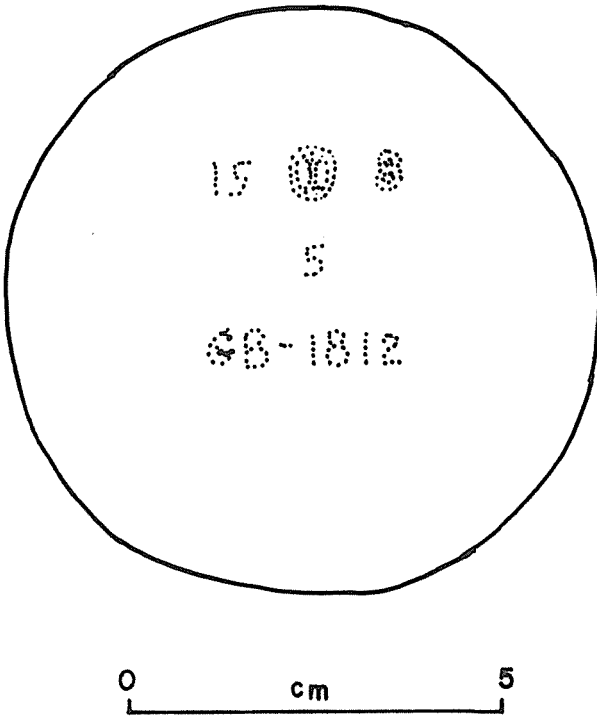


Fig. 9 Modern No-Deposit, No-Return Beer bottle base.

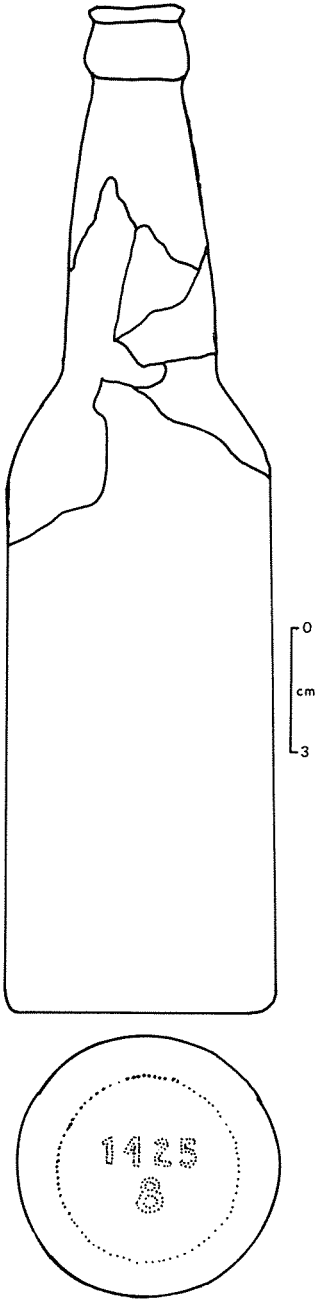


Fig. 10 12 oz Beer bottle.

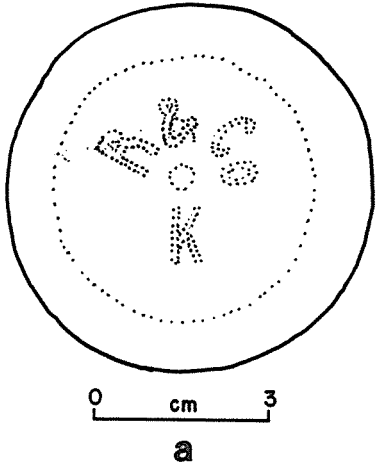
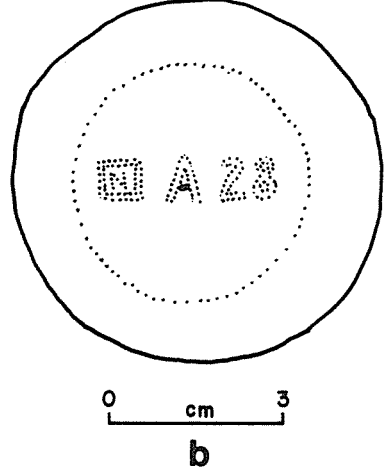


Fig. 11 Beer bottle bases: a) Specimen 301;



b) Specimen 304.

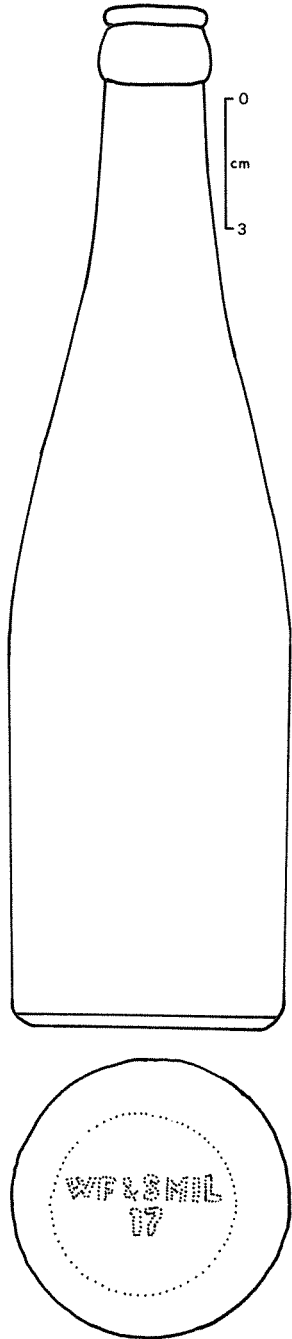


Fig. 12 Soda/Mineral water bottle.

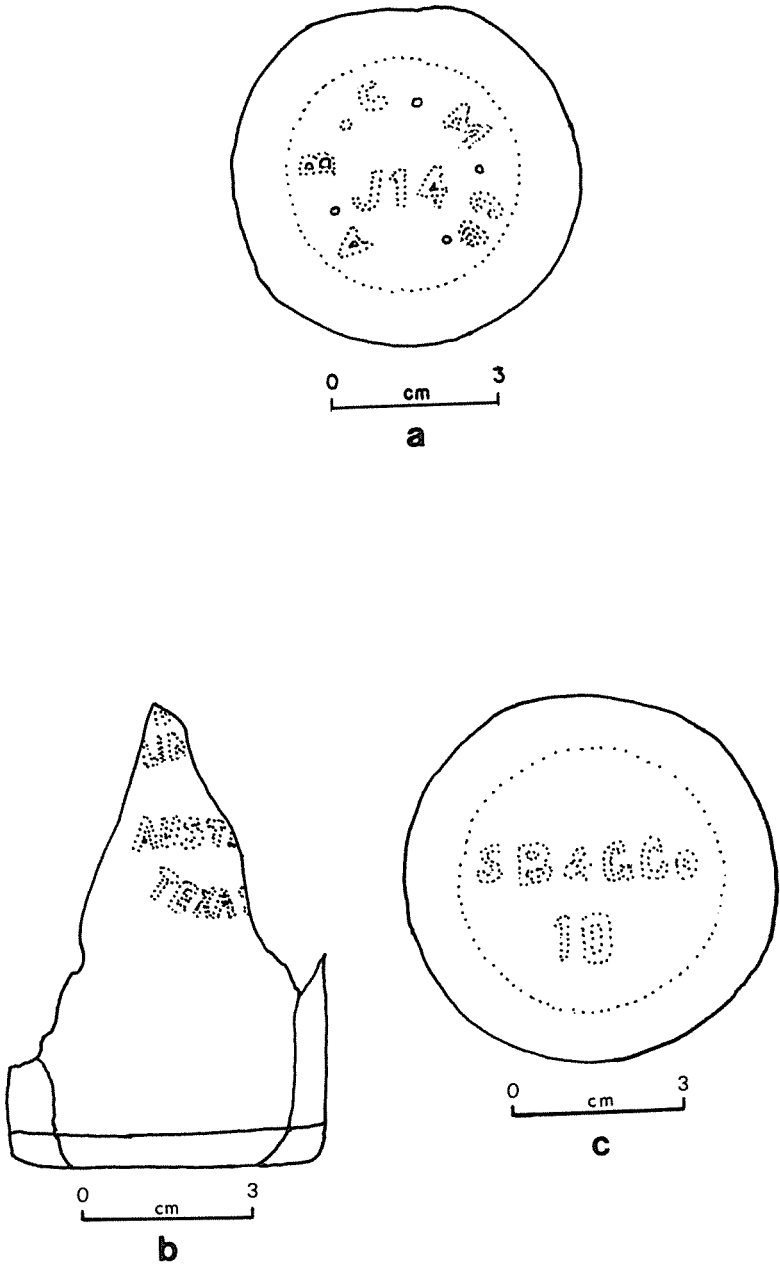


Fig. 13 Soda/Mineral water bottles: a) Specimen 302, light green; b) Specimen 303, aquamarine; c) Specimen 304, light green.

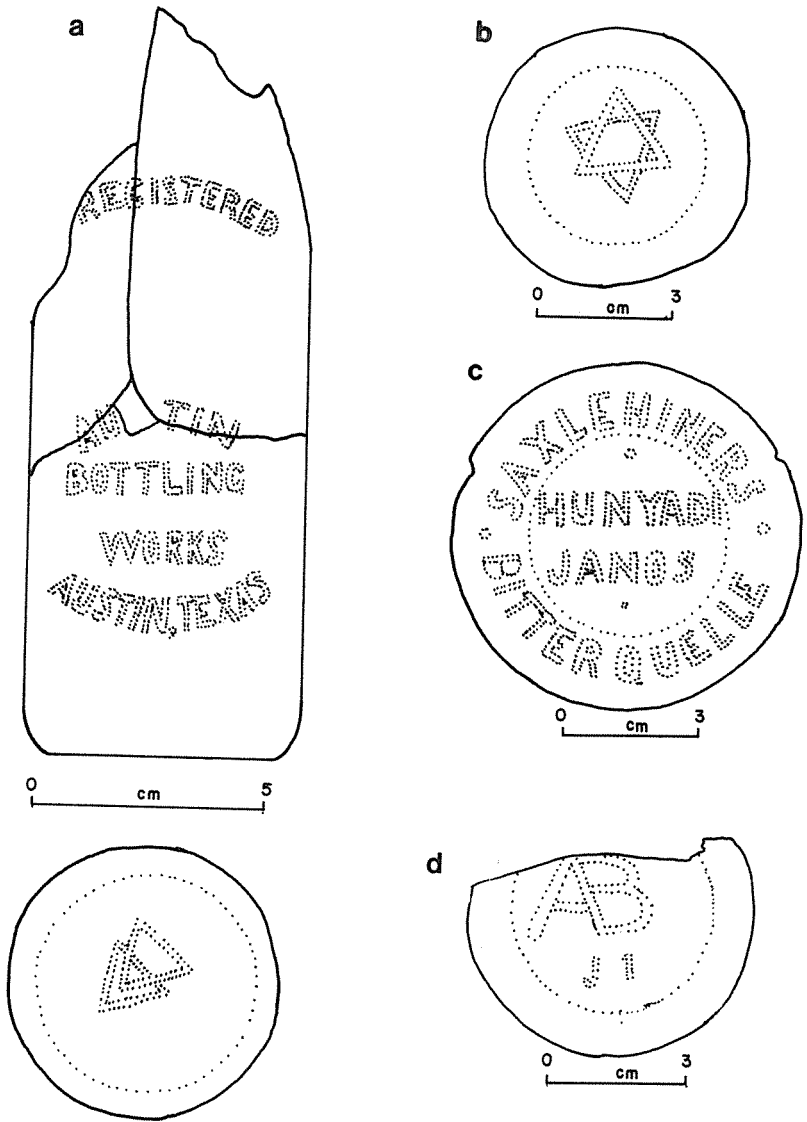


Fig. 14 Soda/Mineral water bottles: a) Specimen 302, light purple; b) Specimen 300, light green; c) Saxlehners Bitterquelle; d) Specimen 302, light green.

SAXLEHNERS BITTERQUELLE MINERAL WATER BOTTLE BOTTOM

Number of specimens: 1

Provenience: 303

Description: Olive green, circular base with a concave bottom, sides tapering slightly outward. Glass has a roughened outer surface. Measurements: 76 mm diameter. Bottom embossed "SAXLEHNERS BITTERQUELLE" and "HUNYADI JANOS" (Fig. 14c).

Discussion: Manufactured by Andreas Saxlehner 1863-1900. This bottle held "water with a gentle laxative property, Bitterquelle meaning Bitter Spring" (Toulouse, 1971:257).

*Panel and Patent Medicine Bottles***PANEL BOTTLE A**

Number of specimens: 1

Provenience: 300

Description: Clear, rectangular base with beveled corners, beveled basal edge. Front, sides, and rear inset panels, straight sides, tapering neck, rim type F with a wire 33 mm down the neck. Measurements: 163 mm high, 43 mm wide, 11 mm inside diameter of mouth. Bottom embossed with a "T" inside an oval (Fig. 15a).

PANEL BOTTLE B

Number of specimens: 1

Provenience: 301

Description: Clear, rectangular base with slightly beveled corners, beveled basal edge, no inset panels, straight sides, convex shoulders, tapering neck, rim type Y. Measurements: 141 mm high, 49.5 mm wide, 13 mm inside diameter of mouth. Bottom embossed "5," and an "N" inside a square (Fig. 15b).

Discussion: Manufactured by Obear-Nester Glass Co. from 1915 to present. The square with an "N" inside was put into use when machine operations began (Toulouse, 1971:373-375).

WATKINS PANEL BOTTLE

Number of specimens: 2 (1 complete, 1 neck)

Provenience: 300, 301

Description: Clear, rectangular base with beveled corners, beveled basal edge, front inset panels, straight sides, tapering neck, rim type B. Measurements: 209 mm high, 72 mm wide, 15 mm inside diameter of mouth. Front panel embossed "WATKINS TRIAL MARK"; bottom embossed "5" and a "34" inside a diamond (Fig. 16).

PFEIFFER CHEMICAL CO. PANEL BOTTLE

Number of specimens: 1

Provenience: 303

Description: Aquamarine, rectangular base with beveled corners, beveled basal edge, front and side inset panels, sides tapering slightly inward, convex shoulder, tapering neck, rim type B. Measurements: 153 mm high, 52 mm wide, 12 mm inside diameter of mouth. Front embossed "PFEIFFER CHEMICAL CO. NEW YORK, ST. LOUIS." Bottom embossed "755" inside a diamond (Fig. 17a).

MORLEY BROTHERS DRUGGISTS PANEL BOTTLE

Number of specimens: 3 (1 neck sherd, 2 body sherds)

Provenience: 302, 303(2)

Description: Amber, base and inset panels missing, convex shoulders, straight neck, rim type M, hand finished. Measurements: 166 mm high (estimated), 63 mm wide (estimated), 15 mm inside diameter of mouth. Front embossed "MORLEY BROS. DRUGGISTS" and a picture of a mortar and pestle (Fig. 17b).

PANEL BOTTLE NECKS

Number of specimens: 4

Provenience: 302(3), 303

Description: Convex shoulders and tapering necks (Table 2).

PANEL BOTTLE BASES

Number of specimens: 5

Provenience: 301, 302(2), 303(2)

Description: Rectangular bases, beveled corners, beveled basal edges, straight sides, front, side, and rear inset panels (Table 3; Fig. 18).

VOLCANIC OIL LINIMENT BOTTLE

Number of specimens: 1

Provenience: 301

Description: Light green, square base, beveled corners, straight sides, slanted shoulders, straight neck, rim type B. Measurements: 16 mm high, 34 mm wide, 12 mm inside diameter of mouth; embossed (each word to a side) "DR. J.H. McLEAN'S/VOLCANIC/OIL/LINIMENT"; bottom embossed "7" and a diamond with "I" inside (Fig. 19a).

Discussion: Manufactured by Illinois Glass Co. 1916-1929 (Toulouse, 1971:264).

KRESS AND OWENS BOTTLE

Number of specimens: 1

Provenience: 303

Description: Clear, oval base, straight sides, rounded shoulders, straight neck, rim type H. Measurements: 101 mm high, 46 mm wide, 9 mm inside diameter of mouth. Shoulder embossed "KRESS & OWENS NEW YORK CLYOTHYMOUNE"; bottom embossed "MBW USA" (Fig. 19b).

Discussion: This bottle is assumed to be a patent medicine bottle manufactured by Millville Bottle Works 1903-1930 (Toulouse, 1971:349).

BROMO-SELTZER BOTTLE

Number of specimens: 1

Provenience: 304

Description: Cobalt blue, circular base, straight sides, curved shoulders, tapering neck, rim type C. Measurements: 103 mm high, 43 mm (estimated) diameter, undetermined diameter of mouth. Front embossed "BROMO-SELTZER EMERSON DRUG CO BALTIM(ORE?)"; bottom embossed "14" (Fig. 20a).

ELY'S CREAM BALM BOTTLE

Number of specimens: 1

Provenience: 301

Description: Amber, rectangular base, beveled basal edge, straight sides, slanting shoulders, neck widens, rim type AA. Measurements: 65 mm long, 32 mm wide (estimated), undetermined diameter of mouth. Front embossed "ELY'S CREAM BALM" (Fig. 20b).

Discussion: An ad for Ely's Cream Balm appeared in the *Ithaca Daily Journal* on January 3, 1880, as a remedy for head colds. Manufactured by Ely Bros, Owego, New York (Baldwin, 1973:166).

*Pharmaceutical Bottles***USONA PHARMACEUTICAL BOTTLE**

Number of specimens: 1

Provenience: 302

Description: Light green, oval base, straight on back side, beveled basal edge, straight sides, concave shoulder, tapering neck, rim type G. Measurements: 117.5 mm high, 43 mm wide, 9 mm inside diameter of mouth. Back embossed with calibrations in cubic centimeters, fluid ounces, and "3 ii"; bottom embossed "USONA".

BLUE RIBBON PHARMACEUTICAL BOTTLE

Number of specimens: 1

Provenience: 302

Description: Clear, oval base, straight on back side, beveled basal edge, straight sides, concave shoulder, tapering neck, rim type A. Measurements: 134 mm high, 146 mm wide, 10 mm inside diameter of mouth. Front embossed "QUALITY PURITY"; back embossed with calibrations in cubic centimeters, fluid ounces, and "3 ii"; bottom embossed "BLUE RIBBON" (Fig. 21a).

Discussion: Manufactured by Standard Glass Co. ca. 1920-1930 (Toulouse, 1971:87).

PHARMACEUTICAL BOTTLE

Number of specimens: 1

Provenience: 302

Description: Clear, oval base, straight on back side with beveled corners, beveled basal edge, straight sides, concave shoulders, tapering neck, rim type E. Measurements: 151 mm high, 49 mm wide, 13 mm inside diameter of mouth. Back embossed with

Table 1
Soda/Mineral Water Bottle Bases from Cistern One

Provenience	Color	Inside Diameter of Mouth (mm)	Remarks
300	Light green	62	embossed "AB J 1 (Fig. 14b); manufactured by Adolphus Busch Glass Manufacturing Co. 1904-1907 (Toulouse, 1971:26).
302	Light green	undetermined	embossed "WF & S," circle with "18" inside.
302	Aquamarine	62	embossed "A. B. Co. B 24."
302	Light green	66	embossed "14 5 4."
302	Light green	66	
302	Light green	undetermined	embossed triangle.
302	Light green	65.5	front embossed "AUSTI(N) TEXAS"; bottom embossed, double triangles (Figs. 13a, 14d).
302	Light purple	58	front embossed "REGISTERED AUSTIN BOTTLING WORKS AUSTIN"; bottom embossed, double triangles (Fig. 14a).
303	Light green	undetermined	embossed "W."
303	Aquamarine	64	embossed "A.B.G.M.CO. J 14" (Fig. 13b). Manufactured by Adolphus Busch Glass Manufacturing Co. 1886-1928 (Toulouse, 1971:26).
303	Light green	64	embossed "W F & S 13 MIL." Manufactured by William Franzen & Son 1900-1929 (Toulouse, 1971:536).
304	Light green	64	embossed "SB & G CO 10" (Fig. 13c). Manufactured by Streator Bottle and Glass Co. 1881-1905 (Toulouse, 1971:461).

calibrations in cubic centimeters, fluid ounces, and "3 ii" (Fig. 21b).

PHARMACEUTICAL BOTTLE BASES

Number of specimens: 2

Provenience: 300, 302

Description: Clear, oval bases, straight on back side with beveled corners, beveled basal edge, straight sides, concave shoulders. Specimen 300 is 53 mm wide; bottom embossed "ASEPTIC." Specimen 302 is 40 mm wide.

Miscellaneous Bottles and Sherds

PAPOOSE BOTTLE

Number of specimens: 2

Provenience: 300, 302

Description: Clear, circular base, sides tapering outward from base, dipping inward, tapering outward to the shoulders, curved shoulders, tapering neck, rim type Z. Measurements: 169 mm high, 43 mm diameter, 9 mm inside diameter of mouth. Front embossed "PA-POOSE A.Z. ZATAPAIN & SONS INC NEW ORLEANS USA"; bottom embossed "A.Z. ZATAPAIN & SONS INC NEW ORLEANS USA DESIGN PAT" (Fig. 22a).

Table 2
Panel Bottle Necks from Cistern One

Specimen	Color	Rim Type	Inside Diameter Of Mouth (mm)
302	Clear	B	11
302	Clear	C	12
302	Purple	D	11
303	Purple	D	12

Table 3
Panel Bottle Bases from Cistern One

Specimen	Color	Inside Diameter Of Mouth/Remarks
301	Clear	39 mm wide; front embossed "PHI . . . ST. JOS ASSURES . . ."; bottom embossed "12" and a diamond with a half circles on top and bottom and an "I" in the center (Fig. 18).
302	Clear	62 mm wide
302	Clear	43 mm wide
303	Amber	undetermined width
303	Aquamarine	undetermined width; front embossed ". . . E PLAINS'S REMEDY", on side "AIN MED CO."

OBLONG BASE BOTTLE

Number of specimens: 1

Provenience: 300

Description: Clear, oblong base, straight sides, rounded shoulders, short thick neck, undetermined rim with metal screw cap attached. Measurements: 202 mm high, 83 mm wide, undetermined inside diameter of mouth. Bottom embossed "MADE IN USA 2M" (Fig. 22b).

PRICE-BOOKER BOTTLE

Number of specimens: 1

Provenience: 301

Description: Light green, planoconvex base, three straight sides, curved back side, beveled basal edge, straight sides, curved shoulders, thick neck, rim type R. Measurements: 230.5 mm high, 72 mm wide, 31 mm inside diameter of mouth. Front panel embossed "PRICE-BOOKER MFG CO. HOUSTON, TEX."; bottom embossed "I" inside a diamond (Fig. 23).

Discussion: Manufactured by Illinois Glass Co. 1916-1929 (Toulouse, 1971: 264).

CIRCULAR BASED BOTTLE

Number of specimens: 1

Provenience: 300

Description: Clear, circular base, straight sides, rounded shoulders, straight neck, rim type J. Measurements: 142 mm high, 49 mm wide, 9 mm inside diameter of mouth (Fig. 24).

EMBALMERS FLUID BOTTLE

Number of specimens: 1

Provenience: 301

Description: Purple, square base with rounded corners, straight sides, curved shoulders, tapering neck, rim type U. Measurements: 202 mm high, 62 mm wide, 13 mm inside

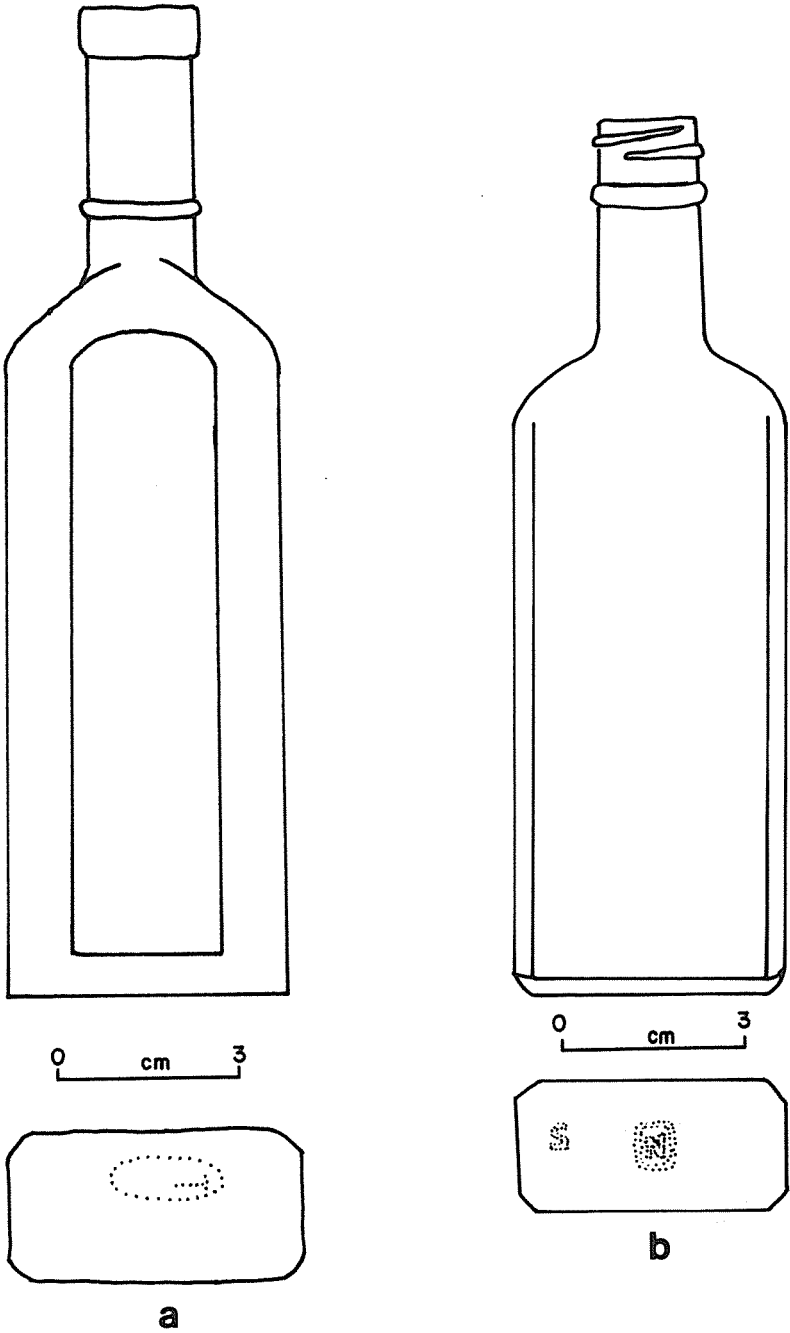


Fig. 15 Panel bottles: a) Specimen 300; b) Specimen 301.



Fig. 16 Watkins Panel bottle.

diameter of mouth. Front embossed with calibrations in fluid ounces and "THE EM-BALMERS SUPPLY CO., WEST PORT, CONN."; bottom embossed "C" (Fig. 25).
Discussion: Dated to ca. 1915 according to Charlie Johns.

FLUID BOTTLE A

Number of specimens: 1

Provenience: 300

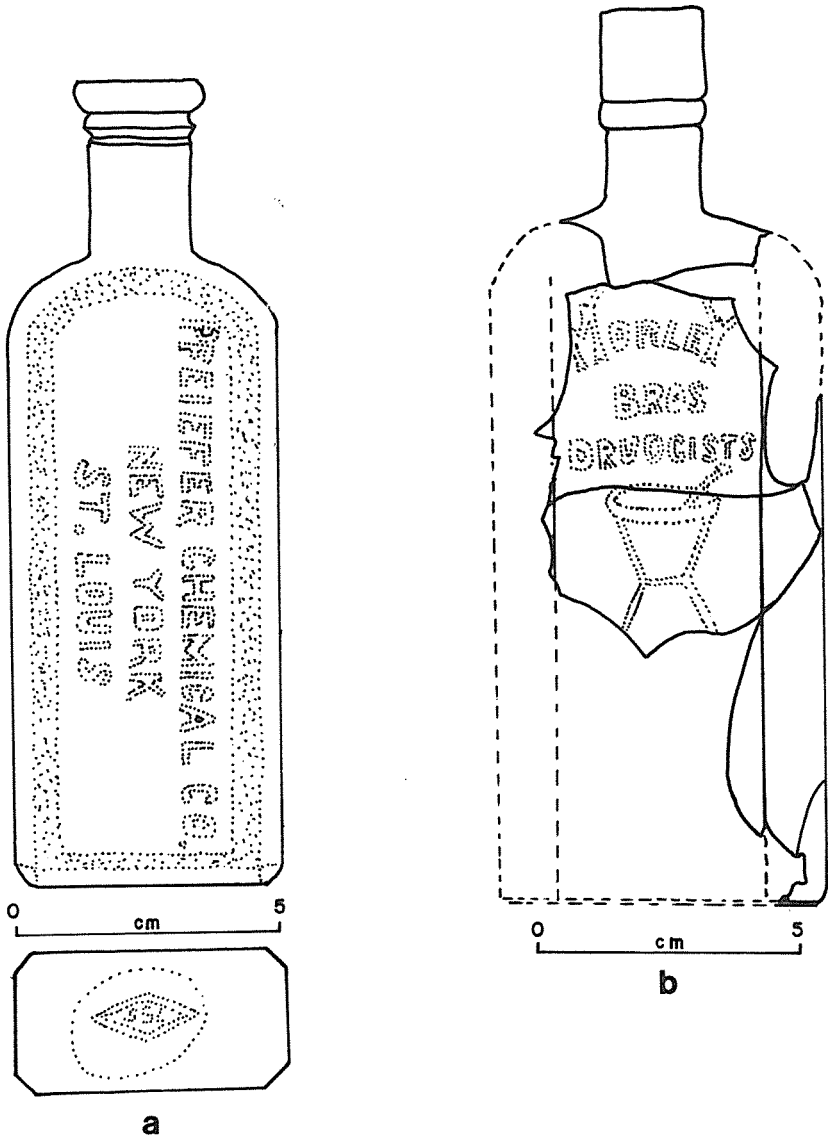


Fig. 17 Panel bottles: a) Pfeiffer Chemical Co.; b) Morley Brothers Druggists.

Description: Aquamarine, circular base, straight sides, slightly curved shoulders, straight wide neck, rim type I. Measurements: 91 mm high, 43 mm wide, 24 mm inside diameter of mouth. Neck embossed "2 1/2 FLUID OZ."; bottom embossed "2" (Fig. 26).

FLUID BOTTLE B

Number of specimens: 2

Provenience: 300, 301

Description: Clear, circular bases, straight sides, rounded shoulders, thick short necks, rim type I. Measurements: 144 mm high, 62 mm wide, 18 mm inside diameter of mouth. Shoulder embossed "8 FLUID OZ" (Fig. 27). Bottle from 301 has "5" embossed on bottom.

FLUID BOTTLE C

Number of specimens: 3 (3 body sherds)

Provenience: 301(3)

Description: Clear, oblong base indented in front and back, sides tapering, rounded shoulders, undetermined rim. Measurements: 125 mm wide (estimated). Front, sides, and back embossed with a straight line pattern; bottom embossed with large "O" with diamond "7 1 4."

Discussion: Manufactured by Owens Illinois Glass Co. 1929-1954 (Toulouse, 1971:403).

BIXBY BOTTLE

Number of specimens: 1

Provenience: 304

Description: Aquamarine, square base with rounded corners, sides taper outward, semicircular shoulders, thick short neck, rim type C. Measurements: 100 mm high, 60 mm wide, 20 mm inside diameter of mouth. Two sides embossed "PATENTED MCH 6 83"; bottom embossed "BIXBY 8 6" (Fig. 28).

MISCELLANEOUS BOTTLE NECKS

Number of specimens: 28

Provenience: 301(5), 302(16), 303(4), 304(3)

Description: Table 4.

MISCELLANEOUS BOTTLE BASES

Number of specimens: 24

Provenience: 300, 301(2), 302(16), 303(3), 304(2)

Description: Table 5.

MISCELLANEOUS EMBOSSED BOTTLE BODY SHERDS

Number of specimens: 15

Provenience: 301(5), 302(10)

Description: Table 6.

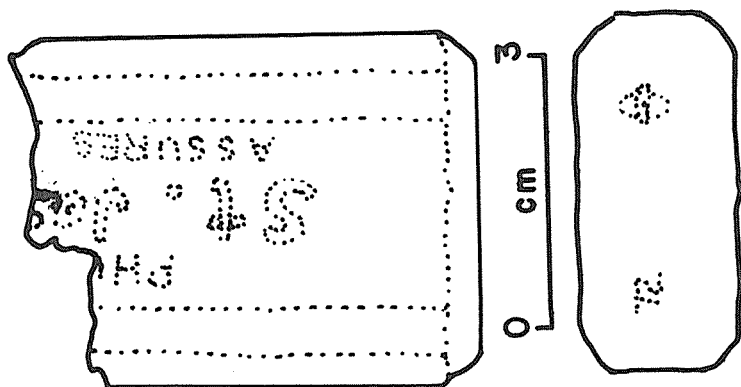


Fig. 18 Panel bottle base and front.

Table 4
Miscellaneous Bottle Necks from Cistern One

Provenience	Color	Rim Type	Inside Diameter of Mouth (mm)	Remarks
301	clear	M	13	
301	light green	B	11	
301	clear	H	9	
301	clear	F	11	
301	light green	L	40	
302	light green	U	15	
302	clear	M	21	line design around neck at shoulder
302	light purple	O	16	
302	clear	G	12	
302	clear	F	10	has wire rim 23 mm down neck
302	clear	D	15	
302	clear	B	15	
302	clear	F	12	has band below rim approximate measurement
302	clear	L	25	
302	light purple	C	12	
302	aquamarine	F	19	
302	light green	P	22	
302	clear	L	24	approximate measurement
302	clear	L	23	approximate measurement
302	light purple	L	24	approximate measurement
302	amber	D	13	
303	clear	M	29	
303	clear	G	9	
303	clear	N	12	
303	light purple	M	13	
304	aquamarine	F	31	
304	clear	F	9	
304	clear	F	30	has wire rim 30 mm down neck

Jars And Lids

JARS

Forbes Brothers Jar

Number of specimens: 1

Provenience: 300

Description: Clear, octagonal base, eight panel sides tapering inward, semicircular shoulder with five bands, rim of a continuous screw thread for a screw cap. Measurements: 102 mm high, 63 mm wide, 40 mm inside diameter of mouth. Bottom embossed "FORBES BROS. ST. LOUIS 1" (Fig. 29).

Round Base Jar

Number of specimens: 1

Provenience: 301

Description: Clear, round base with wide curved band, straight sides of 14 panels, wide band rim with screw threads on inside of rim. Measurements: 184 mm long, 62 mm wide, 51 mm inside diameter of mouth. Bottom embossed "10" (Fig. 30a).

Table 5
Miscellaneous Bottle Bases from Cistern One

Provenience	Color	Base Shape	Dimension	Embossed
300	clear	oblong	97 mm wide	"DES PAT 3 3R APPLIED FOR"
301	clear	oblong	43.5 mm wide	"7 2 07 8"
301	clear	round	81 mm wide	"B"
302	light green	round	55 mm wide	
302	clear	round	72 mm diameter	squarish symbol with "J" inside "4424 9"; manufactured by Knox Glass Bottle Co. 1932-53 (Toulouse, 1971:271)
302	clear	round	71 mm diameter	
302	clear	round	73 mm diameter	oval design
302	clear	rectangular	62 mm wide	
302	clear	concave/rectangular	undetermined width	"g" and diamond with "I" inside; manufactured by Illinois Glass Co. 1916-1929 (Toulouse, 1971:264)
302	clear	rectangular	undetermined width	"11"
302	clear	circular	40 mm wide	"806 03"
302	dark green	circular	undetermined width	inset panel on side
302	light green	circular	undetermined width	"MIL"
302	purple	rectangular	undetermined width	
302	clear	rectangular	undetermined width	
302	light green	rectangular	undetermined width	
302	light green	rectangular	undetermined width	
302	clear	rectangular	undetermined width	"B" & "H" with "A" inside, "5662"; manufactured by Hazel Atlas Glass Co. 1902-64 (Toulouse, 1971:239)
302	clear	circular	88 mm wide	"CAPPA CITY. ONE FULL QUART M"
303	light green	oval	64 mm wide	"E 510 A"
303	clear	oval	undetermined width	"L.C. & R. CO."
303	purple	circular	32 mm diameter	
304	light green	circular	undetermined diameter	"MIL M"
304	aquamarine	circular	undetermined diameter	

Milk Glass Jar

Number of specimens: 1

Provenience: 301

Description: White, square base with rounded basal edge, two rounded bands, straight sides, two rounded bands at upper edge, continuous screw thread for a screw cap.

Measurements: 81 mm long, 61 mm wide, 49.5 mm inside diameter of mouth (Fig. 30b).

Table 6
Miscellaneous Embossed Bottle Body Sherds

Provenience	Color	Embossed (Incomplete)
301	clear	"AL MARK PA"
301	clear	"NAME"
301	green	"AU"
301	aquamarine	"LA" "SH"
301	aquamarine	"S"
302	aquamarine	"SE"
302	aquamarine	"A"
302	green	"MONTICELLO"
302	aquamarine	"A" "H"
302	green	"S"
302	green	"E"
302	green	"ED"
302	aquamarine	"ON"
302	clear	"NC"
302	light purple	"STAU CONG A. MILL AUSTIN TE(XAS?)"

Vaseline Jar

Number of specimens: 2

Provenience: 302, 303

Description: Clear, round base, rounded basal band, straight sides, rounded shoulders, round band, rim is a continuous screw thread for screw cap. Measurements: 61 mm high, 45 mm wide, 29 mm inside diameter of mouth. Front embossed "TRADE MARK VASELINE CHESEBROUGH NEW YORK," bottom embossed "25" (Fig. 30c).

Small Round Base Jar

Number of specimens: 1

Provenience: 300

Description: Clear, round base, rounded basal band, straight sides, rounded shoulders; rim is a straight band for snap-on cap. Measurements: 41 mm high, 49.5 mm wide, 39 mm inside diameter of mouth. Bottom embossed "2," circle with an "I" inside, "7 27."

Discussion: Manufactured by Owens Illinois Inc.; maker's mark used since 1954 (Toulouse, 1971:403).

Miscellaneous Jar Necks

Number of specimens: 7

Provenience: 301, 302(6)

Description: Rim sherds (Table 7).

Jar Base

Number of specimens: 3

Provenience: 302(3)

Description: Clear, circular bases. One specimen has a 45 mm diameter. Another has a 46 mm diameter; embossed "NO 7 PAT INU DEC 22 19 JULY 17 19 M." The third has an undetermined diameter.

JAR LID

Number of specimens: 1

Provenience: 303

Description: Milk glass white, flat circular lid, straight inset sides fitting inside the jar. Measurements: 53 mm diameter. Top embossed "ARTESIA CREAM WACO TEXAS" (Fig. 31a).

*Fruit Jars And Lids***FRUIT JARS**

Atlas Fruit Jar

Number of specimens: 2

Provenience: 300, 302

Description: Aquamarine, circular base, straight sides, rounded shoulders, short wide neck, rim missing. Measurements: 101 mm diameter (estimated). Front embossed "ATLA"; bottom embossed "ATLAS TRADE MARK REG EZ SEAL" (Fig. 31b).

Discussion: Manufactured by Atlas Glass Co. 1896-1964 (Toulouse, 1969:2).

Ball Fruit Jar

Number of specimens: 8

Provenience: 302(5), 303(3)

Description: Aquamarine, base missing, straight neck; rim is two continuous threads. Measurements: 93 mm diameter, 62 mm inside diameter of mouth (Fig. 32).

Kerr Fruit Jar

Number of specimens: 4 (1 base, 3 body sherds)

Provenience: 300(4)

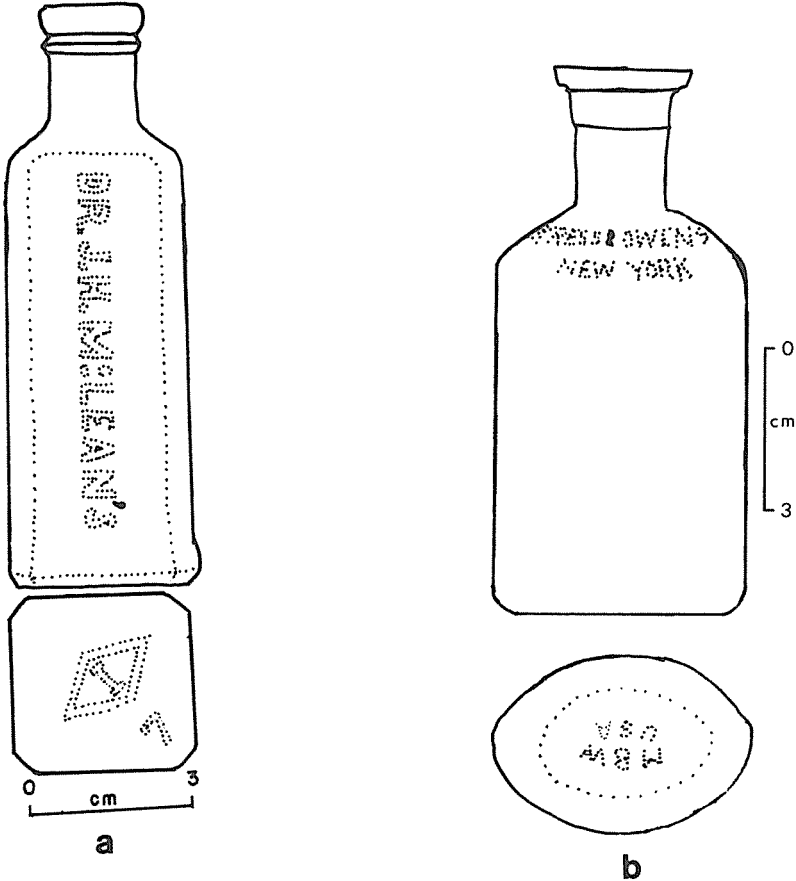


Fig. 19 Patent medicine bottles: a) Volcanic Oil liniment; b) Kress and Owens.

