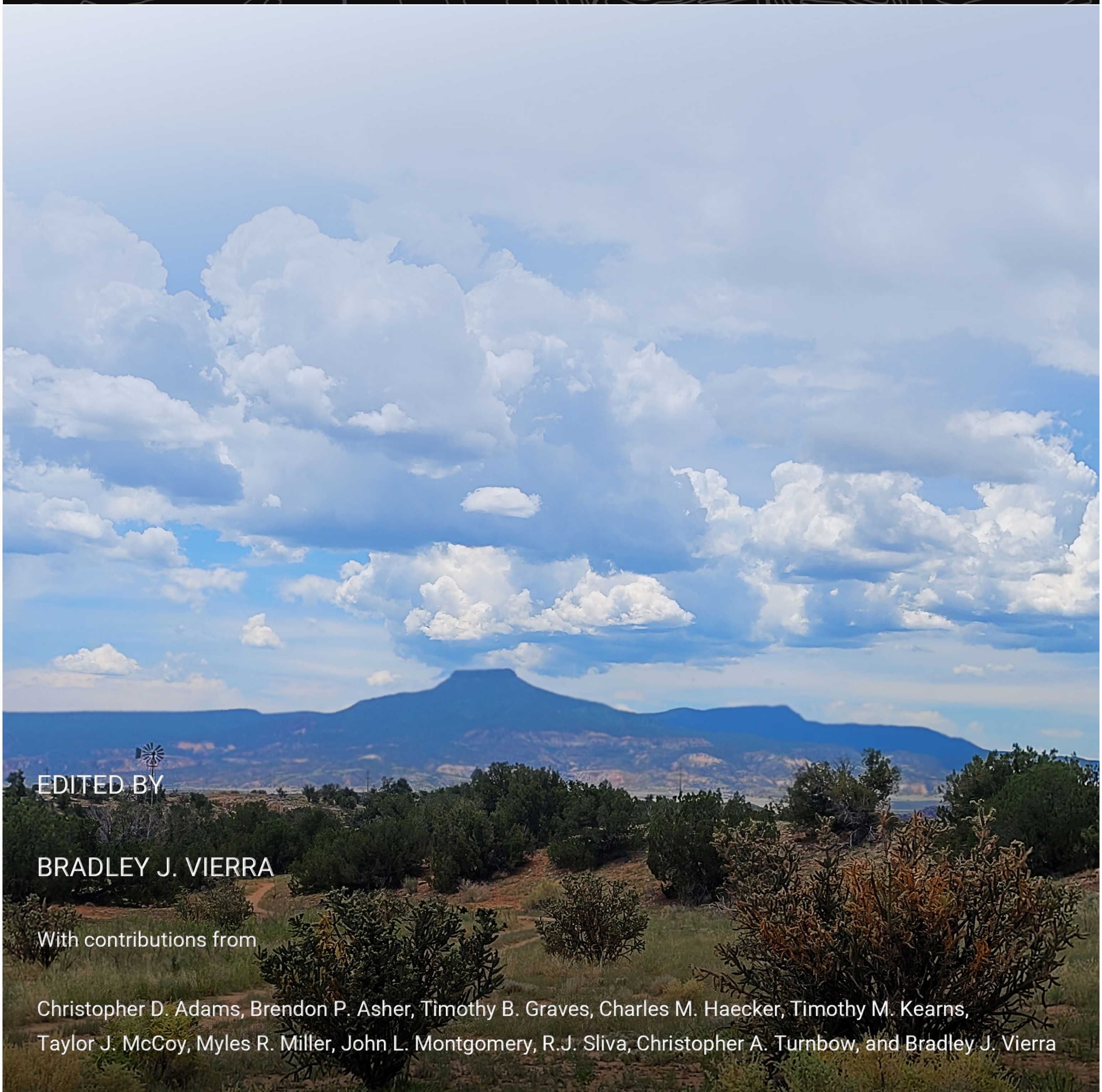
U.S. Department of the Interior
Bureau of Land Management

PROJECTILE POINTS OF NEW MEXICO:

13,000 YEARS OF TECHNOLOGICAL INNOVATION



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(Cerro Pedernal near Abiquiu, New Mexico. Photo by Bradley J. Vierra.)

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Acknowledgments

It all started with a simple posting to NMAC-L by Lynne Sebastian. A colleague of hers was wondering if there were any standard guides for identifying projectile point types in New Mexico. I posted a short bibliography and stated that there were no standardized guides. Rather, most archaeologists were relying on the traditional culture-historical frameworks developed by Irwin-Williams for the Oshara Tradition, by Dick for Bat Cave, and by Leslie for southeastern New Mexico. I became concerned when someone on the list forwarded me a link to "New Mexico Projectile Point Types." I was not sure what New Mexico the website was referring to, but the types listed there were certainly not ones that I was familiar with—yes, having worked over 40 years in the state. It did not take long to see that there was a severe problem in the lack of consistency and accuracy in classifying projectile points. Luckily, I was retired and therefore reached out to several old friends and colleagues to see what they thought. Not only did they agree, but I found colleagues in other states who were having similar problems.

It appeared that a new monograph that clearly defined point types and chronologies was needed. As I told my colleagues, "If we can't do this, then it can't be done." There were certainly times when I wondered if we could pull this off. Especially given that I did not want simple brief descriptions, dates, and illustrations. Rather, I wanted to draw on all the experience we had access to, with experts from across the state. We needed to integrate that knowledge into a broader perspective and more detailed descriptions of the morphology, technology, typology, and metrics for each type. It soon became clear that there was a good reason why field crews working across the state were having a difficult time classifying points. There are over 50 specific point types currently being used, and no single person is experienced in dealing with the variability exhibited across New Mexico. Hopefully, this monograph will help to alleviate this problem by providing a standard guide for projectile point identification.

A study this extensive and complex could not have been completed without the help of so many friends and colleagues. I especially want to thank all the contributors for their hard work and efforts: Chris Adams, Brendon Asher, Tim Graves, Charlie Haecker, Tim Kearns, Taylor McCoy, Myles Miller, John Montgomery, R. J. Sliva, and Chris Turnbow. Sean Daugherty (Bureau of Land Management), Rani Alexander (New Mexico State University), and Robby Heckman, Maria Molina, Andrew Saiz, and Beth Bishop Bennett (Statistical Research, Inc.) were all critical to the success of this project.

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Chapter 1

A History of Projectile Point Classification

Bradley J. Vierra

It is not uncommon in the American Southwest to find isolated projectile points lying on the ground surface that collectively represent over 13,000 years of human occupation. The landscape has changed markedly over that time span, and the ways that people have made a living on that landscape have also changed. These changes likely affected projectile point technology, tool design, and the specific tactics used to hunt game (Nelson 1997; Vierra and Heilen 2020). Indeed, a broad diversity of projectile point forms and design elements were produced over millennia. Some changes, no doubt, relate to requirements of different weapon systems, such as throwing or thrusting spears, the dart and atlatl, and the bow and arrow. The cumulative result has been the development of a series of point designs through time, the complexity of which has challenged archaeologists to develop and consistently apply regional classifications for the temporal placement of lithic scatters. In fact, lithic scatters compose most of the site types in the state of New Mexico.

It was the identification of an in situ stone point associated with extinct fauna in the early 1900s that would thrust New Mexico into the debate regarding the peopling of the Americas. That discovery forever changed the perspective on when Indigenous populations first moved into this virgin landscape. Towns like Folsom and Clovis would become linked to the identification of newly recognized point designs and the initial expansion of Paleoindian hunters into North America and New Mexico.

As the story goes, there was a heavy monsoon across northeastern New Mexico during the summer of 1908. The rains flooded the village of Folsom and continued the downcutting of Wild Horse Arroyo. Erosion exposed bison bones in the channel about 2 m (6.6 feet) below the surface. These protruding remains caught the attention of a local cowboy named George McJunkin, who passed on his observations to local amateurs, and the word eventually spread to professional archaeologists. These studies would subsequently confirm the in situ association of extinct Pleistocene fauna with fluted dart points—stone points that would become the hallmark of Folsom hunters who foraged in the area prior to the Holocene (Meltzer 2006).

The initial discoveries at Blackwater Draw were not as dramatic as those at the Folsom site. A. W. Anderson found an isolated Folsom point in 1932 on the surface of a blowout. He notified E. B. Howard, who had been working at Burnet Cave west of Carlsbad, New Mexico, of the find, and they revisited the locale the following spring. However, it was the New Mexico State Highway Department's gravel excavation for the Clovis to Portales roadway that would expose sediments containing the remains of mammoth and bison. Archaeological excavations were begun by Howard in 1934 and were continued into the 1950s by various professionals, including Sellards, Wendorf, Hester, and others. The result was the identification of a stratigraphic sequence containing evidence of Clovis, Folsom, and Late Paleoindian and Archaic period occupations spanning the Pleistocene/Holocene boundary (Haynes 1995; Hester 1972).

These previous studies were hallmarks in American archaeology, although both of the Paleoindian finds were fortuitous. Herb Dick designed his study of Bat Cave in the 1940s to document the earliest evidence of cultivation of maize in the region. Previous excavations had revealed the potential for early maize at other cave sites in the Mogollon Highlands, and Haury (1962) suggested that early maize had traveled along this upland route into the Southwest. Dick (1965) was able to identify and collect maize specimens. Although his indirect charcoal dates of ca. 3500 B.C. associated with the maize proved to be incorrect, directly dated maize specimens provided an accurate date of ca. 1200 B.C. (Wills 1988), and Dick (1965:Figure 24) did develop a projectile point typology composed of 22 dart and arrow styles for the region based on those excavations (Figure 1).

Interest in hunter-gatherer archaeology began in earnest during the 1960s. Two separate projects focused on Paleoindian and Archaic period occupations in the middle Rio Grande valley. Judge's (1973)

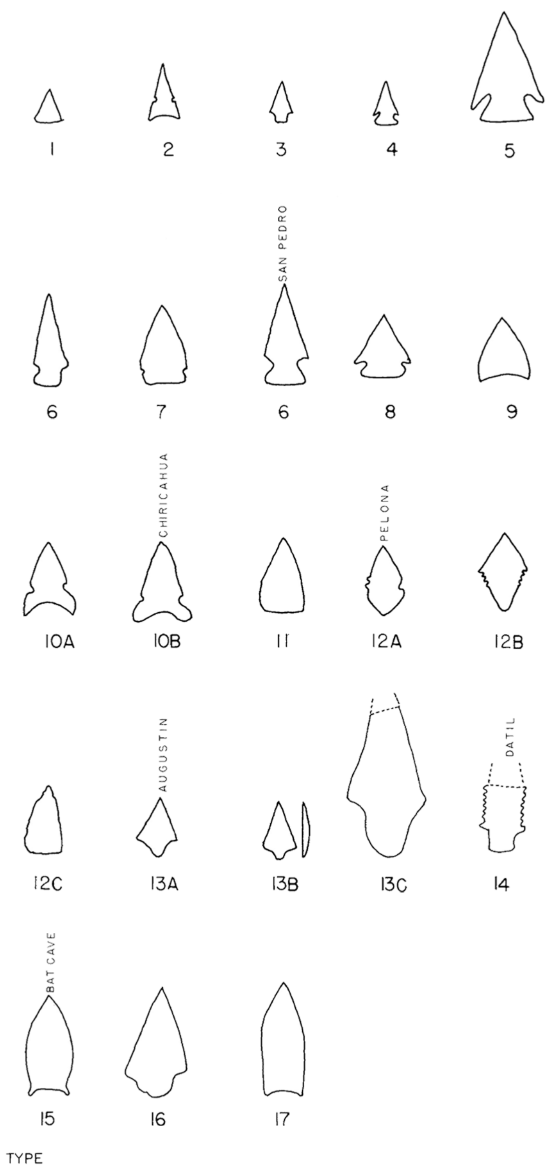

Figure 1. Bat Cave point types (Dick 1965:Figure 24; with permission from the School of Advanced Research).

Paleoindian period study followed the initial surveys and collections made by Ele and Jewel Baker and Jerry Dawson. His subsequent fieldwork and artifact analysis formed the basis of his Ph.D. dissertation, which was published as a monograph. That research identified the Clovis, Folsom, and Late Paleoindian period point types for the Albuquerque Basin.

Irwin-Williams (1973) directed the Anasazi Origins Project in the Arroyo Cuervo area, northwest of Albuquerque. The project title reflects the focus of the research on defining the foraging predecessors of Ancestral Pueblo people. The Oshara Tradition is a culture-historical framework based on excavations conducted at 18 open-air rockshelter sites, including 2 sites near Laguna and the La Bajada site, near Cochiti (Chapin 2017; Vierra 2009). The Oshara Tradition consists of 5 distinctive Archaic period phases, each with its own distinctive point type: Jay, Bajada, San Jose, Armijo, and En Medio (Figure 2). However, illustrations with only limited descriptions provided little guidance for identifying the types. Moore and Brown subsequently provided the initial quantitative means of objectively classifying these point types (Brown 1993; J. Moore 1994; Moore and Brown 2002).

The Lea County Archaeological Society was actively involved in archaeological surveys and excavations in southeastern New Mexico during the 1950s and 1960s. These included Leslie's and Corley's studies of

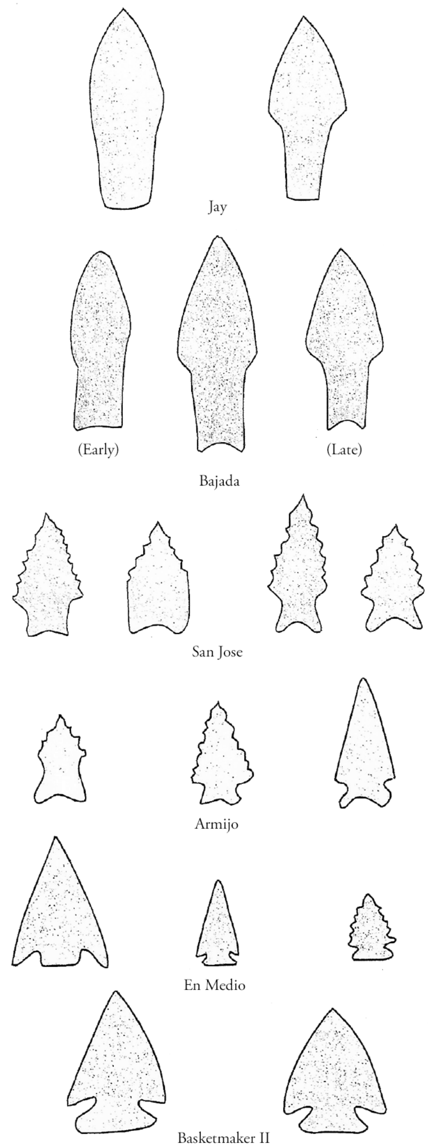

Figure 2. Oshara Tradition point types (with permission from Greg Stradiotto).

pottery and projectile points (Corley and Leslie 1963; Leslie 1978, 1979; Miller et al. 2016). They suggested a potential sequence for the eastern Jornada cultural area consisting of the Ochoa, Maljamar, and Quercho phases and ranging from ca. A.D. 900 to 1500. The analysts distinguished three main arrow-point styles—Triangular, Corner-Notched, and Side-Notched—and variations within each type. The first two types were determined to be earlier than the last type. Besides examples of arrow points, illustrations in the articles also provide examples of Archaic and Paleoindian period points.

During that time, Jelinek (1967) was also doing research in southeastern New Mexico, along the Middle Pecos River valley, but his research focused primarily on excavations of Formative period sites. He was able to define a sequence including the 18 Mile, Mesita Negra, and McKenzie phases and dating to ca. A.D. 800–1300. This sequence consisted of a series of arrow points beginning with Corner-Notched and Stemmed forms, continuing with Corner-Notched forms, and ending with Side-Notched forms.

Investigators for the U.S. Department of the Interior National Park Service Chaco Project conducted research within Chaco Canyon from 1971 to 1978. The project included the excavation of 16 archaeological sites dating to ca. A.D. 500–1300. A study by Lekson (1977) identified 3 primary types of arrow points—Stemmed, Corner-Notched, and Side-Notched—and internal variations. Although all the types were found to have been present throughout the occupations, there was a temporal sequence represented:

Stemmed points composed the majority from the Basketmaker III/Pueblo I period (60.4 percent), Corner-Notched points composed the majority from the Pueblo II period (49.3 percent), and Side-Notched points composed the majority from the Pueblo III period (79.4 percent). Hayes and Lancaster (1971:144) had identified a similar sequence at Mesa Verde.

The 1980s and 1990s witnessed a burst of cultural resource management (CRM) projects across New Mexico, many of which focused on coal mining in the San Juan Basin, including the Coal Gasification Project, which was the first to record all the archaeological sites that were documented within the boundaries of the survey, including lithic sites (Reher 1977). Archaeological surveys conducted during this period focused on the use of the Oshara Tradition for classifying point types. The Cochise Tradition was used for the central and southwestern portions of New Mexico, and the established Texas types were used for the southeastern part of the state (Beckett 1973; Dick 1965; Irwin-Williams 1979; Turner and Hester 1985). Nonetheless, sites with or without diagnostic projectile points were often classified as Archaic period. Paleoindian and Archaic period points provided a general temporal sequence, yet little information was forthcoming toward confirming that sequence. In addition, archaeologists raised the important question of how to deal with the nondiagnostic lithic scatters (Cordell 1979; Hicks 1994; Sebastian and Larralde 1989; Stuart and Gauthier 1981).