Description: Clear, circular base, straight sides. Measurements: 110 mm diameter.
Front embossed "KERR" in script; bottom embossed "KERR GLASS MFG CO SAND SPRINGS OKLA 6 AT U 3 915".
Discussion: Manufactured by Kerr Glass Manufacturing Co. 1912-1946 (Toulouse, 1969:306).

Fruit Jar Necks

Number of specimens: 6
Provenience: 300(2), 301(3), 302
Description: Table 8.

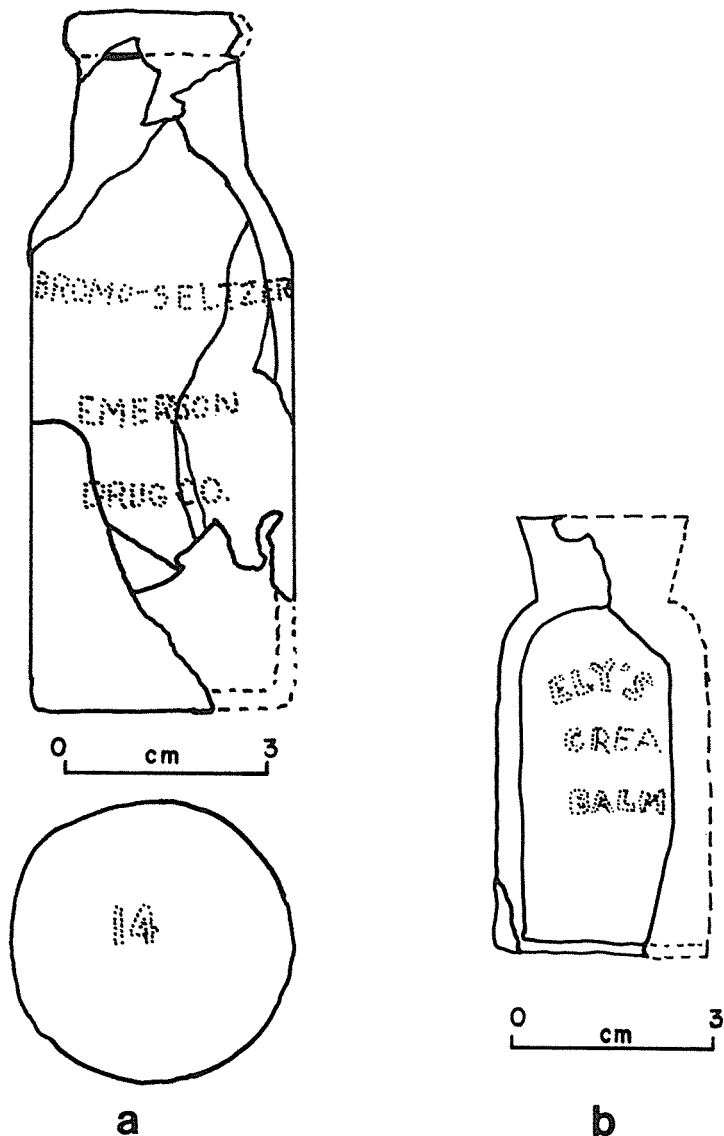


Fig. 20 Patent medicine bottles: a) Bromo-Seltzer; b) Ely's Cream balm.

Table 7
Miscellaneous Jar Necks from Cistern One

Provenience	Color	Inside Diameter of Mouth (mm)	Remarks
301	clear	undetermined	Possibly threaded for a screw-on cap.
302	clear	undetermined	Two wide bands, top one stepped inward.
302	clear	undetermined	Rounded band possibly threaded for a screw-on cap.
302	clear	300	Rounded band at bottom of neck, continuous threads for a screw-on cap.
302	purple	24	Rounded shoulders; continuous threads for a screw-on cap.
302	milk glass white	undetermined	Rounded band; continuous thread for screw-on cap.
302	aquamarine	undetermined	Straight neck; indented; flat banded lip.

Table 8
Fruit Jar Necks from Cistern One

Provenience	Color	Inside Diameter of Mouth (mm)	Remarks
300	clear	undetermined	Circular continuous threads.
300	clear	52	Rounded shoulders; wide band; continuous threads.
301	clear	undetermined	One wide band.
301	clear	undetermined	One wide band; continuous thread.
301	clear	53	One wide band; continuous thread.
302	aquamarine	60	One wide band, continuous thread.

Embossed Fruit Jar Sherds

Number of specimens: 3

Provenience: 300, 301, 302

Description: Specimen 300 is clear; body sherd; embossed "AL." Specimen 301 is aquamarine; body sherd; embossed "S HOULDER SON." Specimen 302 is clear; body sherd; embossed "AS."

FRUIT JAR LIDS

Fruit Jar Lid A

Number of specimens: 1

Provenience: 301

Description: Milk glass white, flat, circular. Measurements: 65 mm diameter. Top embossed "GENUINE BOYD CAP FOR MASON JARS" (Fig. 33).

Fruit Jar Lid B

Number of specimens: 1

Provenience: 302

Description: Gray, metal color rim sherd; Mason zinc cap.

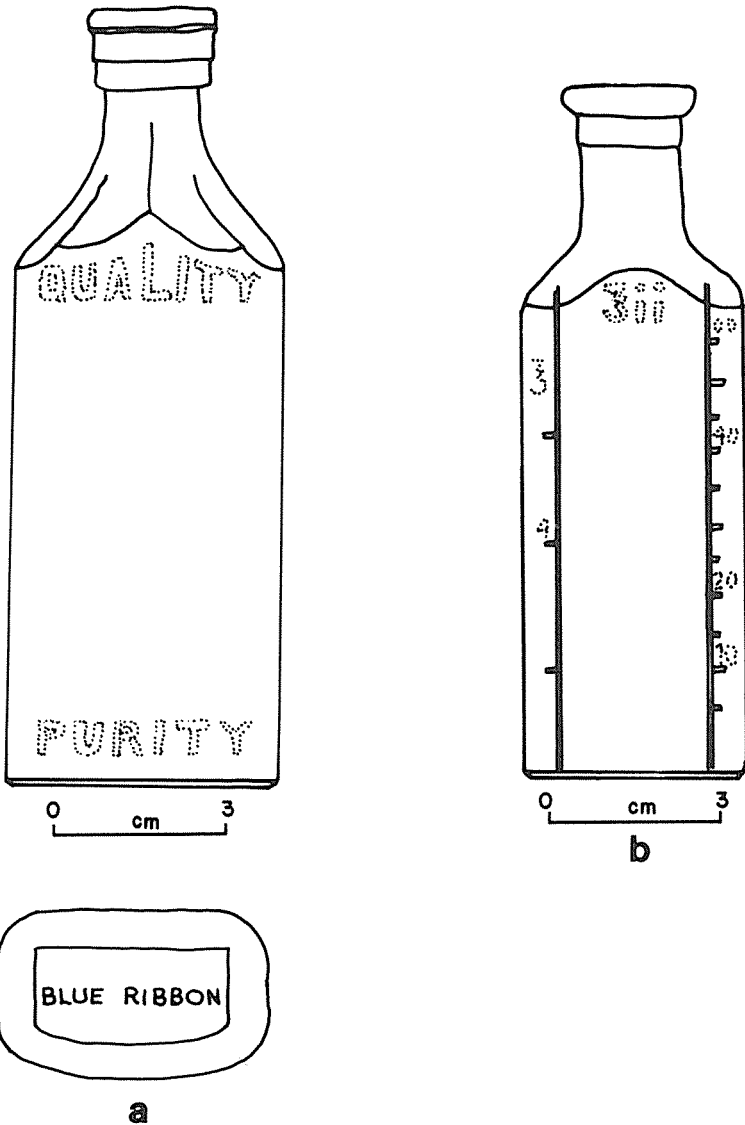


Fig. 21 Pharmaceutical bottles: a) Blue Ribbon; b) Specimen 302.

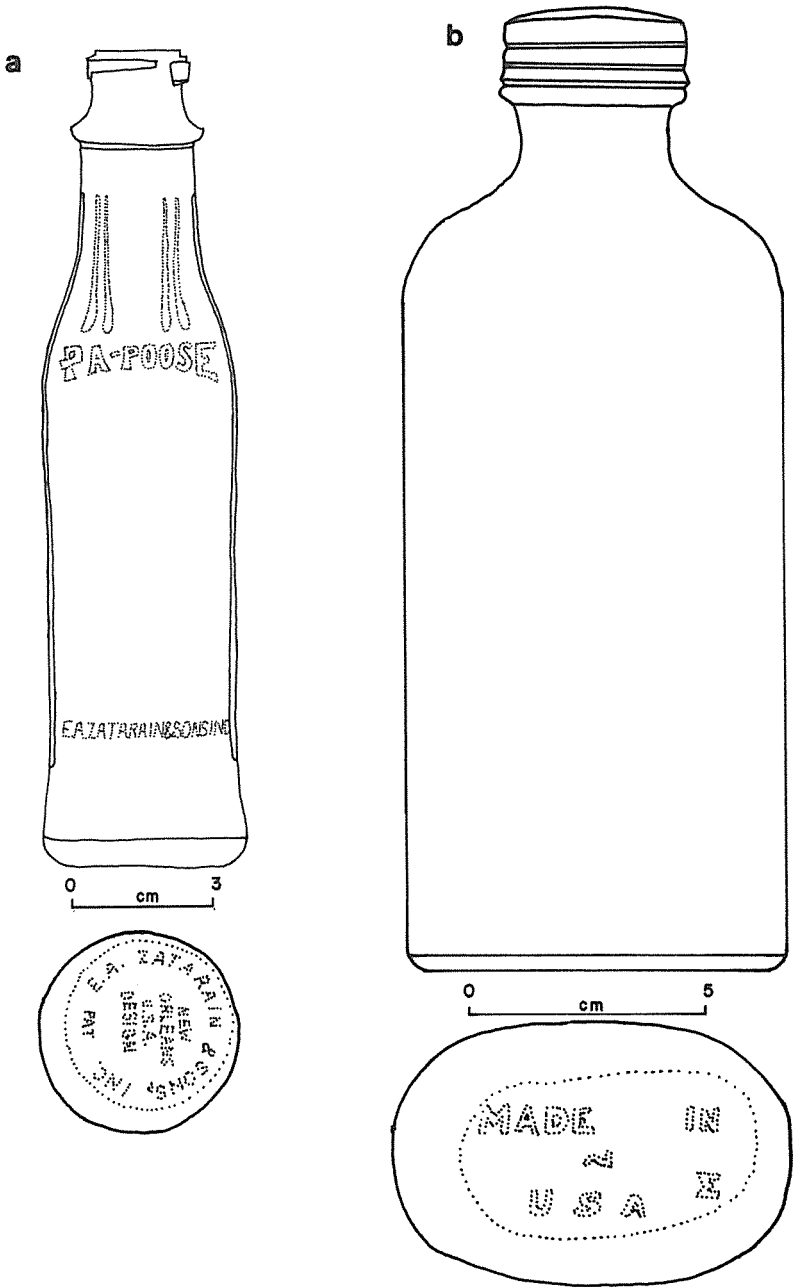


Fig. 22 Miscellaneous bottles: a) Papoose; b) oblong base.

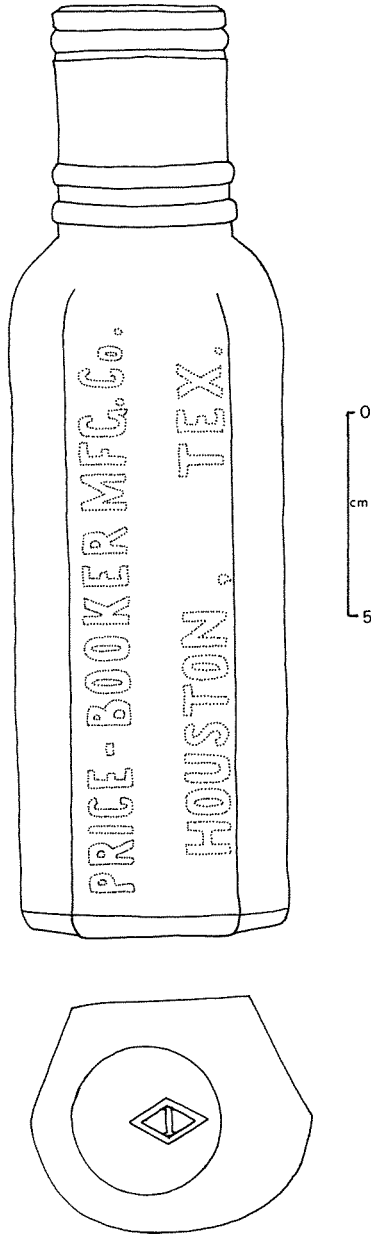


Fig. 23 Price-Booker bottle.

LIGHTENING CLOSURE

Number of specimens: 1

Provenience: 302

Description: One piece of metal wire, curved with fittings for side of fruit jars. Measurements: 92 mm curved width.

Discussion: A lightening closure consists of loop neck tie wires and a bail piece which fits over the top of the glass lid (Toulouse, 1969:466).

MISCELLANEOUS GLASS BOTTLE AND JAR SHERDS

Weight: Table 9.

Provenience: Table 9.

Description: Glass sherds in six colors weighing 7.43 kg.

PRESSED GLASS

Pressed glass is defined as glass with sharply defined, impressed patterns on the exterior and a smooth interior surface (Lorrain, 1968:38). It is made by pressing hot glass into piece molds. The pressing machine was patented in 1827; however, it was not until the 1940's that pressed glass was produced in large quantities (Lorrain, 1968:39). It commonly was found in most households, but "was never what you would call an aristocratic product with a pedigree worth preserving" (Lee, 1946:vii).

Whole specimens were not recovered from the excavations. Specimens are fire polished with a smooth finish. Some colored glass is present, but none of the patterns can be identified. This situation indicates a late date, approximately 1900-1930. Classification is based on vessel form. Patterns are very briefly described as none are well known. There are four vessel forms represented: bowls, bowl lids, goblets, and stems.

Bowls

SHALLOW BOWL

Number of specimens: 1

Provenience: 303

Description: Clear, shallow bowl with flattened rim, 37 mm high. Pattern consists of "S" curves in a circular pattern on the base, with circles on the rim.

SMALL BOWL

Number of specimens: 8 (one bowl)

Provenience: 302(3), 303(5)

Description: Clear, shallow, small dish with scalloped rim; 42 mm high, 103 mm diameter. Pattern consists of geometric interlocking circles (Fig. 34).

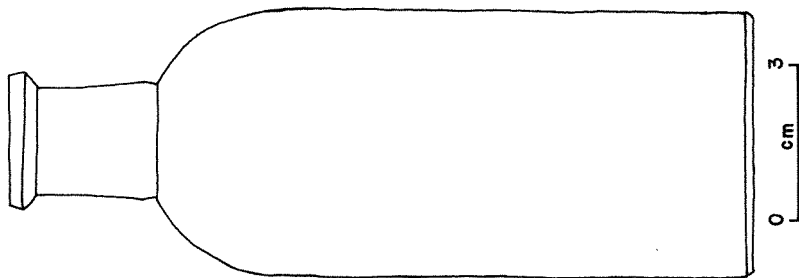


Fig. 24 Fluid bottle.

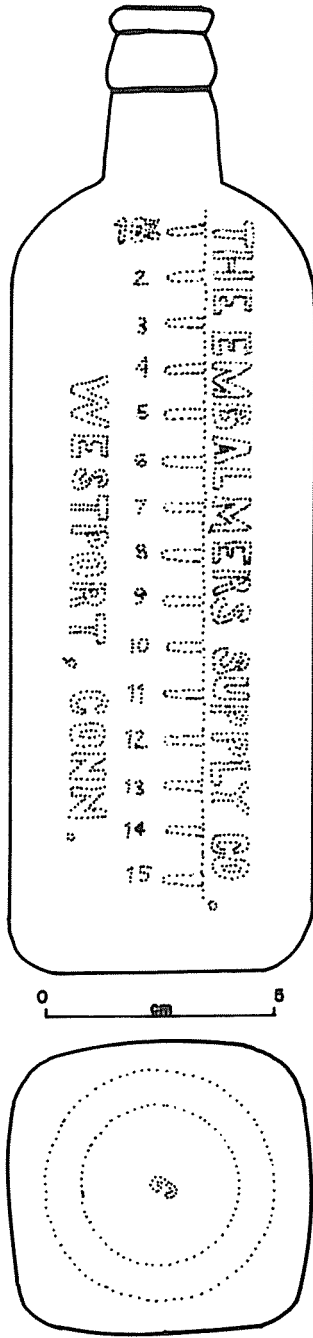


Fig. 25 Circular based bottle.

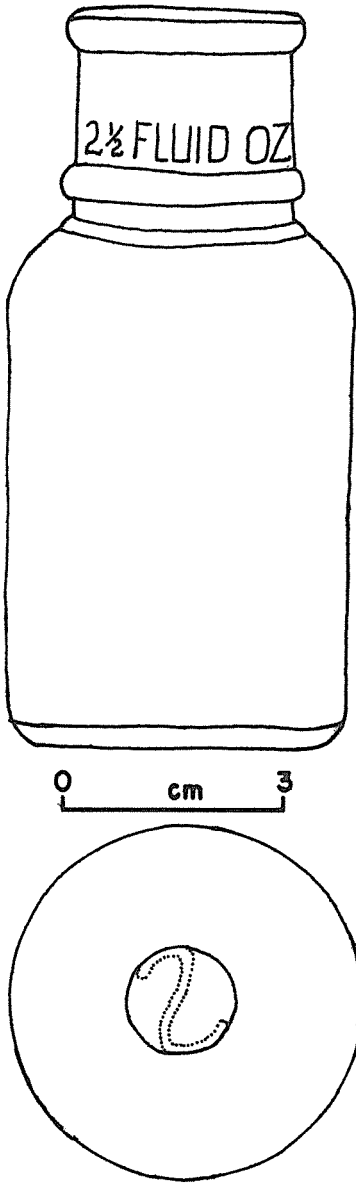


Fig. 26 Embalmers Supply Company.

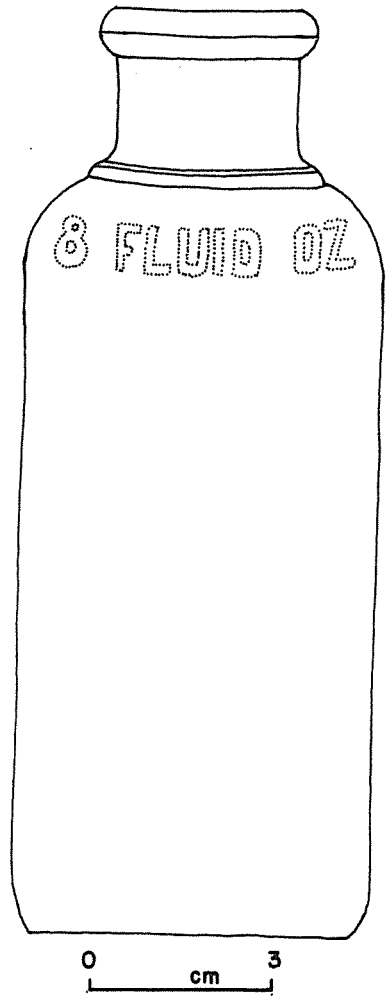


Fig. 27 Fluid bottle.

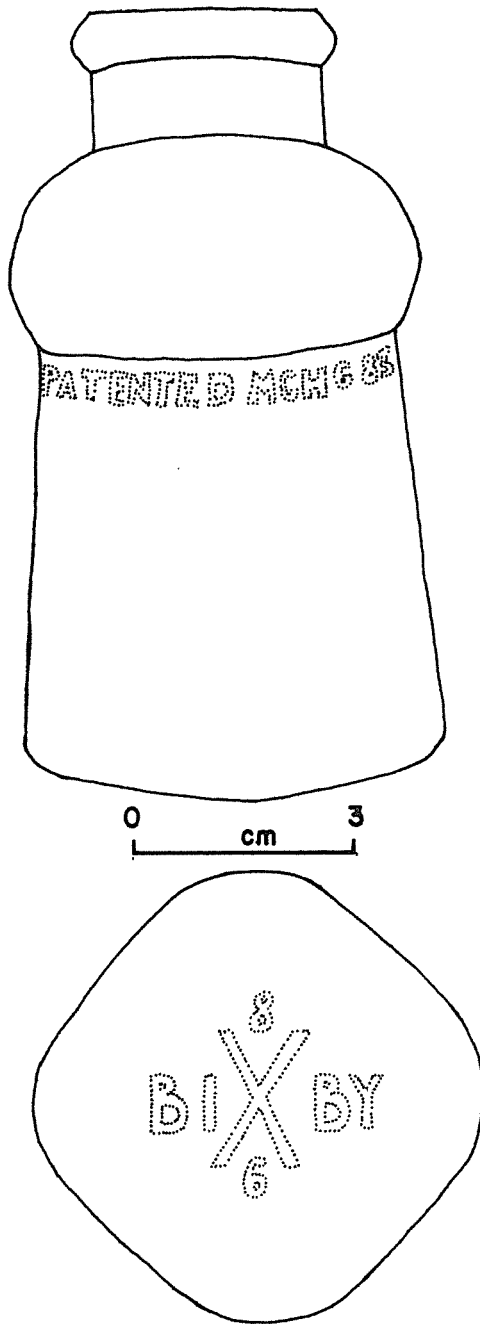


Fig. 28 Bixby bottle.

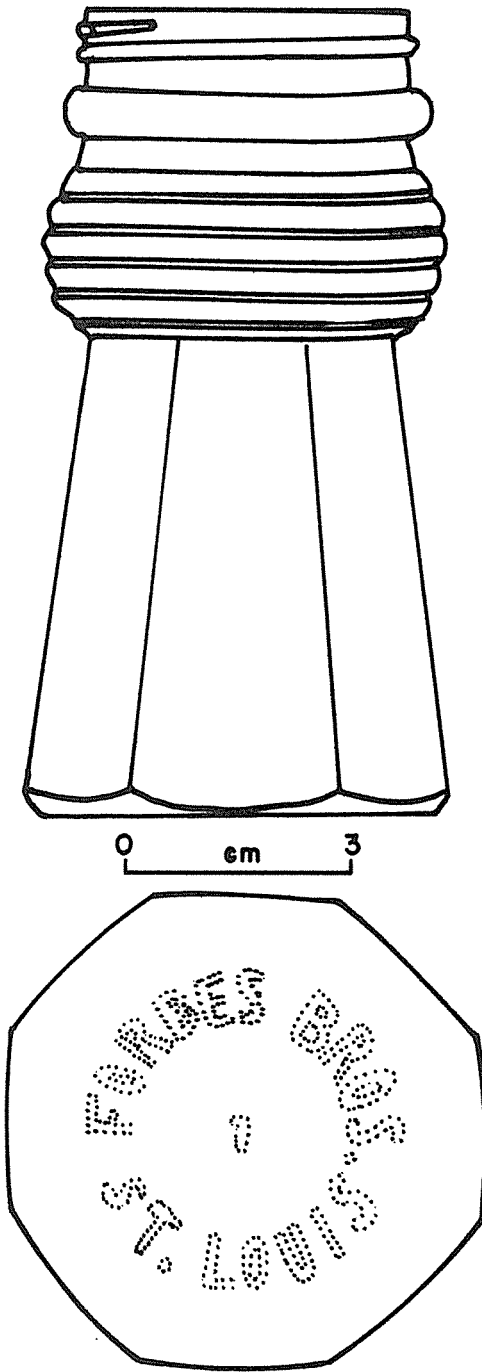


Fig. 29 Forbes Brothers jar.

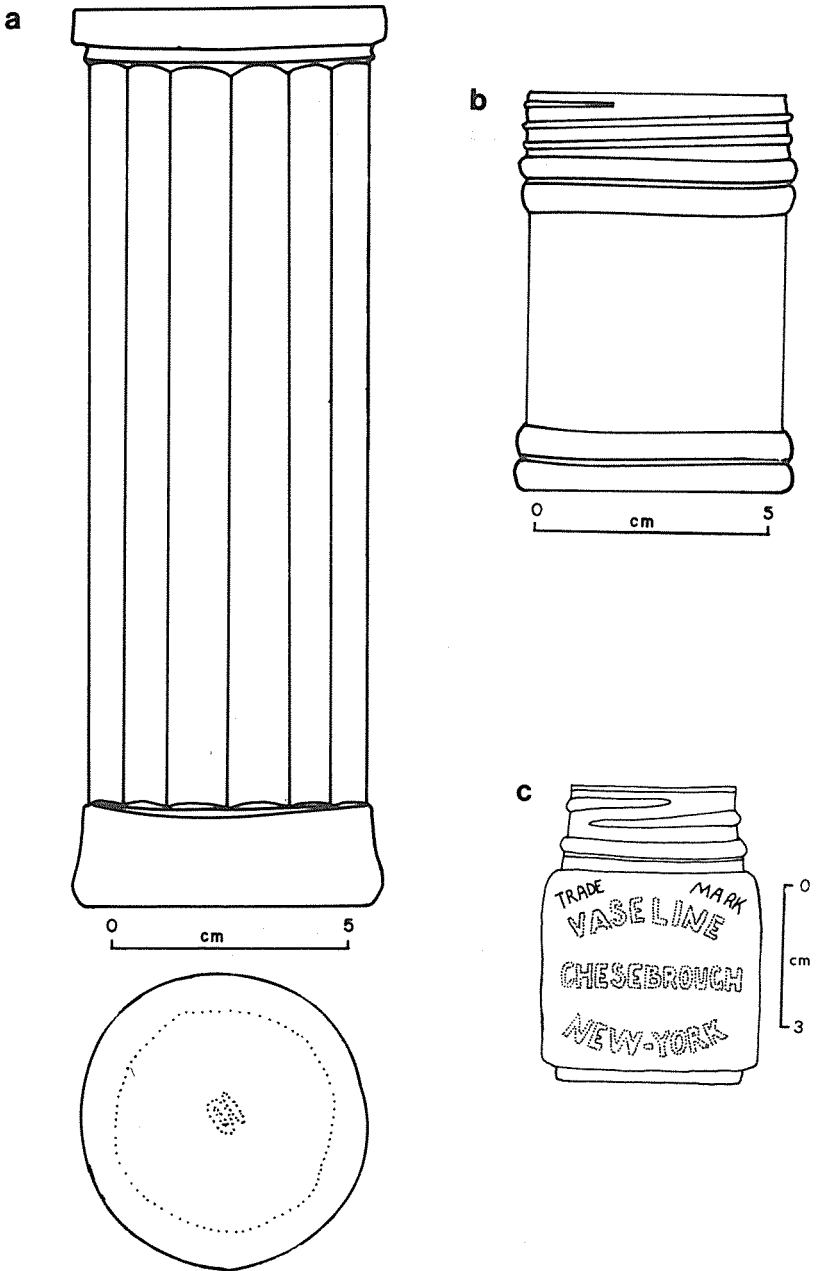


Fig. 30 Jars: a) round base; b) milk glass; c) Vaseline.

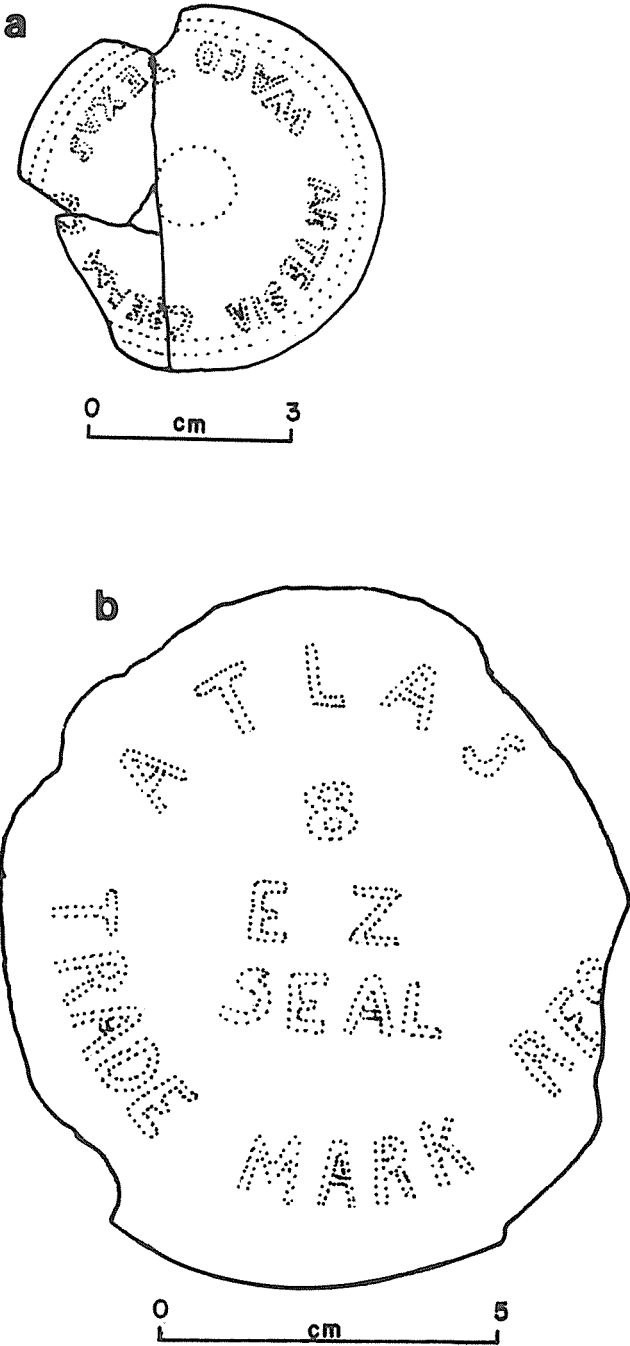


Fig. 31 Jar and lid: a) milk glass lid; b) Atlas fruit jar base.



Fig. 32 Ball fruit jar.

*Goblets***GOBLET**

Number of specimens: 1

Provenience: 301

Description: Clear, wine goblet and stem, base missing; 50 mm inside diameter of rim; floral pattern is filled in with small hexagons.

GOBLET RIM

Number of specimens: 1

Provenience: 303

Description: Clear, goblet rim; 73 mm inside diameter of rim; geometric pattern.

*Lids***CLEAR LID**

Number of specimens: 1

Provenience: 302

Description: Clear, fragment of a curved lid with a lip; probably a bowl lid; diamond and leaf pattern.

*Stems***CABLE STEM**

Number of specimens: 1

Provenience: 301

Description: Purple, rectangular body attached to a tapered stem, cable pattern on stem.

STEM AND BASE

Number of specimens: 1

Provenience: 302

Description: Clear, eight sided stem with base, 49 mm high; base has geometric diamond pattern with scalloped basal edge.

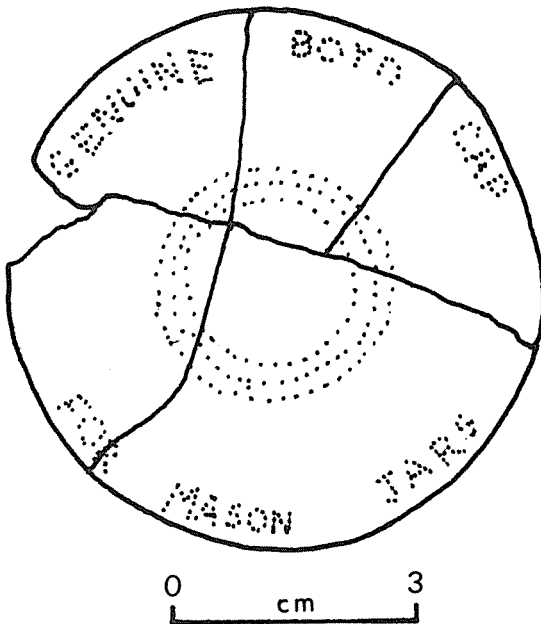


Fig. 33 Fruit jar lid.

COMPOTE STEM AND SHERDS

Number of specimens: 26 (one bowl)

Provenience: 300, 301(2), 302(22), 303

Description: Aquamarine, tapered, partially hollowed stem; glass is 8 mm thick. Rim sherds indicate large body of thick glass. Ribbed pattern on stem; floral pattern on body.

Sherds

PRESSED GLASS SHERDS

Number of specimens: 26

Provenience: 301(3), 302(16), 303(7)

Description: Three purple sherds and 23 clear sherds; 24 geometric patterns. Vessel forms are not discernible.

WINDOW GLASS

WINDOW GLASS

Number of specimens: 155

Provenience: 301(27), 302(71), 303(17), 304(40)

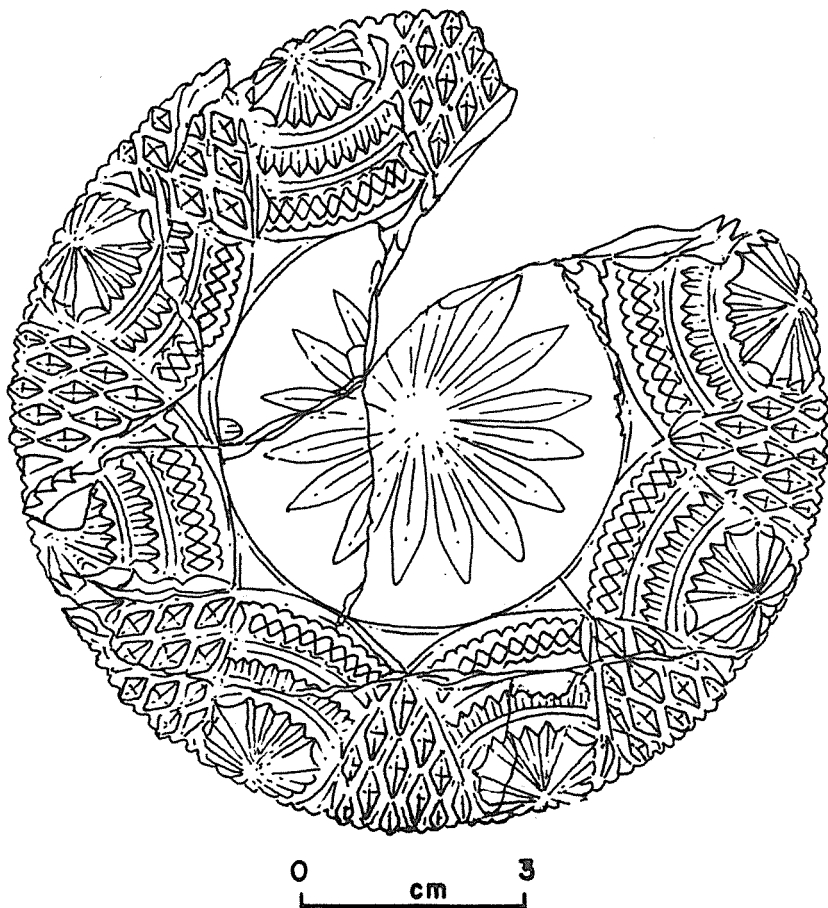


Fig. 34 Pressed glass bowl.

Description: Window glass sherds varying from 1.5 to 3.1 mm thick (between 1/16 in and 1/8 in) of the following weights: lot 302, 122 grams; lot 303, 572 grams; lot 304, 149 grams.

Discussion: Sherds from 301 were inadvertently discarded during the field school and not weighed. Sherds probably are from house windows.

MISCELLANEOUS GLASS

LAMP CHIMNEYS

Number of specimens: 89 or more (1 base, 4 rim styles, 84 body sherds representing at least 4 chimneys)

Provenience: 302(85), 303(4)

Description: Table 10.

MILK GLASS LAMP CHIMNEY

Number of specimens: 22 (one chimney)

Provenience: 302(19), 303(2), 304

Description: White, milk glass lamp chimney with embossed scroll type pattern; painted, red and green floral pattern.

Table 9

Miscellaneous Bottle and Jar Sherds (Weights in grams)

Color	300	301	302	303	304	Total
Clear	615	86	3216	267	111	4295
Brown	139	137	774	149	47	1246
Green	62	-	1134	185	54	1435
Aquablue	-	7	180	92	-	279
Purple	7	-	32	-	-	39
Dark Green	-	-	68	49	19	136
Total	823	230	5404	742	231	7430

Table 10

Lamp Chimney Fragments from Cistern One

Sherd Type And Provenience	Color	Diameter	Remarks
Rim (302)	clear	63 mm inside rim	Thin glass with a scalloped edge; 1 sherd.
Rim (302)	clear	51 mm (approximate) inside rim	Thin glass with a knobbed edge; 3 sherds.
Rim (302)	clear	52 mm (approximate) inside rim	Thin glass with knobbed edge; 5 sherds
Base (303)	clear	80 mm inside base	Thin glass; 1 sherd.
Rim (303)	frosted	50 mm (approximate) inside rim	Thin glass with a smooth edge; 2 sherds.
Body (303)	frosted		84 thin glass sherds.

GOBLETS

Number of specimens: 5 (2 stems, 1 base, 2 rim sherds)

Provenience: 301, 302(4)

Description: Clear, drinking goblets; 81 mm inside rim diameter.

STEM

Number of specimens: 1

Provenience: 304

Description: Clear, thick stem, 40 mm long; probably a compote dish.

DRINKING GLASS

Number of specimens: 4 (one glass)

Provenience: 301(4)

Description: Olive green depression glass tumbler with a base; 70 mm in diameter; embossed pattern in zigzags and triangles in rows.

GLASS HANDLE SHERD

Number of specimens: 1

Provenience: 300

Description: Handle of clear glass for a vessel. Vessel form was not identifiable.

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Hypothesis Testing and Historic Preservation at Bear Creek Shelter, Hill County, Texas

Mark J. Lynott

ABSTRACT

The value of an explicit, problem oriented research design for cultural resource management research is documented in a description of evaluative testing at a Central Texas rockshelter. The research design incorporates regionally significant hypotheses about changes in paleoenvironment, technology, and settlement/subsistence activities. Test implications relating to the hypotheses are used to guide field and laboratory research; data collected during the study are considered in terms of the specific hypotheses. The site is evaluated in regard to its significance to regional research concerns.

INTRODUCTION

The growth and development of contract archeology as a significant and valid part of archeological research has been a slow and gradual process. Despite its past association with emergency salvage operations, modern contract research has the potential to be well planned, organized, and highly effective. General fact gathering under the guise of salvage is no longer acceptable; the dichotomy between pure research and contract/salvage archeology is becoming less viable. Conservation archeology requires that any expenditure of a resource be economical and oriented toward the solution of substantive problems. This circumstance requires the use of a fully developed and carefully planned research design (Goodyear et al., 1978).

Research contributions of an evaluative testing program conducted at a Central Texas rockshelter under the sponsorship of the U.S. Army Corps of Engineers is summarized. The research design of the project was developed to permit examination of several research problems relating to interpretation of regional prehistory. The potential of the National Register of Historic Places as a preservation tool for significant cultural resources also is documented.

Bear Creek Shelter (41HI17) is located in the Bear Creek drainage, a tributary of the Brazos River in Central Texas. The site was recorded by the River Basin Surveys prior to the construction of Lake Whitney (Stephenson, 1970). It was evaluated on the basis of a 22 ft x 5 ft trench through the main part of the shelter. Very few artifacts were recovered and the site was judged to be a short term campsite unworthy of additional consideration.

In fairness to the River Basin Surveys, the limited time and money available coupled with the presence of several other large, well stratified

rockshelters in the area probably explains the conclusions they reached (Lynott, 1980a). Thus, the River Basin Surveys used the allocated time and funding to investigate the site and evaluate it against a general set of research concerns and the potential of other rockshelters in the area. These same types of significance judgments are currently a part of conservation archeological research.

Construction of the original Lake Whitney failed to inundate the site on a regular basis until the lake was enlarged during the middle 1970's. The site was monitored and the immediate erosional damage inflicted upon it by wave action from the lake recorded. Large numbers of artifacts were exposed by the erosional process. The U.S. Army Corps of Engineers was notified of the potential significance of the site.

The site was nominated to the National Register of Historic Places by the Archaeology Research Program at Southern Methodist University. Negotiations between the U.S. Army Corps of Engineers, representatives of the State Historic Preservation Officer, and the Archaeology Research Program resulted in the initiation of a small scale testing program (Lynott, 1976). This testing operation revealed at least 2 m of stratified cultural deposits. The U.S. Army Corps of engineers sponsored additional evaluative studies (Lynott, 1978).

RESEARCH DESIGN

Bear Creek Shelter is situated on the south side of Bear Creek about a mile east of the Brazos River. The shelter is situated in the side of a limestone bluff about 25 m from the current channel of Bear Creek. At conservation level, water impounded by the Whitney Dam covers the floodplain and much of the talus slope in front of the rockshelter (Fig. 1). Only a limited portion of the cultural deposit usually is exposed. The shelter faces toward the west, with the long axis of the shelter running roughly north-south. The overhang covers approximately 225 sq m with an additional 300 sq m of talus slope deposit in front of the shelter (Fig. 2).

The site is situated in the Grand Prairie biotic province. The native uplands of this area are dominated by tall grass prairie, while the floodplains are a mosaic of meadows among hardwood forests. The site is situated near the edge of the prairie and the bottomland forest. The area around the site today consists of juniper, hackberry, mesquite, and oak overstory, with a pasture grass understory. The area has been altered by historic agricultural activities.

The testing program provided sufficient background about the kinds of data which might be preserved to permit the generation of a relatively specific research design (Lynott, 1976). Major goals of the testing program were to gather data relating to the research and management potential of the site. Generally, this information relates to the depth, content, and preservation of the rockshelter deposit. More specifically, the project was designed to test four hypotheses relating to interpretive problems of Central Brazos River prehistory.