Archaeologists rely on field identifications for the temporal placement of lithic scatters, but the problem of confirming the reliability and accuracy of projectile point sequences continues to the present day. In fact, it seems like the classification of projectile points has become less clear to a new generation of CRM field crews. This should not be surprising, given that there are about 50 recognized point types within the state of New Mexico. Such is the reality today, and it is the main impetus for creating this monograph. Certainly, research interests have changed over the years from culture-historical to a variety of behavior-based perspectives. Studies of stone-tool technology and the relationships of dart and arrow points with social interactions, hunting tactics, and warfare have provided new insights into understanding past hunter-gatherer and agricultural societies in the American Southwest (Arakawa et al. 2013; Beale 2014; Keyes 2024; Loendorf et al. 2017; McBrinn 2005; Reed and Geib 2013; Sliva 2015; Vierra and Heilen 2020). Projectile point sequences in adjacent regions, like the northern Great Plains and the Rocky Mountains (Reckin and Todd 2019), the southern Great Plains and Texas (Turner et al. 2011), the Colorado Plateau (Spangler and Zweifel 2021), and the Basin and Range Province (Hockett and Spidell 2022; VanPool 2003), have been described previously. Hopefully, this discussion of 13,000 years of technological change in New Mexico will encourage further research on the topic.

Chapter 2

Background

Bradley J. Vierra, Timothy M. Kearns, Myles R. Miller, John L. Montgomery, and Christopher A. Turnbow

Projectile points are some of the most common items used by archaeologists as temporal markers for the American Southwest. They are often found lying on the ground surface, associated with lithic scatters. This artifact type is characterized by a significant degree of variability over the last 13,000 years. The regional resource structure has changed markedly over that span of time and has involved periodic shifts in the game species being hunted and the methods used to hunt them. Indeed, a variety of about 50 distinctive projectile point forms and designs were produced over the millennia. This diversity of point forms provides a wealth of information on past land use, subsistence, technology, and exchange relationships, but the sheer number of types poses an immense challenge to researchers attempting to classify the various forms according to defined types and time periods. Often, they are left to rely on oral history, a variety of report illustrations, or monographs that are more often produced for the collector rather than the professional. There is no standard set of point-type definitions currently available to the archaeologist working in New Mexico. Many times, researchers use Oshara Tradition types or variations thereof (Brown 1993; Chapin 2017; Irwin-Williams 1973; R. Moore 1994; Moore and Brown 2002; Turnbow 1997; Vierra 2013a; Vierra and Heilen 2020). Other times, they use the classification outlined by Justice (2002), which is part of a general, multiregional set of classifications, or that of Turner and others (2011), which is mostly relevant only to the state of Texas. We wish to alleviate this situation by providing a source of well-documented projectile point classifications, chronologies, and illustrations that can be used to identify a given point to its specific type and time period.

There are major trends in point design over the 13,000 or more years under study that provide some framework for typology and reveal much about technological changes. Vierra and Heilen (2020) presented one avenue of potential research for understanding long-term changes in point designs by suggesting that Clovis, Folsom, and Late Paleoindian period points were primarily designed for penetration efficiency; Early Archaic period points were primarily designed for durability; and Middle to Late Archaic period points were primarily designed for a mix of durability and penetration efficiency. Penetration efficiency is often associated with close-quarters hunting, whereas durability can be related to encounter hunting and the potential for more target misses. Folsom points are certainly the premier points for penetration efficiency, with their lanceolate shape, contracting stems, and extremely thin design. Late Paleoindian period points, including Cody points, reveal a balance between tool designs/purposes: penetration efficiency is reflected in the long and narrow shape of the points and their exhibiting of parallel oblique retouch, and their diamond-shaped cross sections allow for a degree of strength and durability. Folsom and Late Paleoindian period points were often made of high-quality materials like chert and chalcedony. By contrast, Early Archaic period points, such as Jay and Bajada points, are large, shouldered, and quite thick and have straight or contracting stems. Often, they were made on coarse-grained materials like dacite and rhyolite.

Several new point designs were introduced during the Middle Archaic period. San Jose points are characterized by serrated blades, distinctive shoulders, and a basal indentation in each point. The long blades and stems characteristic of Early Archaic period points, such as Jay and Bajada points, could be resharpened or rebased. The shift to a smaller stem and serrated blade in the Middle Archaic period indicates a fundamental change in technology. Sudden-series points reflect a return to a lanceolate shape but with the addition of side notches. They are generally thinner than San Jose points, indicating a complementary weapon design involving durability vs. penetration efficiency, respectively. Augustin points exhibit triangular blades with contracting stems. These characteristics appear to represent the introduction of a different hafting technique from that of shouldered points, and the points with these characteristics may have been designed to detach from the shafts.

The greatest variability in dart-point design is seen among points from the Late Archaic period and is related in part to increasing subsistence diversification. That is, the designs were geared toward hunting specific target species, to increase hunting-return rates. This variability also reflects increasing regionalization of Archaic period populations (McBrinn 2005; Vierra 2013a). The point types include Corner-Notched, Side-Notched, Stemmed, Leaf-shaped, Contracting-stem, and Basal-Notched varieties. These styles set the stage for the later shift to the use of the bow and arrow. Again, a variety of arrow-point types were developed, involving large and small forms of Stemmed, Corner-Notched, Triangular or Unnotched Triangular, Side-Notched, Leaf-shaped, and Contracting-stem designs used for hunting game and for warfare. All together, these points provide a challenge for the researcher attempting to accurately and consistently classify them according to type and associated time period.

Certainly, the best-dated chronology for Archaic and Formative period points in New Mexico is that of Miller and Graves (2019:Figure 10; Figure 3). Their study was based on years of excavations at the Fort Bliss Army Reservation in the southern Tularosa Basin. Vierra and Heilen (2020) also provided a detailed study of Paleoindian and Archaic period point sequences for this area. Stanford (2005) and Huckell (2014) reviewed the chronologies for Paleoindian period points, which are linked to studies in the Southern Plains, and Vierra (2018) provided information on Archaic period sequences across New Mexico and the Southwest. Chapin (2017) reviewed Archaic period sites and radiocarbon dates attributable to the Oshara Tradition in northwestern New Mexico (NWNM).

The information presented in this monograph has been obtained from five regions within the state of New Mexico: Blackwater Draw and the Eastern Plains (presented by Montgomery, McCoy, Asher, and Vierra), the San Juan Basin (presented by Kearns and Vierra), the northern Rio Grande (NRG) region (presented by Vierra), the Mogollon region and southwestern New Mexico (presented by Turnbow, Sliva, and Vierra), and the Jornada region and southeastern New Mexico (presented by Miller, Graves and Vierra; Figure 4). The experts studying each region provide examples of Paleoindian, Archaic, Formative, and Postcontact period projectile points. The section on Blackwater Draw presents the most detailed Paleoindian period (ca. 9340–6550 B.C.) sequence in the state. The point descriptions in this monograph also include examples from the Archaic (ca. 6000 B.C.–A.D. 200/500) and Formative (ca. A.D. 200/500–1540) periods. The concluding descriptions draw on statewide studies of Postcontact period metal points conducted by Haecker and Adams. As the data were synthesized, the collaborators agreed that posters summarizing projectile point morphology over time and a map of lithic raw-material sources would be useful tools to improve identification and documentation for archaeology professionals working in field, laboratory, and museum settings (Appendix A). It is our hope that the definitions and illustrations herein will aid in consistent classification of types and spur further research interest toward understanding the variabilities exhibited in the various point designs.

Regional Settings

New Mexico encompasses a diverse topography with significant variations in resource structures and includes the Colorado Plateau, the Rio Grande rift valley, the Great Plains, the Mogollon Highlands, and the Chihuahuan Desert. The diversity is represented in distinctive habitats that vary by landscape and elevation, including alpine tundra, coniferous forest, woodland, savanna, grassland, and riparian vegetation (Dick-Peddie 1993). These habitats are associated with an array of fauna: bison, antelope, deer, elk, bighorn sheep, peccary, smaller mammals, birds, and fish (Findley et al. 1975). Lithic resources are abundant across much of the state, including chert, obsidian, dacite, and rhyolite (Banks 1990; Church et al. 1996; Kremkau et al. 2013; Letourneau 2000; Shackley 2005, 2011, 2013, 2021). Together, the changing environments provided both challenges to and opportunities for the livelihoods of ancient people.