With the current trend toward regional archeological analysis, the nature of prehistoric occupations in rockshelters of the Central Brazos River drainage has become a significant concern. Rockshelters are relatively com-

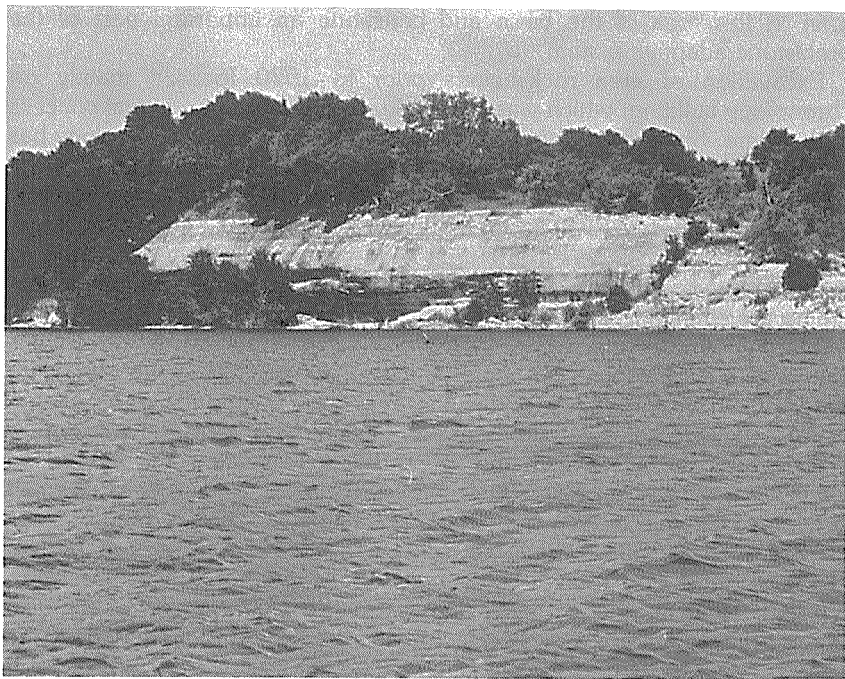


Fig. 1 Bear Creek Shelter with Lake Whitney at conservation level.

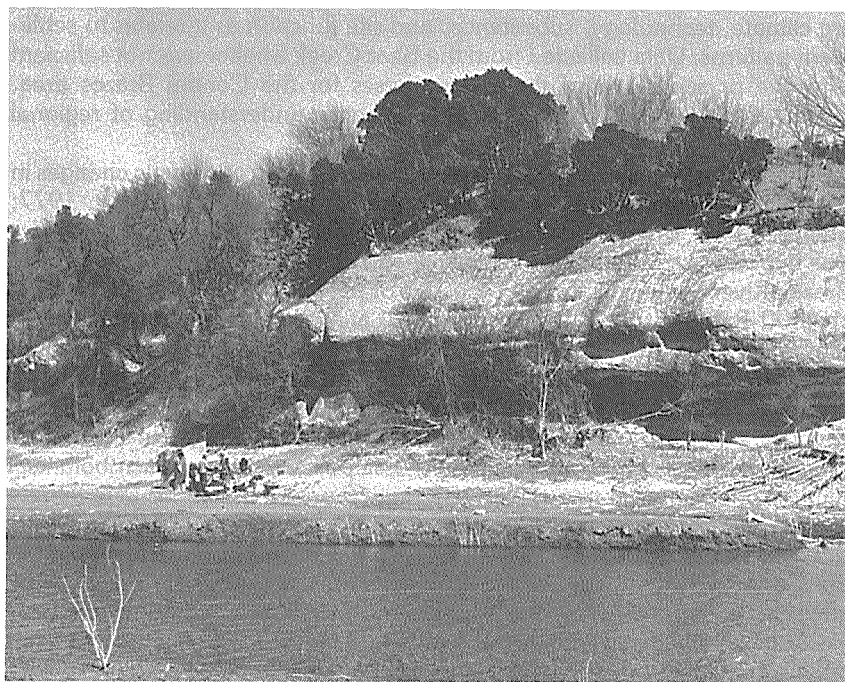


Fig. 2 Bear Creek Shelter with Lake Whitney at an unusually low level.

mon in this area of the basin and constitute an important part of the prehistoric adaptive system.

Excavation of area rockshelters prior to 1970 focused mainly on chronology building, which was the single most important regional concern at that time. Since then, the development of Central Texas archeology has generated a new set of research concerns. These concerns focus on the functional nature of rockshelters as part of the prehistoric adaptive systems of the Central Brazos River basin. In the last four decades, most of the large, well stratified rockshelters in the area have been extensively excavated by archeologists or vandals. Bear Creek Shelter offers an opportunity to examine the changing nature of a rockshelter occupation.

The hypotheses and test implications were generated from regional archeological literature and existing research concerns. They form the basis for the research design which guided the evaluative testing program at Bear Creek Shelter. The research design was developed prior to the initiation of fieldwork at the site. Field and laboratory investigations were directed toward the collection of data which reflected upon the pertinent research concerns identified in the research design. These hypotheses by no means exhausted all potential research concerns in the Central Brazos River Valley. However, they are relevant to recent area studies. Although the hypotheses are somewhat interdependent in regard to the interpretation of regional prehistory, each hypothesis is presented and evaluated independently of the others.

The research design focuses on four aspects of change in the natural and cultural environments of the Central Brazos River Valley. These four areas are climate, technology, subsistence, and site function as it relates to settlement patterns. Data collected from the Bear Creek Shelter was not sufficient to prove or reject any of these hypotheses for the Central Brazos area. However, these data do contribute to a better understanding of regional problems.

The first hypothesis deals with the nature and timing of climatic changes in the Central Brazos River Valley. From the literature (Bryan, 1969, 1977; Shafer, 1977; Bryan and Shafer, 1977; Ritchie and Slaughter, 1972), it was hypothesized that major ecological and climatic changes in the Central Brazos River Valley occurred at the end of the Pleistocene/early Holocene (10,000 B.P. - 7000 B.P.), during the Late Archaic substage (ca. 3000 -2500 B.P.), and at the end of the Early Neo-American substage (750 B.P.). Recognizing that rockshelters represent specialized and potentially protected ecological situations, it was anticipated that regional climatic changes would be manifested in the archeological record at the site. These climatic changes would be reflected in fossil pollen profiles, macrobotanical remains, depositional processes, vertebrate faunal remains, or invertebrate remains.

The second hypothesis deals with the nature of technological change in the Central Brazos River Valley. Traditionally, the change from use of the atlatl to use of the bow and arrow has been viewed as a major development associated with the beginning of the Neo-American stage. In a study of changes in lithic tool manufacture in the Lake Whitney area, Skinner and Gallagher (1974) observed a shift from biface reduction (associated with dart point production) to a core and flake technology (associated with arrow

point production). It was hypothesized that these technological changes are common to the entire Central Brazos River Valley and are interpretable within the Bear Creek Shelter sequence.

In testing the hypothesis, it is necessary to assume that similar sizes of raw material are available throughout the prehistoric period. Given this, it is anticipated that core and biface technologies will produce equal amounts of primary debitage. Interior and possibly secondary elements will be more numerous in biface reduction technologies, but average flake size will be smaller. Conversely, interior and secondary elements will be fewer but larger in core and flake technologies. Average number of dorsal flake scars is expected to be higher and frequency of faceted platforms greater in biface than in flake production technology. It is expected that a biface technology will result in the discard of broken and unacceptable bifaces, while flake technology will be reflected in a large number of exhausted and partially exhausted cores.

The study of culture change in Central Texas generally has focused upon changes in projectile point styles. Shafer (1977) proposed a more extensive model of technological changes in response to a regional climatic and ecological shift. The third hypothesis considered during the study of the Bear Creek Shelter was generated from that model.

The third hypothesis is that major changes occurred in the Central Brazos River basin adaptive systems at about 750 B.P. Prior to this time, nomadic hunting and gathering aimed at exploitation of bottomland resources was the dominant subsistence strategy. After 750 B.P., local economic patterns shifted to horticulture and bison hunting. Associated with this economic shift was a shift from smaller seasonal camps to larger more sedentary villages. It is hypothesized that the function of rockshelters also changed at this time.

Assuming the hypothesis is correct, it is anticipated that there will not be major changes in the lithic assemblage, faunal and floral assemblages, or feature types present prior to the Late Neo-American occupation of the site (ca. 750 B.P.). During the Late Neo-American occupation, horticultural remains, bison scapula hoes, bison remains, end scrapers, four edge beveled bifaces, blades, flake drills, and large leaf shaped bifaces will increase significantly. Nature and number of occupational features and reflected activities will change with the shift from smaller temporary camps to larger more sedentary habitation sites. If the settlement patterns of the Central Brazos River Valley changed about 750 B.P., it is expected that the nature of rockshelter occupations in this area changed in some discernable way.

The final hypothesis tested at Bear Creek Shelter also concerns the functional nature of rockshelters in the Central Brazos River basin. A list of potential hunting and gathering activities which might pertain to prehistoric occupants of the Central Brazos River Valley was generated. The list was refined to include only those activities which could be recognized given anticipated preservation conditions at Bear Creek Shelter. These potentially recognizable activities include cooking, animal food processing, plant processing, manufacture of perishable products (basketry, bone tools, etc.), primary lithic procurement, rough lithic tool manufacture, finished lithic tool manufacture, and disposal of the dead.

The fourth hypothesis proposes that the nature of activities at Bear Creek Shelter changed through time. Furthermore, it was hypothesized that not all

potential activities were conducted during any single occupation.

Implementation of a test of the hypothesis required that attributes characteristic of the hypothesized activities be identified. Cooking would be recognized by burned and fire cracked rock, charcoal, ash, burned food remains, ceramics encrusted with burned food, and hearths. Primary lithic procurement would be recognized by unmodified raw material, cores with few flake scars, large numbers of primary flakes, hammerstones, and debitage with very few dorsal flake scars.

Rough lithic tool manufacture would be identified by hammerstones, cores, large quantities of lithic debris, high frequencies of secondary debitage and broken, roughly shaped bifaces. Finished lithic tool manufacture would be identified by hammerstones, bone or antler flaking tools, large quantities of interior debitage, broken preforms, small interior pressure flakes, well developed bifaces, unused lithic tools, and a relatively high number of dorsal flake scars on debitage.

Animal food processing would be recognized by tools with edge damage, animal remains, cut and butchered bone, and small interior resharpening flakes. Plant food processing would be recognized by manos, metates, nutting stones, mortars, plant food remains, and lithic tools with edge damage. Recognition of manufacture of perishable products was entirely dependent upon preservation conditions but would include complete and partially complete wooden tools, basketry, etc. Disposal of the dead would be identified by intentional human burials. Since some attributes pertain to more than one activity, activities must be identified by combinations of attributes.

Implementation of the research design was affected by contractual obligations, funding limits, and an interest in economical expenditure of the resource. A total of 11 1 m square units were excavated in controlled 10 cm levels. Arbitrary levels were utilized because natural stratigraphic units were generally large and contacts between natural strata were not distinguishable during excavation. A total of 28.1 cu m of matrix from these units was sifted through 1/4 in hardware cloth (Fig. 3). A 25% sample of each arbitrary level from two of the units was fine screened through 1/16 in mesh. Temporal constraints prohibited total excavation of all units; culturally sterile geological deposits were reached only in unit 1. Figure 4 illustrates the location of test units in relation to the shelter deposit. The following data are designed to provide specific information relating to the hypotheses under consideration. A complete description of field and laboratory methods was provided elsewhere (Lynott, 1978).

FIELD AND LABORATORY DATA

The depositional environment of Bear Creek Shelter was not fully studied, but observations of local topography and site stratification were made. The westward facing nature of the shelter permits considerable precipitation and some wind blown sediments to be deposited at the mouth and talus slope. Overhang depth is sufficient to curtail great amounts of precipitation and most wind blown sediments from reaching the rear of the shelter. The bulk of the sediments deposited at the mouth and talus slope appear to be a combination of slopewash from surrounding limestone bluffs, roof fall, and wind blown sediments.



Fig. 3 Test excavations inside Bear Creek Shelter.

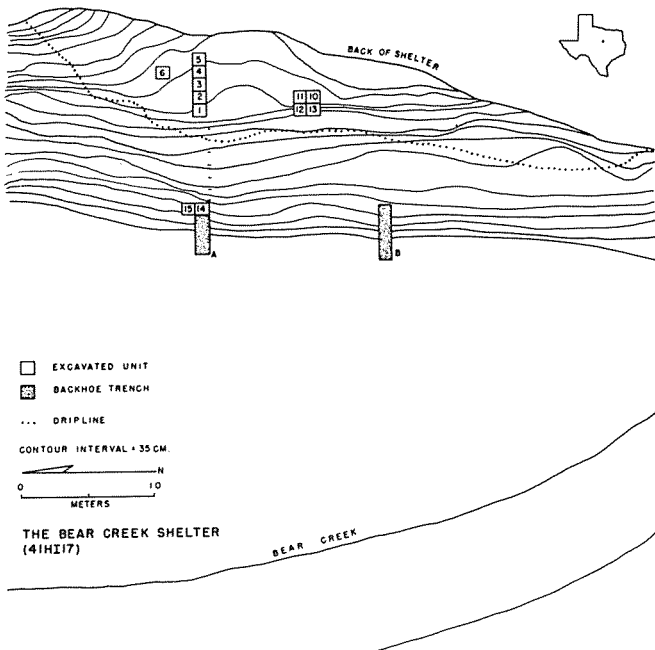


Fig. 4 Topographic map of cultural deposit at Bear Creek Shelter.

Slightly different depositional conditions existed at the rear of the shelter. Exfoliated limestone from the roof and rear forms the basis of the natural deposit. Since less precipitation reached the shelter rear, individual strata show little sign of leaching and are visually more distinct than those at the front of the shelter.

The top strata within the shelter were very light colored layers of decomposed limestone. Occasional, thin, discontinuous sheets of darker, organic sediments were encountered within this zone. This deposit covered a dark organic layer containing a high density of artifacts. Lighter organic sediments were under this dark layer. Differences between sedimentary layers in the upper 3.5 m of the profile (Fig. 5) mainly are attributable to the amount of organic material present in the deposit. In sharp contrast to these layers, the lowest stratum in the profile is a sandy deposit which may be a result of alluvial deposition. The only artifacts were associated with thin, discontinuous sheets of dark midden deposit.

In an effort to quantify the distribution of limestone roof spalls, field investigations recorded the cumulative weight of unburned limestone spalls for each arbitrary excavation unit and level. There is a slight increase in the amount of roof spalling with relative depth in the deposit. However, it is greatly overshadowed by the increase of roof spalling from the mouth to the rear of the shelter. Roof spalling data support the observation that differing depositional environments existed at the front and rear of the shelter.

Hand and machine excavated units at the base of the talus slope revealed considerable disturbance, presumably from wave action. The black clay layers in this area appear to be a combination of natural and cultural sediments, overlying a light brown sediment. The natural stratification of the shelter is illustrated in Figure 5.

Analysis of the vertical distribution of field and laboratory data suggests that several occupational zones are recognizable (Fig. 6). These zones correspond generally with known chronological phases in Central Texas prehistory. Since artifacts were distributed vertically throughout the deposit, evidence for long term shelter abandonment is lacking. Artifacts were not concentrated in any level that could be recognized as a floor or sedentary occupation. Relative frequencies of cultural material, changes in artifact styles, radiocarbon dated charcoal samples, stratification of the deposit, and sediment chemistry were used to correlate excavation levels and interpret the cultural sequence.

The earliest occupation is attributed to the Middle Archaic substage. It was recognized as a sheet midden overlying what appears to be alluvial sandy clay and waterwashed limestone cobbles. This midden was recorded at about 4.0 m below surface. It lies a meter below a feature dated at 2450 B.P. Extrapolation from stratigraphically more recent radiocarbon dates in the sequence suggests that the Middle Archaic occupation zone spans the period 4950 B.P. to 2950 B.P. This span roughly corresponds with phases V and VI at Stillhouse Hollow Reservoir on the Lampasas River (Sorrow et al., 1967) and Clear Fork and Round Rock Phases (Weir, 1976).

The next occupation of the shelter is attributed to the Late Archaic substage. It overlies the Middle Archaic zone and varies in thickness from 40 to 60 cm. A radiocarbon date from the upper part of this zone indicates an age of 2500 B.P. A radiocarbon date from the middle of this zone in unit 11

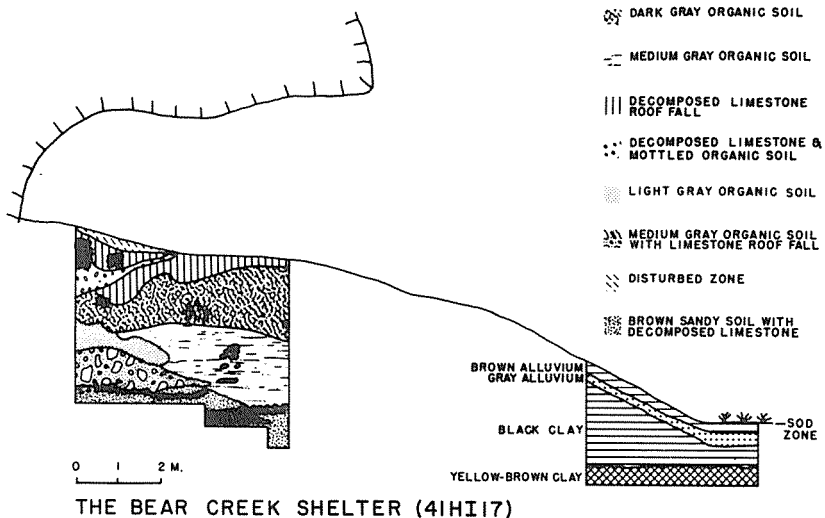


Fig. 5 Stratigraphic profile of test units at Bear Creek Shelter.

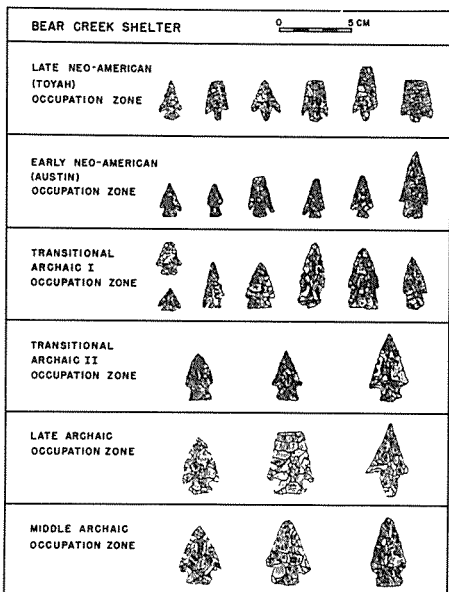


Fig. 6 Interpreted cultural sequence at Bear Creek Shelter.

(4275 ± 140 years B.P.) appears much too early for material recovered. Rodent activity or possibly prehistoric human activity may be responsible for the poor context of this date. Overall, the span of the Late Archaic occupation is estimated at 2950 B.P. to 2150 B.P. This span corresponds roughly with phase VII at Stillhouse Hollow Reservoir (Sorrow et al., 1967) and the San Marcos Phase (Weir, 1976).

The third occupation of the site is the Transitional Archaic substage. Two separate occupations were recognized in units 1-5, but the distinction between these occupations could not be made in units 10-13. The lower of the two occupations, Transitional Archaic II, varies in thickness from 50 to 70 cm. Transitional Archaic I overlies Transitional Archaic II and varies in thickness from 30 to 50 cm. The Transitional Archaic substage comprising the two occupations corresponds with the early part of the Twin Sister Phase (Weir, 1976) and phase VIII at Stillhouse Hollow Reservoir (Sorrow et al., 1967). Transitional II is believed to represent the period from about 2150 B.P. to 1750 B.P., while Transitional I is estimated at 1750 B.P. to 1450-1350 B.P.

The next recognizable occupation of Bear Creek Shelter is attributed to the Austin Phase. This occupation zone is the early phase of the Neo-American or Late Prehistoric stage and spans the period from 1450 - 1350 B.P. to about 750 B.P. This occupation zone varies from 50 to 80 cm in thickness. Four radiocarbon dates from this zone (Table 2) are consistent with this estimate.

The final prehistoric occupation of the rockshelter is attributed to the Toyah Phase, which is the later phase of the Neo-American stage. This occupation zone varies from 70 to 100 cm in thickness and probably dates from 750 B.P. until about 350 B.P. The Toyah Phase occupation is capped by a layer of recent sterile sediment.

A total of 25 occupational features were recognized during the course of the testing campaigns. The majority were concentrations of burned rock and sediment. Other classes of features included a sheet midden, a human interment, mussel shell concentrations, and snail shell concentrations (Table 3). The majority of these features were relatively small and indicated limited use. Evidence of distinct living floors was not encountered; it seems unlikely that any sedentary or semisedentary occupation occurred in the shelter.

Laboratory analysis of flaked lithics consisted of technological classification of lithic debris and morphological classification and microscopic examination of tools. Twenty eight cores were classified into six types based upon number, character, and placement of striking platforms (Table 4). A total of 6864 flakes, 2091 proximal flakes, 364 blades, and 11,720 pieces of non diagnostic shatter were recovered. Lithic debris was examined for the following attributes: percentage of cortex on the dorsal surface, type of striking platform preparation, number of flake scars on the dorsal surface, length, width, thickness, and weight (Tables 5, 6). These attributes were selected because they related directly to the hypotheses and test implications under consideration.

Flaked lithic tools included chert and quartzite pieces that exhibited retouch modification. These pieces were classified using a standard morphological typology (Shiner, 1974) and examined under a 30x binocular

microscope for evidence of edge damage. Edge damage classes were adopted from Greiser (1977). A quantitative summary of flaked lithic tools is presented in Table 7. Other manufactured and modified objects recovered from the site included ground and pecked lithic tools, modified bone and shell ceramics, and unmodified rocks brought into the shelter by man (Table 8).

Sixteen pollen samples were collected using methods recommended by Bryant and Holz (1968). None yielded sufficient pollen to permit a 200 grain count. Consequently, paleoenvironmental interpretations based upon pollen analysis are limited. Indications are of a relative consistency in the species identified throughout the occupation of Bear Creek Shelter (Table 9).

Macrobotanical remains recovered consisted mainly of charred wood; fine screening did recover a limited sample of seeds (Table 10). Seed remains are primarily hackberry and occur throughout the occupational sequence. Identification of larger fragments of charred woods include oak, hackberry, cedar, elm, sycamore, mesquite, and either hickory or pecan. There appears very little variation in composition during the occupation of the site (Table 11). Paleoenvironmental interpretation of the macrobotanical remains suggests an extensive hardwood-floodplain forest existing in the vicinity of the site throughout most of its occupation. An extensive forest probably was present in the bottomlands of lower Bear Creek and the nearby Brazos River.

Vertebrate faunal remains from Bear Creek Shelter are comprised of birds, fish, reptiles, amphibians, and mammals (Murry, 1978). The overall composition of the faunal remains coincides with the interpretation of an associated floodplain forest. White-tailed deer, eastern cottontail rabbit, and turtle seem to represent the most important economic species (Tables 12, 13). Presence of several types of migratory birds indicates September through May exploitation. Limited prairie species recovered include bison, meadowlark, and several rodents. Significant changes in the composition of the faunal assemblage are not notable during the occupation of the site. Overall, the faunal evidence is indicative of a bottomland forest environment and bottomland riverine exploitative pattern throughout the occupation of the rockshelter.

Invertebrate faunal remains are comprised of snails and freshwater shellfish. Two species of gastropod were recovered, both of which indicate riparian environments. *Mesodon roemeri* (Pfeiffer) is a deep riparian woodland snail. It was recovered from every occupation zone recognized in the stratigraphic sequence. This snail was far less common than were the remains of *Rabdotus mooreanus* (Pfeiffer), which occurred in large numbers in almost every excavation unit. *Rabdotus mooreanus* (Pfeiffer) occurs on river terrace deposits in sparsely wooded areas near water. The high frequency of this snail coincides with the dominance of non aboreal pollen noted from the limited pollen counts.

Thirteen species of pelecypods were recovered and identified from Bear Creek Shelter (Table 14). *Proptera purpurata* (Lamarck), *Obvaria olivaria* (Arfinesque), and *Crytibiais tamicoensis* (Lea) are predominant in terms of number and frequency of occurrence in all cultural zones. These and other common shellfish recovered from the site prefer large river and stream

Table 1
Limestone Roof Fall as measured in Kilograms

Depth (cm)	Excavation Units								
	1	2	3	4	5	10	11	12	13
30			5	7	20		6		5
40			5	6	20		2	1	3
50			1	1	20		2	5	4
60			1	6	20		2	7	9
70			17	3	1		10	2	8
80			17	5	22		19	9	8
90			4	4	1		8	13	10
100			6	3	4		8	5	5
110		6	2	3	1		5	6	14
120		4	9	1	22		10	3	20
130		3	2	1	2	32	3	1	21
140		3	32	2	1	32	3	61	24
150		7	23	5	2	13	10	12	26
160		10	30	16	40	13	11	9	9
170		15	10	5	10	13	16	21	3
180		7	5	5	10	14	23	8	3
190		9	2	4	53	2	15		
200		2	0	6	14	1	7		
210	10	2	40	30	29	0	1		
220	2	3	40	10	31	4	2		
230	2	4	6	10	105	11	7		
240	3	9	2	6	105	17	17		
250	3	51	14	9	53	17	8		
260	2	9	1	30	31	14	8		
270	1	8	1	42	13	41	35		
280	1	0	2	57	48	41	18		
290	10	14	25	60	27	41	63		
300	16	10	19	162	210	21			
310	1	8	3	20	210				
320	13	9	5	35	210				
330	8	6	14	33	150				
340	14	9		78	150				
350	33	7							
360	18	18							
370	28	32							
380	10	55							
390	8								
400	32								
Average Kg/level	10.8	11.1	11.4	20.8	51.1	18.1	11.8	10.9	10.8

habitats. Although bottom habitat preferences differ somewhat among the pelecypods recovered, all preferred habitats were present in the Brazos River and lower Bear Creek throughout most of the site occupation. Overall, the shellfish remains exhibit relative consistency from the Middle Archaic through Toyah occupations.

RESEARCH INTERPRETATIONS

Hypotheses and test implications were generated to investigate changes in prehistoric adaptation patterns in the Central Brazos River Valley. Cur-

Table 2
Uncorrected Radiocarbon Dates From Bear Creek Shelter

Context	Occupation	Estimated Age	Sample Number
Unit 2	Transitional I	1570 B.P. ± 60	TX 2942
Unit 2	Late Archaic	2380 B.P. ± 220	TX 2965
Unit 3	Austin	1380 B.P. ± 100	TX 2940
Unit 3	Transitional I	1340 B.P. ± 60	TX 2941
Unit 5	Austin	950 B.P. ± 50	TX 2962
Unit 5	Transitional II	1770 B.P. ± 140	TX 2964
Unit 10	Austin	1030 B.P. ± 50	TX 2961
Unit 10	Transitional II	2110 B.P. ± 150	TX 2959
Unit 11	Toyah	630 B.P. ± 50	TX 2939
Unit 11	Toyah	770 B.P. ± 100	TX 2963
Unit 11	Late Archaic	4150 B.P. ± 140	TX 2958
Unit 12	Austin	1130 B.P. ± 50	TX 2960

Table 3
Summary of Occupational Features (Volume excavated)

Toyah Focus Occupation Zone (7.5 cu m)

Unit 11—small concentration of burned rock, charcoal, burned bone, and mussel shell; small concentration of burned rock, large amount of charcoal.

Unit 12—small concentration of unburned mussel shell and some bone; concentration of burned rock overlying a charcoal concentration.

Unit 13—small concentration of snail shells.

Unit 10—small area of burned sediment and burned rock.

Austin Focus Occupation (5.7 cu m)

Unit 1—concentration of burned rock and some charcoal extending into side wall.

Unit 3—concentration of burned rock covering about 30 cm in diameter; small concentration of burned rock and oxidized sediment.

Unit 5—small concentration of snail shell and bone; small concentration of burned rock and charcoal extending into north wall of excavation unit.

Unit 10—small area of burned sediment and charcoal.

Unit 12—small area of burned rock and charcoal; burned rock and burned sediment with charcoal covering about 0.5 sq m.

Unit 13—small area of burned rock, burned sediment ash, and charcoal.

Transitional Archaic Occupation Zone I (2.0 cu m)

Unit 2—relatively large concentration of burned rock and charcoal.

Unit 3—burned rock concentration covering about 1.0 sq m.

Transitional Archaic Occupation Zone II (3.0 cu m)

Unit 4—small concentration of burned rock and charcoal.

Unit 5—human interment lying on left side facing west; small concentration of charcoal and burned rock.

Transitional Archaic Occupation Zone—undifferentiated (1.0 cu m)

Unit 10—small concentration of burned rock, burned sediment, and charcoal.

Late Archaic Occupation Zone (3.5 cu m)

Unit 2—medium size concentration of burned rock and charcoal.

Unit 11—small concentration of burned rock overlying concentration of charcoal.

Middle Archaic Occupation Zone (5.4 cu m)

Unit 1—thin sheet midden lens.

Unit 3—small concentration of burned rock.

Table 4

Cores From Bear Creek Shelter

	Single Platform	Two Opposed Platforms	Two Perpendicular Platforms	Two Platforms on Different Planes	Amorphous	Pyramidal	TOTALS
Toyah Focus Zone	3	0	2	0	3	1	9
Austin Focus Zone	1	1	1	0	3	1	7
Transitional Archaic Zone I	0	1	0	0	1	1	3
Transitional Archaic Zone II (undifferentiated)	1	0	0	2	0	0	3
Late Archaic Zone	0	2	0	0	1	0	3
Middle Archaic Zone	0	0	2	0	0	0	2
TOTALS	5	4	6	2	8	3	28

rent archeological models for Central Texas in general, and Central Brazos River Valley in particular, suggested that a major climatic change at about 750 B.P. resulted in a drastic change in adaptive strategy (Shafer, 1977; Skinner et al., 1978). Other extant models are concerned with the settlement-subsistence patterns of the prehistoric Brazos River basin. With this emphasis on models dealing with paleoecology and exploitation of past environments, the research at Bear Creek Shelter was directed toward these important concerns. Data available from Bear Creek Shelter offer the opportunity to improve significantly the understanding of prehistory in the Central Brazos Basin by supporting or contradicting these hypotheses.

Hypothesis One

It was hypothesized that major ecological and climatic changes in the Central Brazos River Valley occurred at the end of the Pleistocene (10,000-8000 B.P.), during the terminal part of the Archaic period (2950 B.P.-2450 B.P.), and at 750 B.P. The climatic change at 10,000 B.P. appears to be widespread and associated with the final retreat of the alpine and continental glaciers of North America. The archeological record at Bear Creek Shelter does not contain occupational or ecological data that can be attributed to this period. Consequently, this aspect of the hypothesis cannot be tested.

Climatic change during the terminal part of the Archaic stage was proposed in a study of the geologic history of nearby Aquilla Creek (Ritchie and Slaughter, 1972). This study indicated that a degradational period ended and the modern aggradational period started at about this time. This time period is thought generally to precede the beginnings of technological innovation leading to the concentrated use of the bow and arrow rather than the atlatl. A major climatic change may have been associated with the changes in technology.

The hypothesis of a major climatic change in Central Texas at about 750 B.P. was proposed by Shafer (1977). This climatic change was seen as a major drying period that increased the amount of grassland habitat in Cen-

Table 5
Lithic Debris Recovered from Quarter Inch Screening Process/Fine Screening Process

	Flakes	Proximal Flakes	Blades	Average Number of Dorsal Flake Scars	Average Length mm	Average Width mm	Average Thickness mm	Average Weight gms	Non-Diagnostic Shatter
Toyah Focus Zone	1116/27	325/16	90	2.7/2.0	21.3/15.4	17.9/14.4	4.1/2.9	1.9/1.2	1581/227
Austin Focus Zone	2328/89	603/30	121/2	2.6/2.3	18.9/10.2	16.7/8.4	3.4/1.6	1.4/0.5	3564/474
Transitional Archaic Zone I	725/19	276/4	48	2.5/2.5	19.0/10.0	15.3/8.2	3.4/1.5	1.2/0.3	1224/211
Transitional Archaic Zone II	719/6	237/3	34	2.7/1.8	19.9/7.3	17.2/7.3	3.6/1.2	1.5/0.2	1263/63
Transitional Archaic Zone (undifferentiated)	525/22	168/18	16	2.6/1.9	16.9/7.0	15.5/7.9	3.3/1.4	1.2/0.2	739/345
Late Archaic Zone	643/45	237/15	34/3	2.6/1.8	19.1/10.5	16.7/9.0	2.7/1.0	1.5/0.4	1157/562
Middle Archaic Zone	556/44	152/7	16	2.4/1.9	19.1/15.3	17.1/13.0	3.3/3.8	1.5/2.0	499/300
TOTALS	5612/252	1998/93	359/5						10,027/2,182

Table 6
 Attribute Percentages of Lithic Debris Recovered from Quarter Inch Screening/Fine Screening Process

	Interior Elements %	Secondary Elements %	Primary Elements %	Cortex Platforms %	Plain Platforms %	Dihedral Facetted Platforms %	Multi-Facetted Platforms %	Bulb-only Platforms %
Toyah Focus Zone	56.7/61.8	29.9/32.4	13.4/5.9	24.4/19.5	54.4/75.6	06.6/2.4	06.8/0	08.1/2.4
Austin Focus Zone	55.1/84.4	33.8/13.1	11.1/2.5	20.3/6.7	57.7/80.8	08.2/3.3	06.0/1.7	08.0/7.5
Transitional Archaic Zone I	59.4/89.0	28.8/7.7	11.8/3.8	22.1/17.4	52.9/65.2	06.9/4.3	08.9/4.3	09.2/8.7
Transitional Archaic Zone II	61.3/100.0	27.5/0	11.1/0	23.4/22.2	55.3/33.3	06.1/22.2	08.0/11.1	07.3/11.1
Transitional Archaic Zone (undifferentiated)	62.9/91.3	28.5/6.7	08.6/2.0	14.7/15.0	63.4/60.0	10.4/12.5	04.1/5.0	07.3/7.5
Late Archaic	64.3/77.8	26.0/17.5	09.8/4.8	16.7/14.3	53.1/71.4	09.0/6.3	09.7/3.2	11.6/4.8
Middle Archaic Zone	49.2/54.9	30.0/45.1	20.8/0	23.8/25.5	52.4/58.8	07.3/5.9	05.3/2.0	11.2/7.8

Table 7
 Tool Types Presented by Occupation Zones and Artifact Edge Wear

	Roughout	Blank	Preform	Projectile Point	Arrow	Dart	Expanding Stem	Straight Stem	Contracting Stem	Drill	Notch	Graver	End Scraper	Side Scraper	Misc. Scraper	Retouched Piece	Hammerstone	Totals	Rounding	Use Retouch	Step Flaking	No Wear
Toyah Focus Zone	7	13	16	26	15		6	1	7	2		3	3	3	3	23	125	16	15	22	57	
Austin Focus Zone	7	9	27	49	20	2	16	2		1	3	2	1	1	4	47	1	192	30	29	40	71
Transitional Archaic Zone I	4	1	4	28	5	7	11	3							2	23		88	17	12	9	26
Transitional Archaic Zone II	5	8	4	4	4	3				2	2	1	3	2	12		44	6	14	16	21	
Transitional Archaic Zone (undifferentiated)	2	6	1	5	7	7	1	1					1	1	1	5	1	32	3	3	8	13
Late Archaic Zone	4	3	2	9	6	6	5		2						1	3		35	5	6	4	14
Middle Archaic Zone	3	3	3	12	6	6	6									11		44	5	6	6	9
TOTALS	27	40	61	133	40	32	48	7	9	3	3	7	3	8	13	124	2	560				

Table 8
Provenience of Ceramics, Manuports, and Ground and Pecked Lithic Tools.

	Ceramics	Manuports	Pecked Stone	Battered Quartzite	Red Ochre	Pecked and Ground Sandstone	TOTALS
Toyah Focus Zone	1	1					1
Austin Focus Zone	2	2	2				4
Transitional Archaic Zone I		5		1		1	7
Transitional Archaic Zone II		2			1		3
Transitional Archaic Zone (undifferentiated)		1					1
Late Archaic Zone		1		1			2
Middle Archaic Zone							0
TOTALS	3	12	2	2	1	1	18

Table 9
Summary of Palynological Analysis

	Compositae Low Spine/High Spine	Chenopodium- Amaranth	Graminae	Fagaceae	cf. Polygonum	Umbellifera	TOTALS
Toyah Focus Zone	12/7	4	7	2		1	33
	0/2	2	1				5
Austin Focus Zone	5/7	2		2			16
	3/19	34	2				58
	5/26	4					35
Transitional Archaic Zone I	10/10	5	6				31
Transitional Archaic Zone II	6/10	2	1	1			20
Transitional Archaic Zone (undifferentiated)	7/13	24	5				49
Late Archaic Zone	8/5	4	1				18
	5/3	5	5		4		22
	7/16			1			24
Middle Archaic Zone			1		1		2
	2/0		1				3
TOTALS	70/118	86	30	6	5	1	316

tral Texas, resulting in an increase in the number of bison (Dillehay, 1974). This drying period was proposed as an explanation for decreased use of the tributary valleys after 750 B.P. in the Central Brazos River drainage (Skinner et al., 1978). Presence of a major drying trend at about this time in the

Central Plains was documented by Bryson and Baerreis (1968). Paleoclimatic indicators which were studied from Bear Creek Shelter include natural stratification and sediment chemistry, fossil pollen, charcoal remains, seed remains, and vertebrate and invertebrate faunal remains.

The natural stratification and sediment chemistry of the excavated cultural deposits in the rockshelter are believed to consist of wind blown sediments, slopewash, and exfoliated limestone. Deposits toward the rear of the shelter consist of a higher proportion of exfoliated limestone, while deposits at the front consist of a higher proportion of material brought into the shelter by wind and/or rain. This pattern becomes established shortly after the earliest occupation of the shelter and continues through the final prehistoric occupation. Although the basal layers of the deposit may contain some evidence of water deposited sediments, there is little evidence of a sharp change in depositional processes that can be attributed to climatic change.

Analysis of sediment samples for the identification of fossil pollen in Bear Creek Shelter was disappointing. Preservation of fossil pollen was poor, but some pollen was identified. Samples were far below the number of pollen grains needed to make statistically valid interpretations. However, species represented in the samples were generally consistent from sample to sample.

The identification of charcoal from the shelter suggests that a mature floodplain forest was near the site beginning with the earliest occupation and continuing through the last prehistoric occupation. Some minor compositional changes in this forest may have occurred. Oak and hackberry are major components of the exploited parts of the floodplain forest in every occupational zone. The only group of charred wood which changes significantly at 3000 B.P. - 2500 B.P. and 750 B.P. is the Juglandaceae, which includes pecan and hickory. The total sample of this group is quite small. It is impossible to determine whether the changes noted are due to sample size or minor changes in the environment. Considering the fairly consistent presence of trees such as oak, hackberry, and elm, it seems unlikely that a significant climatic or ecological change is represented.

Analysis of vertebrate faunal remains also failed to provide any significant evidence of climatic change during the prehistoric occupation of the rockshelter. The majority of vertebrates identified prefer a riverine or bottomland forest habitat. A few grassland species were identified, but these are too limited in number to interpret a climatic change at any point in the sequence.

Making climatic interpretations from freshwater shellfish remains is more difficult than interpreting other kinds of paleoenvironmental data. Pelycopods present in the rockshelter are totally dependent upon the kinds of shellfish habitats in the area and collecting habits of the shelter occupants. The limited changes in relative frequencies of the pelycopods could be a result of minor changes in area stream flows, but the majority of identified species in each occupational zone prefer large streams or rivers. It appears that collecting habits were oriented toward major waterways throughout the prehistoric period, with little effort being directed toward collecting shellfish from minor tributaries.

Quantitative data on gastropods were not collected; relative frequency of the two identified species cannot be compared. Despite this, both species

Table 10

Seeds Recovered from Fine Screen Sample

	Celtis	Prunus	Complete	Fragment	Carbonized	TOTALS
Toyah Focus Zone	79		18	61	9	167
Austin Focus Zone	19		3	15	7	45
Transitional Archaic Zone I	1	1		1		2
Transitional Archaic Zone II	3			3		6
Transitional Archaic Zone (undifferentiated)	26		5	21	2	54
Late Archaic Zone	14		6	8	2	30
Middle Archaic Zone	29		4	25	7	65
TOTALS	171	1	36	134	27	369

Table 11

Identifiable Charcoal Remains

	<i>Juglandaceae</i> (<i>Carya</i> or <i>Juglans</i>)	<i>Ulmus</i> sp.	<i>Juniperus</i> sp.	<i>Quercus</i> sp.	<i>Platanus</i> sp.	<i>Prosopis</i> sp.	<i>Celtis</i> sp.	TOTALS
Toyah Focus Zone		2	1	18			9	30
Austin Focus Zone	1	7	2	34		1	10	55
Transitional Archaic Zone I	2		1	13			4	20
Transitional Archaic Zone II	2	4	1	4	1		12	24
Transitional Archaic Zone (undifferentiated)	1		5	3			1	10
Late Archaic Zone		4	8	4			7	23
Middle Archaic Zone		1	4	1			2	8
TOTALS	6	18	22	77	1	1	45	170

Table 12
Vertebrate Fauna Recovered from Quarter Inch Mesh Screen

	Toyah Focus Zone	Austin Focus Zone	Transitional Archaic Zone	Transitional Archaic Zone I	Transitional Archaic Zone II	Late Archaic Zone	Middle Archaic Zone	Disturbed	TOTALS
BIRD									
Unidentified bird	45	20	7	6	4	18	14	4	118
<i>Anas carolinensis</i>	17								17
<i>Anas cf. acuta</i>	3	1			1		1		6
Order Falconiformes					1				1
Family Corvidae									
<i>Meleagris gallopavo</i>							2		2
<i>Colinus virginianus</i>	1								1
<i>Callipepla squamata</i>	1								1
<i>Regulus calendula</i>		1							1
<i>Sturnella</i> sp.						1			1
<i>Parus carolinensis</i>							1		1
FISH									
Unidentified Fish					2	1	2		5
<i>Lepisosteus</i> sp.	17	9		4	1	2		1	34
<i>Ictalurus</i> sp.		1		1		2	3		7
<i>Lepomis</i> sp.		3			2	2	1		8
REPTILES									
Unidentified turtle	112	166	7	46	34	18	21	11	415
<i>Chrysemys</i> sp.	1								1
<i>Tryonix spiniferous</i>	34	4	2	14	2	2	1	1	60
Family Colubridae									
<i>Natrix</i> sp.	1	3				1	1		6
<i>Coluber constrictor</i>	9	5	2		2				20
<i>Lampropeltis</i> sp.	1				1	2			4
<i>Crotalus</i> sp.	5	1							6
MAMMALS									
Large artiodactyle	169	176	30	45	32	41	15		508
Small mammal	17	20		1	7	15	29		89
<i>Bison bison</i>	3	1	1			1			6
<i>Ovis aries</i>	1								1
<i>Odocoileus virginianus</i>	42	41	4	3	10	8	2		110
<i>Scalopus aquaticus</i>						1			110
Lagomorpha		2				1	4		7
<i>Lepus californicus</i>	1	1				1	2		5
<i>Sylvilagus floridana</i>	17	10	1	2	7	2	3		42
<i>Sciurus niger</i>	1				1	2	4		8
<i>Geomys bursarius</i>	6	6		4	9	6	6		37
<i>Perognathus</i> sp.	5	2			1	3	2		13
<i>Castor canadensis</i>		1					2		3
<i>Sigmodon hispidus</i>	29	19	1	5	9	21	10		94
<i>Neotoma floridana</i>	10	6		1	6	7	3		33
<i>Pitymys pinetorum</i>	1	3		3	1	5	1		14
<i>Canis latrans</i>				3					3

Vertebrate Fauna Recovered from Quarter Inch Mesh Screen

	Toyah Focus Zone	Austin Focus Zone	Transitional Archaic Zone	Transitional Archaic Zone I	Transitional Archaic Zone II	Late Archaic Zone	Middle Archaic Zone	Disturbed	TOTALS
<i>Procyon lotor</i>	1					1	1		3
<i>Mephitis mephitis</i>	3	1							4
<i>Lynx rufus</i>	1	1							2
Unidentified carnivore	6	3		1		1			11
Burned Bone	96	142	69	46	26	42	57	0	478
TOTALS	560	507	55	139	133	165	133	17	1709

have similar habitat preferences and occur in every occupation zone within the shelter deposit.