San Juan Basin

NWNM covers the southeastern quarter of the Colorado Plateau and shares many of the topographic features and floral and faunal resources found farther west and northwest on the plateau. River valleys, broad basins, rolling plains, mesas, canyons, and mountain pediments and peaks dominate the landscape and provide a wide range of environments and resource options.

The San Juan Basin, in the northwestern corner of New Mexico, extends roughly 220 km (136.7 miles) north–south, from the San Juan Mountains to Mount Taylor and the Zuni Mountains, and 190 km (118.1 miles) east–west, from the San Pedro and Nacimiento Mountains to the Chuska Mountains, covering an area of approximately 42,000 km^2 (16,216.3 square miles). Elevations range from 1,500 to over 3,000 m (4,921.3–9,842.5+ feet). The San Juan River and tributaries drain the northern basin, the Chaco River drains the central basin, and the Rio Puerco East and Rio Puerco West

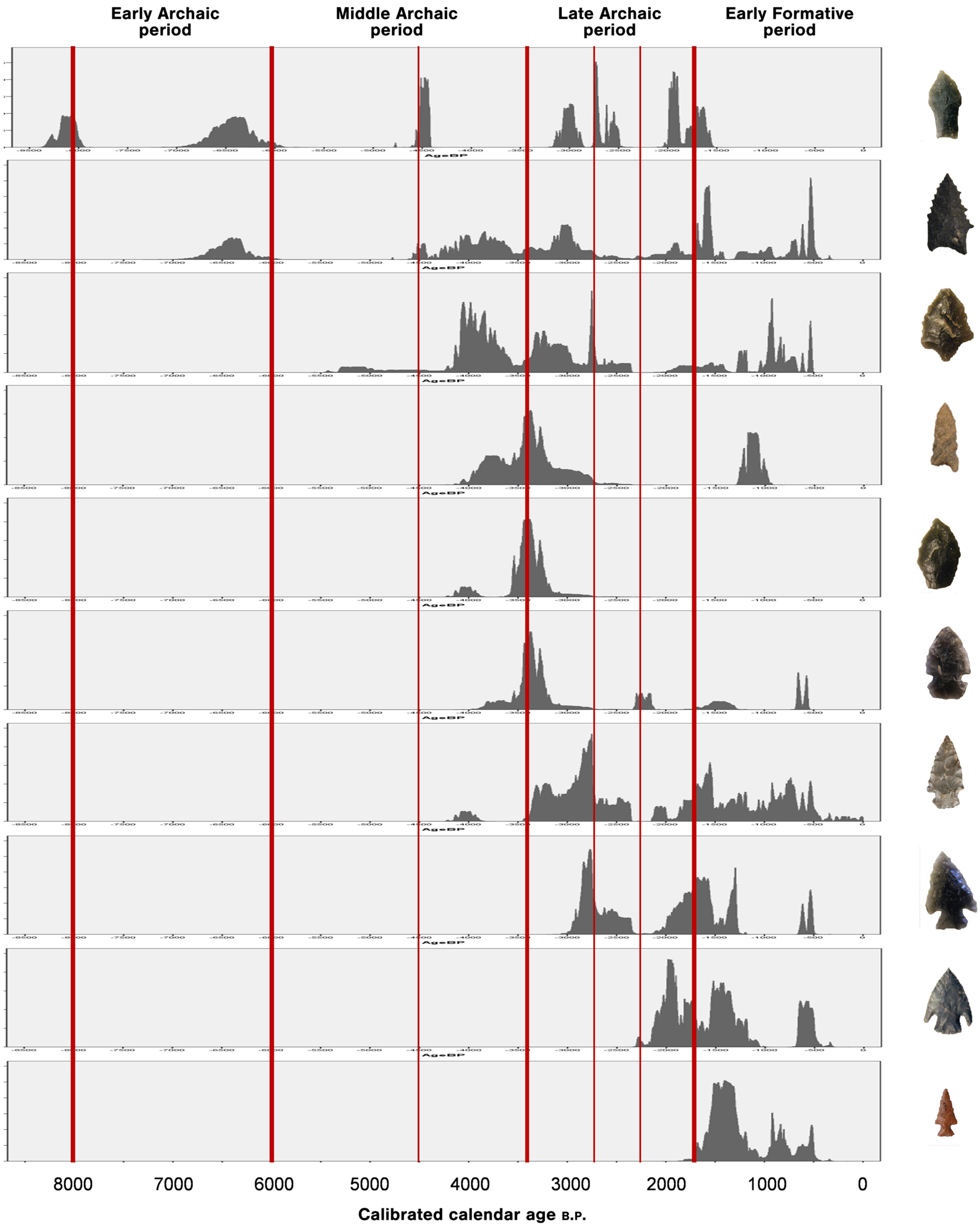

Figure 3. Comparison of the probability-density distributions of nine Archaic period arrow forms and one Early Formative period arrow form (Miller and Graves 2019:225; with permission from the El Paso Archaeology Museum).

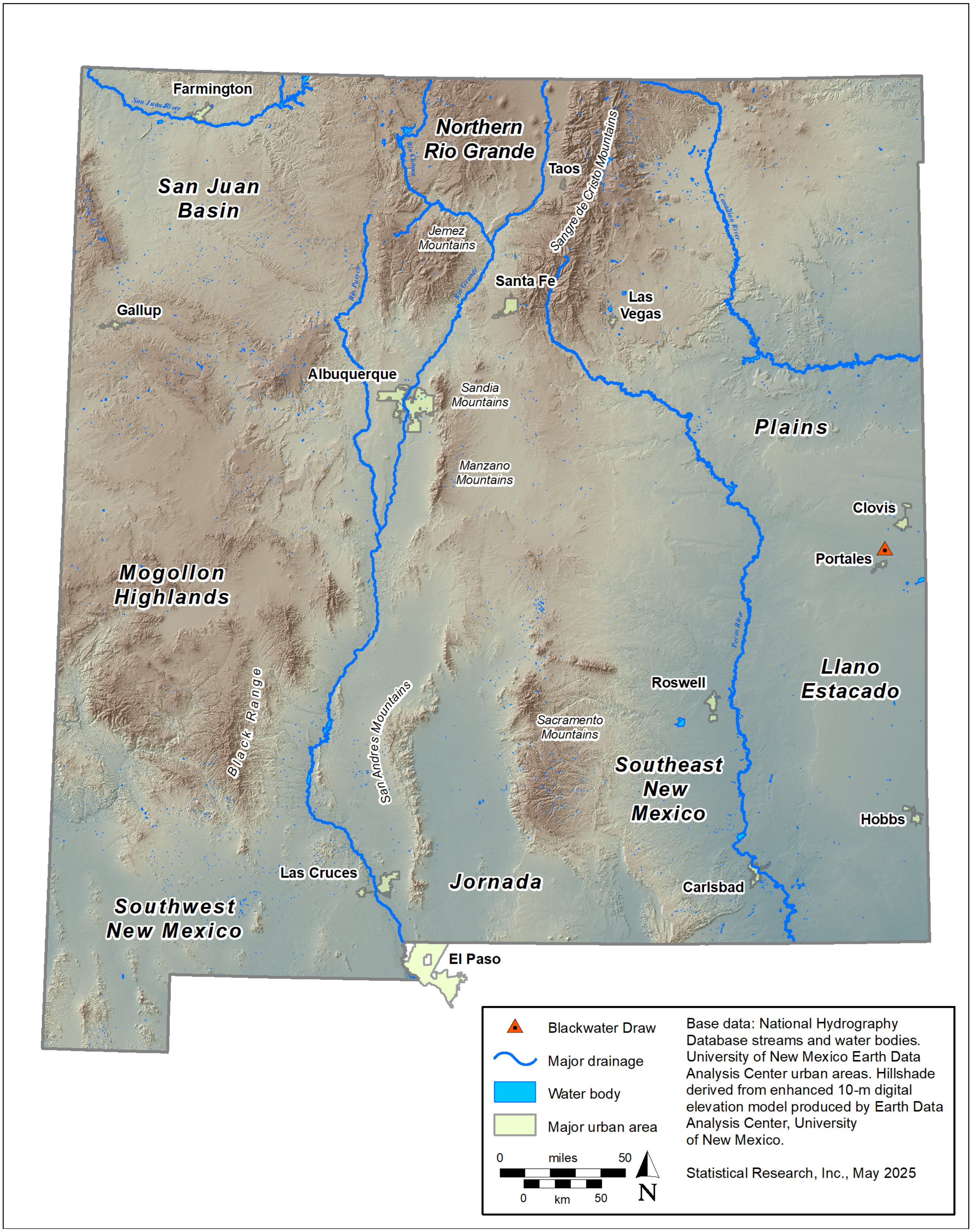

Figure 4. Regions of New Mexico.

drain the eastern and southwestern margins of the basin, respectively. To the south, the Zuni River and Rio San Jose drain the southern flanks of the Zuni Mountains and Mount Taylor, respectively. Ephemeral watercourses and springs throughout the region provide additional sources of water.