The paleoenvironmental data which are available from Bear Creek Shelter dates from roughly 5000 B.P. to about 450 B.P. Available data suggest a prolonged period of consistent climate and depositional conditions. This situation does not preclude the possibility that climatic changes occurred elsewhere in Central Texas during this time period. Climatic interpretations are complex and a shift to wetter or dryer conditions in one area may not necessitate a similar shift throughout Texas. Additional data are needed from the area to determine whether the stable climatic conditions interpreted for Bear Creek Shelter are representative of the Central Brazos drainage as a whole.

Hypothesis Two

The second hypothesis was originally proposed and tested by Skinner and Gallagher (1974) at the Bowling Pin and Indian Springs sites at Lake Whitney. The Bowling Pin site is a Neo-American campsite, while the Indian Springs site is a Late Archaic campsite. Comparison of the flaked lithic debris, cores, and bifaces suggested that a technological shift from biface reduction in the Archaic stage to flake production from cores in the Neo-American stage could be distinguished. A positive correlation between biface technology and atlatl dart points, and core and flake technology and arrow points may be significant in the hypothesized technological change. Bear Creek Shelter offered the opportunity to test this hypothesis in a situation where occupational zones from the time periods in question were situated in a stratified context. Presence of Transitional Archaic phase occupations at Bear Creek Shelter offered the opportunity to determine whether the hypothesized change was gradual or abrupt.

Examination of data in Table 13 indicates that very little change occurred in the technological elements during Archaic, Transitional Archaic, and

Table 13
Vertebrate Fauna Recovered from Fine Screen

	Toyah Focus Zone	Austin Focus Zone	Transitional Archaic I	Transitional Archaic II	Transitional Archaic (undifferentiated)	Late Archaic	Middle Archaic	TOTALS
Class Osteichthyes								
<i>Lepisosteus</i> sp. - Gar		2			2			4
Order Cypriniformes	9	17	8	11	11	21	20	97
<i>Ictalurus</i> sp. - Catfish							1	1
<i>Morone</i> sp. Temperate basses							1	1
Class Amphibia								
Order Anura	2			1				3
<i>Scaphiopus</i> cf. <i>holbrookii</i>	13							13
<i>hurleri</i> - Hurter's Spade-foot Toad								
Class Reptilia								
<i>Trionyx spiniferus</i> - Spiny softshell turtle			1			2		3
Order Squamata								
Family Colubridae	23	13			1	1	6	44
<i>Natrix</i> sp. - Water snake		1		1				2
<i>Coluber constrictor</i> - Racer	6	5						11
<i>Lampropeltis</i> sp. - King snake	11	6					1	18
<i>Thamnophis sirtalis</i> - Garter snake	164	19	1	2	1			187
Family Crotalidae		1					2	3
Family Iguanidae-Iguanid		1					1	2
Class Aves	3					5		8
Class Mammalia		2					5	7
Order Lagomorpha		1						1
<i>Sylvilagus floridana</i> - Eastern cottontail							1	1
Order Rodentia	30	6		6		3	12	57
<i>Sciurus niger</i> - Eastern fox squirrel	1							1
<i>Geomys bursarius</i> - Plains pocket gopher	1	2	1			1	2	7
<i>Perognathus</i> sp. - Pocket mouse	3		1				4	8
<i>Sigmodon hispidus</i> - Hispid cotton rat	2	4		1			8	15
<i>Pitymys pinetorum</i> - Woodland or pine vole	6	3		1	7	1	11	29
<i>Peromyscus</i> sp. - Deer mice	31	6			1	7	1	46
Order Carnivora								1
<i>Mephitis mephitis</i> - Striped skunk		1						1
Order Artiodactyla	7	9	1		2		11	30
<i>Odocoileus virginianus</i> - Whitetail deer	1	1				1	3	

Vertebrate Fauna Recovered from Fine Screen

	Toyah Focus Zone	Austin Focus Zone	Transitional Archaic I	Transitional Archaic II	Transitional Archaic (undifferentiated)	Late Archaic	Middle Archaic	TOTALS
Small mammals							4	4
Large artiodactyl	7	9	1		2		11	30
Carnivore				1				1

Neo-American occupations of the shelter. A high core/biface ratio is thought to be indicative of a core technology, while a low ratio indicates a biface technology. The limited variation (Table 15) indicates that the highest ratio is associated with the Late Archaic zone, while the second lowest ratio is associated with the Austin zone. This situation is the opposite of what was predicted by the hypothesis.

Examination of relative frequencies of faceted platforms and average number of dorsal flake scars reveals limited variation between the occupation zones in question. The only significant variation in flake weight and length between the occupation zones is the low average size of flaking debris in the undifferentiated Transitional Archaic zone. The anticipated increase in size of flakes associated with core technology in the Austin and Toyah zones is generally lacking.

Evaluation of this hypothesis assumes that the same range of flaked lithic manufacturing activities occurred consistently at the site throughout its occupation. Examination of data relating to Hypothesis 4 provides some support for this assumption. It appears that the total manufacturing sequence for flaked lithic tools is not present at the site. Solid evidence to support the interpretation of a technological change from biface reduction technology to core and flake production technology is lacking.

It is possible that the limited sample of excavated area biased the evaluation. However, the large size of the lithic sample and consistency of technological elements through all occupations seem to be more than coincidence. It is proposed that core and biface technologies were in use throughout the prehistoric occupation of Bear Creek Shelter.

Hypothesis Three

Shafer (1977) proposed that the most significant technological change during the prehistoric period in Central Texas was related to the abrupt transition from the Austin to Toyah Phase. A major climatic change in Central Texas at about 750 B.P. is thought to have resulted in a major increase in the grassland habitat favorable to bison. During the Archaic period and the Austin Phase, prehistoric economy in Central Texas was heavily oriented toward exploitation of bottomland and riverine resources.

This hunting and gathering population was nomadic, living in small bands. With the climatic shift and increase in locally available bison, the entire economy and settlement systems of Central Texas changed. Group size

Table 14
Identifiable Pelecypod Remains

	Toyah Focus Zone	Austin Focus Zone	Transitional Archaic Zone I	Transitional Archaic Zone II	Transitional Archaic Zone (undifferentiated)	Late Archaic Zone	Middle Archaic Zone	TOTALS
<i>U. tetralasmus</i>					1			1
<i>C. parva</i>		4	2	1		1		9
<i>L. teres</i>	7	13	1	5	1	5		32
<i>L. r. Siliquoidea</i>	5	8	2	1	1	2	1	20
<i>Q. quadrula</i>			1	1		1		3
<i>F. flava</i>	1							1
<i>A. plicata</i>	11	20	8	9		1	5	54
<i>P. purpurata</i>	37	51	29	24	7	36	5	189
<i>O. olivaria</i>	52	72	34	48	24	62	20	312
<i>C. tampicoensis</i>	14	53	37	76	20	34	7	241
<i>T. verrucosa</i>	2	3	1	6	1	4	1	18
<i>M. gigantea</i>		1						1
<i>T. macrodon</i>		1		3		1	1	6
<i>L. sp.</i>		1	1	1			1	4
TOTALS	129	227	116	175	55	148	41	891

Table 15
Combined Data from Coarse and Fine Screen Samples Relating to the Test
Implications of Hypothesis Two

	Average Number of Dorsal Scars	Cores/Bifaces	Relative Frequency of faceted platforms	Average Flake Weights (Grams)	Average Flake Lengths
Toyah Focus Zone	2.7	.25	.131	1.9	21.3
Austin Focus Zone	2.6	.16	.147	1.4	18.9
Transitional Archaic Zone I	2.5	.33	.162	1.2	19.0
Transitional Archaic Zone II	2.7	.23	.142	1.5	19.9
Transitional Archaic Zone (undifferentiated)	2.6	.11	.145	1.2	16.9
Late Archaic Zone	2.6	.33	.200	1.5	19.1
Middle Archaic Zone	2.4	.22	.128	1.5	19.1

increased and populations became more sedentary, occupying more established village sites. The economy shifted away from hunting and gathering in the river valleys and emphasized horticulture and bison hunting. The settlement and subsistence change produced an hypothesized change in Central Texas lithic tool technology.

Evidence of change in the vertebrate faunal remains is lacking. Floodplain forest dwelling animals are dominant throughout the prehistoric period. Bison remains are limited in number but are present in the Late Archaic, Transitional, Austin, and Toyah zones. Evidence of a bison hunting economy is lacking. Throughout Northcentral Texas, bison remains from archeological sites are outnumbered greatly by remains of white-tailed deer. There is some evidence for slight increase in bison exploitation in Northcentral Texas during the late prehistoric period (Lynott, 1980b). However, it is not sufficient to postulate a bison hunting economy.

Evidence of horticultural remains or tools is lacking. Limited horticultural remains were recovered through more extensive excavations at nearby Pictograph and Kyle sites (Stephenson, 1970; Jelks, 1962) but are not interpreted as representing an economic dependence upon horticulture. Fine screen sampling at Bear Creek Shelter produced a small quantity of charred hackberries, but overall exploitation of plant resources appears to have been secondary to hunting.

Examination of lithic tools revealed little evidence of change in the kinds of tools used between the Austin and Toyah occupations. There is a slight increase in the relative frequency of blades, but not a real change in the frequency of end scrapers, flake drills, or leaf shaped bifaces. Four edge beveled knives are absent. Lithic tool technology seems to change very little between the end of the Austin and beginning of the Toyah Phase. The only significant change seems to be the style of the projectile points found in each zone.

Based upon evidence from Bear Creek Shelter, it does not seem reasonable to accept the hypothesized economic and settlement change for the Lake Whitney area of the Brazos River basin. Floodplain forest and riverine exploitation by small groups of hunters and gatherers seems to continue throughout the prehistoric period. The pattern may apply to other areas of Central Texas.

Hypothesis Four

This hypothesis proposed that eight different activities were conducted at Bear Creek Shelter during the prehistoric period. Not every activity was expected to occur during each occupation. It was anticipated that site function changed through time.

Interpretations must be considered tentative because they are based upon the assumption that the excavated sample is representative of everything which occurred at the site. Since only a small portion of the site was excavated, this assumption is tenuous. However, by pursuing the testing of this hypothesis, it is possible to interpret some of the activities which were conducted at the site and provide a model of changes which may have occurred in site use during the 4500 year period.

Cooking was a significant activity during each of the temporal periods represented at the site. Concentrations of burned and firecracked rock were present within each of the occupation zones. Charcoal was abundant

throughout the cultural sequence and burned animal bone was recovered from every occupational zone. Burned sediment was noted in Toyah, Austin, and Transitional Archaic zones. Ash was noted only in the Austin zone. Food encrusted ceramics were not recovered.

Evidence indicates that primary lithic procurement was absent or of minimal significance during each of the occupational stages. Unmodified chert cobbles are absent from the lithic collections in each occupational zone. Primary elements are a small part of the total lithic debris throughout the sequence, while cores, rough bifaces, and hammerstones are relatively uncommon.

Rough lithic tool manufacture seems to have been a consistent part of the prehistoric activities at Bear Creek Shelter. Hammerstones and cores are scarce in occupation zones, but bifaces are relatively plentiful throughout the sequence. Unused tools, or tools without edge damage, occur in every occupational zone. Secondary elements occur far less frequently than interior elements in every occupational zone, but they always represent at least 25% of the debitage. This activity does not seem to have produced as much debris as the final stages of toolmaking activities, but occurred consistently in each occupational phase.

Lithic, antler, and bone flaking tools are rare at Bear Creek Shelter. This situation may be due to the limited areal sample or a result of reuse and prehistoric curation of these tools. Although these aspects of the test implications for finished lithic tool manufacture are lacking, other aspects are present for most of the occupation zones.

Interior elements occur in high frequency in all zones, and flaked lithic tools with edge damage occur in every zone. However, preforms are relatively limited from undifferentiated Transitional Archaic and Late Archaic zones. The relatively high frequency of preforms in the Transitional Archaic I and II zones indicates that sampling bias may be responsible in part. Finished lithic tool manufacturing was important during most of the prehistoric occupation of the site, but was relatively less important during the Late Archaic and possibly Transitional Archaic phases.

Animal food processing was a significant activity throughout the prehistoric occupation of the rockshelter. Bone and shell remains are common in every occupational zone. Lithic tools with edge damage which may have been used for butchering occur in every zone. Examination of the fine screen lithic debris sample does not exhibit fully the large number of small interior flakes. The few large flakes in every sample greatly skewed the sample.

In contrast to the importance of animal food processing, evidence for plant food processing is minimal. Ground stone is rare at the site and grinding implements occur only in the Austin zone. The only significant plant food remains recovered through fine screening were hackberry seeds. Some of these are uncharred and were probably introduced into the deposit by natural means. Consistent absence of relevant data indicate the limited importance plant food processing played during all phases of the prehistoric period at Bear Creek Shelter.

Objects recovered from Bear Creek Shelter that could possibly fit into manufacture of perishable products are four modified bone and two modified shell artifacts. Lithic tools used to make such objects probably are

present; but without perishables, it is not possible to recognize these activities. The manufacture of perishable products must be considered an untested part of the prehistoric activities conducted at the site.

A human grave was uncovered at Bear Creek Shelter in the Transitional Archaic II zone. Evidence of an intrusive pit was not noted, but it is possible that this burial represents an interment by later residents of the site. A large mass of limestone rubble which was situated about 20 cm above the burial may have served as a rock cover for the grave. Interment age is estimated at 1950 to 1450 B.P.

The major focus of activity throughout the use of the site seems to be cooking, animal food processing, and rough and finished stages of lithic tool manufacture (Table 16). Consistency of average flake dimensions, average number of dorsal flake scars, and platform preparation indicate a consistency in the types of chert flaking activities throughout the occupation. Evidence of long term occupation during the prehistoric period at Bear Creek Shelter is lacking. The site seems to represent a series of short, intermittent habitation, occurring consistently over a period of almost 5000 years.

CONCLUSIONS

The archeological record at Bear Creek Shelter has important implications for the interpretation of Central Brazos River prehistory. Archeological investigations at the site were designed to test four hypotheses relating to changes in climate, technology, and settlement-subsistence patterns in the Central Brazos region. Of central interest to the study was the role of rockshelter occupations within the regional adaptive system.

Rockshelters are relatively common in the Central Brazos River drainage, particularly in the Lake Whitney area. Research at a variety of sites (Jelks, 1953, 1962; Long, 1961; Stephenson, 1970; Watt, 1978) produced a reasonably well established chronology for the Central Brazos Valley. However, knowledge about the position of rockshelter occupations within the regional settlement and subsistence system is limited. Investigations at Bear Creek Shelter were directed toward this topic.

To insure that specific data relating to regional research concerns were collected, archeological investigations at Bear Creek Shelter were aimed at testing four hypotheses. About 2% of the site was excavated and evaluation of the four hypotheses suffers from a small sample. Interpretations are offered on the basis of the limited excavated sample being representative of site data.

The first hypothesis proposed that climatic changes in the Central Brazos River basin occurred during two periods. Data from Bear Creek Shelter included gastropods, pelycopods, vertebrate faunal remains, macrobotanical remains, fossil pollen, and sediment chemistry. Data showed considerable stability throughout the occupation of the rockshelter. If climatic changes did occur, they were minor and not recognizable in the archeological record.

The second hypothesis proposed a major change in flaked lithic tool production technology at the end of the Archaic period. Prehistoric occupants of the area shifted from a biface reduction to a core and flake production

Table 16

Summary of Interpreted Activities

	Cooking	Primary Lithic Procurement	Rough Lithic Tool Manufacture	Finished Lithic Tool Manufacture	Animal Food Processing	Plant Food Processing	Manufacture of Perishables	Disposal of the Dead
Toyah Focus Zone	X		X	X	X			
Austin Focus Zone	X		X	X	X	X		
Transitional Archaic Zone I	X		X	X	X			
Transitional Archaic Zone II	X		X	X	X			X
Transitional Archaic Zone (undifferentiated)	X		X		X			
Late Archaic Zone	X		X	X	X			
Middle Archaic Zone	X		X	X	X			

technology. Both forms of lithic tool manufacture were utilized throughout occupation of the shelter.

The third hypothesis proposed major technological changes occurring in the Central Brazos River basin adaptive patterns at about 750 B.P. Relevant data did not provide evidence of technological or subsistence changes. Exploitation of a diffuse group of bottomland fauna represents the dominant economic pattern from the Middle Archaic phase until the end of the prehistoric period. Evidence of a shift to any significant kind of horticultural economy is lacking and evidence of plant food processing is limited.

The final hypothesis proposed a variety of prehistoric activities recognizable from material remains. Data indicated that cooking, animal food processing, and rough and finished lithic tool manufacture were primary activities conducted at the site during every occupation. Plant food processing and disposal of the dead were occasional activities. There is little evidence for the primary procurement of lithic raw material. The nature of occupations at the site appear to indicate a series of short term usages over a considerable period of time. Evidence of a prolonged single occupation or a prolonged abandonment is lacking.

On the basis of these interpretations, the site is considered a hunting camp. It is uncertain whether the shelter was used for only one season of the annual round or was inhabited regularly throughout the year. Activities and site function inferred at Bear Creek Shelter may not be representative of other shelters in the Central Brazos basin. Restudy of existing collections are needed.

Grinding slabs and manos are present at Kyle (Jelks, 1962:55) and Picograph shelters (Stephenson, 1970:140-141) suggesting that plant food processing was an important activity at these sites. Features at these sites are more substantial in size and frequency than those at Bear Creek Shelter. Presence of slab lined cists or hearths at those sites may mean that the oc-

cupations there were more regular or prolonged than inferred for Bear Creek Shelter.

Due to the size limitations of rockshelters in this area, it is unlikely that any shelter served as a permanent base camp for a population of any size. Some rockshelters probably were used as temporary hunting camps while others in more favorable locations served as seasonal camps for several family groups. The westward facing position of Bear Creek Shelter may have made it a less desirable winter camp than more sheltered localities.

The hypothesis testing format utilized in testing and evaluating Bear Creek Shelter demonstrated that data relating to a series of problems which are important to the interpretation of regional prehistory are preserved at the site. Recognizing the significance of Bear Creek Shelter, the U.S. Army Corps of Engineers chose a mitigative procedure designed to stabilize and preserve the site. The Corps plans to stabilize the site deposit with a liquid concrete solution (Galm, 1978). When the solution dries, it should seal the cultural deposits and prevent further erosion from wave action of the lake. Not only does this decision preserve an extremely significant cultural resource, it offers the opportunity to monitor the affect of partial inundation on archeological remains over a prolonged period. Similar examples of in place preservation of significant archeological remains are relatively rare.

A well defined program of significance evaluation which incorporates the testing of regionally important hypotheses with the gathering of management data provides an effective means of demonstrating and evaluating significance (Raab and Klinger, 1977). The archeological resource base in the United States is diminishing too rapidly to permit salvage excavations to be conducted without a fully developed research design. Contract archeologists have an obligation to the profession and public to make their work contribute to the interpretation of significant research problems. The future of American archeology is dependent upon the profession's ability to make serious research contributions from contract projects and incorporate research concerns with in place preservation of significant cultural resources.

ACKNOWLEDGMENTS

Spatial constraints require that I offer only general thanks to the large number of friends and colleagues that have made this paper possible. I would like to specifically express my gratitude to Allie Majors, William Harrell, and Don Weise of the U.S. Army Corps of Engineers (Fort Worth) for their support of this study. I would also like to thank Eldon and Loretta Corkill for their efforts at monitoring the impact of wave action on Bear Creek Shelter. Jeffrey Richner made helpful comments on earlier drafts of this paper and Lynn Frankowski provided monitoring assistance and advice throughout my involvement with the site. Dr. S. Alan Skinner served as Principal Investigator for the project. Phillip Murry identified the vertebrate fauna and Dr. Richard Fullington the invertebrate fauna. Macrobotanical and palynological samples were identified by Kathleen Volman and Donna Chapman. The fine drawings were prepared by Melodie Tune. Dr. F.A. Calabrese and members of the Midwest Archeological Center provided much needed technical assistance in the production of this report. Finally, the author wishes to acknowledge the influence of the late Dr. Mark Grady upon the outcome of this study. Dr. Grady's concern for the preservation of significant archeological resources served as an inspiration during the 1978 testing and report preparation phases of the project. Any value contained in this paper can be largely attributed to these individuals, while shortcomings or errors are the sole responsibility of the author.

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Marks Beach, Stratified Paleoindian Site, Lamb County, Texas: Preliminary Report

Kenneth Honea

ABSTRACT

The Marks Beach site in Lamb County exhibits parallels in specific stratigraphic details and cultural data to both the Lubbock Lake and Blackwater Draw Locality No. 1 sites. It is assumed reasonable that successive units in the three sites are culturally analogous and essentially contemporaneous. A *Bison antiquus* pelvis fragment from a diatomaceous unit at Marks Beach was radiocarbon dated at 9920 ± 380 years BP; samples from an apparently equivalent unit at Lubbock Lake were dated to the same period.

INTRODUCTION

The Marks Beach site (provisional designation TT5) is located to the southeast of Earth (Texas) in Lamb County on the Llano Estacado. Exploratory excavations were conducted during the summers of 1968, 1969, and 1970 by student teams from Texas Tech and Northern Illinois universities. The site is situated in a recent blowout or deflation hollow on the north bank of an east to west bend of Blackwater Draw at an altitude of 1102 m (3650 ft). The irregular course of the draw in the area follows a northwest to south pattern, veers west a short distance in the vicinity of the site, and then continues to the southeast (Earth Quadrangle Map, U.S.G.S. 7.5 minute topographic series).

The site area, known as the Sand Hills, is characterized by numerous dunes and drifting sands, which block the course of the draw in spots. These sands belong to the Tivoli-Brownfield series, which bisect the central portion of Lamb County from west to east. The former series occurs as dunes up to 25 m in height (Newman, 1962:3, 20-21).

The importance of Marks Beach lies in shared geomorphic and stratigraphic similarities to both the Lubbock Lake site (E. Johnson, 1976), located about 50 miles downstream in Yellowhouse Draw near the confluence of Blackwater and Yellowhouse draws, and Blackwater Draw Locality #1 (Hester, 1972), 50 miles upstream in New Mexico. Analogues occur over much of the Llano Estacado in respect to general geomorphology and gross stratigraphy, aiding in stratigraphic and cultural correlations of sites and palaeoenvironmental interpretations (C. Johnson, 1974:81) (Fig. 1).

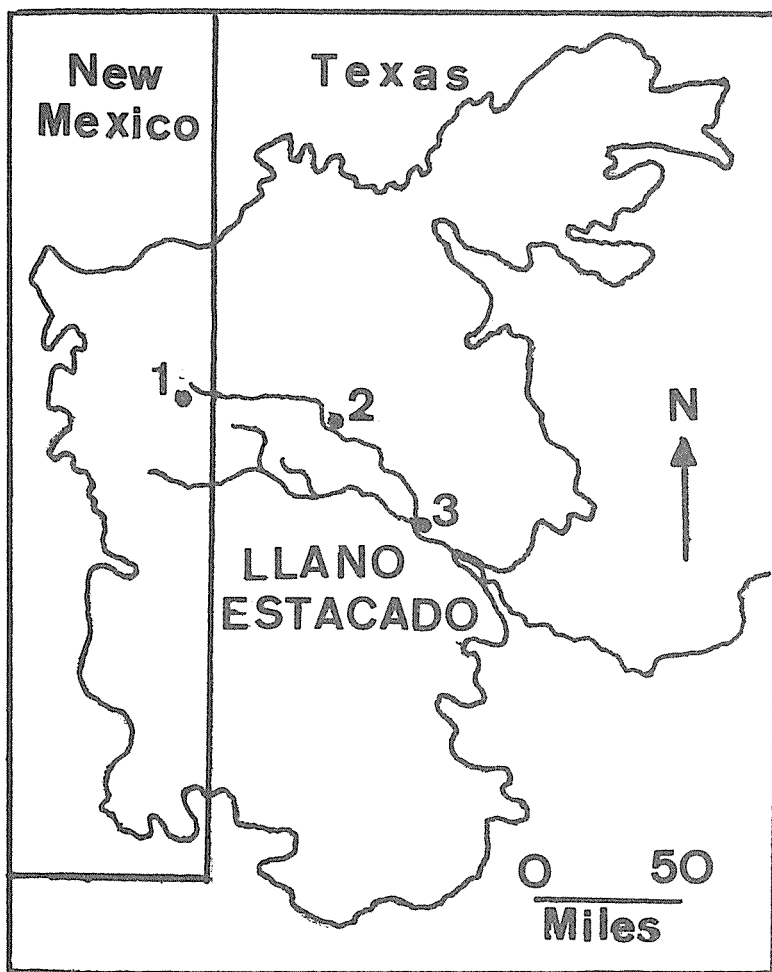


Fig. 1 Map of Llano Estacado showing locations of (1) Blackwater Draw Locality No. 1, (2) Marks Beach (both on Blackwater Draw drainage), and (3) Lubbock Lake (in Yellowhouse Draw).

Marks Beach is situated on a bank of what during the Late Pleistocene had been a perennial stream. The stream dried up gradually by the end of this epoch and was accompanied by local development of ponds. With extended periods of increasing dessication and development of dunes, the site came to be occupied by a small marsh. This minor moist period was followed by another drying period, characteristic of the landscape today.

Postulated intermittent seepage springs, perhaps issuing from gravels beneath caprock outcrops in the north edge of the site, may have been instrumental in making the location a choice way station through time (Fig. 2). Seepage springs still occur in the region.

Two distinctive dune trends are evidenced at the site. The modern one is along the east and southeast margins of the site and an older one on the northeast and east margins. The latter underlies the former in part.

Surface evidence of cultural activities at the site is indicated by numerous exposed cobble hearths, bone, and lithic concentrations (Fig. 2). This material occurred in modern sands above the preserved margins of the terminal marsh deposits at the leeward base of the dune on the east, southeast, and south inner margins of the blowout. The disturbed basin surface of the blowout exhibited a scattering of lithic debitage, tools, and occasional sherds. Most were probably derived from recent sands occupying the basin prior to deflation.

A number of apparently older bone accumulations, not clearly associated with cultural remains, were observed during initial survey. They were eroding out of the upper portion of the marsh deposits below the level of the recent sands. Indications of Pleistocene sediments or cultural activities were not seen on the surface.

Because of the situation of Marks Beach in the Blackwater Draw drainage, it seemed possible that exploratory excavations would yield cultural and stratigraphic sequences that could, at least in part, be correlated with those known from both Lubbock Lake (Johnson, 1976; Holliday and Allen, in press) and Blackwater Draw Locality No. 1 (Hester, 1972). Preliminary evaluation of the resultant data suggest such a correlation is well founded.

EXCAVATION PROCEDURES

Surface cultural materials were noted and recorded on the south and east preserved margins of the terminal marsh deposit and on the wind scoured leeward slope of the modern dune. These cultural features were associated with several late prehistoric occupations (probably successive) and may occur in a stratigraphic context. They were recorded, mapped, and cultural and faunal materials retrieved. Excavations were minimal. Only shallow surface skimming with flat shovels was carried out since penetrating excavations were to be conducted only in the blowout and along its margins.

Blocks of one or more site provenience numbers were used during each of the three seasons work to identify materials, features, and excavation units. The numbers were applied serially each year and gaps were intentionally left in the numbered sequence from year to year to separate each seasons work. Each numbered phenomenon was recorded on appropriate forms and in the field catalog and mapped. During initial surface and excavations (1968), the number block 1 to 60 was used. The number 80 (1969) designated a deep test pit. The block of numbers 85 to 96 were used in excavation (1970). Random surface finds not associated with particular artifact concentrations or features were assigned the provenience number 0.

Exploratory penetration excavations or tests, in the form of trenches or pits, were undertaken in the southwestern quarter of the site in areas identified as excavation units 35, 40, 41, 42, 43, and 44 (Fig. 2). Arbitrary 10 cm excavation levels initially were employed. Once distinctive stratification was apparent, digging proceeded by natural levels. Where thickness warranted, natural levels were subdivided into 5 cm or less levels.

Excavation unit 35 was the first 20 x 1 m north-south oriented test trench excavated to a 1 m depth to explore stratigraphy. It was located on the south inner margin of the blowout. Excavation in a final 1.5 m unit at the

north end of this unit was extended to a depth of 2.5 m, where sandy diatomaceous earth was encountered. The west profile (Fig. 3) of this trench was drawn.

Excavation unit 40 is comprised of two 2 x 2 m northeast and northwest test pits at the north end of unit 35. They were separated from it and each other by 1 m balks. Both were excavated to a depth of 3.5 m below surface, to a point about 1 m below the uppermost diatomaceous surface. A profile

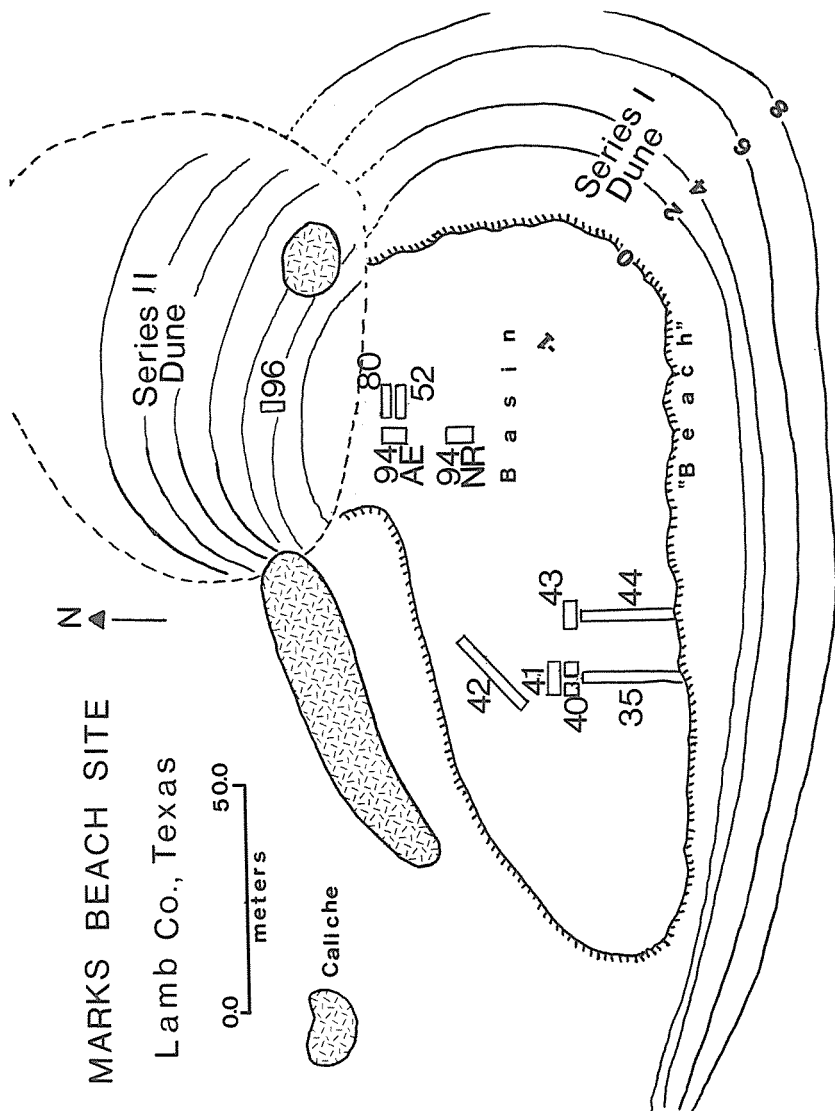


Fig. 2 Map of Marks Beach showing location of excavation units, caliche outcrops, deflation basin, "beach", and younger Series I and older Series II dunes. Contour interval is 2 m.

(Fig. 4) was drawn of the east wall of the northeast test pit and a series of paired sediment samples taken from each stratigraphic unit. Unit 41, a 3 x 5 m test pit, was to the north of these excavation units (separated by a 1 m balk). It was excavated to the upper surface of the diatomaceous earth.

Excavation unit 44, a 20 x 1 m test trench, further to the east, was excavated to a 1 m depth to further explore stratigraphy of the upper sediments. It was located 12 m to the east and parallel to unit 35 (Fig. 2).

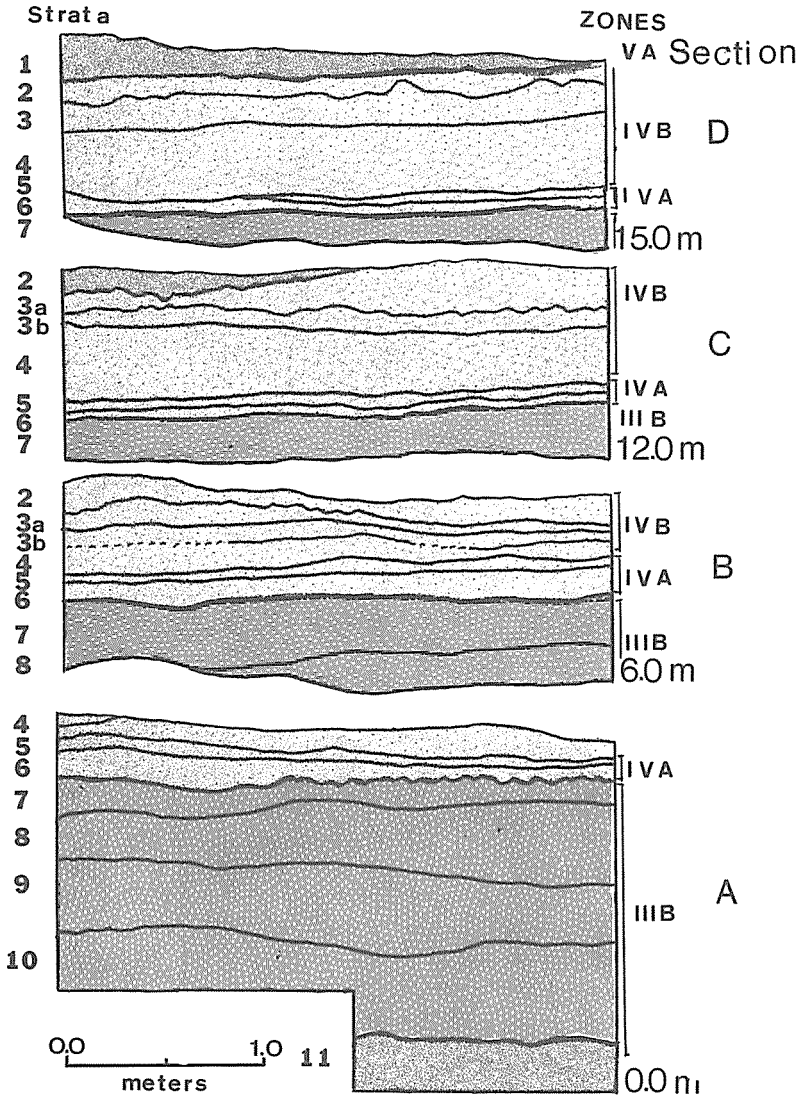


Fig. 3 Representative profile of west wall of excavation unit 35 at 0.0 - 3.0 m (A), 6.0 - 9.0 (B), 12.0 - 15.0 m (C), and 15.0 - 18.0 m (D) intervals. Point A 0.0 is at north end of trench. Strata numbering follows that employed in field (1-11). Strata zonal ordering follows that devised in data synthesis.

Stratigraphies of the two excavation blocks essentially were the same. Unit 43 was a 2 x 5 m test pit (due north of unit 44 and separated by a 1 m balk) excavated to the surface of the diatomaceous earth. The stratigraphic profile compared favorably with that recorded in the northeast unit of unit 40 to the west.

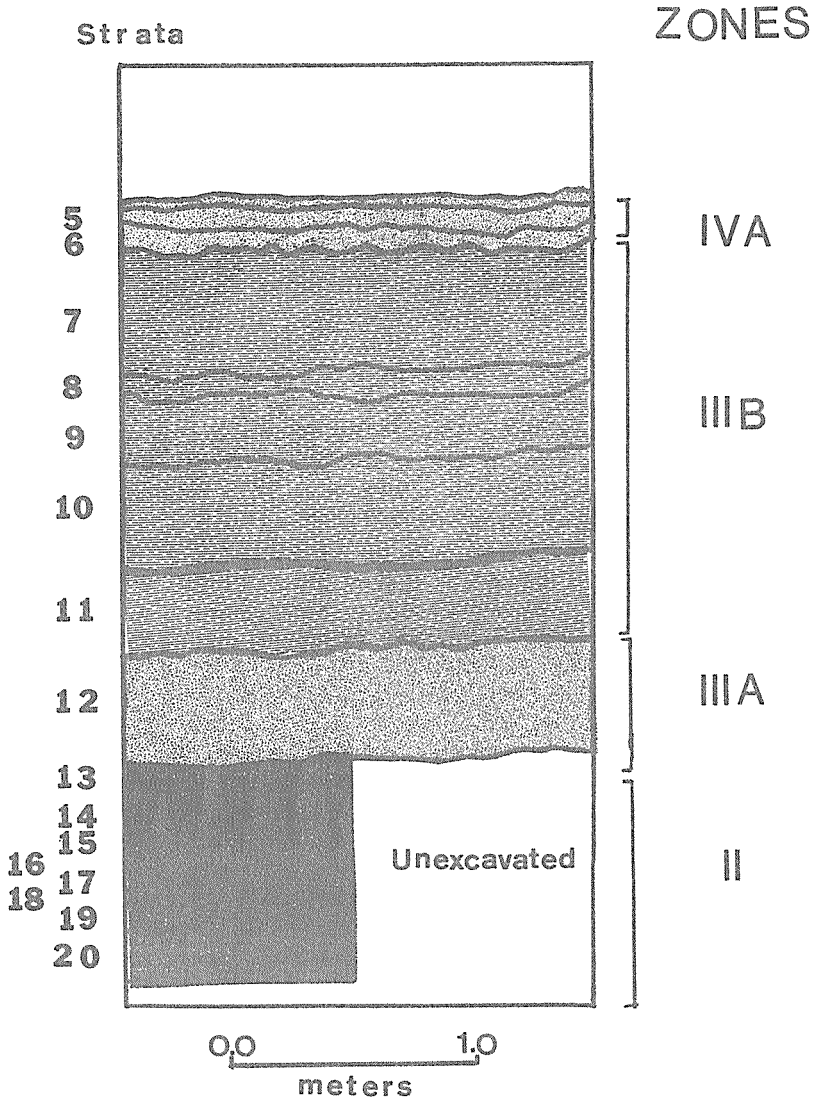


Fig. 4 Profile of east wall of excavation unit 40, northeast test pit. Strata numbering follows that employed in field. Unnumbered unit at profile top is recent blow sand. Profile right edge is south and located about 1 m north of point A 0.0 at north end of excavation unit 35 profile. Zonal designations are those devised in data synthesis.

Excavation unit 42 was a 20 x 1 m test trench. It was located about 5 m to the north of unit 41 and was oriented southwest - northeast. Total excavation depth was 2 m. A profile was drawn of the north wall.

The following units were excavated in the northeast part of the blowout basin close to the caliche outcrops: 52, 80, 94 AE, and 94 NR (Fig. 2). Units 52 and 80 are 2 x 5 m test pits excavated to a depth of 4.5 m below the blowout surface into the top of the gray sand below the diatomaceous complex. The two excavation units were separated by a 1 m baulk. A *Bison antiquus* bone bed was discovered in the upper diatomaceous complex in the west halves of both pits. All excavated bone blocks were carefully mapped, encased with reinforced plaster, and removed from the site. They were subsequently opened in the laboratory, excavation was completed, and bones preserved with butvar or shellac. The east stratigraphic profile of unit 52 was drawn (Fig. 5).

Excavation unit 94 AE was a 5 x 3 m test pit due west of units 52 and 80. It was excavated to the diatomaceous level on which the bison bone bed was situated in the units to the east. These units and 94 AE were separated by a 1 m balk. Bones were not found but the diatomaceous surface was entirely covered with what may be hoof prints of the killed bison. The profile of a prehistoric water well was discovered in the southeast corner of this pit.

Excavation unit 94 NR, 9 m to the south of 94 AE, was a 5 x 3 m test pit. It was excavated to 5 m below the surface of the blowout basin into the underlying gray sands. Excavation unit 96, a 4 x 1.5 m test trench, north of unit 80, was excavated to a depth of 2 m in the base of the fossil dune.