The complex landscape encompasses broad expanses of rolling dunes and sheet sand, as well as alluvial valleys and eroded badlands punctuated by buttes, cuestas, and hogbacks; cliff-bound mesas are incised by entrenched canyons, and foothills and pediment slopes flank lofty mountains. The lower elevations support extensive grassland, desert-scrub, and sagebrush-grassland communities; the surrounding uplands support juniper savanna and pinyon-juniper woodland and, in the mountains, at successively higher elevations, forests of oak and ponderosa pine, aspen, fir, and spruce.

The faunal resources are diverse. Lagomorphs, rodents, and other small mammals are ubiquitous throughout the region. Historical records and archaeological data indicate that deer, pronghorn antelope, and bison roamed the central basin, and deer, elk, bighorn sheep, bear, and turkey occupied the uplands and canyon and mesa terrain. Geese and other waterfowl were seasonal residents along waterways (Akins 1985; Harris 2006). The locally abundant lithic resources include silicified wood, chert, quartzite, chalcedony, and other materials present as outcrops or lag gravel and on the terraces of the San Juan River and other drainages. Distinctive toolstone sources include pink chert from the Chuska Mountains, spotted yellow-brown chert from the Zuni Mountains, obsidian from Mount Taylor, and Burro Canyon and Dakota quartzite and Morrison mudstone from the Four Corners region (Moore 2023).

Northern Rio Grande Region

The NRG runs through north-central New Mexico from Taos to Albuquerque. It follows the Rio Grande rift, which is composed of a series of subsidence basins bounded by highlands created by volcanic activity. From north to south, these lowland areas include the San Luis, Española, and Albuquerque Basins. The region is drained by the Rio Grande and Rio Chama, which originate in the San Juan Mountains of southern Colorado but eventually merge near Española. Together, the rivers and tributaries drain roughly 23,000 km^2 (8,880.3 square miles). The NRG valley acts as a natural corridor between the Rocky Mountains to the north and the Chihuahuan Desert to the south.

The valley is bounded on the west by the Jemez Mountains and on the east by the Sangre de Cristo Mountains, with elevations ranging from 1,600 to 4,260 m (5,200–14,000 feet). The landscape is covered with juniper savanna, pinyon-juniper woodlands, and mixed coniferous forests, from lower to higher elevations. In addition, a riparian habitat is present along the rivers. It is just 30–40 km (18.6–24.9 miles) from valley bottom to mountaintop, with easy access to all elevational habitats via various side canyons.

The region is rich in economic species. Foxx and others (1998) identified a total of 985 plant species in their study of the Jemez Mountains, over 200 of which had been identified by Dunmire and Tierney (1995) as having ethnobotanical uses for food, medicine, or implements. In addition, varieties of large game, like bison, elk, bighorn sheep, deer, and antelope, and small game were available. The Rio Grande flyway provided seasonal sources of migratory fowl (Akins 2013; Henderson and Harrington 1914). Stone-tool raw materials are available from various locations in the region, including several distinct raw-material sources, such as the Jemez Mountains and No Agua Peak for obsidian, Cerro Pedernal for chert, the Pajarito and Taos Plateaus for dacite, and terrace gravels along the river valleys for a range of materials, including quartzites (Newman and Nielson 1987; Shackley 2011, 2013, 2021; Smith and Huckell 2005).

Mogollon Region and Southwestern New Mexico

Southwestern New Mexico extends from the Rio Grande westward to Arizona and from Mexico northward to the Colorado Plateau Province, north of the Plains of San Augustin. Originally referred to as the Mogollon Highlands, the northern half of the region is now classified as the Datil-Mogollon Section, a transitional subdivision between the Basin and Range Province to the south and the Colorado Plateau Province to the north (Hawley 1986). Covering most of the section, the Datil-Mogollon volcanic field is characterized by erosional remnants of massive cauldron structures and stratovolcanoes. Ash-flow tuffs; andesite, rhyolite, and basalt flows; and volcanic-derived conglomeratic sandstones originating from these cauldrons provide a distinctive backdrop for the region. The maximum relief in the section exceeds 1,800 m (5,905.5 feet), and elevations range from about 1,400 m (4,593.2 feet) in the Gila River canyon to 3,240 m (10,630.0 feet) in the Mogollon Mountains.

The climate in this rugged terrain is semiarid. The annual precipitation ranges from 23 cm (9.1 inches) in the lower elevations to 51 cm (20.1 inches) or more in the high mountains. Major drainage systems include the Upper Gila River and its tributaries, the San Francisco and Tularosa Rivers to the west of the Continental Divide, and the headwaters of the Mimbres River to the south. The San Augustin Plains consist of a large, closed basin that was the pluvial Lake San Augustin during the late Pleistocene.

Biotic communities in the Datil-Mogollon Section include coniferous and mixed woodland in the lower drainages and montane coniferous forest, juniper savanna, subalpine coniferous forest, and montane grassland at gradually higher elevations (Dick-Peddie 1993). The crests are covered in subalpine forest. Major faunal species exploited by prehistoric populations included mule deer, white-tailed deer, pronghorn, wapiti, bighorn sheep, bison, jackrabbit, cottontail rabbit, and turkey.

The southern half of the region lies within the Mexican Highland Section of the Basin and Range physiographic province (Hawley 1986). It is characterized by wide, nearly flat basins filled with Upper Cenozoic sediments and narrow, steep, north-/northwest-trending mountain ranges with imposing escarpments. The ranges were formed by fault-block uplift of Paleozoic, Cretaceous, and Tertiary rocks or by volcanic fields. Elevations in the Mexican Highland Section range from approximately 1,128 m (3,700.8 feet) near the Gila River to 2,563 m (8,408.8 feet) at Cookes Peak, and the basins typically extend between 1,280 and 1,402 m (4,199.5–4,599.7 feet).

The climate of the northern Chihuahuan Desert is arid to semiarid. The annual precipitation is 10–30 cm (3.9–11.8 inches) per year. From the Rio Grande westward to the Arizona border and the Gila River, there are no major watercourses except the Mimbres River, which flows southward out of the Black Range before dissipating into the desert near Deming. Although ephemeral washes occur, the water sources for most of the Mexican Highland Section are mountain springs and closed playa basins that often hold water during the rainy season. The largest basins contain remnants of the larger Pleistocene pluvial lakes of Animas, Playas, Cloverdale, and Palomas (Hawley 1993).

Biotic communities in the Mexican Highland Section are dominated by Chihuahuan desert scrub, desert grassland, and closed basin scrub, although with increasing elevation, the mountains in the bootheel portion of New Mexico have montane scrub, coniferous and mixed woodlands, and montane coniferous forest (Dick-Peddie 1993). Faunal species of economic importance in the past included lagomorphs, artiodactyls, and, to a lesser extent, carnivores. Of those, remains of jackrabbits, cottontail rabbits, desert bighorn sheep, pronghorn, mule deer, white-tailed deer, and bison typically are present in prehistoric faunal assemblages.

Native populations exploited a wealth of both primary and secondary lithic sources in southwestern New Mexico. Obsidian was procured from near Mule Creek and, to a far-lesser extent, from Gwynn Canyon and Red Hills in the Datil-Mogollon Section and Antelope Wells in the Basin and Range Province (Shackley 2005). Cherts, including Eagle Mountain chert; petrified wood from near Virden; and chalcedony derived from fault zones were also important. Glassy rhyolite, quartzite, and chert were collected from colluvial- and alluvial-outwash gravels (Zeigler et al. 2011).

Jornada Mogollon Region and Southeastern New Mexico

The Jornada Mogollon region encompasses portions of south-central New Mexico in Doña Ana, Otero, and Lincoln Counties; the western Trans-Pecos; El Paso and Hudspeth Counties in Texas; and a small area of north-central Chihuahua, Mexico, between the United States–Mexico border and the town of Villa Ahumada. For this study, the region of southeastern New Mexico is defined as Eddy, Chaves, and Lea Counties in New Mexico and the adjacent Culberson County in Texas. The mountainous landscapes of the Jornada Mogollon region, including the Sacramento highlands to the northeast and the lower-elevation deserts of the western and southern regions, are considered parts of the Basin and Range physiographic province (Fenneman 1931), which is characterized by north–south-trending, block-faulted mountain ranges separated by interior drainage basins. To the east of the escarpment of the Sacramento and Guadalupe Mountains lies the expanse of grasslands and playas of southeastern New Mexico that are part of the Great Plains physiographic province (Gustaveson et al. 1991). This region is relatively flat, aside from the Pecos River valley and the Mescalero Caprock. Grasslands and aeolian dunes are present across most of the area, and small drainages, playas, ridges, and bedrock outcrops provide most of the topographic variation across the plains.