Surface cultural features discovered during the initial survey (1967), others exposed by later deflation (1968, 1970), and all phases of excavation were photographed. Documentation includes: bison bone bed in various stages of exposure and recovery (slides and a film), proposed bison hoof prints, prehistoric well, and distant and close-up views of stratigraphic profiles and contact surfaces of various sedimentary units. The laminated diatomaceous complex in the east wall of unit 52 is photodocumented, some shots taken from a distance of only 5 cm to show structural detail.

Field numbering of strata at the site (lowest number at top of column) has been retained since excavations are to continue. They have been correlated in Table 1 with designations of specific sedimentary units (lowest number at bottom of column). Thirty strata were recognized and recorded in the field in various excavation units in the blowout basin and along its margins. They are assignable to five major sedimentary complexes.

A bench mark or datum point for establishment of horizontal and vertical controls during survey and excavations was established at an arbitrary location on a level, firm area on the southcentral margin of the blowout above and away from the loose blowout sand.

An extensive series of sedimentologic and palynologic samples was taken from profiles in key sections of Marks Beach. Where of sufficient thickness, paired sedimentologic and palynologic samples (\pm 0.5 kg) were removed from the contact surfaces of stratigraphic units and successively, the upper, middle, and lower portions of each stratum. In some cases, a stratum was sampled two or three times in different areas of the site for later comparative studies.

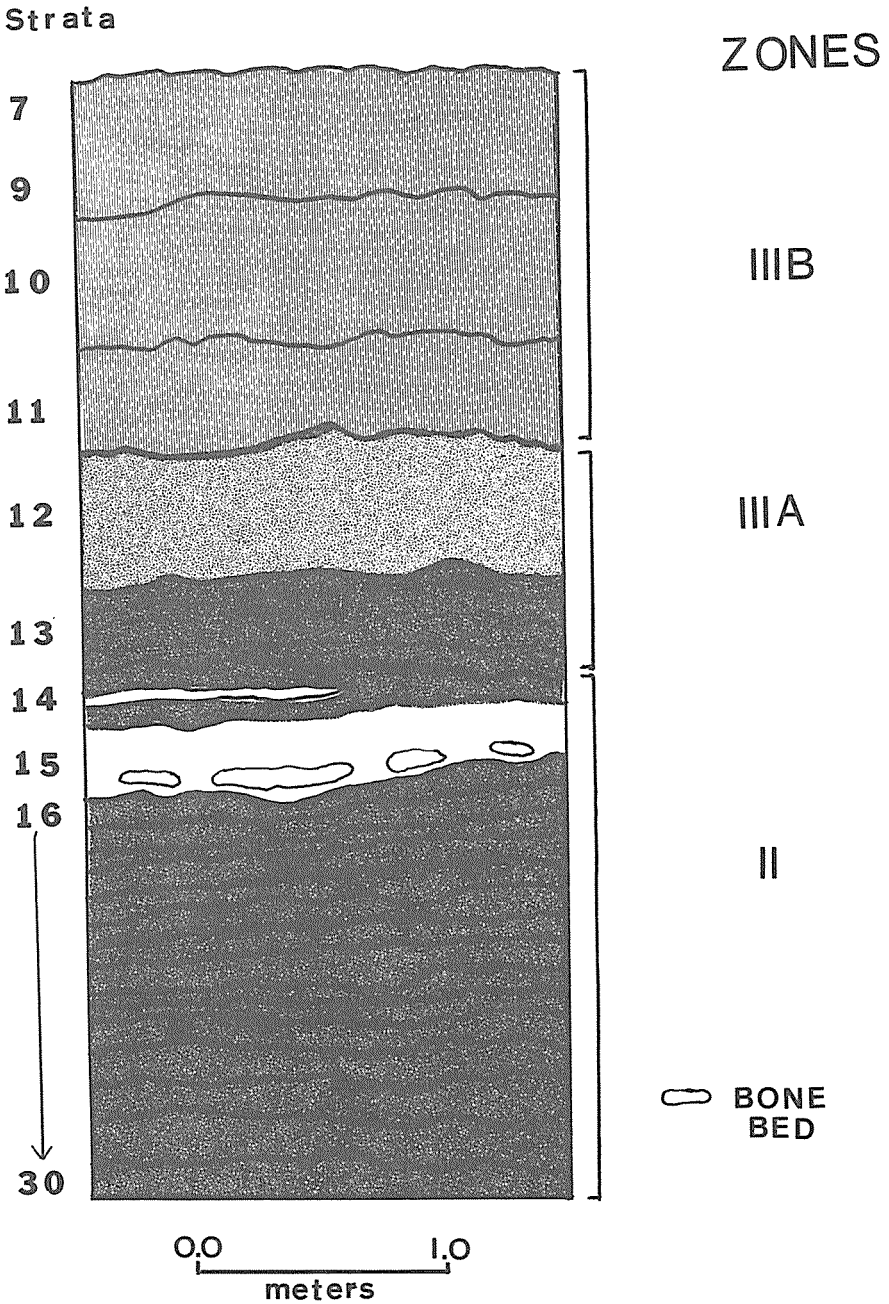


Fig. 5 Profile of east wall of excavation unit 52. Bison antiquus bone bed lay on stratum 16 surface at west end of this and excavation unit 80.

Radiocarbon samples were recovered from Zones II through V in various parts of the site. Charcoal and ash samples taken from post Pleistocene deposits (Zones III and V) were generally sufficient weightwise. Charred bone fragments were collected when charcoal was rare or nonexistent. For control purposes, unburned bone samples also were taken frequently. The fossil dune in the northeast quadrant of the site, which may be coeval with Zone III, also was sampled. A series of samples were taken from deep strata producing carbonaceous materials. Unburned bone samples were taken in these zones for control purposes.

STRATIGRAPHY

The provisionally established geological units, numbered oldest to youngest, follow (Table 1).

Zone I: massive deposit of compact, unstratified, grayish calcareous sands. The upper contact surface is eroded. Auguring in excavation units 52, 80, 94 AE, and 94 NR showed the deposit to be greater than 2 m in depth. Faunal remains were not discovered. Neither basal gravels nor bedrock were reached in testing.

Zone II: complex of laminated beds of sandy diatomaceous earth and diatomite of variable thicknesses in different parts of the site. Most of the beds exhibit even horizontal lamination but some are undulate and swirled. A thick bed of sandy diatomite, containing extinct faunal remains, is situated in the upper section of the complex in excavation units 52 and 80 (Fig. 5). The lowest subunit of the complex, directly under the bone bed, rests unconformably on Zone I. This subunit is rich in carbonaceous, peaty, vegetal matter.

While the contact surfaces of subunits in most of this sedimentary complex are conformable, both the upper and lowermost subunits represent erosional surfaces. The zone is about 2.0 m thick in the immediate area of the bone bed. Exploratory tests into this zone were made in excavation units 94 NR and 40 to the southwest, further offshore in the former bed of the pond. Testing revealed a lack of faunal and carbonaceous materials and increasingly sandier diatomaceous earth laminae that were much more widely separated from one another by sandy sediments (Fig. 4). The most extensive exploration of the complex was carried out in excavation units 52, 80, 94 AE, and 94 NR. Phenomena observed in the first three are suggestive of a former pond margin.

Zone III: complex of semiconsolidated, stratified, black and gray to greenish clayey to silty sediments (lower unit: A) and friable reddish to tan or gray sandy (upper unit: B) sediments of about 3.0 m thickness. The lower unit is initially carbonaceous, then gleyed and yellow mottled; it contains abundant root casts. The upper unit is of progressively more sandy texture, has fewer root casts, and is oxidized in part.

Contact surfaces in the complex vary from conformable in the lower unit to erosional in the upper unit. The topmost, deflated, subunits of Zone III B comprise the present central basin of the blowout. Excavations showed that component parts of the whole complex are preserved intact only along the inner east and south margins of the blowout, undisturbed under the Zone IV complex (Fig. 3).

Zone IV: complex of friable, tannish to dark gray, sandy, aeolian and marsh sediments of about 0.8 m depth. The lowest unit (A) is composed successively of brown sand, yellowish white silt, and gray sand. Contact surfaces of the two lower subunits are conformable while that of the third eroded.

The upper unit (B) is made up of grayish green silt (lower) and grayish to black carbonaceous silt subunits. The latter contains abundant small land snails. Contact surface between these subunits and surface of the top subunit are erosional. Compact upper surface of the grayish to black subunit of this zone is preserved mainly along the inner south and southeast margins of the blowout basin, producing a flattish bench or beach effect (Figs. 2, 3).

Zone V: modern tannish to brownish dune sands along the east, southeast, and south margins of the blowout. The deposit is comprised of lower (A) compacted, stratified, humus stained, near recent and upper (B) loose, recent sands. The dune is oriented to the east-southeast side of the blowout. Maximum height is about 10 m above the blowout basin (Fig. 2).

CALICHE OUTCROPS, SPRINGS, AND ANCIENT DUNE

Gravels at the base of two caliche outcrops may have played a substantial role in attracting prehistoric visitors to the site area. It is hypothesized the gravels were an aquifer, giving rise to seepage springs. Springheads still occur in the region, e.g., Springlake and Sodhouse springs near Earth. The rock outcrops are local expressions of the widespread Llano Estacado caprock caliche (pedogenic calcrete) and are of Miocene/Pliocene age.

The caliche outcrops are situated on the north margin of the present deflation hollow (Fig. 2). During the Late Pleistocene, they probably were situated closer to the then existing north bank of Blackwater Draw and were considerably more exposed to view than now. Presently, they are covered partially with dune sands. The two outcrops are separated from one another by a sandy saddle 45 m wide. The northwest one (larger) is oblong and oriented approximately southwest-northeast; the northeast one (smaller) is irregularly shaped.

The saddle is covered to an unknown depth with a consolidated dune (orange hued) deposit. The highest point is about 8 m above the blowout basin. It contains cultural and faunal detritus in at least the scoured upper subunits. Lithics are typically wind polished. This aeolian deposit may be associated with one of the lower deposits in the blowout basin, perhaps one of the oxidized subunits of Zone III.

The sedimentary complexes containing the most abundant faunal and cultural assemblages of all periods seem to be located in proximity to the outcrops (Fig. 2). Springheads may have originated at the base of the caliche formation, attracting occupants. They also may have played a role in local ponding phases and sedimentation processes at the site. The prehistoric wells at the site in Zone III are believed associated with the possible springs.

A small exploratory test trench (excavation unit 96) was placed in the northeast margin of the blowout at the south base of the upward sloping fossil dune deposit (Fig. 2). The uncovered stratigraphic units are similar in color and texture to those of Zone III buried in the blowout basin but contain more abundant cultural detritus.

Heavily lime cemented caliche gravels were encountered below Zone III at a depth of about 2 m. The gravels sloped upwards at about the same 20° angle as the fossil dune surface. The gravels were not excavated beyond this point.

A 50 cm diameter, circular grayish area encountered (free of conglomerate) in the test trench floor may be a small ancient water well. The caliche conglomerate may represent either of two events. The gravels may be fragments eroded from the nearby caliche outcrops that have moved downslope. They also could represent a high on shore remnant, or facies, of an ancient fluvial gravel formation primarily associated with the basal Zone I gray sands (Fig. 6).

The oxidized orangish sands of the fossil dune in the saddle are older than the modern dune. Orientation of the two dunes is different: that of the latter is to the east-southeast, the former to the north-northeast. A major shift in wind direction is indicated (Reeves, 1965). Deposition of the older oxidized sands probably can be correlated with the Zone III sedimentary complex

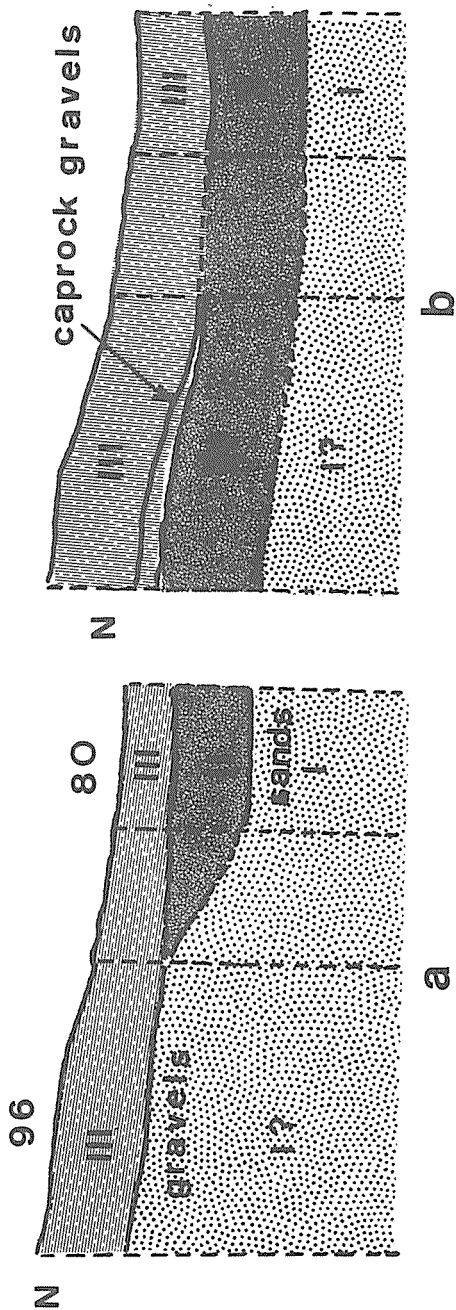


Fig. 6 Hypothetical cross section sketches of east walls of excavation units 96 (a) and 80 (b). Diagram a shows gravel encountered at base of Zone III as shore facies of gray sand. Gravels are shown in b as materials eroded downslope from caliche caprock outcrops.

now buried in the basin. Similar oxidized sands occur in subunit B of this complex in all excavation units.

CULTURAL AND FAUNAL SEQUENCES

Cultural and faunal materials were sparse in excavation and stratigraphic units with two exceptions. Exceptions are: the bison bone bed of Zone II and extensive late prehistoric camp debris of Zone V A. Lithics were not found with the former. If there was an associated camp, it was situated elsewhere.

Zone I: sterile to a depth of 2 m.

Zone II: the dismembered, arranged, well preserved bones of a mature, butchered *Bison antiquus* lay scattered on the surface of one of the upper diatomaceous earth units of excavation units 52 and 80 (Figs. 5, 7). The bones were covered with a very hard, thin layer of calcrete. A series of possible large hoof prints, perhaps representing trampling by the creature, are preserved on the same surface near the bones in adjoining excavation unit 96 AE (Fig. 7). The surface exhibits a scattering of ash, charcoal flecks, and vegetal impressions. The entire bone feature and possible prints were covered by 30 cm of nearly pure, unstratified diatomite. This sedimentary subunit is overlain, in turn, by several, increasingly sandy, laminae of diatomaceous earth (Fig. 5).

Disjointed bones include the pelvis, sacrum, a scapula segment, femur, radii, vertebrae, metacarpals, and metatarsals. Several of the latter were longitudinally broken and exhibit percussion marks. The cranium, with articulated atlas and cervical vertebrae, lay dorsally on a pile of ribs and scapulae. The frontals exhibit several possible massive concussion areas above the orbits (Fig. 8). The fracture areas, however, may be due to erosional damage from ground conditions (E. Johnson, personal communication).

The mandibles lay detached in front of the cranium, the left resting symmetrically on top of the right. The edge of a small, partially surface polished, possible bone tool, made from a non bison ungulate scapula, protruded longitudinally from under the lower edges of the stacked mandibles (Fig. 9). Due to poor preservation and incomplete cast excavation, it has not been entirely freed of matrix. Identification as a tool is speculative.

A stack of eight ribs were evenly placed with distal ends one over the other and proximal articular ends resting on the ground in a V shaped configuration (Fig. 10). Parallel placed metacarpals lay near the rib stack. The pelvis lay several meters from the cranium-mandibles-rib concentration; it served as a radiocarbon sample in lieu of charcoal. A second bison pelvis was discovered in excavating a large bone block from the bed in the laboratory (1980), suggesting two bison may be present (Fig. 11).

Projectile points or lithic tools were not recovered during excavation of the bison bone feature. A small chert flake found among the bones is considered dubiously associated with them.

The butchered bison remains, possible bone tool, and charcoal flecks are indicative of cultural activities by a small Paleoindian population. A bison was trapped on the muddy bank of an early Holocene pond, perhaps lamed by stunning (cranial fractures), killed, and dismembered. The bison, perhaps mired, was approached and attacked from downwind. The possible bone tool may have been used in the butchering process to detach the mandibles, extract the tongue, and strip meat from the carcass.

The lowest laminated diatomaceous sections of this zone contained scattered faunal remains but not direct evidence of human presence.

Zone III: diffuse cultural materials occur in all members of both subunits A and B. Materials include caliche cobble hearths in excavated basins, a water well, small (burned and unburned) broken bone, bone tools, three projectile points, scrapers, bifacial lithic tool fragments (rare), flaking debitage, hammerstones, and abrading stones. The fauna consists of bison (*Bison* sp.), pronghorn antelope (*Antilocapra americana*), and other small mammals. Bone in the zonal base (III A) is mineralized.

A possible water well was discovered at the base of Zone III B in the southeast corner of excavation unit 94 AE. About a quarter of it was situated within the unit. The unexcavated portion appears as a silhouette in the profile wall (Fig. 12). A wall peel was taken.

Diameter was about 1.5 m and depth 2.5 m. The vertical shaft walls were well preserved and the bottom (disturbed) was probably basin shaped. The well had been sunk into Zone II sediments, possibly an aquifer at the time. The well fill was composed of a humus and ash

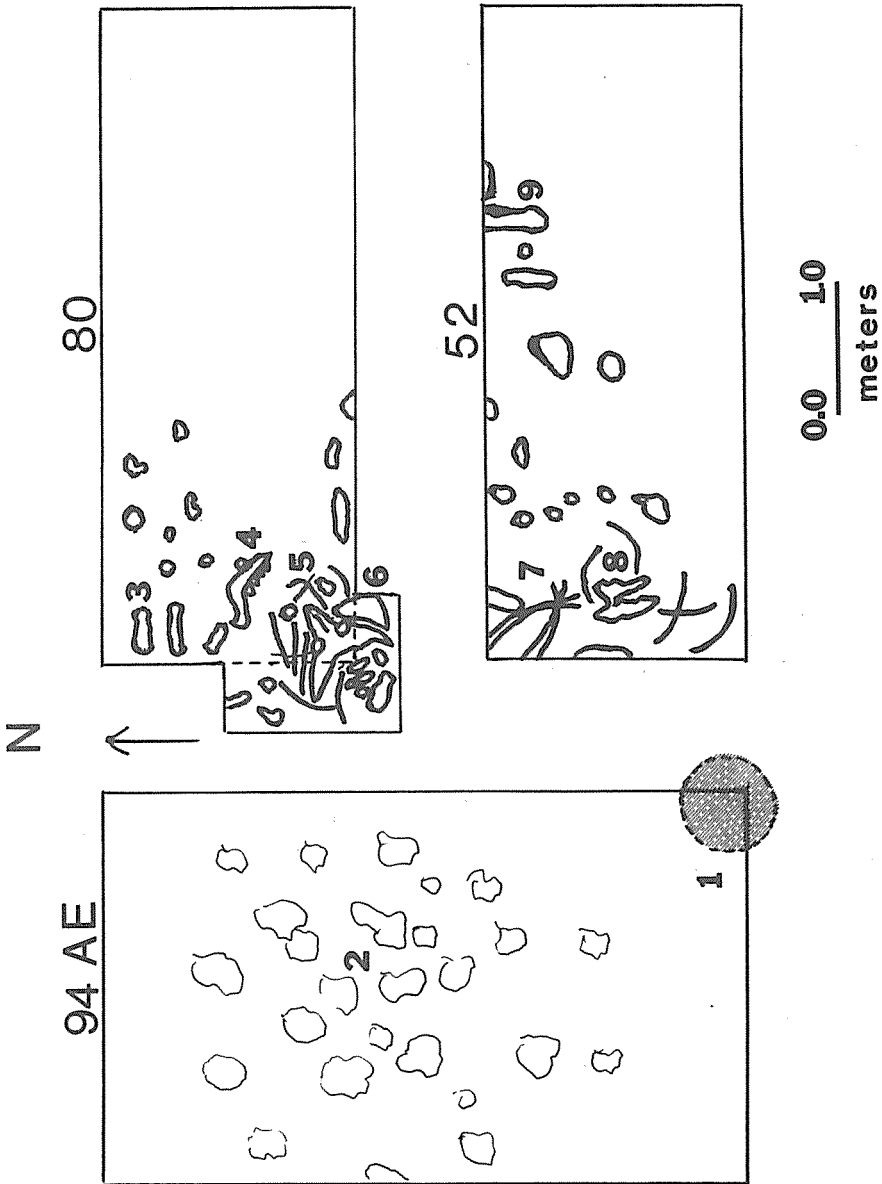


Fig. 7 Map of excavation units 52, 80, and 94 AE showing horizontal location of *Bison antiquus* bone bed, possible bison hoof prints, and later water well: 1) water well, dug from base of Zone III B; 2) possible bison hoof prints; 3) parallel placed metatarsals; 4) paired bison mandibles; 5) bison skull lying dorsally on broken ribs and vertebrae; 6) scapula; 7) stacked ribs; 8) pelvis; 9) cracked tibia. Items 2-9 are situated on a diatomaceous earth surface in upper part of Zone II that represents an ancient pond edge. Southwest corner of excavation unit 80 was expanded to permit recovery of bison skull block.

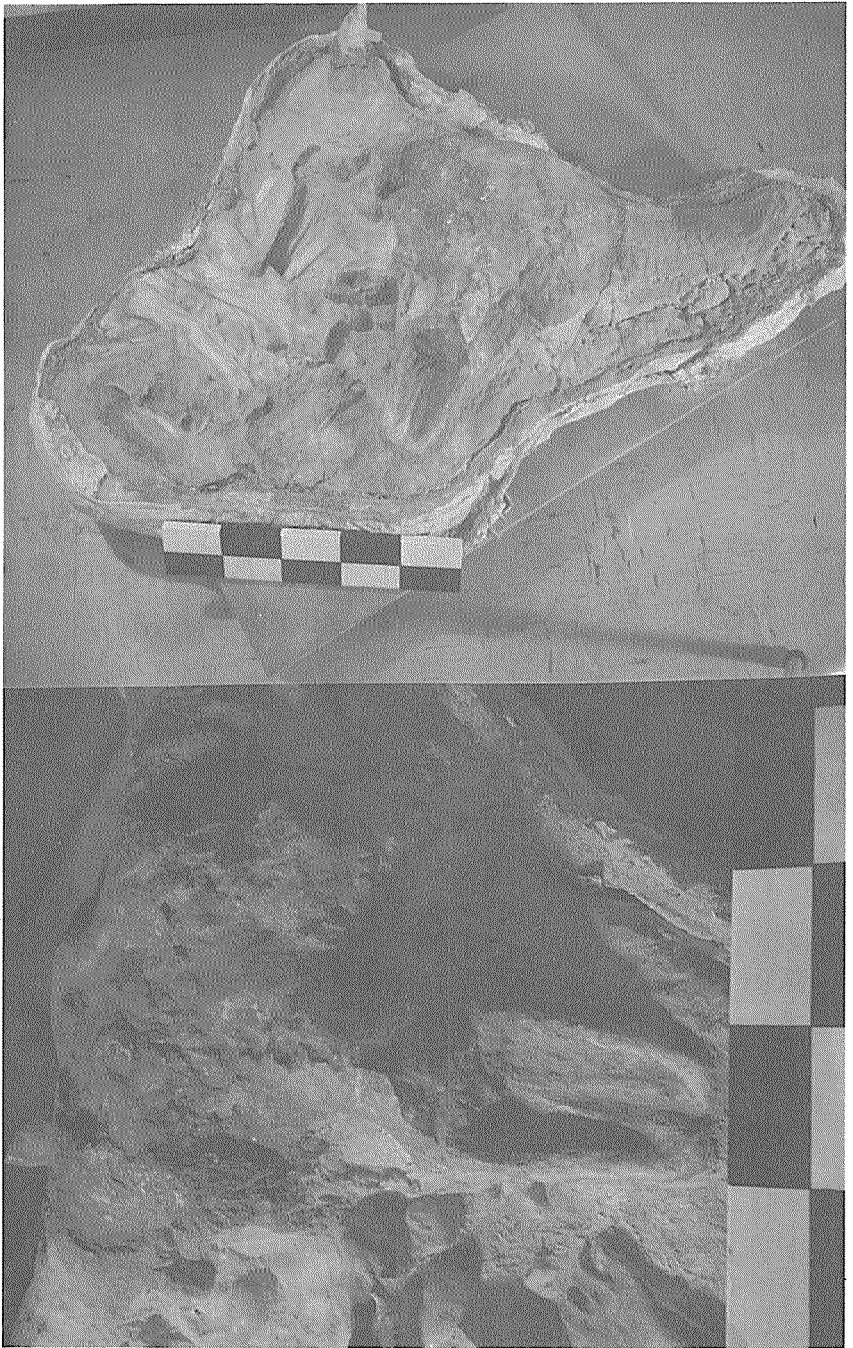


Fig. 8 Views of Zone II Bison antiquus skull bone block in laboratory after clearing of diatomite mantle: top) from distance; bottom) close up showing possible concussion marks on frontals between orbits. 10 cm scale intervals.



Fig. 9 Views of paired *Bison antiquus* mandibles in Zone II: top) in situ at time of discovery; middle) bone block in laboratory after clearing diatomite; bottom) possible bone tool under lower edges of mandible (arrow).



Fig. 10 Stacked Bison antiquus ribs in Zone II (in situ). Cracked femur adjoins ribs on right; patella located right of crossed ribs. Trowel is 25 cm long.

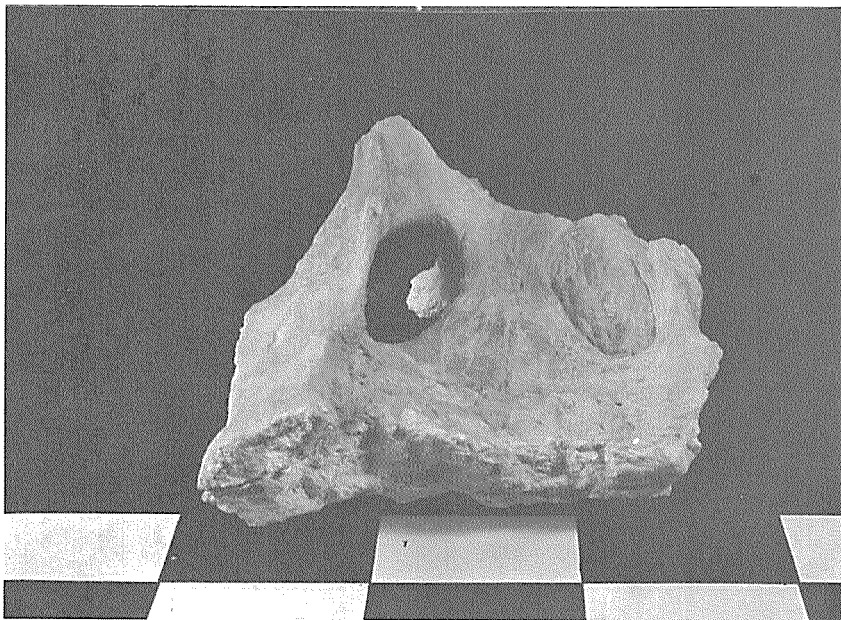


Fig. 11 Poorly preserved pelvis cleared of matrix mantle in laboratory (1980). Scale interval is 10 cm.



Fig. 12 Silhouette of water well in southeast corner of excavation unit 94 AE, dug from base of Zone III B down into Zone II.

stained sandy sediment containing a few bone scraps. Artifacts were not recovered. The former ground level margin of the well was quite hard packed, perhaps from treading by users. Rapid filling of the well after abandonment is likely since wall slumping is absent.

The water well appears, on the basis of stratigraphic evidence from this and other parts of the site, to have been dug from Zone III B and in use during the Archaic period. The possible unit 96 well also was situated in the Zone III B base.

Zone IV: culturally sterile; fauna includes bison (*Bison* sp.), pronghorn antelope, a canid, and small snails.

Zone V: subunit B is sterile. Subunit A (stratified) exhibits numerous caliche cobble hearths in excavated basins, clay lined (rare) and unlined storage pits, hackberry seed caches, broken bone (predominantly bison), tortoise shells (rattles?), and lithic artifact concentrations (Fig. 13). An infant burial with a turquoise pendant necklace and two partial adult burials (femur and cranial fragment) were recovered. Features occur mainly along the east and southeast margin of the blowout, especially on the leeward slope of the modern dune.

Other material includes Washita arrowpoints, bone tools, abrading stones, manos, grinding slab fragments, heavy duty chopping and scraping tools, flake scrapers, lithic debitage, sherds, worked turquoise and malachite, and limonite. Flaked lithics are of chert brought in from some distance, e.g., Tecovas from the No Trees area to the southwest, Edwards Plateau from the southeast, and Alibates from the north.

Pottery indicates contact with Puebloan and possibly Mogollon groups to the northwest and southwest respectively. Ground stone tools of sandstone and heavy tools made of silicified caliche are of local materials. Successive ephemeral occupations of nomadic hunter-gatherers are indicated. Fauna consists of modern bison (*Bison bison*), unidentified small mammals, and reptiles.

DIAGNOSTIC CULTURAL REMAINS

Due to their diagnostic value, projectile points and ceramics discovered in the site and at other nearby surface sites are discussed. They have been subjected to preliminary analyses.

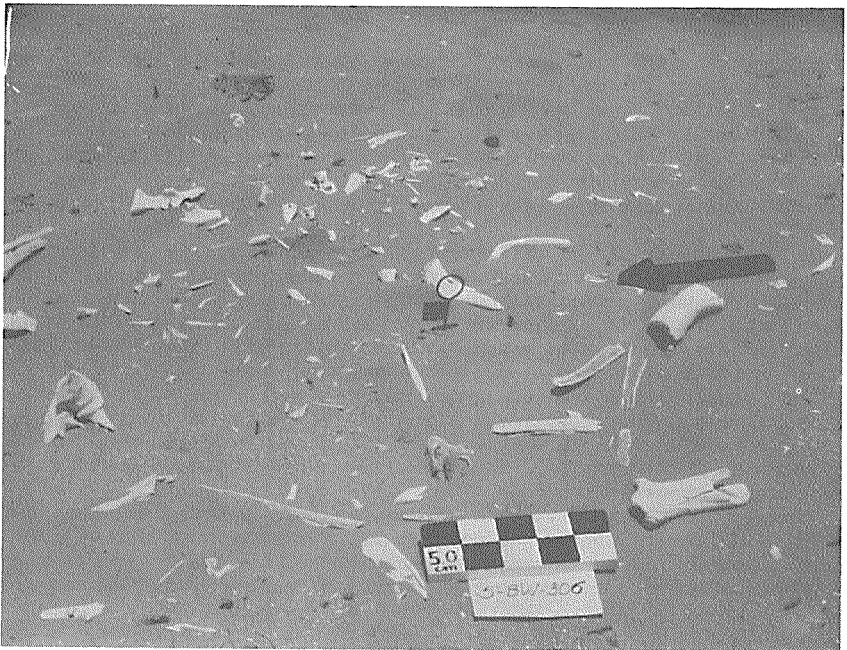
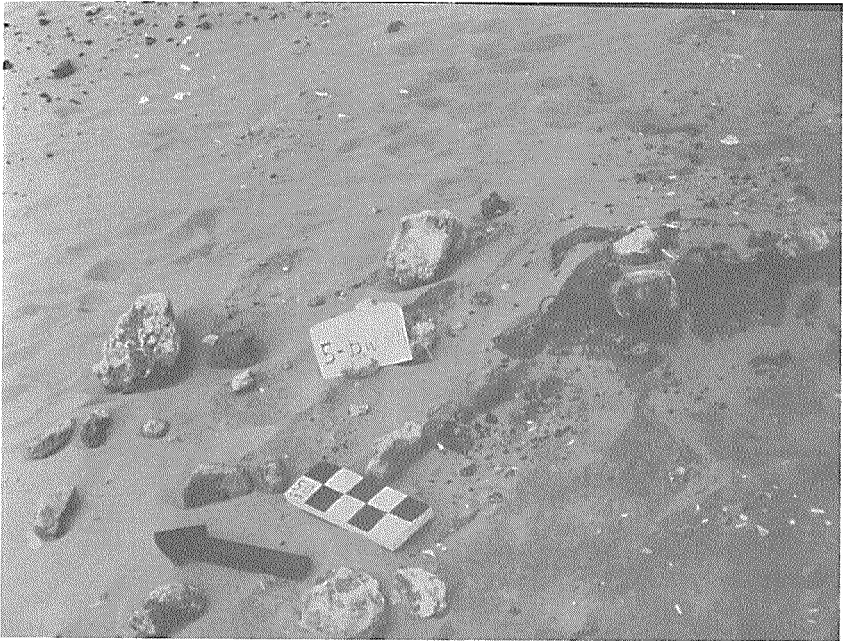


Fig. 13 Views of cultural features uncovered by deflation in Zone V A at base of Series I dune in southeast quarter of site: top) charcoal filled hearth associated with burned caliche cobbles (middle right) and charred bone (upper left); bottom: circular concentration of cracked bison bone.

Projectile Points

Ten complete points and base fragments were recovered from the deflated basin surface and vicinity of *in situ* Zone V A cultural features (Fig. 14). All are Washita points associated with the final prehistoric occupations of the site. Washita points also were recovered from the surfaces of other nearby sites.

Two Ellis and three base fragments and Marcos and Martindale bases (Archaic) were collected from the site surface (Fig. 14). Presumably, they originated in the deflated upper sections of Zone III B in the blowout basin. A quartzite Marcos point (Archaic) was recovered from an undisturbed lower Zone III B level in excavation unit 80. A chert base from a point of the same type was obtained from an upper level of the same zone in excavation unit 94AE. The water well and several *in situ* hearths discovered there or in other units could be coeval.

A proximal dart point fragment (Alibates chert), excavated from uppermost Zone III A, is stemmed and reminiscent of a Frio-Uvalde form in respect to the recurved base shape. However, it is not shouldered (Fig. 14). The transverse cross section at the top of the stem is biconcave, suggesting it may have been refashioned from a Clovis point.

Pottery

About 150 potsherds were recovered mainly from deflated Zone V A cultural areas along the inner south and east margins of the blowout. The majority are quite small due to trampling.

Most sherds are fragments of oxidized, fired, culinary and brown wares. Detailed studies of temper have not been made. Preliminary sorting created two basic groups: nonmicaceous (commonest) and micaceous (rarest). Stone temper is common to both, either weathered or crushed igneous rock or sand. Exterior surfaces in the first group, which tend to be thick, are either coarsely smoothed or smeared indented corrugated. Exterior surfaces of the second group, thinner sherds than the preceding group, are either finely smoothed or smoothed and finely striated. This group was made from a micaceous clay. Both may be interiorly polished. Closed and open vessel forms are represented. Some of this material may be derived from a Mogollon source, e.g., the lower Pecos drainage.

The collection of 20 small Upper Rio Grande paint decorated sherds are in two groups. The carbon painted, reduced fired group are probably of the Jemez or Wiyo Black-on-white types. The remainder are glaze painted. Most are Glaze A types Agua Fria Glaze-on-red and Cieneguilla Glaze-on-yellow. They are dateable to the mid 14th Century A.D. (Honea, 1968:163, Table 30). Several reduced fired sherds lacking surface decoration are stone tempered and may stem from the New Mexico Middle Rio Grande drainage.

Radiocarbon Date

Half of an unburned *Bison antiquus* pelvis from excavation unit 52, Zone II, was processed for a radiocarbon date. The specimen (TT5-52-108) was submitted to Geochron Laboratories, Cambridge, Massachusetts. It had been covered with a deposit of calcrete and a bed of nearly pure diatomite. It was cleaned of diatomite in the laboratory and a final dry bone sample of

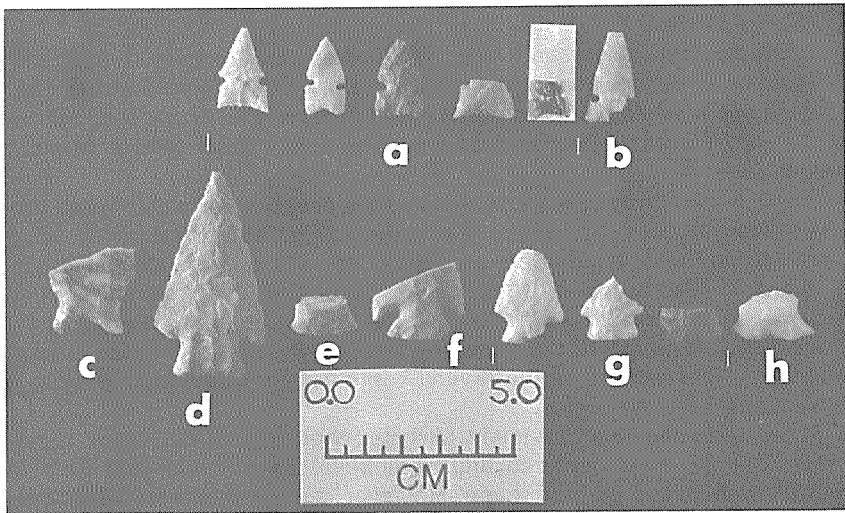


Fig. 14 Marks Beach projectile points. Top row (Neo American): a) Washita; b) Harrell. Bottom row (Archaic): c) unnamed type, Zone III A; d) Marcos, lower Zone III B; e) Marcos base, upper Zone III B; f) Marcos, surface; g) Ellis, surface; h) Martindale, surface.

261 gm obtained. In the course of analysis, the carbon dioxide fraction was extracted from the contained apatite of the bone sample and this fraction was dated. The estimated date was $\pm 10,000$ B.P. The sample assayed at 9920 ± 380 years B.P. (GX-1458; 5,570 years half life).

REGIONAL CORRELATIONS AND INTERPRETATIONS

Stratigraphy

The geomorphic sequences in Marks Beach, Lubbock Lake (E. Johnson, 1976; Holliday and Allen, in press), and Blackwater Draw Locality #1 (Haynes, 1975) exhibit generalized similarities in stratigraphy. At present, only correlations of the most generalized kind are made between the three sites. The Marks Beach sedimentary units that can be correlated with this basic scheme are in Table 2.

Common regional geologic denominators seem to be the following:

Lower Sedimentary Complex: basal, predominately fluvialite, massive gray sands, overlain on an erosional contact surface by a series of lacustrine sediments composed of laminated diatomaceous earth, diatomite, carbonaceous and/or sand strata, indicating moist conditions.

Middle Sedimentary Complex: progressive series of carbonaceous, clayey, silty to increasingly sandy strata, some of the latter oxidized, deposited unconformably on the preceding complex, marking a change from a moist climatic regime to increasing dessication of the landscape, lowering of groundwater level, and terminated locally by one or several ponding phases.

Upper Sedimentary Complex: series of unconformable sands of locally variable facies but mainly of aeolian origin and indicative of continuing arid conditions, extending to the present.

Caliche Aquifers

Blackwater Draw Locality No. 1 (Haynes and Agogino, 1966) is associated with ancient, intermittent, caprock seepage springs. Such springs

Table 1
 Stratigraphic Description and Concordance of Excavation Units 52, 35, 40 at
 Marks Beach Site

Stratum	Zone	Color and Characteristics
1a	VB	Recent tannish blow sands.
1b	VA	Compacted, near recent, stratified, brownish sands.
2	IVB	Gray black, sandy, carbonaceous silt with abundant small snails.
3a	IVA	Gray green silt; snails; root holes.
3b	IIIBix	Light gray sand; snails.
4	IIIBviii	Gray sand; root holes.
5	IIIBvii	Yellowish white silt; root holes.
6	IIIBvi	Brown sand; root holes.
7	IIIBv	Tannish sand; root holes.
8	IIIBiv	Light gray sand; root holes.
9	IIIBiii	Brownish tan sand; root holes.
10	IIIBii	Light gray sand, in part oxidized; root holes.
11	IIIBi	Firm, brownish tan sand, in part oxidized; calcareous hard pan, scattering of caliche pebbles at base; unit 94 AE well dug from this stratum; root holes.
12	IIIAii	Soft, light gray sand; few caliche pebbles in upper margin; scattered root holes.
13	IIIAi	Firm, brownish tan sand with firm discontinuous laminae; brownish black diatomaceous earth and/or carbonaceous silt, darkest at base.
14	IIxvi	Firm, diatomaceous earth with sand lens; undulate, finely laminated.
15	IIxv	Soft, loose, sandy diatomite with sparse root holes in upper portion; lower portion harder, limonite stained, with fine root casts; lower part covers <i>Bison antiquus</i> remains lying on surface of IIxiv encased in a shell of calcrete in excavation units 52 and 80.
16	IIxiv	Firm, diatomaceous earth; finely laminated; <i>Bison antiquus</i> remains in units 52 and 80, possible hoof prints in unit 94 AE; firm, muddy, pond edge suggested.
17-30	IIi-xiii	Firm laminae of diatomaceous earth, sandy diatomite and/or sand; small unidentified mammal bone recovered from IIiv, deepest faunal material discovered; IIiii through IIx to greater or lesser extent limonite stained; IIi sandy and transitional to deeper gray sands; some laminae in the upper part of profile with carbonaceous vegetal material.

occur at Rattlesnake Draw, west of Buckeye (New Mexico), but have not been studied in detail (Smith et al., 1966:305-306). Blackwater Draw Locality #1 spring conduits are older than the initial occupation and are associated with deposition of both the lower complex gray sand and diatomaceous units. The conduits appear as nearly vertical, irregularly cylindrical, or tapering sand filled tunnels close to the caprock caliche aquifer. Some of the tunnels are reported to extend under the caliche into underlying red sands and gravels (Haynes and Agogino, 1966:813). Many of the

Table 2
Marks Beach Sedimentary Units Correlated With Regional Scheme

Regional Scheme	Marks Beach Units
Lower Complex	Zone I Zone II
Middle Complex	Zone III A Zone III B Zone IV A Zone IV B
Upper Complex	Zone V A Zone V B

conduits contained cultural detritus of both Paleoindian and Early Archaic periods.

The springs dried up because of increased aridity and a regional drop of the water table during deposition of Middle Complex sediments. This event was correlated with onset of the Altithermal (Haynes, 1975:83). The excavated water wells from this site (Evans, 1951; Green, 1962) and those at Rattlesnake Draw (Smith et al., 1966) may be contemporaneous with this particular event.

Evidence for springs at Marks Beach is at best circumstantial. Although spring conduits were not identified, a possible water well was. The well seems to have been excavated in the same stratigraphic complex as those at the Blackwater Draw (Haynes and Agogino, 1966) and Rattlesnake Draw (Smith et al., 1966) localities. A temporal equivalency is implied, although not demonstrated.

Dune Trends

Ephemeral playas on the Llano Estacado are usually associated with distinctive dune trends produced by shifts in paleowind directions (Reeves, 1965). Marks Beach is significant since it exhibits two dunes of different lithology and orientation. They are the active modern dune of tannish sands in the east and southeast part of the site with an eastsoutheasterly orientation and an oxidized, orangish fossil dune in the northeast part with a northeasterly orientation. The former comprise the Upper Complex sediments (Zone V A and B), while the latter is believed coeval with the buried Middle Complex (Zone III B sediments).

Reeves (1965:504-508) noted three successive dune trends, the latter two of which are pertinent to Marks Beach. Series III dunes, furthest from present playas, accumulated more than 15,000 years ago in mean paleowind directions of S 60° E. Evidence of these dunes at the site is lacking.

Series II dunes accumulated mainly on the north and east edges of playa blowouts with paleowinds blowing predominantly southeast to east at a mean direction of S 60° E. They are dated 15,000 to 5,000 years ago. Series I dunes accumulated on the northern and eastern blowout margins at a prevailing mean paleowind direction of N 20° E. The inference is that they were deposited in part over earlier Series II trends on the north and east blowout margins. Development of this trend is believed to have begun 5,000 years ago. Such dunes are active today on the Llano Estacado (Reeves, 1965).

At Marks Beach, the exposed oxidized fossil dune between the two caliche outcrops is evidently a remnant of the Series II type based on probable age and orientation; it probably extended onto the east edge of the site. Buried portions of it may still be preserved. The buried Zone III oxidized sediments in the site proper are believed associated with this early period of deflation.

The present active sand dune (Zone V) is equivalent to the Series I trend. It is separated from Series II dune sands on the east margin of the site. Middle Complex Zone IV marsh sediments separate the two dunes. Deposition of both dune trends was affected by the two caliche outcrops in the site. They present a kind of barrier or windbreak and as such have influenced wind flow patterns over the millenia.

Since deposition, the Series II fossil dune has been affected physically by the shift in paleowind direction (S 60° E to N 20° E). Surface indications of it are lacking east of the blowout, although present in the protected saddle area between the caliche outcrops in the northeast quadrant. In the former area, it either is buried intact under Series I sands or it was partially or fully deflated as the Series I dune trend accumulated. The remnant of this older dune in the saddle area is being subjected to severe wind scouring in the course of which ostensibly older cultural and faunal materials are being exposed. Lithics are typically wind polished.

An hypothesis concerning the possible location of transitory camps of early site habitants is based on available data. Cultural detritus buried in sediments of Zones II and III is rare. Similarities exist between buried Zone III sediments in the basin and those exposed in preliminary excavation of the south leeward margin of the fossil dune. Fossil dune sediments on the saddle between the caliche outcrops may contain stratified cultural deposits of these early camps. They should be present above the caliche gravels and possibly below. This area is in a dry position which would have been away from muddy or marshy edges of the draw and/or later ponds and marshes. The testing of this hypothesis involves more thorough excavations and radiocarbon dates.

Local Related Sites

The as yet unexcavated Amherst site, stratigraphically similar to the lower geologic units of Marks Beach, was discovered about 2 mi further upstream on the same bank of Blackwater Draw (Fig. 15). An oblong area of whitish, weathered diatomaceous earth measuring about 20 x 50 m is exposed. The long axis of this unit is parallel to the course of the draw. The exposure may represent an ancient pond margin. Weathered faunal material is embedded in the surface. Lithic debris and other cultural detritus occur on but not in the surface and could be secondarily associated. This diatomaceous unit is on the same level as the present level of the draw and may correlate with the Zone II sedimentary complex at Marks Beach.

Chronology

The available Marks Beach bison bone date from Zone II is 9920 ± 380 years B.P. (GX-1458). Charred bone from a comparable stratigraphic unit at Lubbock Lake produced a date of 9883 ± 350 years B.P. (C-558) (Green, 1962:115). Recent Lubbock Lake Project work in the same stratigraphic unit (2B cienega/base) produced dates of 9960 ± 80 years

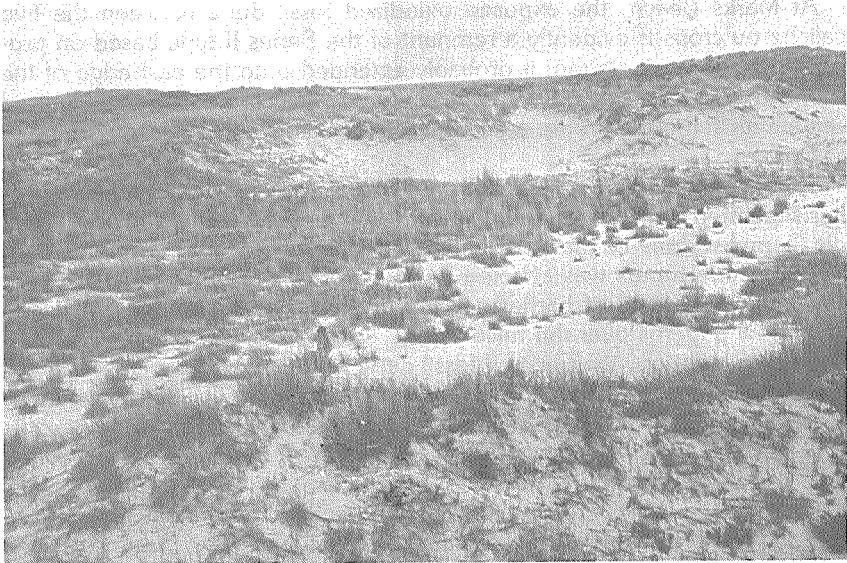


Fig. 15 General view of Amherst site, located about 1 km to the north of Marks Beach. Whitish material in center is weathered diatomaceous earth deposit corresponding to Zone II at Marks Beach. Overburden formerly covering this deposit appears as a dune in the right background.

B.P. (SMU-275; diatomite humates) and 9985 ± 100 years B.P. (SMU-728; cienega humates) (Johnson and Holliday, 1980; Holliday and Johnson, in press).

Cultural Sequences

Evidence from the Marks Beach excavation suggests sporadic habitation from the Paleoindian, Archaic, to the Neo-American periods. Diagnostic cultural materials are rare, with only those of the final occupants recovered in any quantity.

Camps associated with peoples living at the site during accumulation of the Lower and Middle Sedimentary complexes (Zones II and III) most likely are buried in the fossil dune in the northeast quadrant of the site near the caliche outcrops. Results from exploratory testing support this hypothesis.

Disarticulation and patterned placement of bones in the Zone II bison bone bed were observed in a comparable level at Lubbock Lake (Johnson and Holliday, 1980). Stacking phenomenon was noted at the Hell Gap Casper site in Wyoming (Frison, 1974:62-69), dated to 9880 ± 350 years B.P. (RL-125) (Frison, 1974:108).

The Marks Beach bison bone bed of Zone II probably represents a Plainview occupation. The three Lubbock Lake radiocarbon dates are in association with Plainview points and date the Plainview occupation at the site. Although the earlier date (9883 ± 350 years B.P.) originally was considered a Folsom date (Green, 1962:115), current Lubbock Lake Project work has shown it to be Plainview (Johnson and Holliday, 1980; Holliday et al., in press). The latter humate dates support the general accuracy of the bone date.

Other sites with dated Plainview occupations are the Plainview type site (9800 ± 500 years B.P.; Haynes, 1967:271) and Bonfire Shelter (average age 10,080 ± 130 B.P.; Dibble, 1970:251). Materials dated in the former were unburned bone and in the latter charcoal.

Archaic projectile points recovered from Middle Sedimentary Complex subunits III A and III B are too few to permit much speculation. A point similar to the anomalous Frio-Uvalde like one was recovered from a spring conduit at Blackwater Draw Locality No. 1 and believed to date to the Early Archaic (Haynes and Agogino, 1966:818, Fig. 7). Two other examples were surface collected from the Rattlesnake Draw site (Smith et al., 1966:P1. III F, G).

Two Marcos points at Marks Beach were excavated from Zone III B, a zone associated with the possible water well; a third was collected from the site surface. The published age range of this type places its earliest occurrence at about 4,000 years B.P. (Bell, 1958:42). If the Marcos points are contemporaneous with the well and dating of the Rattlesnake and Blackwater Draw wells to the Altithermal (Smith et al., 1966:306; Haynes, 1975:83) is correct, then the earliest appearance of Marcos points may be somewhat earlier than indicated.

Ellis points are believed to date to about 3,000 B.P. and Martindale points to 5,000 or 6,000 years ago (Bell, 1960:32, 70). The Marks Beach specimens are from the surface and could come from either the disturbed upper Zone III B or IV sediments. Washita points recovered from Zone V A have an estimated age range of about A.D. 1100 to 1600 (Bell, 1958:98). The Upper Rio Grande pottery associated with them in the site suggests a time period of about A.D. 1350 (Honea, 1968).

FURTHER WORK

Definitive conclusions regarding Marks Beach cannot be made until the recovered data have been studied. Similarities with other deeply stratified sites of the region are manifest.

Renewed excavations at the site should concentrate in the following areas. First, the fossil dune and its contents should be explored. Secondly, both the geologic and cultural stratigraphies in the modern dune base need to be defined in detail. Finally, excavation of the nearby Amherst site should provide a wealth of comparative data regarding local late Pleistocene and early Holocene geologic and cultural events since the post Pleistocene overburden was removed by deflation.

This proposed work, new data from Lubbock Lake, and definitive studies on Blackwater Draw Locality #1 (Wendorf and Hester, 1975; Hester, 1972) should help in gaining new insights into the early archeology of the Llano Estacado.

ACKNOWLEDGMENTS

The Marks Beach site was discovered by Mark Randall of Littlefield in 1967, then an undergraduate student at Texas Technological College. It was reported to this writer and we both carried out the initial surveys there and in the general area.

Grateful thanks is here extended to the management of the ranch on which the site is located for permission to excavate. A condition for this was that the exact location of the site is to remain confidential.

The recovery of the important data from the site would have been impossible without the dedicated efforts of the 1968 and 1969 Texas Tech student team members: Arthur Black, Randall Callahan, Susan Driskill, Robert Hayley, Kathy King, Mark Randall, Danny Sessums, Judy Trotter, and Doug Yarbrough. The 1970 team, from Northern Illinois University, included Lonny and Herbert Hothan, Nancy Nelson, and Craig Scheffler, My son, Andreas, provided invaluable help during the three excavation seasons.

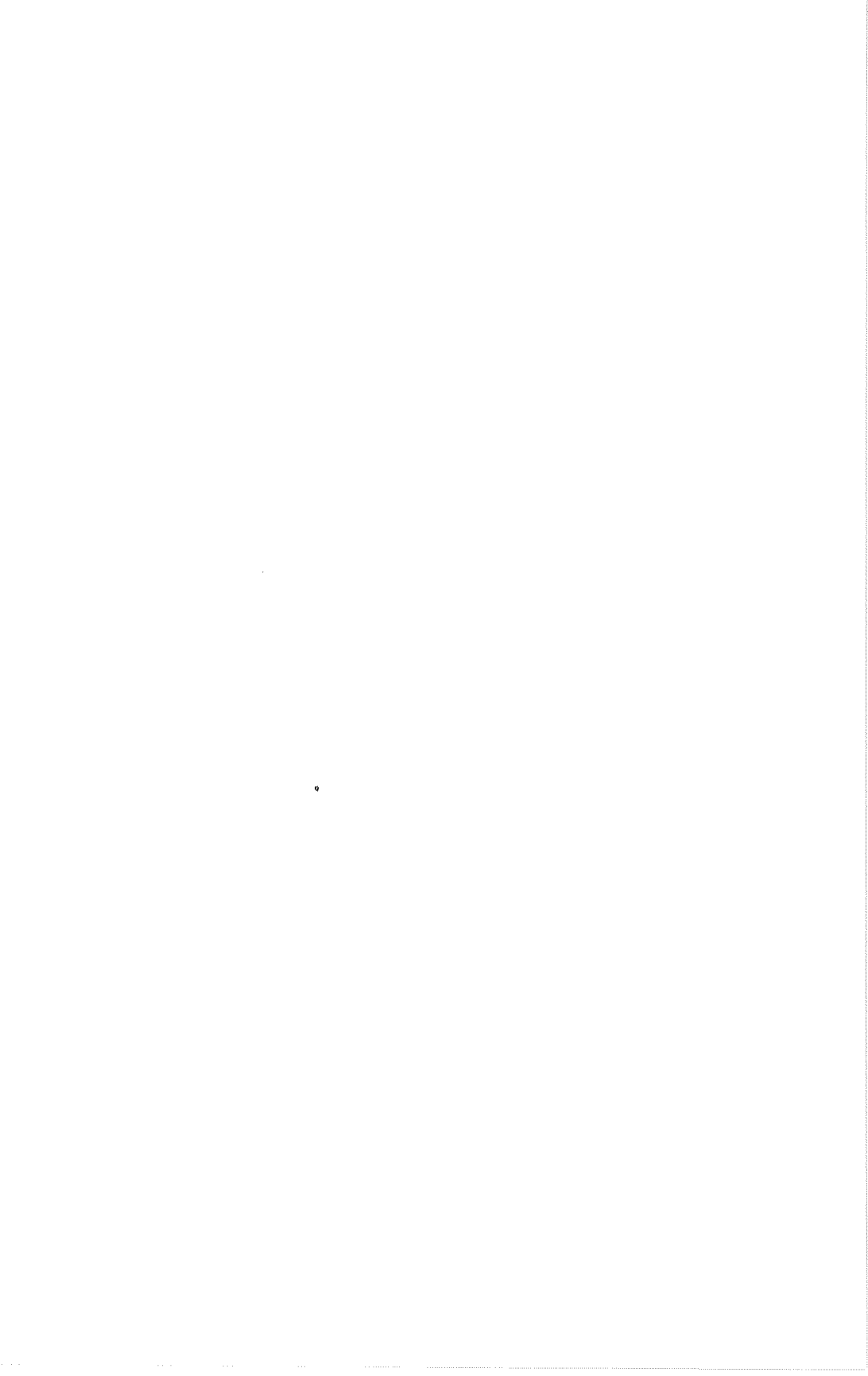
A paper presenting preliminary results of the excavations at the Marks Beach site was presented by the writer at the December 1968 annual meeting of the American Association for the Advancement of Science in Dallas, Texas.

Special thanks are due to Eileen Johnson, editor of this journal, for the herculean efforts that went into making this a readable report. C.C. Reeves offered invaluable advice in the field. Errors of omission, and mistakes, are of course my own.

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The Material Evidence of Texas History

Daniel E. Fox

ABSTRACT

A general review of historical archeology in Texas provides an introduction to the subject for the state. Discussion is focused on selected accomplishments of archeological investigations of historic Indian sites, shipwrecks, French occupation, Spanish Colonial establishments, early 19th Century sites, German settlements, frontier military outposts, and archeological sites of the second half of the 19th Century and the 20th Century. Some contemporary research problems and potential contributions of historical archeology in Texas are derived from this summary.

INTRODUCTION

Numerous books have been published detailing the events of Texas history and every community has its own folklore, written or unwritten, about its heritage. Archeologists study the material evidence and the cultural environmental contexts of human behavior. They have an opportunity to verify, correct, and supplement the documentary record of Texas history and explain why events happened.

Systematic archeological investigation of non-Indian sites of the historic period is a recent development in the disciplines of history and archeology in Texas. Most work has been concerned with the state's prehistory. Historical archeology often is restricted as well as encouraged by legal, financial, and political aspects. As yet, historical archeology in Texas does not have an organized system of method and theory; although more recent, intensive historic site investigations have adopted current scientific concepts and methods (e.g., Gilmore, 1973; A. Fox and Livingston, 1979).

The following summary is a simplified version of the historical archeology that has been done in Texas. It is written as an introduction and by no means is exhaustive.

TEXAS ABORIGINES

The search for material evidence of historic Indian societies has long been an important interest of Texas archeologists. Linking early explorers' and missionaries' accounts with the material remains of native peoples helps to identify prehistoric groups and reconstruct their lifeways. It also makes it possible to study the processes involved in the acculturation of aboriginal peoples. Few archeological sites have been found which can be attributed with certainty to historic Indians in Texas, particularly those with a cultural

heritage of occupation in one general environmental situation. It is difficult to affiliate known historic Indian remains with prehistoric cultural materials.

Eastern Apaches, Tonkawas, Coahuiltecanas, and Karankawas

The only archeological sites that have been investigated intensively which are known to have been occupied by various nomadic hunting and gathering peoples of Central, South, and Coastal Texas are the Spanish Colonial missions located in those aboriginal homelands (Hester, 1975; Gilmore, 1969; Schuetz, 1969; A. Fox et al., 1976). Identification of the material culture produced by the mission Indians is difficult. Most of the missions were built on sites which had been occupied by prehistoric groups. Mission Indian materials sometimes are mixed with evidence of earlier occupations, some dating back thousands of years (D. Fox, 1979a). The probability that mission inhabitants collected or reused artifacts of earlier peoples further complicates the identification of mission Indian material culture (D. Fox, 1979a:33-34).

Mission converts used European tools, weapons, ornaments, and other implements. An analysis has not been done of how dependent they were on European technology; or of how the mission system adapted to conditions of the Texas frontier and was supplemented by native materials and Indian technology.

Prior to entering the missions, the native peoples of the Edwards Plateau and the Rio Grande Plain already had undergone generations of culture change in adaptation to population decline, territorial displacement, segregation and ideological pressure, loss of ethnic identity, and absorption by invading populations (Campbell, 1975:2). As mission neophytes, Indians from different cultural backgrounds were integrated into a single, hierarchically organized mission population (Scurlock et al., 1976:24-27) and quickly acculturated into the laboring class necessary to support the hacienda system of New Spain (Chevalier, 1966; Fehrenbach, 1968:65).

Artifacts produced from native materials identified as mission Indian include simple pottery vessels and other ceramic artifacts, triangular arrowpoints, gun flints and other flaked lithic tools, and a few ornaments and tools of bone and shell (Schuetz, 1969:62-77; D. Fox, 1979a). This material is only vaguely similar to Late Prehistoric material culture. The limited, standardized nature of mission Indian artifacts appears to reflect a dependence upon European technology, an adaptation to sedentary life, and organization of the hacienda, more than a continuation of Indian cultural traditions (D. Fox, 1979a).

Wichitas

The Wichita speaking peoples who inhabited Northcentral Texas and adjacent parts of Oklahoma during the 18th and early 19th centuries are some of the archeologically best known Indian cultures. Artifacts of native manufacture found in association with European trade materials at a series of localities in Northcentral Texas were designated the Norteño Focus. This archeological complex was thought to be attributable to historic Wichita tribal groups (Duffield and Jelks, 1961:69-71; Bell et al., 1967).

Material remains of the Norteño Focus include triangular arrowpoints, scraping tools, knives and other flaked lithic implements, types of locally

made and trade ware pottery, ceramic and ground stone smoking pipes, ornaments and tools of bone and shell, and other artifacts of local origin; European trade beads, knives, axes, metal arrowpoints, gun parts, ornaments, kettle fragments, and horse trappings (Duffield and Jelks, 1961; Harris et al., 1965; Jelks, 1967).

This material represents a hunting and gathering lifeway. The extensive size of Norteño Focus sites, remains of substantial dwellings, and nature of other archeological features reflect a partial dependency upon agricultural crops necessary to support large semipermanent villages (Suhm, 1960:67). Trade and other forms of socioeconomic interaction with neighboring Indian groups and Europeans also must have been an important part of historic Wichita subsistence.

Some studies of the material culture inventory of the Norteño Focus and historical documentation of the Wichita were applied toward an interpretation and reconstruction of Wichita culture of the Historic Period (Newcomb and Field, 1967). Some Norteño Focus artifacts resemble Late Prehistoric cultural remains referred to as the Henrietta Focus of Northcentral Texas (Duffield and Jelks, 1961:73). However, Wichita peoples probably were not native to Texas (Suhm, 1960:66; Newcomb, 1961:248; John, 1975:338). Norteño Focus materials have not been compared to their prehistoric counterparts in order to study the degree to which the Wichita had become acculturated; or in what ways Wichita culture changed from its prehistoric antecedents.

Comanches

The aboriginal nomads of Central, South, and Coastal Texas were the first to disappear during the Historic Period. The culture of the more organized, semisedentary Wichita immigrants endured a while longer. The Comanches were among the last to surrender (Newcomb, 1961:158).

Possibly because of their mobility and their late arrival in Texas, archeological evidence of the Comanches is limited (Willey et al., 1978). A few isolated burials have been found (Suhm, 1960:67; Word and Fox, 1975). Offerings commonly associated with Comanche burials include horse trappings (occasionally, the remains of a horse), knives, hoes and other tools, brass bracelets, glass beads, finger rings, conchos, hair pipes and other ornaments, leather and fabric garments, mirrors, and aboriginal artifacts (Word and Fox, 1975:43-52).

Several Comanche burial customs reported in ethnographic accounts have been verified from archeological evidence (Word and Fox, 1975:48, Table 5). Among these customs, the body was flexed and bound in position, painted with vermilion, dressed in the finest clothes, and wrapped in a robe or blanket. The body was buried in a crevice or secluded place along with the deceased's possessions, including his saddle, bridle, and favorite horse. The grave was covered with rocks and a ceremonial fire was built.

With the warrior appropriately laid to rest, the spirit of the Comanches lived on in the perfect afterworld. "There was plenty of game for the men to hunt, the horses were fast, pounded corn was always available, and there was no sorrow or suffering" (Newcomb, 1961:189).

SHIPWRECKS

Archeological investigation of shipwrecks along the coast is a recent addition to historical archeology in Texas. The successes of professional treasure hunters during the 1960's spurred the development of a whole new system of antiquities legislation and archeological technology.

Meticulous study of 16th Century Spanish artifacts from Texas tidelands confiscated by the state resulted in the thorough description of Spanish cargo (Olds, 1976) and development of new techniques for historic artifact analysis and conservation (Hamilton, 1976). The location, identification, and underwater excavation of wrecks of a Spanish Flotilla off South Padre Island resulted in technological innovations, publication of technical archeological reports and historical documentation (e.g., McDonald and Arnold, 1979), public exhibitions, a motion picture, and a book (Arnold and Weddle, 1979).

The science of underwater archeology in Texas is developing rapidly and is being integrated with the study of maritime archeology in the United States and Old World (Arnold, 1978). This has created an atmosphere conducive to reducing the high cost of managing underwater cultural resources and balancing the popular appeal with the academic values of historical archeology. Underwater archeology, particularly that concerned with 19th Century coastal and inland shipping, will contribute to the understanding of the history of the people of Texas.

LA SALLE'S FORT SAINT LOUIS

While historians decipher documentary sources and attempt to plot historic places, archeologists look for material evidence left by the people who occupied the places. The identification of the site of La Salle's Fort Saint Louis on the Texas coast is an example of historical research and archeological investigation applied to historic site location (Gilmore, 1973).

Rene Robert Cavelier, Sieur de la Salle, established an ill fated colony on the coast in 1685. On hearing of French claims to this territory, the Spanish sent several expeditions to locate and destroy Fort Saint Louis (Weddle, 1973). In 1689, when Alonso de Leon finally found La Salle's colony, it had been destroyed by Indians (Bolton, 1959:398-399). Determined to protect their territories from the French, the Spanish established the presidio of Nuestra Señora del Loreto (La Bahia) in 1722 on the site of Fort Saint Louis. The Mission Espiritu Santo de Zuñiga was established nearby among the Karankawa Indians (Hackett, 1945).

Using a Spanish map of 1691, Bolton (1924) found a possible location of the French colony (Keeran site) on Garcitas Creek near Lavaca Bay in Victoria County. Other historians contested Bolton's claims (Gilmore, 1973:1). Archeological excavations at the Keeran site (Gilmore, 1973) failed to demonstrate that this was the location of the French colony. None of the artifacts recovered were identified positively as being representative of French occupation (Gilmore, 1973:1).

Using a methodological approach developed to demonstrate precise locations of other historic sites, Gilmore (1973) formulated a conceptual model of what the location of La Salle's Fort should look like. This model was based on researching historical documents to reconstruct the geography,

physiography, and topography of the site's location and studying archeological materials from sites of the appropriate time period to determine what material remains of the French fort and the Spanish presidio should be.

Gilmore (1973:20-21) found that certain characteristic types of Mexican made ceramic vessels, particularly decorated majolica categories, were recovered from the Keeran site. This material indicated that it was the site of Presidio Loreto. The geographic, physiographic, and topographic situation of the Keeran site also corresponded relatively well to historical accounts of the locations of the Presidio and the French colony.

Search for artifacts characteristic of French occupation was complicated by the fact that French trade goods such as guns and gun flints were traded and used by others than the French (Gilmore, 1973:30). Furthermore, the main French settlement area at the Keeran site probably was not excavated during the investigation (Gilmore, 1973:36). Concentrating on ceramics as a more sensitive indicator of cultural traditions, Gilmore (1973:31) found one type of French pottery in the collection which indicated that the Keeran site probably is the site of La Salle's Fort Saint Louis.

SPANISH COLONIAL MATERIAL CULTURE

Federal, state, local, and private funding has encouraged considerable amounts of historical research and archeological investigations of Spanish Colonial sites, particularly those in or near populated areas. Archeologists conducted a variety of intensive and short term investigations at the better known, best preserved Spanish Colonial sites. Their research has been extended to include the location and description of the more obscure, almost forgotten localities, such as the missions, presidios, and ranchos of East, South, and Coastal Texas (e.g., Hester, 1975; Adams, 1976).

The Spanish Colonial sites of the San Antonio area have received the greatest amount of attention. Missions San Antonio de Valero (the Alamo), Concepción, San José, San Juan Capistrano and Espada, San Fernando Cathedral, the Governor's Palace, and sections of the acequia (irrigation) system of Spanish Colonial San Antonio have been investigated (A. Fox et al., 1976; D. Fox, 1979a; D. Fox et al., 1977; Schuetz, 1969).

Investigations were limited primarily to salvage or cultural resource management operations instead of well funded, problem oriented archeological programs (Scurlock et al., 1976:64). Basic information about the remains of the Spanish Colonial peoples was recovered. However, it has yet to be synthesized thoroughly and applied toward the explanation of the expansion and decline of Spanish Colonial feudalism.

Eighteenth Century material remains of Spanish Colonial Texas include goods imported from Europe, Mexico, and China and artifacts and architecture produced locally (Gilmore, 1969:45-46, 48-49, 55-56; Schuetz, 1969; D. Fox, 1979a). Household goods include Mexican made majolica (hand painted, tin enamelled earthenware), lead glazed wares and red burnished earthenware, oriental procelain and mission Indian pottery vessels, knives and other lithic tools, Mexican grinding implements, Spanish olive jars, needles, pins and thimbles, glassware and wine bottles, metal knives, and kettle and boiler fragments.

Building hardware is limited primarily to hand wrought nails and hinges, perhaps because of the difficulty of transporting large quantities of metal overland from Mexico. Agricultural implements include hoes, axes, and picks. Horse trappings include bridle parts, saddle parts, and buckles. Spanish and French gun parts, saber fragments, lead, European and locally made gun flints, triangular flaked lithic arrowpoints, and occasional projectile points of glass and copper represent weapons and hunting implements. Religious paraphernalia such as medals, crucifixes, and rosary beads occur at missions and other sites (Gilmore, 1969; Schuetz, 1969).

Spanish Colonial architecture was fashioned in timber, adobe, and stone, or a combination of those materials. Techniques of temporary construction were adapted from Mexican and local traditions. More substantial, permanent edifices were patterned in the styles of Europe and Spanish Colonial Mexico (Gilmore, 1969; Schuetz, 1969).

Vast areas separated the frontier outposts of the Spanish Colonial Empire in Texas from the logistical support of the core cities of New Spain. This remoteness created difficulties in dealing with French intrusion in eastern Texas and with invasions of Indian populations from the north; it hampered relations between the Spaniards and sometimes threatened their existence (Tunnell and Ambler, 1967:10-16).

Spanish Colonial material culture reflects more than 18th Century occupation and Hispanization of Texas aboriginies. It is evidence of frontier adaptation and the development of a mixture of Spanish military, settler, and acculturated Indian elements which was destined to evolve into Mexican society as Anglo-American colonists encountered it in the early 19th Century (Scurlock et al., 1976:41-42).

MEXICAN, ANGLO-AMERICAN, AND AFRO-AMERICAN TEXANS

Minimal attention has been paid to the material remains of the period from 1836 to the Civil War in Texas. Less is known about the archeology of Mexican Texas of the early 19th Century. Only the best known sites of early Anglo-American Texas have been investigated. Only a few Afro-American sites have been identified.

Recent archeological work at the Alamo has uncovered evidence of the battle, such as remains of fortifications and weapon related artifacts (A. Fox et al., 1976). Archeological investigations at Washington-on-the-Brazos State Park (Davis and Corbin, 1967) found little left of the early Texas town of Washington. Preliminary investigations recovered minimal information about the disturbed condition and contents of Mexican and Texan Fort Lipantitlan (1831-1842) in Nueces County (Ing, 1976).

Many of the Spanish Colonial sites in the San Antonio area were occupied before and after the Texas Revolution. However, archeological investigations at these sites have focused on Spanish Colonial evidence (A. Fox et al., 1976; D. Fox et al., 1977; Schuetz, 1969). The material culture of the early 19th Century occupations is difficult to identify amidst the complexity of remains of earlier and later occupations.

Intensive archeological surveys of reservoir areas and other projects have located and identified a variety of early 19th Century Anglo-American

homesteads, plantations, communities, and cemeteries. Many sites of Austin's and DeWitt's colonists have been identified (Mallouf et al., 1973; D. Fox et al., 1974); however, only a few of these have received additional study. At Palmetto Bend Reservoir, archeological investigation found that little remained of Texana, an early inland shipping port in Jackson County (Jackson, 1977).

Even less attention has been paid to the identification and investigation of the archeology of Mexican cultural elements of early Texas. Only preliminary studies have been done of Mexican settlements in the areas around Victoria, Goliad, and San Antonio (Mallouf et al., 1973; Scurlock et al., 1976; A. Fox, 1977; D. Fox et al., 1978; Katz, 1978). Late 18th and 19th Century architecture of the Falcon Reservoir area on the Rio Grande was recorded (George, 1975). However, the archeology of the early 19th Century peoples along the Rio Grande virtually is unknown.

Because historical documentation and folklore pertaining to much of early 19th Century Texas is biased, inaccurate, or lacking, the archeology of this period can be of great value to the understanding of Texas history. The historical archeology of early Mexican and Anglo-American Texas is in the early stages of development. Its primary objectives are concerned with the association of dates and functions with the various types of material remains of the period (Schuetz, 1969; Mallouf et al., 1973:156-193; A. Fox et al., 1976:53-78; D. Fox et al., 1978:26).

Samples of ceramics from occupations of the first half of the 19th Century include a high percentage of decorated British white paste earthenware (transfer printed, featheredge, blue flown, hand painted floral design, and mocha wares). Glass bottle fragments are from free blown vessels and containers with molded bodies, pontil scarred concave bases, and hand finished necks and rims. Metal objects include square nails, hand wrought nails and other hardware, harness trappings, and cast iron vessel fragments. (Mallouf et al., 1973:156-192; D. Fox et al., 1974:216-247; A. Fox et al., 1976:53-78; Scurlock and Fox, 1977:55-135).

Dates and functions of much of the material culture of 19th Century occupation has been determined, particularly for the period after about 1830 (A. Fox et al., 1976; Scurlock and Fox, 1977; D. Fox et al., 1978). However, the cultural or ethnic affiliation of 19th Century historic sites in some areas is a major problem. Mexicans, Anglo-Americans, and Afro-American slaves in frontier Texas were dependent upon the same markets and used many of the same imported goods. Where people of different backgrounds settled near each other, they probably shared many technological elements.

Similar tools, weapons, and techniques of stone, frame, and jacal construction probably were shared by different ethnic groups of early Texas. The place of manufacture of a particular artifact does not necessarily reflect the nationality of its user. The occurrence of a sherd of Mexican made pottery in a sample of ceramics, for example, is not necessarily representative of Mexican occupation. A sample consisting entirely of British ceramics could be indicative of a Mexican or Afro-American slave occupation.

Ongoing archeological research at 19th Century sites needs to be aimed at developing ways to identify ethnic or cultural affiliation and

socioeconomic status represented by the patterning of occupational evidence. Only then can the integration of the people who settled pre-Civil War Texas be reconstructed.

GERMAN IMMIGRANTS

Of the diversity and large numbers of European immigrants in Anglo-American Texas, the German settlers of the 19th Century have received the most attention from historians and archeologists (Jordan, 1975; Flach, 1974; A. Fox and Livingston, 1979; Carter and Ragsdale, 1976). The stability of rural German settlement, based upon the stability of the German family as the basic socioeconomic unit (Jordan, 1975:185; Flach, 1974:6, 51), is reflected by the sturdy, enduring presence of German farm complexes in the Hill Country and on the Coastal Plain of Texas. The age, integrity, and architectural distinctiveness of these 19th Century sites has attracted public interest and encouraged some of the most exhaustive archeological investigations of historic sites done in Texas.

Archeological research at the Biegel Settlement in Fayette County (Carter and Ragsdale, 1976) and Steiner-Schob Complex in Victoria County (A. Fox and Livingston, 1979) recovered evidence that supports historians' generalizations about how German immigrants became Texans. An example is the cultural rebound hypothesis (Jordan, 1966:199-200) which suggests that when the Germans first arrived they adopted the frontier architecture of Anglo-American settlers. As soon as they were established, they returned to traditional, Old World styles of construction. After 1880, later generations began building frame houses devoid of imported methods, reflecting their eventual assimilation.

Because German immigrants were dependent upon the same markets of the United States and Western Europe as other Texas frontier settlers, most of the artifacts at German sites are like those at other 19th Century homesteads (A. Fox and Livingston, 1979; Carter and Ragsdale, 1976). Occasional objects from Germany, such as coins, do appear. The lifestyle of German settlers, their reuse and recycling of construction materials and other goods (heirlooms), is reflected in the patterning in which their occupational evidence occurs. The stability of German family residence, dispersed settlement pattern, intensity and diversity of agrarian enterprises, and tendency toward frugality and conservatism are archeologically observable (A. Fox and Livingston, 1979; Carter and Ragsdale, 1976).

German immigrants maintained their cultural identity while becoming Texans. "The result was a blend of adopted and imported traits, a partial assimilation, which caused the Texas Germans to differ not only from southern Anglo-American farmers, but also from their countrymen back in Europe" (Jordan, 1966:192).

FRONTIER MILITARY OUTPOSTS

In the mid-19th Century and following the Civil War, the United States government established a chain of forts along the Texas frontier from the Red River to the Rio Grande for the protection of settlers against Indian depredations. Other forts were located in western Texas along the San Antonio-Santa Fe Road. These outposts were unfortified, planned military

communities rather than forts. It is questionable as to what degree they were successful at controlling the activities of hostile Indians (Westbury, 1976:22).

Most of the earlier frontier military posts were abandoned during the Civil War. Afterward, these and new forts were occupied until Indian troubles ceased. The more isolated posts fell into ruin. Others were maintained as military posts into the 20th Century, particularly those in strategic places such as towns.

Historians and archeologists have researched the Texas frontier forts, many of which are now State Historic Parks (Black, 1974; Ing, 1976; A. Fox, 1976; Dickson, 1976). Government reports, plans, and other records document the organization, personnel, and operation of the forts and provide some information on life style. Archeological investigation has become an important means of verifying this documentation and obtaining specific information about fort layouts and architecture (A. Fox, 1976; Dickson, 1976; Black, 1974). Most archeological work has been oriented toward recovering those details necessary for historic site restoration and management. Little has been done to study how people lived at frontier military posts.

The forts are valuable as cultural resources for the comparative information they contain. Architectural and artifactual data which can be associated with specific function and chronology at frontier military outposts can be used in the identification and interpretation of contemporaneous non military frontier homesteads and settlements. Methods of stone, frame, canvas, picket, and adobe construction employed at the forts were adapted to local conditions and sometimes involved civilian labor and expertise. Food, household, personal goods, and other necessities were procured from many of the same depots and markets that supplied other frontier communities.

The assemblage of material culture of Texas forts includes the typical ceramic, glass, and metal of the period from about 1850 to the 1880's (D. Fox, 1979b; Black, 1974). Brightly decorated British white paste earthenware, characteristic of pre-Civil War occupation, include featheredge, hand painted floral design, transfer printed, and blue flown wares. Other decorated types such as mocha and sponged wares probably were used before and for a short time after the Civil War.

After about 1860, the market became flooded with undecorated ironstone china, the most common ceramic wares at the forts. Sherds of porcelain and stoneware crockery vessels also occur. Occasional tin enamelled and lead glazed pottery sherds are found at forts near the Mexican border (Black, 1974; A. Fox, 1976; D. Fox, 1979b).

Bottle glass at the forts is indicative of the period just before and after the invention of the snap case which superceded the use of the pontil in the manufacture of glass vessels. Except for an occasional free blown vessel, most bottles from the forts have molded bases and bodies and hand finished necks and rims. Numerous cylindrical and lettered panel bottles represent the popularity of patent medicines which occurred during and after the Civil War (Black, 1974; A. Fox, 1976; D. Fox, 1979b).

Square nails, agate ware door knobs, hinges and locks, and window pane glass are common at frontier forts. Personal items include clay tobacco pipes

of various forms, coins, clothing fasteners, pen knives, pins, and thimbles. Harness trappings and stove parts also are common. The military nature of the outposts is reflected in the layout of structures and their standardized nature of construction, uniform buttons and insignia, bridle parts, and weapon related items (lead balls, percussion caps, cartridges) (Black, 1974; A. Fox, 1976; D. Fox, 1979b).

Each kind of artifact is indicative of details about fort construction, the function of different post structures, the way the inhabitants dressed, and what they ate. The relative frequencies at which different characteristic kinds of material culture occur reflect the life style at the frontier military posts. Perhaps the most easily recognizable past time of the inhabitants is indicated by the large quantity and variety of alcoholic beverage bottles found at every fort site.

At Fort McIntosh in 1856, Colonel J.K.F. Mansfield observed (Crimmins, 1939:237):

There is a sutler at this post, and as at other posts is permitted to sell ardent spirits. The regulations forbid the sutler to sell ardent spirits, but the disregard of it, is excused on the ground that others would hover around in the vicinity of the post and sell liquor to the men, and that it was better for them to obtain it of the sutler. The regulation should either be rescinded or enforced. Beer, cheap wine or cider would be a very good substitute for strong drink and no doubt satisfy all the wants of the men who have been brought up to drink habitually.

There probably was variation in the quality of accommodations at a frontier fort based upon rank (Black, 1974; Westbury, 1976:23). However, post personnel as a community encountered hostile Indians and endured bad weather and other discomforts of life in desolate places. The documentary record and material evidence seem to indicate that enlisted men at a frontier fort lived a routine of daily duties, boredom, and liquor in an isolated place.

AMERICAN TEXAS

During the mid-19th Century, the Texas cotton industry became established, South Texas cattle enterprises developed, and the frontier pushed westward. Following the Civil War, Texas gradually became a part of a socioeconomic system that removed state sovereignty over politics, money, and social organization. The railroads came in, as did waves of immigrants who settled the vacant and unused lands. The cotton and cattle kingdoms of Texas were made tributary to American industrialized society (Fehrenbach, 1968:603).

The Americanization of Texas is observable in the great variety of historic sites dating from the last half of the 19th Century. Changes in the settlement pattern of the lower Frio River Valley reflect changes in economies based on cattle, sheep, and oil and gas production (Lynn et al., 1977). In the Trinity River Basin, changes in rural Anglo-American economies are being studied. The pattern advances from cash crops, cotton plantations and a reliance on river navigation, to tenant farming, lumbering, and establishment of railroad transportation; and then to an agribusiness period of urban growth, automotive transportation, and beef and hay production (Richner and Bagot, 1978).

Around 1873, architectural alteration of the church of the Villa de San Fernando created the San Fernando Cathedral of downtown San Antonio.

The patterning of material culture reflects the rapid growth of the surrounding urban area (D. Fox et al., 1977). Other sites in metropolitan areas have been investigated (Roberson, 1974; Ivey, 1978). Archeological evidence at the Dolores Aldrete House in San Antonio reflects changes in the function of the site from a 19th Century household occupation to a 20th Century commercial property (D. Fox et al., 1978).

Archeological research has been done at sites of various developing industries of 19th Century Texas. Mills in Travis County (Durrenberger, 1965; McEachern and Ralph, 1980), pottery kilns and lime kilns in various areas (Malone et al., 1979), commercial salt manufacturing operations of the Neches Saline (Skinner, 1971), Chinese railroad camps in West Texas (Briggs, 1974), and other industrial sites have been investigated.

An increasing diversity and standardization of material goods mass produced by a greater variety of manufacturers is represented at post-Civil War archeological sites. Technological innovations are apparent in food and beverage containers, tools, weaponry, and other goods. The material evidence of life in Texas after the Civil War reflects varying degrees of industrialization and Americanization. Further historic archeological research at late 19th Century and 20th Century sites will contribute to the understanding of the ways in which the peoples of Texas have adapted to ever increasing pressures toward integration into the greater American socioeconomic system.

FUTURE OF HISTORICAL ARCHEOLOGY IN TEXAS

Historical archeology has become an established part of cultural resource management in Texas, attracting archeologists, historians, planners, developers, associations, and private citizens. The increasing amount of historical archeological research rapidly is accumulating a substantial body of comparative data and gradually contributing to the study of culture history. Most historical archeological investigations have been short term cultural resource management projects. They have recovered little more than assorted bits of information about historic material culture, architecture, subsistence technology, and settlement pattern.