Elevations range from 870 m (2,854.3 feet) at the southeastern corner of Lea County to 3,660 m (12,007.9 feet) at Sierra Blanca Peak, in the Sacramento Mountains subregion. The modern climate of the region varies from semiarid in the highest-elevation landforms of the Sacramento and Guadalupe Mountains to arid in the central basins and on the Eastern Plains. The average annual precipitation is low and occurs primarily in the form of thunderstorms from late summer through early autumn. The average annual precipitation at El Paso is less than 2.5 cm (1.0 inch), whereas an average of 30.0 cm (11.8 inches) of rain falls annually at Ruidoso, in the Sierra Blanca region.

The modern vegetation of the Jornada region and southeastern New Mexico is that of the Chihuahuan Desert biotic province (Dick-Peddie 1993; Shreve 1942). The vegetation is strongly conditioned by landscape position, elevation, and soils, but the primary vegetation communities throughout the region consist of signature Chihuahuan Desert plant species such as creosote bush, mesquite, broom snakeweed, and fourwing saltbush. Several succulent species of agave and yucca are present, as well as prickly pear, cholla, and other cactus species. Numerous species of grasses, shrubs, and forbs are common. Shinnery oak is present in certain environments in southeastern New Mexico. Pine, juniper, oak, and fir trees dominate the higher elevations of the Sacramento, Guadalupe, and Capitan Mountains (Whitehead and Flynn 2017).

The fauna of the region is also typical of the northern Chihuahuan Desert. Species diversity is greatest in the higher-elevation mountain regions, where forage and vegetation cover are greater. Antelope, deer, elk, mountain sheep, and peccary are present in the highlands. The fauna in the lowland basins consists predominantly of birds, rabbits, rodents, reptiles, and small predators. A few large game animals, such as pronghorn antelope, occasionally pass through the lowland basins and grasslands of Otero Mesa. Archaeological investigations have established that bison were once abundant on the plains of southeastern New Mexico. However, rabbits and small game species were much more important food sources for the past inhabitants of the Jornada region and southeastern New Mexico (Choate 1997; Railey 2016).

Stone resources are available as chert nodules in limestone outcrops distributed across the region, most notably around the Sacramento Mountains. Rhyolite is present in the uplands adjacent to the Tularosa Basin. Chert, rhyolite, quartzite, and obsidian can all be found in surface gravels within the basin and in secondary gravels along the Rio Grande, and chert and quartzite are represented in gravels along the Pecos River (Church 2000; Church et al. 1996; Dolan et al. 2017; Kremkau et al. 2013; Shackley 2021).

Eastern New Mexico

Eastern New Mexico is part of the Great Plains physiographic province. The Raton Section, with the Las Vegas and Park Plateaus, composes the northern quarter; the Southern High Plains dominates the eastern half, and the Llano Estacado rises above the Pecos Valley Section to the west. The Pecos River drains the western area of the region, and the Portales Valley is a prominent incision in the Llano Estacado.

Volcanism characterizes the Raton Section. The volcanic rocks, which form peaks, mesas, and cones, have protected the older sedimentary rocks from the erosion that has cut deeply into the adjoining Pecos Valley to the south. The Pecos River forms a broad valley that extends from the Sangre de Cristo Mountains to the Rio Grande. The Ogallala Formation is the caprock at the top of the Mescalero escarpment, which is the eastern boundary of the Pecos Valley. The western boundary of the Pecos Valley consists of the eastern bases of discontinuous mountain ranges, including the Guadalupe and Sacramento Mountains to the south and the Sangre De Cristo Mountains to the north.

The Llano Estacado is the part of the High Plains south of the Canadian River in eastern New Mexico. It consists of an enormous mesa that covers more than 89,000 km^2 (34,363.1 square miles). The top of the mesa is extremely flat and ranges in elevation from 1,554 m (5,098.4 feet) in northeastern New Mexico to 854 m (2,801.8 feet) in the southeastern area of the state. The Llano Estacado is a coalescent alluvial plain composed of Tertiary and Pleistocene deposits carried eastward from the Rocky Mountains by west–east-trending streams. Its isolation results from downcutting by the Canadian River and headward erosion of the Pecos River. Distinct physical boundaries mark three sides: the rugged valley of the Canadian River on the north and the prominent Caprock and Mescalero escarpments on the east and west, respectively. To the south, the llano merges imperceptibly with the Edwards Plateau. The surface of the llano is covered with widespread aeolian deposits, including sand sheets and dunes, which are found in many areas. Among the llano's topographic features are numerous playa basins and a few shallow draws that drain southeastward and form the headwaters of the Red River, Rio Brazos, and Rio Colorado.

The primary habitats on the llano are grasslands, including those dominated by blue grama and buffalo grass and those associated with honey mesquite; mesquite grasslands dominate most of the southern third of the llano in New Mexico. Sand sage and shinnery oak associations are present in extensive sandhill areas, although shinnery oak is absent from the northern part of the llano. The sandhills are typically vegetated with tall-grass-prairie species such as big bluestem, little bluestem, Indian grass, switch grass, and other grasses. Woodlands dominated by junipers are present along the northern escarpment and higher-elevation portions of the western escarpment, and pinyon pine is present on the northern escarpment (Brown 1982; Dick-Peddie 1993; Whitehead and Flynn 2017). Various game species are present in the region, including bison, antelope, deer, elk, mountain sheep, and peccary (Choate 1997). Stone resources in this open environment are available as chert nodules, in limestone outcrops; chert; and quartzite, in secondary gravel deposits along the Pecos River or on the ground surface of the Llano Estacado and often associated with the Ogallala Formation (Kremkau et al. 2013; Vierra et al. 2013).

Point Technology

Over the millennia, an array of technological innovations have been developed by both foragers and farmers who were coping with changes in the natural and cultural environment. Stone-tool design is often characterized as a dichotomy between core reduction and bifacial-tool production. That is, expedient flake tools are generally associated with settled village communities, whereas emphasis on the production of curated bifacial tools is generally associated with hunter-gatherers. Stone-tool technologies include a mix of both core reduction and bifacial-tool production as a means of coping with the uncertainties of food procurement and processing. Conceptions of subsistence, competition, mobility, site function, prey size, labor organization, tool use life, and raw-material availability all played roles in the development of stone-tool and projectile point designs (Andrefsky 2008; Arakawa 2013; Arakawa et al. 2013; Bamforth 1986; Binford 1977, 1979; Brantingham 2003; Buchanon et al. 2011; Eerkens et al. 2007; Ellis 1997; Nelson 1996; Parry and Kelly 1986; Reed and Geib 2013; Schriever et al. 2011; Surovell 2009:220–221; Vierra 2020).

Consistency in lithic-analysis studies has always been a challenge. Research designs require the monitoring of varying attributes, and analysts often have their own perspectives as to what and how to monitor (e.g., attribute-based vs. technological methods; Railey 2010; Vierra et al. 2020). Nonetheless, there have been attempts at standardization (Farmington Resource Area Cultural Advisory Group 1991; Railey 2010). Here, we suggest some standard terminology for nonmetric attributes and a possible method of arbitrarily distinguishing stone dart points from arrow points. In addition, tool use life could also play an important role in the design and function of projectile points, including the nature of tool blanks and subsequent resharpening events, which could have affected the degrees of variability exhibited among the various point types.