The promotion of a research design for historical archeology would stimulate healthy debate and imaginative research. Some archeologists suggest that the implementation of a regional research strategy would produce more meaningful results (Schiffer and House, 1977:250; Patterson, 1980:4-5). However, it is possible that general acceptance of a rigorously defined framework could stifle innovation, encourage stagnation of the discipline, and expose historical archeology to management by government agencies and professional organizations.

At this stage in the development of historical archeology in Texas, it seems more appropriate to suggest some pertinent problems for further research. The following suggestions are derived from the preceding review:

Archeological investigation of the historic Indians of Texas should be coordinated with ethnohistorical research (Campbell, 1972, 1975, 1977). An attempt should be made to compare historic Indian remains with prehistoric cultural materials so that Late Prehistoric and Protohistoric aboriginal groups can be identified and their acculturation studied.

An analysis should be done of how dependent mission Indians were on European technology and how colonial technology was supplemented by native materials and technology.

The remote sensing technology used for underwater archeology should be developed further for use in terrestrial archeology. The results of underwater archeology can be used to stimulate public interest in Texas archeology.

The nature and meaning of the material culture of French occupation should be studied.

Spanish Colonial archeology needs to be synthesized and applied toward the explanation of 18th Century feudalism and evolution of Mexican society in Texas.

The material culture of early 19th Century Texas should be identified and interpreted. There is need to develop methods of identifying ethnicity and socioeconomic status archeologically so that the processes of integration in different parts of 19th and 20th Century Texas can be explained.

The assimilation of Germans and other immigrants deserves further study.

The archeological manifestation of ranking can be studied at frontier military outposts and compared to evidence of social ranking in other archeological contexts.

The industrialization and Americanization of 19th Century Texas deserves thorough historical and archeological investigation.

The development of Texas industry and commerce can be researched at a variety of 19th and early 20th Century sites.

The potential value of historical archeology just now is being realized. It can contribute to the understanding and expand the meaning of history. It can be used as a testing ground for new approaches to prehistoric archeology and provide insights into the significance of prehistoric cultural remains. It can be applied in conjunction with historical research toward the development of public awareness in the cultural heritage of Texas.

ACKNOWLEDGMENTS

At first, it seemed that drafting a general review of historical archeology in Texas would be relatively simple. However, as the project developed and more and more personalities became involved, the author learned how difficult it is to write even a basic summary that will satisfy everyone in the discipline. The following people helped with their constructive comments and encouragement to make the project an interesting and introspective exercise: W. Hayden Whitsett, Archeologist, Texas Department of Water Resources. Anne A. Fox, Dr. Thomas R. Hester, Steve Black, and Fred Valdez, archeologists, Center for Archaeological Research, The University of Texas at San Antonio. Alton K. Briggs, Director, Cultural Resources Management, Texas Historical Commission. Dr. Eileen Johnson, Editor, and the anonymous reviewers of the peer review process for this volume of the *Bulletin of the Texas Archeological Society*. Non-archeologists (engineers and hydrologists), Construction Grants and Water Quality Planning Division, Texas Department of Water Resources.

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NOTES

Attributes of Experimental Folsom Points and Channel Flakes

J.B. Sollberger and L.W. Patterson

ABSTRACT

Physical attributes of large samples of experimental Folsom points and channel flakes are presented and discussed in regard to related manufacturing technology. Comparison with archeological specimens is limited by data availability. The use of lever devices for pressure flaking to produce channel flakes is described.

INTRODUCTION

The Folsom fluted projectile point was one of the first point types identified as Paleoindian (Wormington, 1957:23-41). It is of wide interest both because of its antiquity and fine workmanship. Folsom points are described in several works (Bell, 1958:26; Judge, 1973:165; Suhm and Jelks, 1962:193; Wilmsen, 1974:Table 5.9; Wilmsen and Roberts, 1978:Table 43). Articles on Folsom point replication also are available (Crabtree, 1966; Flenniken, 1978; Sollberger, 1977).

Not much quantitative data are available on the attributes from large samples of Folsom points in order to establish what is typical and what variations can be expected. For example, regional variations may exist in average dimensions. Variations might be caused by raw material types, work of individual craftsmen, or by localized cultural preferences.

Data are presented on physical attributes of large samples of experimental Folsom points and channel flakes made by the senior author. These data could be useful for the following reasons: 1) provides quantitative data to supplement limited data available from archeological sites; 2) gives the basis for comparison of an experienced replicator's product with archeological materials; 3) a large statistical sample is presented not previously available in the literature; 4) may be useful to others in future replication work; and 5) experimental data may be useful in determining aboriginal manufacturing methods.

Channel flakes are specialized flakes produced to form the long longitudinal flake scars that are the flutes on Folsom points. Except for Lindenmeier (Wilmsen and Roberts, 1978) and Hanson (Frison and Bradley, 1980), little site information is available on the physical attributes of channel flakes removed from Folsom point preforms. Several reports (Hester, 1972:134; Judge, 1973: Fig. 14; Tunnell, 1977:152) illustrate only fragments of Folsom channel flakes although sample sizes are fairly large. At Lindenmeier (Wilmsen and Roberts, 1978:101), there are 948 channel flake specimens and only one is unbroken.

The senior author experiences breakage of most channel flakes during replication of Folsom points. This breakage occurs because these thin flakes bend away from the preform while still under load during the fracture time interval. Breakage of these fragile flakes also could occur rather easily from fortuitous causes. A large collection of experimental Folsom channel flakes resulted from this replication work. Most complete specimens of these channel flakes were reconstructed by gluing fragments together. A summary of the attributes of this collection is presented; Lindenmeier (Wilmsen and Roberts, 1978) and Hanson (Frison and Bradley, 1980) data are summarized for comparison.

MEASUREMENT METHODS

Attributes of Folsom points and channel flakes (Fig. 1) were made using the same methods as for the measurement of prismatic blades (Sollberger and Patterson, 1976:518). A dial caliper with an accuracy of 0.1 mm was used to obtain linear dimensions. A 10 power magnifier was used to examine qualitative attributes.

An optical comparator was used to measure striking platform and proximal end angles of channel flakes. This instrument is a 7 power magnifier with a protractor reticle. The striking platform angle is the angle of the striking platform surface to the main preform face. The bevel at the striking platform edge formed during platform preparation was ignored. This short bevel does not represent the overall geometry involved in flake removal mechanics. The proximal end angle is the total angle included between lateral edges as these edges flare out from the striking platform. This attribute is a distinctive feature of channel flakes. This angle is generally clearly defined, with little curvature of the lateral edges at this location. After full width is reached, lateral edges become parallel or taper gradually toward the distal end.

KNAPPING TECHNIQUES

Force application techniques to produce long, relatively narrow Folsom channel flakes are varied. Crabtree (1966) replicated Folsom points by both pressure and indirect percussion and more recently by direct percussion (Crabtree, 1979:10). Flenniken (1978) used indirect percussion and Sollberger (1977) used level pressure from two types of mechanical devices. These experimental knappers agree that the preform must be securely held during channel flake removal. Striking platforms for channel flakes must be well isolated by pressure flaking and well smoothed by grinding. The

preform must be uniformly thinned for successful channel flakes to be produced. Dorsal ridges are not present to act as force guides as on prepared cores used to make long, narrow prismatic blades.

For the Folsom replicates described, two level pressure methods were used. In both methods, the striking platform angle employed averages about 80° . Approximately 90% of the replicates were fluted with a device specially made for this purpose. The preform is held in a vertical position by a wood clamp that presses against both lateral edges, with the distal end of the preform resting on a wood anvil. The hooked end of a level arm is placed on the striking platform that has been prepared for channel flake removal, and uniform pressure is applied to remove the flake (Fig. 2).

The other level pressure method used involves use of a two pronged fork (Fig. 3). The fork notch serves as a fulcrum point for a separate pointed pressure flaking tool that is used as a level to apply force. Use of a fork for pressure flaking was previously described (Sollberger and Patterson, 1976:524; Sollberger, 1978).

Regardless of which force application technique is used, the process of fluting Folsom points requires exacting knapping procedures. Folsom fluted points are more difficult to manufacture than Clovis fluted points since Folsom points are much thinner and subject to breakage. Folsom flutes generally are relatively much longer in proportion to point length than Clovis flutes.

The exact techniques used by aboriginal knappers to flute Folsom points is still subject to speculation. However, a tool made from the first brow tine of an elk antler from the Agate Basin site (Frison, 1980) suggests that a lever

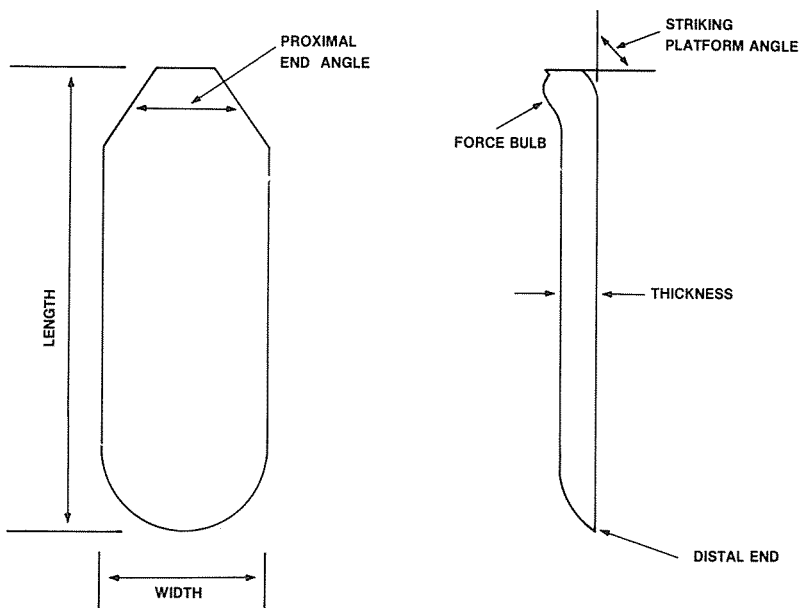


Fig. 1 Channel flake measurements.

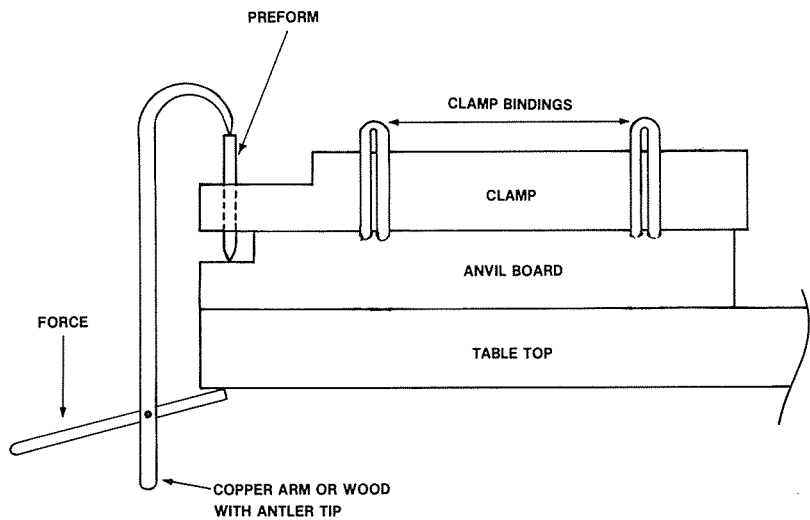


Fig. 2 Lever pressure devices.

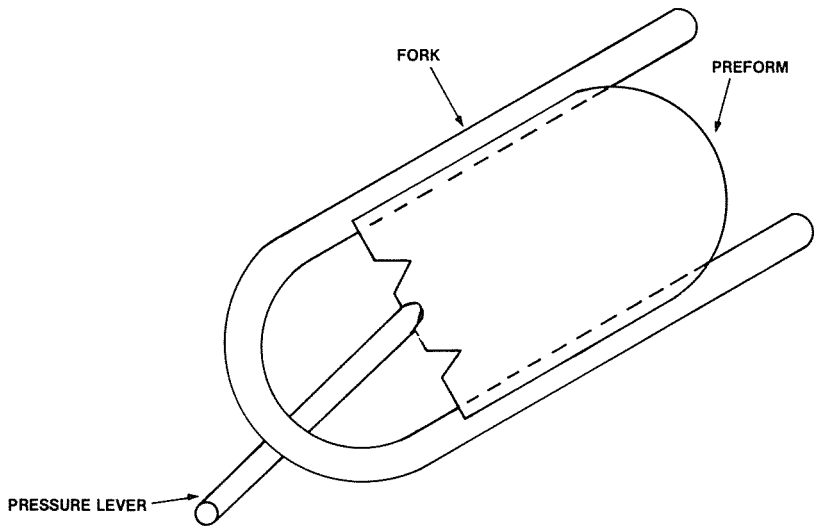


Fig. 3 Fork pressure devices.

device was used at least sometimes. A distinctive notch in the tip may indicate that this was the pressure contact point with the Folsom preform for the fluting operation. Frison (1980) proposed that the base of this antler tine would have been fastened to some type of level pole.

FOLSOM POINT ATTRIBUTES

Data presented on attributes of Folsom point replicates (Fig. 4) are based on 36 points (Table 1). Data on individual points are given in Tables 2 and 3. Table 2 shows replicates where flutes on both faces extend the entire length of the point. Table 3 shows replicates where a flute on only one face extends the entire length of the point, with the flute on the other face terminating short of the distal end.

The minimum thickness of a completed Folsom point is related to the preform thickness after removal of the first flute. This relationship is because the second flute flake cannot be generally thicker than the thickness between the two channel flake scars without causing breakage. Replicates for this study have thicknesses of 2.6 to 4.7 mm (Table 1). This range can be compared with Lindenmeier Folsom point thicknesses of 3.3 to 4.3 mm (Wilmsen and Roberts, 1978:Table 43) and some New Mexico Folsom point thicknesses of 3.4 to 4.3 mm (Judge, 1973:165, 213). Three Folsom points from Hanson (Frison and Bradley, 1980:Table 4) have thicknesses of 4.10, 3.85, and 3.80 mm.

Because of the small published archeological data base, modern replicators do not know if they are really replicating typical Folsom points. A few skillful flintknappers can do well, however, in replicating the few Folsom specimens generally available for study. One of the main values in Folsom point replication has been to demonstrate the amount of skill needed to produce this point type. Making flutes on Folsom points is a highly specialized process.

A better summary of archeological data on dimensions of large numbers of Folsom points is needed in order to judge what is typical and what may represent regional variations. There can be considerable variation in Folsom point dimensions. Suhm and Jelks (1962:193) give a range of 3 to 8 cm for lengths of Texas Folsom points. Hester (1972:124) gives a length range of 2.5 to 5.0 cm for Folsom points from Blackwater Draw Locality No. 1 in New Mexico. Roberts (1943:Fig. 1) illustrates a Folsom point with a length of 11.9 cm and two others of 4.5 cm length. Wilmsen and Roberts (1978:Table 43) show lengths of 2.9 to 3.6 cm for 31 specimens, but a number of these may have been shortened by reshaping.

In describing Folsom point replicates, Flenniken (1978:474) selected five specimens from 100 made as a random sample for tabulation of quantitative attributes. This set, however, is not a statistically significant sample. Large samples should be used, when available, to minimize errors that can result from small samples (Arkin and Colton, 1970:160).

Since the Folsom point replicates summarized in Tables 2 and 3 were made over a long time period, data are not available on corresponding preform dimensions. The majority of these replicates are made of chert from Georgetown, Lake Belton, and other miscellaneous Edwards Plateau sources.

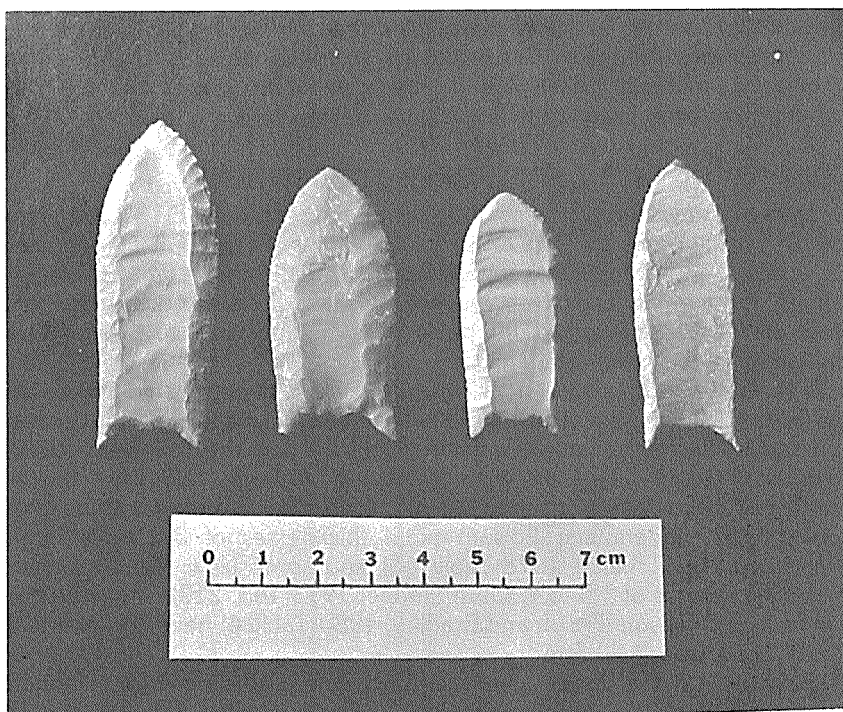


Fig. 4 Folsom point replicates.

CHANNEL FLAKE ATTRIBUTES

The attributes of 66 complete experimental Folsom channel flakes (Fig. 5) are summarized in Table 4. Data are not available to match individual channel flakes with finished point specimens. Many of the attributes are predictable from the technology involved. For example, the dorsal faces of flakes are covered with fine, roughly parallel flake scars formed during uniform thinning of the preform. Channel flakes have striking platform isolation flake scars starting at the platform edge on the dorsal face. Striking platforms show evidence of grinding. These channel flakes are characteristically long and narrow with parallel or gradually tapering lateral edges. Striking platforms are small, relative to flake width. In the replicate collection, the ratio of average flake width to average striking platform width is 4:1.

Striking platforms tend to be nearly perpendicular to the dorsal faces, with an average striking platform angle of 79° . The angle of force application used generally was approximately 15° from the dorsal face, applied toward the dorsal face. Over $2/3$ of these flakes are lipped at the proximal end on the ventral face. Specimens have diffuse bulbs of force. Concentrated bulbs of force were not observed, as are common when using direct percussion. Almost all specimens had radiating (undulating) force lines on the ventral faces. Fine grained chert fractures cannot be produced without force lines at channel flake thicknesses.

Table 1
Summary of Attributes of Folsom Replicates

Attribute	Average	Std. Dev.	Range
length, mm	52.7	6.2	38.0-73.5
width, mm	22.4	1.9	19.0-26.4
thickness, mm (A)	3.6	0.5	2.6- 4.7
L/T ratio	15.1	2.1	11.9-21.0
W/T ratio	6.4	0.7	4.7- 7.7

(A) thickness at fluted section

Table 2
Attributes of Type 2 Folsom Replicates (A)

Sample Number	Length (mm)	Width (mm)	Thickness (mm)	L/T	W/T
1	38.0	20.0	2.6	14.6	7.7
2	49.0	19.5	3.0	16.3	6.5
3	42.0	21.5	3.0	14.0	7.2
4	63.0	19.0	3.0	21.0	6.3
5	48.0	23.0	3.0	16.0	7.7
6	55.0	19.0	2.8	19.6	6.8
7	45.0	20.2	3.4	13.2	5.9
8	57.0	21.7	3.5	16.3	6.2
9	47.6	21.1	3.1	15.4	6.8
10	48.8	20.5	3.1	15.7	6.6
11	50.0	23.0	3.5	14.3	6.6
12	48.0	23.0	3.4	14.1	6.8
13	52.0	23.4	3.1	16.8	7.5
14	48.7	19.5	3.0	16.2	6.5
15	55.0	19.8	3.4	16.2	5.8
16	56.0	25.0	3.4	16.5	7.4
17	43.0	23.2	3.6	11.9	6.4
18	51.0	22.0	4.0	12.8	5.5
19	52.5	24.2	4.1	12.8	5.9
20	52.0	22.4	3.9	13.3	5.7
Average	50.1	21.6	3.3	15.4	6.6
Std. Dev.	5.7	1.8	0.4	2.2	0.7
Range	38.0-63.0	19.0-25.0	2.6-4.1	11.9-21.0	5.5-7.7

There are almost equal numbers of channel flakes with parallel lateral edges and with lateral edges tapering toward the distal ends. Over 2/3 of these flakes were broken during original detachment from the preforms. The residual striking platforms generally are roughly rectangular, and the striking platform width averages about twice the thickness. Lateral edges flare out sharply from the striking platform. This condition is caused by the nature of the platform isolation geometry. This flare is the Hertzian Cone force-flare, but modified by platform isolation and preform facial convexity. There are about equal numbers of flakes with feathered or abrupt (snapped or hinged) terminations on the distal ends. These channel flakes do not have much curvature because of the nature of flake removal (from flat faces of preforms).

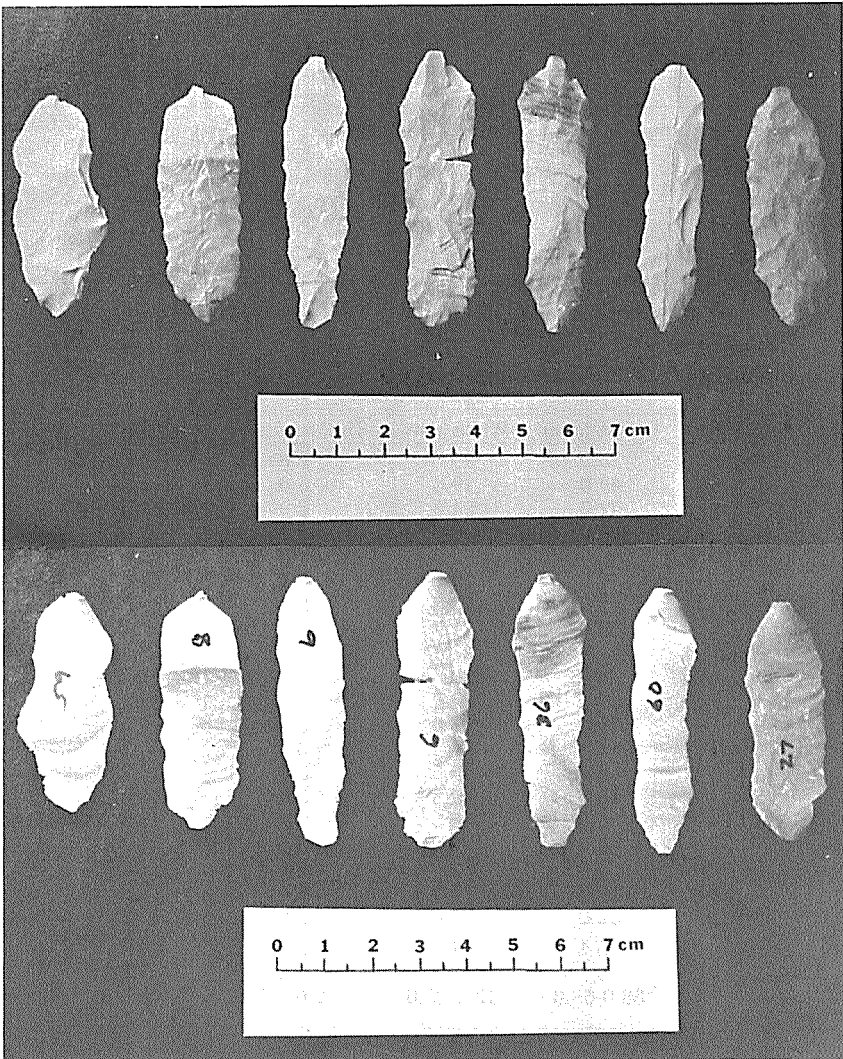


Fig. 5 Channel flake replicates: (top) dorsal surfaces; (bottom) ventral surfaces.

Widths and thicknesses of Folsom channel flakes are compared in Table 5 for replicates (Table 4), Hanson (Frison and Bradley, 1980: Fig. 67), and Lindenmeier (Wilmsen and Roberts, 1978: Table 38). The average dimensions in these collections seem to be fairly close. This situation may indicate some consistency in the overall technology involved.

SUMMARY

Information is presented on various attributes of experimental Folsom points and channel flakes from relatively large samples. Some of the most significant attributes of channel flakes could be predicted from the technology involved in the fluting process. Since most Folsom channel

Table 3
 Attributes of Type 2 Folsom Replicates (A)

Sample Number	Length (mm)	Width (mm)	Thickness at Fluted Section (mm)	Thickness Beyond Fluted Section (mm)	L/T*	W/T
1	47.0	21.5	3.8	3.3	12.4	5.7
2	50.0	21.0	3.4	4.6	14.7	6.2
3	48.8	20.1	3.1	3.5	15.7	6.5
4	51.0	26.4	3.5	3.4	14.6	7.5
5	53.0	22.5	3.7	3.8	14.3	6.1
6	56.1	21.9	3.0	3.8	18.7	7.3
7	54.8	21.0	3.5	2.8	15.7	6.0
8	48.6	22.8	3.8	2.9	12.8	6.0
9	54.1	22.1	3.5	3.3	15.5	6.3
10	55.3	24.0	3.9	4.0	14.2	6.2
11	73.5	22.8	3.9	4.4	18.8	5.8
12	51.5	24.6	4.3	4.0	12.0	5.7
13	56.7	25.0	3.9	3.7	14.5	6.4
14	60.8	25.6	4.3	4.4	14.1	6.0
15	63.5	25.5	4.5	4.4	14.1	5.7
16	58.0	22.2	4.7	3.7	12.3	4.7
Average	55.2	23.1	3.8	3.8	14.7	6.1
Std. Dev.	6.6	1.9	0.5	0.5	2.0	0.6
Range	47.0-73.5	20.1-26.4	3.0-4.7	2.8-4.6	12.0-18.8	4.7-7

A-Flute On Only One Face Extends Entire Length Of Point
 * Ratios Use Thickness At Fluted Section

flakes found on archeological sites will probably be broken, it is recommended that emphasis be placed on proximal end fragments. Many of the significant attributes of channel flakes are on this type of fragment.

Information presented represents the results of a single flintknapper, using two pressure techniques for channel flake removal. Other flintknappers who replicate Folsom points should publish similar data on large samples for comparison. Of most importance is the need to publish more data on Folsom points and channel flakes from archeological sites in order to establish a better picture of the quantitative nature and variability of these artifacts.

Table 4
 Attributes of Experimental Folsom Channel Flakes (sample size = 66)

Attributes	Percent	Average	Range	Std. Dev.
Width (mm)	--	15.6	11.5-21.3	2.34
Length (mm)	--	48.9	29.3-69.0	8.41
Thickness (mm)	--	2.3	1.5- 4.4	0.50
Length/Width Ratio	--	3.2	2.1- 4.1	0.49
Width/Thickness Ratio	--	7.0	4.4-11.9	1.32
Ground Str. Plat.	100.0	--	--	--
Str. Plat. Width (mm)	--	3.8	2.1- 5.7	0.62
Str. Plat. Thk. (mm)	--	1.7	1.1- 2.5	0.32
Plat. Width/Plat. Thk.	--	2.3	1.4- 3.5	0.46
Str. Plat. Angle (degrees)	--	79.2	65-90	7.53
Prox. End Angle (degrees)	--	76.1	50-120	14.51
Force Bulb Type				
lipped	68.2	--	--	--
diffuse	31.8	--	--	--
Force Bulb Thk. (mm)	--	2.4	1.7- 4.3	0.59
Radiating Force Lines	97.0	--	--	--
Plat. Prep. Flake Scars	100.0	--	--	--
Lateral Edges				
Uniform Parallel	27.3	--	--	--
Irregular Parallel	19.7	--	--	--
Uniform Tapered	33.3	--	--	--
Irregular Tapered	19.7	--	--	--
Distal End Termination				
abrupt	56	--	--	--
feathered	44	--	--	--
Number of Breaks				
none	30.3	--	--	--
one	37.9	--	--	--
two	24.2	--	--	--
three or more	7.6	--	--	--

Table 5
 Comparison of Folsom Channel Flake Dimensions

Dimensions (mm)	Replicates (A)	Hanson (B)	Lindenmeier (C)
Width			
average	15.6	15	15.3
range	11.5-21.3	11-23	--
Thickness			
average	2.3	1.98	1.84
range	1.5-4.4	1.5-3.3	--
A-Table 4			
B-Frison and Bradley (1980:Fig. 67)			
C-Wilmsen and Roberts (1978:Table 38)			

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Notes On Trace Element Analysis Of Obsidian From Hutchinson and Roberts Counties In The Texas Panhandle

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Fred Stross***

ABSTRACT

This brief note reports the x-ray fluorescence analysis of obsidian artifacts recovered from the McGarraugh Ranch (41RB2) and Tarbox Creek (41HC2) sites in the Texas Panhandle. The obsidian specimens are distinguished by a high Niobium content. In this respect, they are very similar to obsidian recovered from archeological sites in the Radium Springs area of Southcentral New Mexico and a few sites in Western and Southcentral Texas. Such high Niobium obsidian appears to match obsidian from the Valles caldera, a basin in the Valles mountains west of Santa Fe, New Mexico. Dating the use of High Nb obsidian is problematic. Associated artifacts at the McGarraugh Ranch suggest a Panhandle Aspect occupation which is generally dated at A.D. 1200 to 1450. Tarbox Creek artifacts include both Panhandle Aspect and an earlier component. The Radium Springs and other sites with High Nb obsidian are dated A.D. 900 to about 1400. High Nb obsidian may have potential as a horizon marker for this period in Texas and New Mexico archeology.

INTRODUCTION

Trace element analysis of obsidian artifacts is a technique which has been used extensively over the past two decades to infer prehistoric trade relationships among regions of the United States and Mexico, in the Near East, and in other parts of the world (Hester et al., 1975). Trace element quantities are determined through x-ray fluorescence (XRF) and these data compared with information from known obsidian flows (Michels, 1973:215). Since the pattern of relative quantities is unique to each geologic source, inferences can reasonably be made that the obsidian originated in a specific geographic source.

Previous obsidian trace element analysis research suggests that much of the obsidian found in Texas archeological sites comes from areas of New Mexico (Hester and Mitchell, 1974) or from obsidian sources in Mexico (Hester, House, et al., 1975). Sources in Mesoamerica are defined fairly

well but obsidian flows in parts of the United States, particularly New Mexico, are not yet completely documented (Stross et al., 1978).

OBSIDIAN SPECIMENS

Three obsidian artifacts were surface collected in the Texas Panhandle; one from the Tarbox Creek site (41HC2) in Hutchinson County, and the others from the McGarraugh Ranch site (41RB2) in Roberts County (Fig. 1).

Tarbox Creek (41HC2)

A number of early expeditions (Holden, 1929; Moorehead, 1931) documented a massive, multiroom structure at Tarbox Creek. Much of the area was subsequently destroyed by oil production activities. In recent years, surface collecting on the hill top area surrounding the ruin produced Washita and Harrell arrowpoints, a small corner notched point (possibly a Glendo), a large oval knife, a grinding basin, and several large, expanding base dart points. The dart points are basally smoothed and similar to points found at several Panhandle sites; these have been called Tarbox Creek points (Mitchell, 1976). An obsidian flake was recovered at the edge of the site (Fig. 2a); this specimen was made available for trace element analysis and designated Tex 10.

McGarraugh Ranch Site (41RB2)

The McGarraugh Ranch site is a previously unreported site in northwestern Roberts County; its exact location is on file at the Texas Archeological Research Laboratory. It is a village site with at least six Panhandle Aspect houses still visible on the surface. Several houses are severely disturbed and a portion of the site was destroyed by a county road. The site extends from creekside to a saddleback which connects a small isolated mesa to the western edge of the canyon.

An isolated house site, relatively undisturbed, is on top of a shelf three quarters up the western edge of the saddleback. The single line of upright stones marking the house outline (23 x 25 ft) is broken on the east side by an 8 ft entryway consisting of a double line of stones about 18 in apart. This entryway faces a notch in the eastern wall of the valley across the creek from the site.

Materials collected from the surface of this site include Fresno and Washita arrowpoints, diamond shaped beveled knives, a greenstone celt, a sandstone grooved arrowshaft smoother, scrapers, and fragments of mussel shell. Pottery fragments collected include Borger Cordmarked, a smoothed plainware (Borger Plain?), a reddish, smoothed ware which is atypical of the Panhandle Aspect, and Pueblo trade pottery which is decorated with either parallel black lines or a single line with dots. This decorated ware appears to be Chupadero Black-on-White, a type reported at several sites in the Texas Panhandle (Crabb, 1968).

Two obsidian fragments also were recovered from the site; one small irregular piece was analyzed in the current project, labeled Tex 7 (Fig. 2b). A second specimen was analyzed previously in a pilot project by Robert Jack; it was identified in Jack's unpublished records as a "Canadian River" specimen (Fig. 2c).

TRACE ELEMENT ANALYSIS

The obsidian specimens were analyzed at the Lawrence Berkeley Laboratory and University of California at Berkeley. Results of the XRF analysis are shown in Table 1, which displays the abundances in parts-per-million except for Iron (Fe) which is shown as a percentage. Data shown for the Canadian River specimen result from converting Jack's measurements

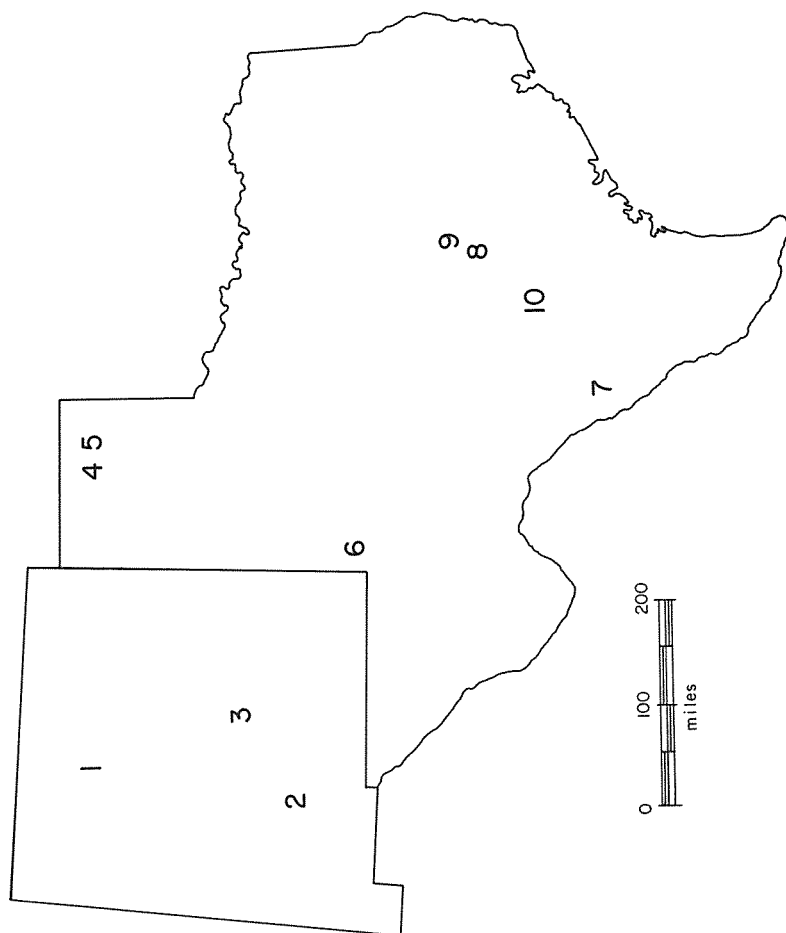


Fig. 1 Geographic relationship of sites discussed in text: 1) Valles Caldera; 2) Radium Springs area; 3) Northern Jornada Mogollon area; 4) Hutchinson County; 5) Roberts County; 6) Andrews County; 7) Dimmit County; 8) Travis County; 9) Williamson County; and 10) Bexar County. Map prepared by Kathy Bareiss.

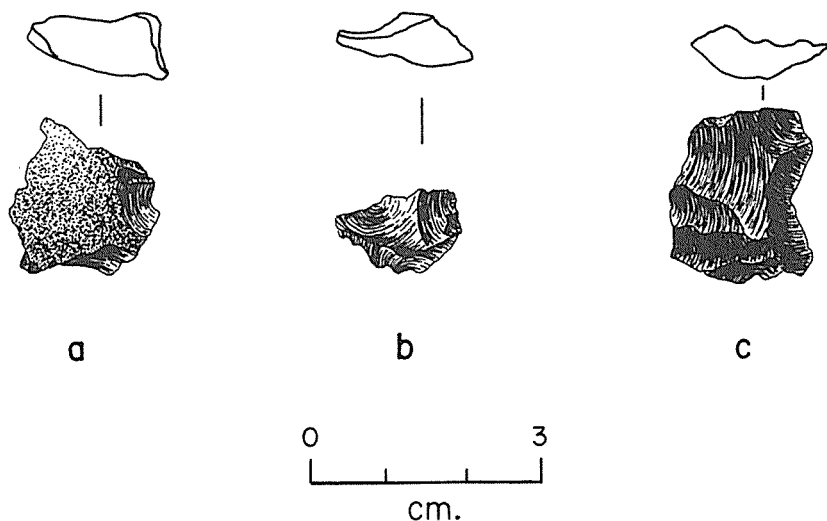


Fig. 2 Obsidian specimens from Hutchinson and Roberts counties, Texas Panhandle: a) Tex 10, Tarbox Creek site (41HC2); b) Tex 7, McGarraugh Ranch site (41RB2); c) Canadian River specimen (41RB2). Drawings by Kathy Bareiss.

(counts-per-second) to abundances using a special algorithm developed from a set of known obsidian values.

Data on the Texas Panhandle obsidian specimens revealed an unusually high Niobium (Nb) content. The specimens are similar in this respect to a number of obsidian artifacts recovered from the Radium Springs area of Southcentral New Mexico (Black and Hester, 1977) which were also analyzed at the Lawrence Berkeley Laboratory. The high Niobium content of this group of artifacts also is similar to a group of obsidian specimens studied previously by Jack. Jack was the first to identify a cluster of obsidian specimens which he called the High Nb group; his clustering included specimens from sites in Andrews County (41AD2, 41AD8), Travis County (41TV39), Williamson County (41WM56), and the Canadian River specimen. At the time of Jack's analysis (1971-1973), a known source for the High Nb obsidian was lacking and a formal report of the discovery of the High Nb group was not made.

Using the more detailed XRF measurements now available, a check was made against currently documented obsidian sources on file in the geochemical library of the Lawrence Berkeley Laboratory. This check resulted in a tentative identification of a source as the Valles caldera in New Mexico (Fig. 1). This caldera is located in the Valles mountains west of Santa Fe (Williams, 1941:251). The Valles caldera measures 20 x 25 km across; its walls enclose a circular moat partially filled by a ring of rhyolite domes. The caldera was formed approximately one million years ago by a major eruption of materials and subsequent collapse of the area (Williams and McBirney, 1978:211-212). The resulting basin contains a sizeable number of obsidian deposits which apparently were utilized by prehistoric man.

Table 1
 Element Abundances as Determined by XRF for Obsidian Artifacts from Texas Panhandle Sites

Sample Designation	Rb	Sr	Zr	Y	Nb	Fe(%)	Zn	Mn
Tex 10	218	12+	188	80	84	.71	63	598
Tex 7	209	7+	193	83	83	.71	105	448
Mean Value for seven Texas & New Mexico Specimens (NMex 2-7 and Tex 7 and 10)	222	11+	186	80.3	81.3	.71	90	558
Canadian River Specimen	222	13	205	82	100			
Rb = Rubidium					Nb = Niobium			
Sr = Strontium					Fe = Iron			
Zr = Zirconium					Zn = Zinc			
Y = Yttrium					Mn = Manganese			

The exact provenience of the geochemical sample from the Valles caldera is not known. It is not yet possible to suggest in which part of the basin the various specimens may have originated. Additional research is underway so that it may eventually be possible to relate samples of High Nb obsidian to specific sources within the caldera.

DISCUSSION

Three obsidian specimens recovered from two archeological sites in the Texas Panhandle are traced to a probable source in the Valles caldera west of Santa Fe, New Mexico. They match a group of distinctive obsidian specimens (High Nb group) which appear to have a fairly widespread distribution (Fig. 1).

Such a dispersion pattern of High Nb obsidian is suggestive of a fairly extensive network of trade in obsidian. However, trace element analysis results are not sufficient to establish either the time frame or cultural relationships inferred by such trade. It is necessary to examine more traditional archeological data to develop an understanding of such relationships.

House sites and other artifacts at the McGarraugh Ranch site suggest a Panhandle Aspect occupation (A.D. 1200-1450). Presence of Chupadero Black-on-White pottery would indicate a trade relationship with New Mexico (Holden, 1929; Moorehead, 1931; Watts, 1963; Hughes, 1968; Honea, 1973; Lintz, 1976). However, Tarbox Creek yielded both Panhandle Aspect materials and dartpoints which probably predate the Panhandle Aspect period (Mitchell, 1975; 1976). Hughes (1962; Hughes and Willey, 1978) noted the possibility of earlier trade based on Jornada brownware.

In the Radium Springs area of Southcentral New Mexico, one obsidian projectile is serrated and resembles the Temporal point type (Black and Hester, 1977:55). This type is diagnostic of the Jornada branch of the Mogollon. Ceramics from sites in the area include 21 various wares varying from plainware to Black-on-White and polychrome pottery. These date between A.D. 900 and 1400 (Roemer and Katz, 1977). The strongest exter-

nal relationship of these sites appears to be with the northern part of the Jornada district. This relationship is based on the relative quantity of specific types of ceramics versus pottery from other areas to the west and south (Roemer and Katz, 1977).

In the Andrews County (Texas) localities, Collins (1968) postulated an actual migration of eastern Jornada people onto the Llano Estacado of West Texas. At the Adobe Mound site (41AD3), Fresno, Toyah like, stemmed, and side notched points were recovered. A house site was reported with stone walls similar to sites in the Texas Panhandle.