Point Terminology

A projectile point is a specialized form of biface designed to be hafted to a dart or an arrow. Obviously, numerous point designs were used for over 13,000 years in hunting a variety of game species. The result has been a plethora of proposed point types based on an array of attributes. Multiple studies have discussed the characteristics of specific point types with respect to design, technology, and function, and these studies comprise a subset of lithic-artifact analysis. Typologies and defining attributes have been presented by various researchers, including Amick (1995), Andrefsky (2005), Bousman and others (2004), Callahan (1979), Chapin (2017), Crabtree (1972), Fogle-Hatch (2015), Inizan and others (1999), Kerr (2000), Keyes (2024), Knecht (1997), Loendorf and Rice (2004), Loendorf and others (2017), McDonough and others (2024), O'Brien (2017), Rondeau (2023), Sliva (1997, 2015), Turner and others (2011), Vierra and Heilen (2020), Whittaker (1994), and Woodbury (1954). Figure 5 illustrates standard terminology used

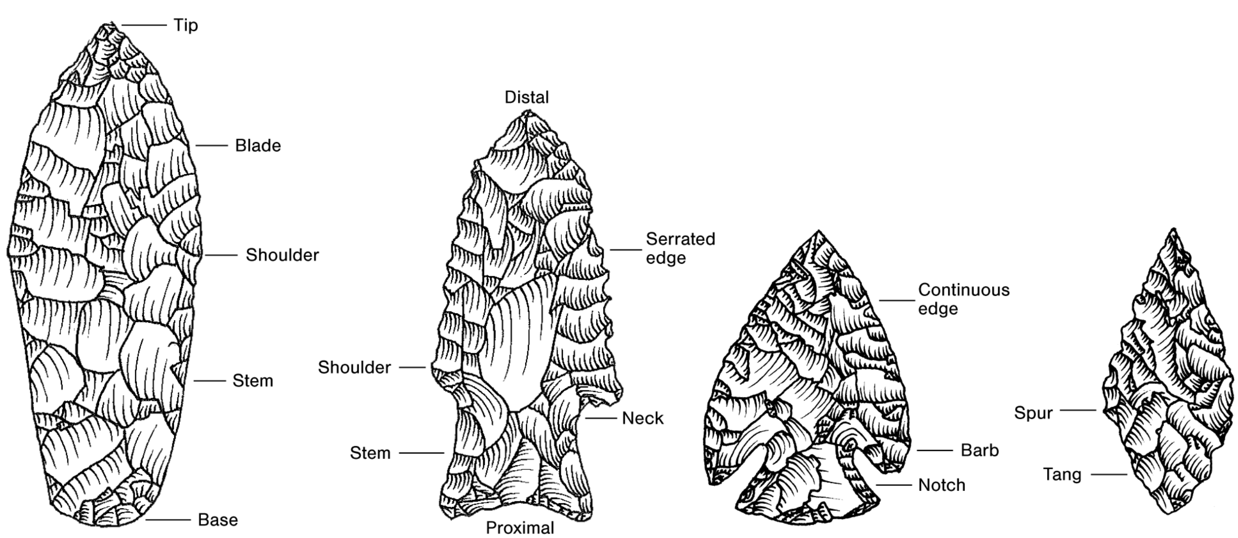

Figure 5. Standard terminology for projectile point morphology.

in describing projectile point morphology. Much of it is familiar to lithic analysts in discriminating the blade from the stem of a point and describing the presence of barbs and notches and the configuration of the stem and base. Projectile points come in many different sizes and shapes, from lanceolate to stemmed to notched designs. Consistency in terminology is important when comparing multiple studies. Though not described here, metric attributes should also be clearly defined and illustrated, for consistency (see Chapin 2017:85; Sliva 2015:10).

Darts vs. Arrows

The current southwestern evidence indicates a potential north–south pattern in the timing of the transition to the bow and arrow, which possibly occurred earlier in the north and later in the south. For example, based on point types, the bow and arrow appeared as early as A.D. 200–400 on the Colorado Plateau, later (ca. A.D. 450–600) in the Chuska and NRG valleys, between A.D. 500 and 600 in the Mogollon Highlands, and within a potential range of A.D. 500–900 in the lower Rio Grande (LRG) valley of New Mexico (Geib 2011:281–284; Geib and Bungart 1989; Geib and Spurr 2002; Kearns et al. 2000; Kelley 1984:114; Miller and Kenmotsu 2004; Morris 1980:50, 124; Post 2002:43; Reed and Geib 2013; Reed and Kainer 1978; Reed and Wilcox 2000; Roth et al. 2011; Torres 1999; VanPool 2003, 2006; Vierra 1998, 2011; Walth 1999). This follows arguments by Geib (2011; Geib and Spurr 2002), Roth and others (2011), and VanPool (2006) that the spear and atlatl continued to be used for an extended period in conjunction with the bow and arrow. As pointed out by VanPool (2006) and Tomka (2013), the spear and atlatl may have been more effective for hunting large game in open settings than the bow and arrow, using traditional hunting methods.

Miller and Graves's (2019) review of radiocarbon dates and projectile points in the southern Tularosa Basin identified an overlap of dart (Basal-Notched) and arrow (Scallorn) points of about 400 years during the Early Formative period (see also Miller 2018). In fact, they suggested that the earliest dates for Scallorn points are ca. A.D. 200–500, which increases the overlap of the use of darts and the use of arrows. Although it seems likely that at least some of that overlap is attributable to disturbed contexts, misidentification, or scavenging, several other researchers have also suggested that the two technologies may have overlapped in time (Condon et al. 2008:347; Komulanineu-Dillenburg and Perez 2013:266–267; Upham et al. 1986; Whalen 1994:109). It has been suggested that the bow and arrow were initially used in southern Arizona during the first centuries B.C. (Sliva 1999, 2019). If so, then it may be possible that the bow and arrow later followed the same route as that of early maize into Arizona: northward out of Mexico, not southward out of the Great Basin.

Discriminating dart points from arrow points has been a challenge for archaeologists. Whittaker (2012) was correct in stating that given the potential overlap in the sizes of dart and arrow points, metric analyses would presumably have limitations for discriminating between these two types of artifacts. More recently, Schroedl (2024) noted overlap in the shaft diameters of arrows and darts. Nonetheless, a variety of studies have discussed this important issue, using metrics-based approaches that include neck width (Corliss 1972) and neck width and thickness (Hildebrandt and King 2012). Neck width is often available from both whole and proximal point fragments, and using it in a metrics-based approach seems appropriate, given that it is a direct measure of the width of the foreshaft of a dart or arrow (the portion of the shaft to which the point was attached) and was not affected by blade resharpening.

Fields's (2013) ethnographic study of 542 dart and arrow shafts from Correo, Isleta Cave, Feather Cave, and the Upper Gila River sites provides some insight into this issue. That study involved measuring notch width where a point was hafted. His research indicates that arrow shafts have a notch-width range of 3.1–6.8 mm, darts have a range of 11.0–16.0 mm, and the two overlap between 6.8 and 11.0 mm. A neck width of about 9 mm (ranging from 8 to 10 mm), which falls within the overlap range identified by Fields, is often used to distinguish between archaeological darts (neck widths of greater than 9 mm) and arrows (neck widths of less than 9 mm; Brown 1993:386–387; Corliss 1972; Lekson 1977:662; Lorentzen 1993; Roth et al. 2011; Vierra 2013b). An analysis of Carmichael's (1986) data from the LRG valley illustrates the overlap. The Paleoindian and Early Archaic period points have mean neck widths of 17.1 and 17.2 mm, respectively; the Middle and Late Archaic period points have mean neck widths of 14.2 and 13.2 mm, respectively; and the Formative period points have a mean neck width of 7.7 mm. As Figure 6 illustrates, the LRG valley sample is normally distributed and has a mean neck width of 11.7 mm and a mode of 12.0 mm, although there is a break between 12.0 and 13.0 mm (n = 335). For comparison, the neck widths of a sample of 1,169 Archaic period dart points and Formative period arrow points from the NRG region are shown in Figure 7. The data from the sample exhibit a slightly bimodal distribution with a mean of 11.5 mm and modes of 7.0 and 13.0 mm.