While a large Jornada trade sphere would reasonably account for the presence of High Nb obsidian and trade pottery at these sites, it is difficult to postulate direct trade to explain such obsidian in Central and Southern Texas counties (Fig. 1). However, several sites in these counties also have produced southwestern pottery. Hester and Hill (1969) report El Paso Brownware from a site in Dimmit County along San Ambrosia Creek; the Armstrong site in northeastern Dimmit County produced a specimen of High Nb Obsidian (Hester, House, et al., 1975).

Tularosa and Reserve Black-on-White and Los Lumas Smudged pottery were recovered from the Olmos Dam and San Pedro Park areas of Bexar County and other sites in South Texas (Orchard and Campbell, 1960; Fawcett, 1972). Pilares Banded pottery was recovered from the Granberg site (Schuetz, 1966) which may date as early as A.D. 900. These pottery types are either Pueblo II or Pueblo III wares which Honea (1973) dates from A.D. 900 to A.D. 1300. Roemer and Katz (1977) date these periods to A.D. 900 to A.D. 1400.

Ceramics and other materials consistently are estimated to be between A.D. 900 and about A.D. 1400 in all areas where High Nb obsidian has been identified. This situation is particularly significant for the study of trade in Southcentral and Southern Texas where there is little evidence of a local ceramic tradition prior to about A.D. 1000 or 1100 (Hester and Hill, 1971; Mitchell, 1978).

CONCLUSIONS

Obsidian specimens recovered from archeological sites in Hutchinson and Roberts counties in the Texas Panhandle were analyzed and proved to be a distinctive form of obsidian distinguished by a high Niobium content. The obsidian was linked tentatively with a source in the Valles caldera west of Santa Fe, New Mexico. Obsidian from this source was recovered from sites in Southcentral New Mexico, and West, Central, and South Texas. In these locations, the distinctive High Nb obsidian can be dated approximately to A.D. 900 - 1400 by ceramics or other artifacts. High Nb obsidian may have potential as a horizon marker for this period in the study of archeology in Texas and New Mexico.

ACKNOWLEDGEMENTS

We are particularly grateful to Dr. Robert N. Jack who accomplished much of the early work with Texas obsidian specimens and who initially recognized the High Nb group; his work was invaluable as a foundation for the present study. We also are indebted to several individuals in the northeastern Panhandle area who loaned obsidian specimens, shared site information, and cooperated with pottery identification and other work; they include Charles Bulls of Farns-

worth, Texas and Rick Williams and Bob Fleming of Perryton, Texas. Our thanks also to Chris Lintz, University of Oklahoma, for his very helpful comments on an earlier draft of this report. Finally, we are indebted to the Center for Archaeological Research, University of Texas at San Antonio, for support of the XRF analyses included in this report.

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The Significance of Dart Point Stem Breakage

L.W. Patterson

ABSTRACT

A pattern of possible dart shaft and foreshaft reuse is developed from the frequency of dart point stem fragments with transverse fractures found at archeological sites in Central and Southeast Texas. Dart point blade fracture patterns also are considered, as related to damage during the hunt and subsequent reworking. Good comparisons are shown between surface collected and excavated assemblages in Harris County.

INTRODUCTION

Stem pieces are the most common type of dart point fragments found on archeological sites studied in the Lake Limestone area on the eastern edge of Central Texas (upper Navasota River area east of Waco) (Prewitt, 1974:62, 1975:17). Prewitt (1974, 1975) suggested that basal fragments of dart points found at campsites may be the result of retrieval and reuse of dart shafts and foreshafts. Points were broken during the hunt. New points would be refitted upon the user's return to camp, and basal fragments discarded at the campsite.

To test Prewitt's (1974, 1975) hypothesis, data from two other areas of Texas were examined. One location was Harris County, in the greater Houston area. This area is on the upper Texas coast in Southeast Texas, approximately 150 mi southeast of Prewitt's (1974, 1975) study area. The other location was Bandera County in Southcentral Texas, approximately 50 mi northwest of San Antonio. Bandera County is about 240 mi west of Harris County and approximately 210 mi southwest of Prewitt's (1974, 1975) location.

The three locations (Fig. 1) are far enough apart that any consistent conclusions reached could be considered to be regional patterns for the eastern and central areas of Texas involved. Current inventories of dart points and fragments from archeological sites in Harris and Bandera counties were used to develop data. Quantitative confirmation of general impressions on dart breakage patterns for sites (Patterson, 1974, 1975a, 1975b, 1975c, 1976a, 1976b, 1977, 1978a, 1978b, 1979a) was generated.

In order to develop a more complete picture of what may have happened at archeological sites, it was necessary to consider other types of dart point breakage. Therefore, dart point blade breakage patterns also are discussed. There is a good match of dart point breakage patterns for surface collections and an excavated site in Harris County. This match gives support to the

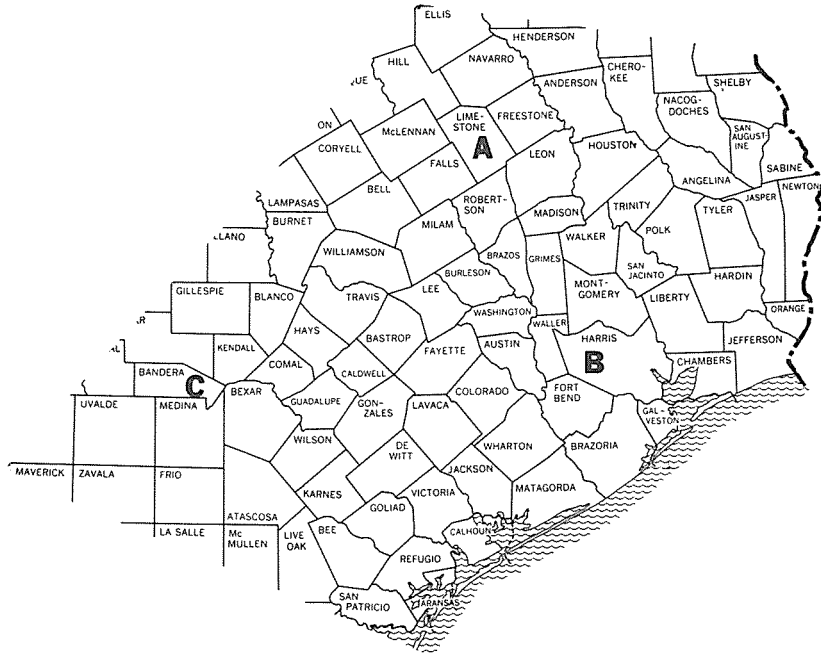


Fig. 1 Texas study locations: A) upper Navasota River; B) Harris County; C) Bandera County.

value of data from surface collection for some types of archeological interpretation.

DART POINT BREAKAGE PATTERNS

Dart points generally are believed to have been used in a weapon system consisting of a spear thrower (atlatl), a spear shaft, and a hafted lithic projectile point (Chard, 1975:Fig. 12-5). Projectile points could be hafted directly to a single shaft; or a compound shaft could be used, with the point hafted to a removable foreshaft. Although made from perishable wood materials, some archeological remains of spear throwers (Aikens, 1979:Fig. 114; Hester et al., 1974; Willey, 1966:Fig. 4-18) and foreshafts with hafted points (Schuetz, 1960:Fig. 2b; Willey, 1966, Fig. 4-18) have been recovered. Lithic projectile points weighing over 3 gr are classified as dart points, in contrast to lighter, smaller arrowpoints (Patterson, 1976c:Fig. 4).

Dart points found on archeological sites could have been broken for a number of reasons, including surface disturbances by modern man. If the assumption can be made that most dart point breakage occurred during original site occupation, breakage patterns might furnish some information on specific site activities (Roper, 1979:113). Data developed for this study do not indicate that fortuitous dart point breakage, either prehistoric or historic, was an important factor in overall dart point breakage patterns. If fortuitous breakage were statistically significant, large numbers of matching

dart point pieces should be recovered from intensive surface collecting and excavations. This recovery rate was not observed in the data used.

Few quantitative studies of dart point breakage patterns are available. Roper's (1979) recent study of this type is largely inconclusive. Roper (1979:Table 2) presented some data on longitudinal breakage of stems; but did not give data on transverse stem fractures, which is the more common breakage pattern in data reviewed.

There are two breakage locations for stemmed dart points, stem breakage and blade fractures. Most stem breakage on archeological sites reviewed involved transverse fractures near the point where the stem joins the dart point blade. This stem breakage pattern is the one under consideration. Blade breakage seems to occur in a variety of directions, ranging from transverse to longitudinal. It is discussed along with the possible causes of blade breakage.

DART POINT BREAKAGE CAUSES

Activities during the hunt is one of the principle causes of dart point breakage that can be postulated. During hunting activities, points may have been broken during impact; or points tightly wedged in an animal may have been snapped by leverage to retrieve the shaft or foreshaft. If projectile points were broken during hunting, fragments remaining in a hafted position would be stem fragments or more complete points with broken blades. If spear shafts and/or foreshafts with broken points were being carried back to camp for refitting projectile points, there should be disproportionate higher percentages of these two types of dart point fragments at campsites. Data presented (Tables 1-3) show that this disproportionate pattern of point fragments occurs at the widely separated campsites studied.

If hafted projectile points also were used as knives for butchering activities, physical stresses might cause stem breakage during this type of activity. Due to shape, it is less likely that cutting function would cause many blade fractures except on delicate tips. If this type of use caused stem breakage at campsites, it would be expected to find approximately equal amounts of dart point stem fragments and points with broken stems. This situation is not the case for data reviewed. Many dart points would not make very good cutting tools due to rough and steeply beveled edges. At campsites, large chert flakes with sharp edges would have been generally superior to the reuse of dart points as knives (Patterson, 1975d). A bifacial edge must have a very acute angle (25° or less) to approach the cutting efficiency of a sharp flake (Patterson, 1976d).

During the hunt, it may have been convenient for Indians to use dart points as expedient cutting tools. If stem breakage occurred from this activity, it would be difficult to separate this cause from other stem breakage during the hunt. Therefore, this study is only concerned with whether or not stem breakage occurred at remote hunting locations away from campsites. Regardless of specific point breakage cause, shafts and foreshafts could have been carried back to campsites for refitting of new points.

Manufacturing failure is another possible cause of dart point breakage. This cause is not considered important since the author's experience in experimental flintknapping and observation of other flintknappers is that most

Table 1
 Harris, County, Texas Dart Point Breakage (surface collected sites)

Site	Points with Stem Fracture (PS)	Stem Fragments (SF)	SF/PS	Points with Blade Fracture (PB)	Blade Fragments (BF)	BF/PB	Whole Points
41HR184	2	51	25.5	18	21	1.2	18
41HR206	4	28	7.0	4	10	2.5	12
41HR182	1	4	4.0	4	2	0.5	11
41HR244	2	11	5.5	13	9	0.7	11
41HR210	0	6	-	3	2	0.7	1
41HR185	0	10	-	1	6	6.0	6
41HR209	0	2	-	1	1	1.0	2
41HR223	2	5	2.5	3	2	0.7	2
Total	11	117	10.6	47	53	1.1	63

Table 2
Site 41HR315 Dart Point Breakage (excavated site)

Site Level	Points with Stem Fracture (PS)	Stem Fragments (SF)	SF/PS	Points with Blade Fracture (PB)	Blade Fragments (BF)	BF/PB	Whole Points
Mixed Area	1	9	9.0	3	5	1.7	3
10-20 cm	1	6	6.0	1	0	-	4
20-30 cm	0	5	-	2	3	1.5	2
30-40 cm	1	22	22.0	6	9	1.5	15
40-50 cm	9	33	3.7	16	10	0.6	26
50-60 cm	7	26	3.7	4	10	2.5	26
60 + cm	0	2	-	0	0	-	0
Total	19	103	5.4	32	37	1.2	76

Table 3
Bandera County, Texas Dart Point Breakage (surface collected sites)

Site	Points with Stem Fracture (PS)	Stem Fragments (SF)	SF/PS	Points with Blade Fracture (PB)	Blade Fragments (BF)	BF/PB	Whole Points
41BN11	1	8	8.0	2	6	3.0	3
41BN8	1	17	17.0	5	12	2.4	1
Total	2	25	12.5	7	18	2.6	4

manufacturing failures occur during bifacial preform thinning. Failures show up as generalized biface fragments lacking finely pressure retouched edges. Preform failures can be separated from finished dart point fragments. Stem breakage during dart point manufacture is rare since stems are formed by pressure flaking, which produces little breakage.

Some broken dart points could have been reworked into smaller serviceable points at campsites. This reworking would be done mainly by reshaping of broken blades. This activity would complicate the analysis of dart point fragments as numerous blade fragments could be produced during reworking of a broken dart point. There were few examples of reworked dart points in the data reviewed, although some reworking may have occurred which was not obvious.

ARCHEOLOGICAL DATA

Archeological collections from several sites in Texas were examined for dart point breakage patterns. Table 1 is a tabulation of data from eight surface collected sites in Harris County. Dart point specimens are typical types of the Archaic and Early Woodland periods of the upper Texas coast (Suhm and Jelks, 1962; Patterson, 1979b). These dart points (Fig. 2) include expanding, straight, and contracting stem point types (e.g., Gary, Kent, Bulverde, Yarbrough, and Ellis).

All sites have more stem fragments than points with stem fractures (Table 1). The total collection has over 10 times as many stem fragments as points with stem fractures. This disproportionate pattern is not present in comparing blade fragments and points with blade fractures. The number of blade fragments and points with broken blades is approximately equal. However, there is not a particular geometrical match between blade fragments and points with broken blades. Some points with broken blades may be from breakage during the hunt and some miscellaneous blade fragments could be from reworking of broken points.

Data were tabulated for a well excavated site in Harris County (41HR315; Patterson, 1978a) as a comparison with surface collections (Table 1). Data are summarized (Table 2) from all excavated levels of 41HR315, spanning a total time period from the Late Paleoindian/Early Archaic (starting approximately 7,000 BP) to the Late Prehistoric (ending approximately AD 1500). A culturally mixed area is included that appears to have been the result of a prehistoric erosion episode.

The dart point breakage pattern (Table 2) is similar to the surface collections (Table 1) from the same county. There are over five times as many stem fragments as points with stem fractures and an approximately equal number of blade fragments and points with blade breakage. The collection from 41HR315 represents a 10% sample of the total site area. The overall dart point breakage for surface and excavated collections (Tables 1, 2) also is fairly similar. For the surface collections, there are 3.6 times as many dart point pieces as whole dart points. For the excavated site, there are 2.5 times as many dart point pieces as whole dart points.

Dart point breakage for two surface collected sites in Bandera County are summarized (Table 3). There is a large difference in numbers of stem fragments and points with stem fractures, with 12.5 times more stem

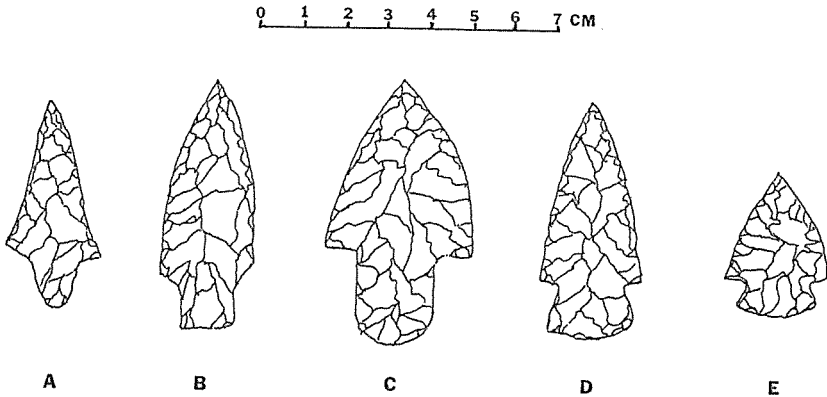


Fig. 2 Typical dart point types: A) Gary; B) Kent; C) Bulverde; D) Yarbrough; E) Ellis.

fragments. There are 2.6 times as many blade fragments as points with blade fractures.

J.B. Sollberger (personal communication) tried to match up surface collected dart point fragments from Kerr County. A large number of stem fragments without corresponding numbers of other complimentary types of fragments were identified.

CONCLUSIONS

Archeological data presented support Prewitt's (1974, 1975) hypothesis that dart points were broken more often on hunting trips than at campsites, especially as related to stem fractures. Indians returned to campsites with basal fragments of dart points still attached to spear shafts. The geographical spacing of archeological sites examined supports a regional rather than local pattern of dart point breakage.

The data used were from overall lithic collections of significant sizes and should represent random samples. Blade breakage patterns of dart points examined are different from stem breakage patterns. Blade breakage pattern might relate to reworking of broken points and some fortuitous breakage. Some points with broken blades may be the result of point breakage during the hunt. It may be that spear points were regarded as expendable items, while good quality spear shafts and foreshafts were held as valued items for more permanent use.

Comparison of dart point breakage patterns for surface collected and excavated materials does not show any particular bias. The value of study of surface collections is underrated. All types of archeological remains are imperfect samples of materials from past use; and all types of archeological data should be considered to obtain the largest data base.

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Transport Of Cultural And Non-Cultural Materials By Texas Woodrats: Examples And Archeological Implications

Thomas R. Hester and T.C. Hill Jr.

ABSTRACT

A study was conducted of modern woodrat (*Neotoma micropus*) houses located on or near prehistoric open campsites in southern Texas. Structural components of the houses are documented. Large, shallow basins are found beneath the houses, containing grass lined nests and tunnels. The rodents often transport a variety of cultural and non-cultural materials into these domiciles. Nature and type of the collected items are recorded. Possible archeological implications are discussed, particularly those which might lead to misinterpretation of artificially created artifact and debris patterns.

INTRODUCTION

Archeologists have noted various mechanisms through which animals can be responsible for the transport or movement of artifacts and other cultural materials. Heizer (1968) documented a number of examples. Woodrats (*Neotoma* sp.) are particularly well known for their ability to carry and move artifacts and other large objects, with such items usually being taken to their nests. This situation is a common phenomenon in Great Basin caves and rockshelters, where a wooden artifact (such as a dart shaft or digging stick) might be incorporated in the construction of a woodrat house (Heizer and Krieger, 1956:10).

Heizer and Brooks (1965) presented data on the contents of packrat nests found in California and the Great Basin to support their argument that the features excavated at the Lewisville locality in northern Texas might be burned woodrat houses and not Paleoindian hearths. There have been detailed analyses of Pleistocene packrat nests and middens in various parts of the American Southwest and adjacent desert areas (Finley, 1958; Raun, 1966; Wells and Jorgensen, 1964; Wells, 1966, 1976; Van Devender, 1974, 1976; Phillips and Van Devender, 1974; Riskind and Van Devender, 1979). The primary goal of these studies was paleoenvironmental research.

These studies often illustrated the potential for the transport of artifacts (Finley, 1958) and other materials by woodrats (Riskind and Van Devender, 1979:6). These materials sometimes are used as components in

house construction or they end up in the nest and tunnels beneath the house. These data lead to a simple conclusion: the rodents can distort the archeological record. Most field archeologists are familiar with the stratigraphic problems that burrowing rodents can cause. However, fieldworkers perhaps are less cognizant of the horizontal disturbances that could result from woodrat activities.

Woodrats can disturb artifact patterning on living floors; or they can create artificial features, i.e., clusters of artifacts or materials that might be interpreted as activity loci. Hester (1975) described an example of this kind of phenomenon caused by roadrunners in southern Texas. Transporting activities might have a significant effect on interpretations of prehistoric features and artifact patterning. Since the hunter-gatherer camp sites of the region were repeatedly abandoned, there would have been ample opportunity for the rodents to collect and move cultural residues left behind by seminomadic inhabitants.

Results obtained by the dissection of two large modern woodrat houses found on the surface near prehistoric open camp sites in southern Texas are described. Woodrats (*Neotoma micropus*, Southern Plains Woodrat) are extremely common in the area (Raun, 1966) and their houses are numerous. These houses sometimes occur on or near local prehistoric sites. Faunal assemblages found in excavated sites in the area provide evidence of the abundance of these rodents in prehistoric times (Hester and Hill, 1975). They were present not only in the area but also were a favored staple in the aboriginal diet.

WOODRAT HOUSES AND THEIR CONTENTS

Two woodrat houses along Tortugas Creek in Zavala County, southern Texas, were dissected in 1971. These houses were located on, or adjacent to, Late Prehistoric sites, including 41ZV14 and 41ZV155 (Hester and Hill, 1973, 1975; Hill and Hester, 1973). House components were documented and nest contents within houses collected. Only general comments are made about the houses and their construction; additional details for South Texas woodrat houses are in Raun (1966) and Johnson (1966).

House #1 was located 150 yds east of Tortugas Creek in an open floodplain microenvironment dominated by prickly pear (*Opuntia lindheimeri*) (Holdsworth, 1973). Site 41ZV14 is nearby (Hester and Hill, 1973). The house (outer shelter) appeared as a large accumulation of sticks and brush. It was 6 ft long (east-west), 5 ft wide (north-south), and 22 in high. It was built against an *Opuntia* sp. stump which served as a buttress to the structure. Five entrances to the house were observed.

Major components recorded were: prickly pear (*Opuntia* sp.) leaves, segments of the pitaya cactus (*Echinocereus enneacanthus*), many small mesquite (*Prosopis glandulosa*) branches, mesquite bark, lotebush branches (*Condalia* sp.), huisache (*Acacia farnesiana*), Christmas cactus (*Opuntia leptocaulis*), granjeno or hackberry (*Celtis pallida*), and guayacan (*Porlieria angustifolia*). Items used to fill areas on the house included cow dung and dirt clods. Data were recorded for six sticks in order to illustrate the size of some of the woody components of the house (Table 1). In total, nine bu of materials were tallied as components of the house.

A large adult and two juvenile woodrats made their escape as demolition of the house proceeded. Removal of the structure exposed a saucer shaped depression in the earth, approximately two thirds the size of the house and 3 in deep in the central part. Burrows, consisting of tunnels and trenches (some lined with grass), constituted the nesting areas.

House #2 (Fig. 1) was also in the area of site 41ZV14, 300 yds east of Tortugas Creek in a similar prickly pear zone. The house was 5.5 ft long (north-south), 4.75 ft wide (east-west), 14 in high, and had eight entrance holes. Like House #1, it was built against a bush or tree stump. The same type of building components were observed; they filled 6.5 bu when removed. The longest stick used in construction was 43 in long. A sample of sticks used in the building of the house was recorded (Table 2).

A large, shallow depression was noted beneath the house; within this depression, two rooms (one a grass lined nest) were connected by four trenches. Unlike House #1, this woodrat domicile was abandoned.

While only Houses #1 and #2 were totally dissected, casual observations were made on several other woodrat houses that were either totally or partially dissected. Their components differed little from those described in detail. However, the brief inspections allow additional generalizations. Houses were built from whatever was immediately available in the vicinity. Lanner and Van Devender (1974:207) observed that the home range of woodrats is approximately 100 m (328 ft) in radius. However, Raun (1966:23) observed that South Texas woodrats have a greater home range of between 1,700-2,500 sq ft. These animals often move objects of considerable weight and size; sticks form the basic structure that is capped with *Opuntia* sp. leaves, animal dung (cow, horse), and dirt clods.

This work was designed to obtain data on the kinds of items taken into the nests by woodrats. Tabulation of the kinds of components used in building the houses documents the capacity of these rodents to move large objects. It also ascertains the variety of items collected from the area around the houses and brought into the chambers and nests. Specific data are available for Houses #1 and #2 (Table 3). Using the observations from the casual inspection of several other woodrat houses, Table 4 illustrates some of the diversity of items collected.

ARCHEOLOGICAL IMPLICATIONS

Distortion of the archeological record and misinterpretation of evidence could result from woodrat activities. For instance, were House #1 or #2 to have been built in prehistoric times on the fringes of an aboriginal camp site and then burned (either through natural causes or by aborigines), a 20th Century archeological excavation might lead to their documentation as cultural phenomena. The archeologist would find a shallow, basin shaped depression, perhaps up to 4 ft in diameter and a few inches deep, containing some burned rocks, burned clay or dirt lumps, land snails, pebbles, perhaps a chert flake (or even a tool), and a varied assortment of animal remains.

Paleobotanical, palynological, or phytolith analyses of the feature's contents could reveal the presence of *Opuntia* sp. and pitaya cactus, hackberry seeds, and other plant remains that would have been contained in animal dung. An archeologist, working on or near the edge of a known prehistoric

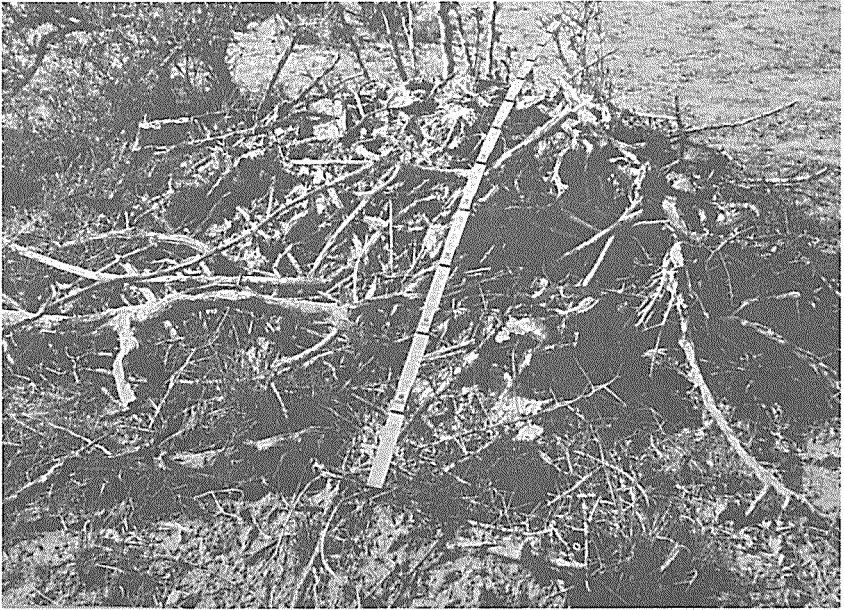


Fig. 1 View of Woodrat House #2.

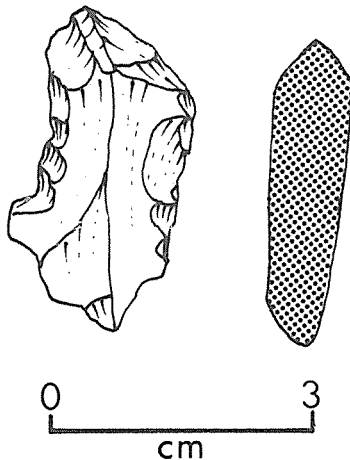


Fig. 2 Chert uniface from nest within Woodrat House #2. Dorsal view and cross section shown.

site might infer a hearth function for such an occurrence.

The shape, size, and contents of such a house are not unlike aboriginal hearths documented at South Texas hunter-gatherer sites (Hester and Hill, 1975; Montgomery, 1978). There is not a great abundance of woodrat bones in the nests (remains resulting from natural deaths in the domicile). The few charred woodrat bones found in the burned depression might indeed argue against it being a woodrat nest, i.e., they represent remains of rodents cooked during an aboriginal meal.

Table 1
Measurements of Six Sticks from Woodrat House #1

Stick	Wt (oz)	Length (in)	Avg Diam (in)
1-1	7.5	16	1.50
1-2	8.0	17	1.25
1-3	4.0	10	1.25
1-4	6.0	18	1.25
1-5	9.5	25	1.00
1-6	11.5	42	1.25

Table 2
Measurements of Six Sticks from Woodrat House #2

Stick	Wt (oz)	Length (in)	Avg Diam (in)
2-1	5.5	16	1.25
2-2	8.0	24	1.25
2-3	17.5	30	1.50
2-4	5.0	20	1.25
2-5	4.5	12	1.00
2-6	4.0	13	1.00

Table 3
Materials found within Woodrat Houses #1 and #2

HOUSE #1

1 18 in length of double strand barbed wire
several horse and other mammal feces, up to 2.5 in in diameter
five *Rabdotus* sp. land snails, up to 1.75 in in length
four small pieces of charcoal
mandible fragment of a woodrat

HOUSE #2

two dried segments of pitaya cactus
several horse feces
one oboriginal baked clay lump (of the type documented for the area by Hester and Hill 1973, 1975)
several fragments of cow dung
one 410 gauge shotgun shell
11 *Rabdotus* sp. land snails (averaging 1.25 in in length)
bits of other animal feces (including deer)
three small rounded pebbles (.75 to 1.0 in in length)
four burned rocks of aboriginal date
one aboriginally modified chert flake, probably a unifacial scraper (34 mm long, 18 mm wide, and 8 mm thick; Fig. 2)

Woodrat houses in South Texas prickly pear flats usually are clustered (Holdsworth, 1973). A prairie or brush fire sweeping through the community could create a whole series of burned depressions (with the kinds of contents noted). This distribution could reinforce the archeologist's inference that these excavated features were not natural but camp fires of family units in a hunter-gatherer band (cf. site plans of Bushmen open occupation sites; Yellen, 1977).

Table 4
Examples of Materials Collected from Several Other Woodrat Houses

woodrat crania
cottontail rabbit (<i>Sylvilagus</i> sp.) cranium
white-tailed deer (<i>Odocoileus virginianus</i>) scapula
opposum (<i>Didelphis marsupialis</i>) cranium
turtle (<i>Chrysemys</i> sp.) carapace fragments
fragments of a white-tailed deer long bone
animal feces of types described from other houses (including coyote)
a piece of lumber (5.0 x 1.25 x 1.25 in)
20-gauge shotgun shells

Criteria for distinguishing between a burned woodrat nest and some types of aboriginal cooking areas cannot be provided. In South Texas, the size, contents, and density of materials is likely to be similar. Perhaps controlled experimental burning of woodrat houses, followed after some time by careful excavation, would serve to better define the situation in archeological terms.

Although field studies and speculative comments have dealt with modern woodrat houses, these data may be compared to a controversial site like Lewisville (Heizer and Brooks, 1965). The largest fire feature at Lewisville (Hearth 1; Crook and Harris, 1957) is larger in plan than the modern woodrat nests examined. However, some of the 21 fire features are approximately the same size as the substructural woodrat depressions noted. Hearth 14 was 4.75 x 3.3 ft, hearth 15 was 5.8 x 3.5 ft, and hearth 16 was 4.5 x 2.6 ft; all were shallow, 3 to 8 in deep (Crook and Harris, 1957:34).

Their contents, and those of the other fire features, make interesting comparisons to the modern data presented. There are a variety of animals (turtle, deer, skunk, rabbit, mole) within the features, including woodrat remains in practically every one; there are also pieces of sandstone, snails, and charcoal (cf. House #1) (Crook and Harris, 1957).

Archeologists working in areas where woodrat houses occur on or near open occupation sites, as in Texas and other parts of the western United States, should be aware of the potential for misinterpretation of subsurface burned features. Additionally, prehistoric woodrat houses that deteriorated and decayed through natural processes could conceivably have created artificial clusters of animal bone, burned rocks, and even lithics which might be seen by the excavator as an activity area. The selective sampling habits of these rodents could have caused some disarray in fragile aboriginal activity patterns on abandoned camp sites by the moving of lithics, bones, and other items from the camp sites to their nests.

ACKNOWLEDGMENTS

The authors would like to thank John B. Holdsworth of Crystal City, Texas, for his assistance with this project. Notes and color slides resulting from the field study are on file at the Center for Archaeological Research, The University of Texas at San Antonio.

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BOOK REVIEWS

A Travel Guide to Archaeological Mexico. By Robert D. Wood. Hastings House Publishers, Inc., New York. 1979. 156 pp. \$6.95 (paper), \$9.95 (cloth).

This little guide is divided into five parts. The first is a section on various travel routes which are geographically arranged, e.g., Route 11 - In and around Guadalajara. The text gives fairly detailed information on how to get to the sites. However, it is not a road log a la SANBORN who prepares you for every bump in the road. Maps (not to scale) of routes showing more than 100 of the known archeological sites as well as maps of larger sites are included.

The second section gives concise background information on sites which are listed alphabetically. Included is a pronunciation of the name, translation or derivation of the name, location, route, dates of occupation, cultural affiliation, most interesting things to see, and when and by whom the site was excavated.

The third section contains a brief description of the archeological regions; while the fourth part presents a short introduction to the early cultures of Mexico. In general, the information seems to be accurate.

The fifth section gives travel tips and describes a few special customs. This section should be read before your first trip south of the Rio Grande; or Rio Bravo as it is called in Mexico.

There are other guides to archeological sites in Mexico, but they are usually on one particular cultural group or a single geographical area. Because this guide packs a wealth of information in very little space and covers all of Mexico, it will be one of the items in my shoulder bag next trip.

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Ethnographic Notes on Indian Groups Associated with Three Nations in Guerrero, Coahuila. By Thomas N. Campbell. Center for Archaeological Research, *Archaeology and History of the San Juan Bautista Mission Area of Coahuila and Texas Report*, No. 3, The University of Texas at San Antonio. 1979. 76 pp. \$4.00

This work is a detailed report of a chapter submitted by Dr. Campbell in the final report of Guerrero or Gateway Project undertaken by the University of Texas at San Antonio. The chapter of the final report is entitled "Resident Indian Populations at the Guerrero Missions." In *Ethnohistoric Notes*, more detail is included than was possible in the final chapter.

Dr. Campbell (Professor Emeritus, Department of Anthropology, University of Texas at Austin) has accomplished a great deal of study on ethnohistory in southern Texas. He is a thorough and cautious researcher and the information contained in this report is witness to those qualities.

Missions San Francisco Solano, San Juan Bautista, and San Bernardo were established on the Rio Grande near present Guerrero during 1700 to 1703. A summary of what is known about each of the 88 named Indian groups at the missions is presented in alphabetical order by group. The summaries make it painfully apparent, however, how little is known about most of the groups. As Dr. Campbell states, "much of what is known consists of miscellaneous bits of information, often trivial in nature, haphazardly recorded by Europeans who varied in native intelligence and educational background." He further states that it is not wise to take each bit of

recorded information at face value and that it must be challenged in various ways before being accepted.

It is evident in the summaries about what is known of these Indian groups that Campbell has challenged the information. Campbell does not make an attempt to present the complete list of known named variants for all groups, since some Indian group names had as many as 40 variants. Sample lists are included to show range of name variations and call attention to various kinds of errors. For instance, in the *Handbook of American Indians* (Hodge, 1907, 1910), 14 names should no longer be regarded as separate groups because it can be demonstrated that these are variants of other group names: Guisoles, Haeser, Hihame, Morbana, Ohaquames, Pachaloco, Pacuachiam, Pasteal, Psaupsau, Putsay, Quesal, Sinicu, Taimamares, and Tusonid.

Campbell points out how risky it is to use secondary sources in ethnohistoric research. On page 9, he notes that Swanton (1940, 1952) and Ruecking (1954, 1955) followed the lead of Hodge and consequently made mistakes about the ethnic units. Key pages in the widely scattered documents, both published and unpublished, are noted so that the "serious inquirer . . . may evaluate the evidence independently."

Secondary sources also are cited when they add to the interpretation of the primary source or where errors have been made. An attempt is made to place each group within a geographic range before they entered the missions. Therefore, special attention was given to reports of where each group might have been living prior to mission entry.

Three kinds of population figures are included: 1) occasional headcounts made by Spaniards and native encampments; 2) population estimates made by missionaries that refer either to Indian groups in missions or groups still living under native conditions; and 3) population figures compiled from mission records and censuses. Some population figures are corrected. Where possible, the language spoken is mentioned when there is enough evidence to warrant some kind of statement. Being careful and scholarly, Campbell includes cultural information only where it can be related to a specific group.

A table at the end of the report lists the numbers present of each group at each of the missions: at San Francisco Solano on the registers from 1700 to 1718; San Juan Bautista censuses 1734, 1772; San Bernardo, censuses 1734, 1772.

Since Solano was moved to San Antonio in 1718, becoming San Antonio de Valero, some of the Indians went to San Antonio. Campbell notes where the same groups are listed on the San Antonio census. He also corrects some errors of assumption in that some of the groups on the Solano registers were mistakenly thought to have been at Valero because both registers were filed at Valero.

The summaries will clarify many confusions about these Indian groups. It is not completely clear how Campbell arrives at the synonymous names. He takes to task those who suggest synonymity on similarity alone; he implies cross checking of names in different registers or censuses. No doubt, nevertheless, each has been carefully researched.

The summaries also will prove useful for the geographic range. Many of the groups ranged into Texas and some made up the aggregation known as *Rancheria Grande* located somewhere between the Colorado and Brazos rivers. All of this information should be useful to archeologists working in these areas. There is a paucity of sites of this time period and we may be misinterpreting our archeological data.

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Documentary Sources for the Wreck of the New Spain Fleet of 1554.
By David McDonald and J. Barto Arnold III. *Texas Antiquities Committee Publication*, No. 8. 1979. xvii + 330 pp. \$26.00.

This fairly large, paperbound, double columned book is the eighth in a series of reports on investigations of the material remains of three Spanish ships that were blown ashore on Padre Island in April, 1554. The homebound New Spain fleet of that year consisted of only four vessels.

This publication presents English translations (by McDonald) of Spanish documents or extracts from documents (mainly derived from the archives and libraries of Simancas, Seville, and Madrid) which contain specific or general information on the three wrecked ships, their equipment and supplies, their crews and passengers, and their cargoes.

Two documents report the results of salvage operations conducted at the shipwreck locality a few months after the vessels were lost. These results include inventories of objects recovered and officially recorded weights of all gold and silver pieces. Other documents provide background information on Spanish shipping activities during the 16th Century. The various document and extract translations are presented in three sections but are numbered consecutively from 1 through 60.

Most of the 60 presentations are said to be taken from "about 35,000 pages" of microfilmed, xeroxed, and photographed documents obtained in Spain by a research team. The items selected for translation are of unequal value, and a few are so brief and minimally informative that one wonders why they are included.

McDonald and Arnold's comment on the selections appears in a general introduction to the volume, in introductions to individual documents or sets of related documents, and in footnotes. The general introduction is very well done, but the introductions to specific documents vary in quality. Some of these are detailed, informative, and quite interesting because the editors point out how the documents negate certain conclusions drawn by modern historians.

Other introductions, however, seem perfunctory, and they sometimes contain statements that are difficult to understand. For example, in connection with a lengthy list of medicines purchased for use on armed escort vessels it is stated that the "influence of New World herb lore adopted from Aztecs is apparent." Close inspection of the list does not reveal a single "medicine" that is immediately identifiable as Aztec in origin. One entry ("Indian electuary") may refer to India and not to North America. Extensive pharmaceutical research is required here.

The translated excerpt from Davila's *Historia* (a secondary source published in 1596) is the only known detailed account of what happened to the shipwreck survivors, nearly all of whom died from starvation, thirst, and exposure or were killed by Indians as they walked southward. According to Davila, the same group of Indians pursued the rapidly dwindling party of Spaniards down the Gulf coast from lower Padre Island all the way to southern Tamaulipas, a distance of well over 200 miles.

McDonald and Arnold might have pointed out how dubious this pursuit appears in light of what is known about the rather large number of Indian ethnic units distributed along the Gulf coast and also the restricted nature of their territorial ranges. This knowledge refers particularly to Indian groups encountered by Cabeza de Vaca some 20 years before the ships were wrecked and also to Indian groups recorded later by chroniclers of Spanish colonization in Tamaulipas.

Fifty pages of this book are used to present reproductions of 25 single pages from Spanish manuscripts, each accompanied by a facing transcription and an English translation. These pages give impressions of 16th Century Spanish handwriting and will be of interest mainly to those who know Spanish but who have never seen similar manuscripts. Those who do not know Spanish may ask why so many were included.

Distribution of these illustrations throughout the book may be somewhat distracting to those who search the text for various kinds of information. Perhaps they should

have been grouped and presented as a unit at the end of the volume. The most interesting illustrations are eight drawings taken from a treatise by Ledesma (1623) on methods of salvaging sunken ships. One of these is effectively used on the front and back covers of McDonald and Arnold's book.

This publication is not aimed at professional scholars, who would prefer a good facsimile reproduction of each Spanish manuscript in its entirety, along with a printed transcript. Instead, it is aimed at those who need certain kinds of information for special purposes and do not have the time or motivation to learn Spanish, acquire the appropriate scholarly skills, and visit archives. The volume contains much previously unpublished information that will be of interest to laymen and to specialists outside the field of underwater archeology. Its usefulness would have been enhanced by inclusion of a detailed topical index.

This intricate and complex volume is, in general, well edited, and readers will not be able to detect many errors. There is occasional confusion in bibliographic citations. Several sources used are omitted from the list of references cited. A sharp-eyed reader may catch the use of "principle" for "principal" and rendition of one Spanish historian's name as "Gómera" instead of Gomara. Prospective buyers should perhaps be warned that some copies of this attractive book may be insecurely bound. After moderate use, several pages of this reviewer's copy worked loose from the spine.

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Information for Contributors

The *Bulletin of the Texas Archeological Society* publishes original papers in the field of American archeology. Emphasis is placed on Texas and adjoining areas in the United States and Mexico; papers on other areas are also considered. Articles concerning archeological technique, method, or theory are encouraged.

Manuscripts must be typed, double spaced throughout, on 8½ x 11 white paper. Footnotes should be avoided. References to published literature, by author, date, and page or figure number, should be placed within parentheses in the body of the text, with full bibliographic citations at the end. See this issue of the *Bulletin* for examples. Authors also should consult "Style Sheet for Authors" in *Texas Archeology*, 23(1):11-13 (January, 1979) or write the Editor for a copy.

The proportions of full page illustrations (picture or drawing plus captions) should be suitable for reduction to effective *Bulletin* page size of 4¼ x 7 inches. Plates may be printed either horizontally or vertically; allowance for the caption to be printed in the same direction must be made. Captions for illustrations should be listed in numerical order and placed behind the list of references cited.

A complete manuscript is one with: a title, abstract, main body with subdivisions, acknowledgements, references cited, appendices (if necessary), figure captions, completed photographic and drafted plates, and biographical note. Submit three copies of the typed manuscript. Manuscripts are subject to peer review; final decision rests with the Editor.

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