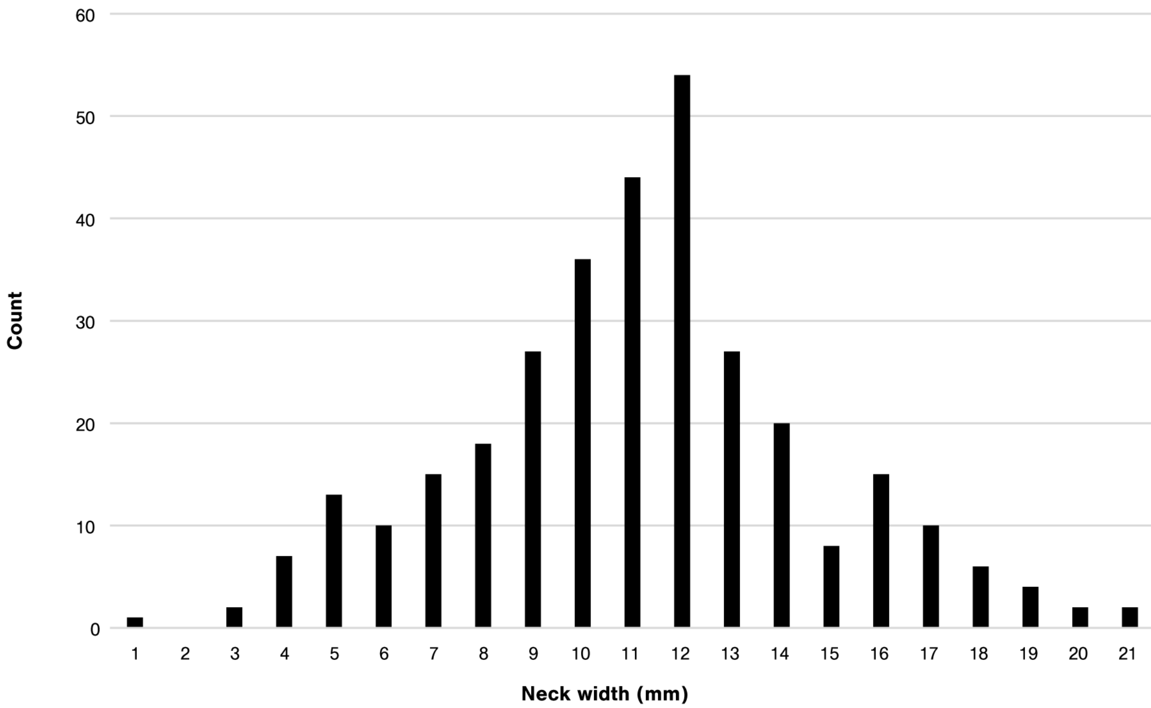

Figure 6. Distribution of neck widths for projectile points in the lower Rio Grande valley.

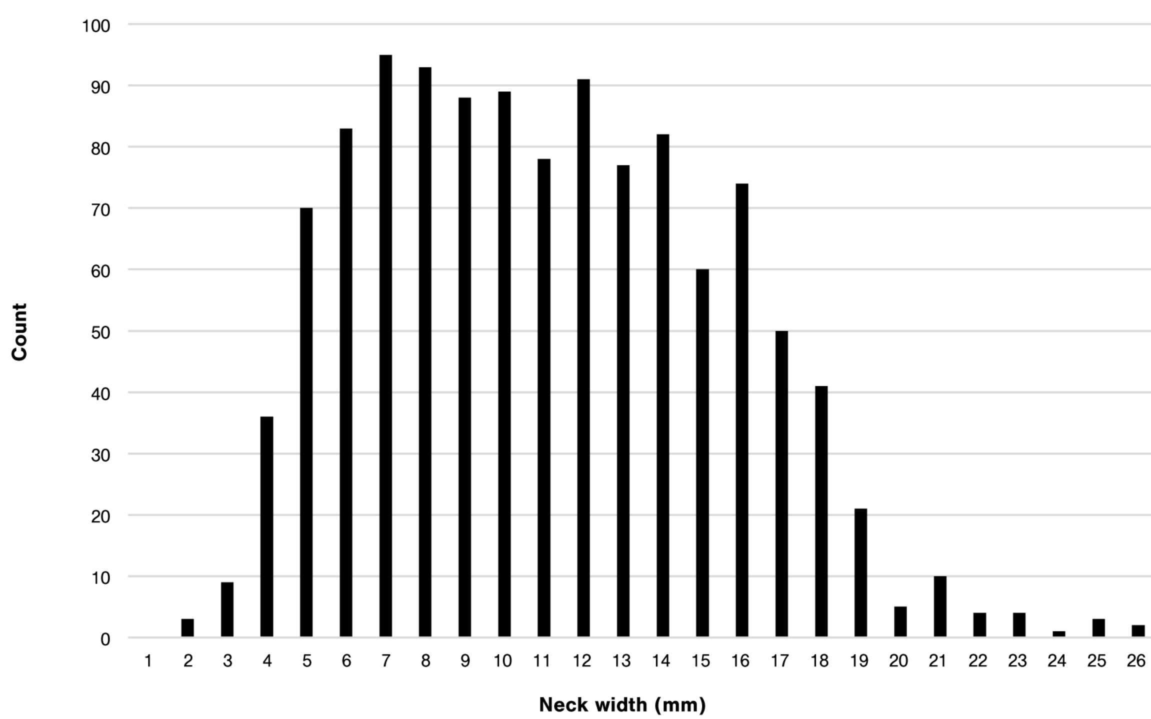

Figure 7. Distribution of neck widths for projectile points in the northern Rio Grande valley.

Projectile Point Morphology: Reworking and Blank Forms

The use of a few generalized point types and low tool-replacement rates due to resharpening during the Early and Middle Archaic period were replaced with a diversity of point types, high tool-replacement rates, and little blade resharpening to extend tool use life during the Late Archaic and Formative periods. Biface blanks allowed for a greater degree of resharpening, which was advantageous to those with residential mobility, whereas flake blanks could reduce tool-production costs and allow for a greater variety of smaller raw materials to be used, which would have been important to those with restricted mobility (Vierra 2013a).

The process of reworking stone tools has been discussed in relation to the potential effects on tool typology (Dibble 1995; Flenniken and Raymond 1986). Reworking has also been linked to the concept of curation and the extension of tool use life through resharpening or rebasing (Andrefsky 2008; Horowitz and McCall 2013; Odell 1996; Shott 1986) and recycling through later reuse of discarded tools (Harper and Andrefsky 2008). The effects of reworking could have included a decrease in the length of a tool as well as variations in blade thickness and edge angle. Flake-removal size also could have been affected, depending on the use of flat, invasive or steep, abrupt (beveled) retouch (Buchanon et al. 2015; Sollberger 1971). Resharpening and rebasing worked well with points that had long blades and stems. For example, small base fragments of Cody points are often recorded. One study suggested that the remainder of a point was retrieved from the prey carcass and rebased for continued use (Vierra et al. 2012). Figure 8 illustrates the life history of a Bajada point from biface blank to preform, to point, to reworked point, the last of which reflects the rebasing of a point whereby the stem was extended into the blade, creating a distinctive shoulder and a short stem. Figure 9 compares a Jay point to a point that has been heavily resharpened and rebased and compares a Sudden Side-Notched point to a point so heavily resharpened that the blade is shorter than the stem.

In addition to tool reworking, the nature of the blank used for artifact production could also affect tool use life and classification (Kuhn 1992). For example, it has been suggested that Jay, Bajada, and San Jose points often tended to be made on biface blanks that reflected increased numbers of resharpening events. Figure 8 provides examples of biface blanks from the La Bajada site that are very large flakes of dacite. By contrast, Late Archaic period points tended to be made on flake blanks with fewer instances of resharpening (Vierra 2013a; Vierra et al. 2012).

Biface blanks can be distinguished from flake blanks based on several criteria: thickness, edge angle, cross section (biconvex vs. plano-convex), and the presence of a ventral flake surface. That is, points made on biface blanks tend to be thicker, have greater edge angles and biconvex cross sections, and lack ventral flake scars. Tables 1–3 provide this information for a sample of NRG-region dart and arrow points and include metric data from Vierra (2013a) and Vierra and others (2012) in addition to metric and nonmetric data collected for this analysis. The dart points are segregated into Bajada, San Jose, Sudden, Armijo, and Late Archaic period Stemmed and Corner-Notched types. This information supports the contention that Bajada and San Jose points were usually made on biface blanks, whereas Sudden, Armijo, and Late Archaic period points tended to be made on large flakes. This pattern continued into the Formative period with the selection of small flakes to produce Stemmed, Corner-Notched, and Side-Notched point types.

Besides these attributes, biface-edge angle can also be used to identify tool blanks. Callahan (1979:30–33) noted that edge angles can be reliable indicators in his biface-stage-replication process, in which Stage 2 bifaces have edge angles that measure 55°–75°, Stage 3 bifaces have edge angles that measure 40°–60°, and Stage 4 bifaces have edge angles that measure 25°–45°. Vierra and Dilley's (2008) study of platform angles of biface flakes in Archaic period assemblages on the Pajarito Plateau revealed that the bifacial cores had platform angles ranging from 70° to 85°, the bifacial blanks had platform angles ranging from 55° to 65°, and the darts had edge angles ranging from 40° to 50°. The bifacial cores had been produced from large obsidian cobbles available in the Jemez Mountains. The same tactic appears to have been used at the La Bajada site with dacite derived from an outcrop to the northwest, on the Pajarito Plateau (Vierra et al. 2012).

Projectile Point Morphology: Breakage, Recycling, and Reworking

One of the most vexing issues that impedes consistent classification of projectile points in the Basin and Range region of southern and southeastern New Mexico is that most of the specimens are incomplete (Miller 1996:IV:71–73). A study of breakage patterns

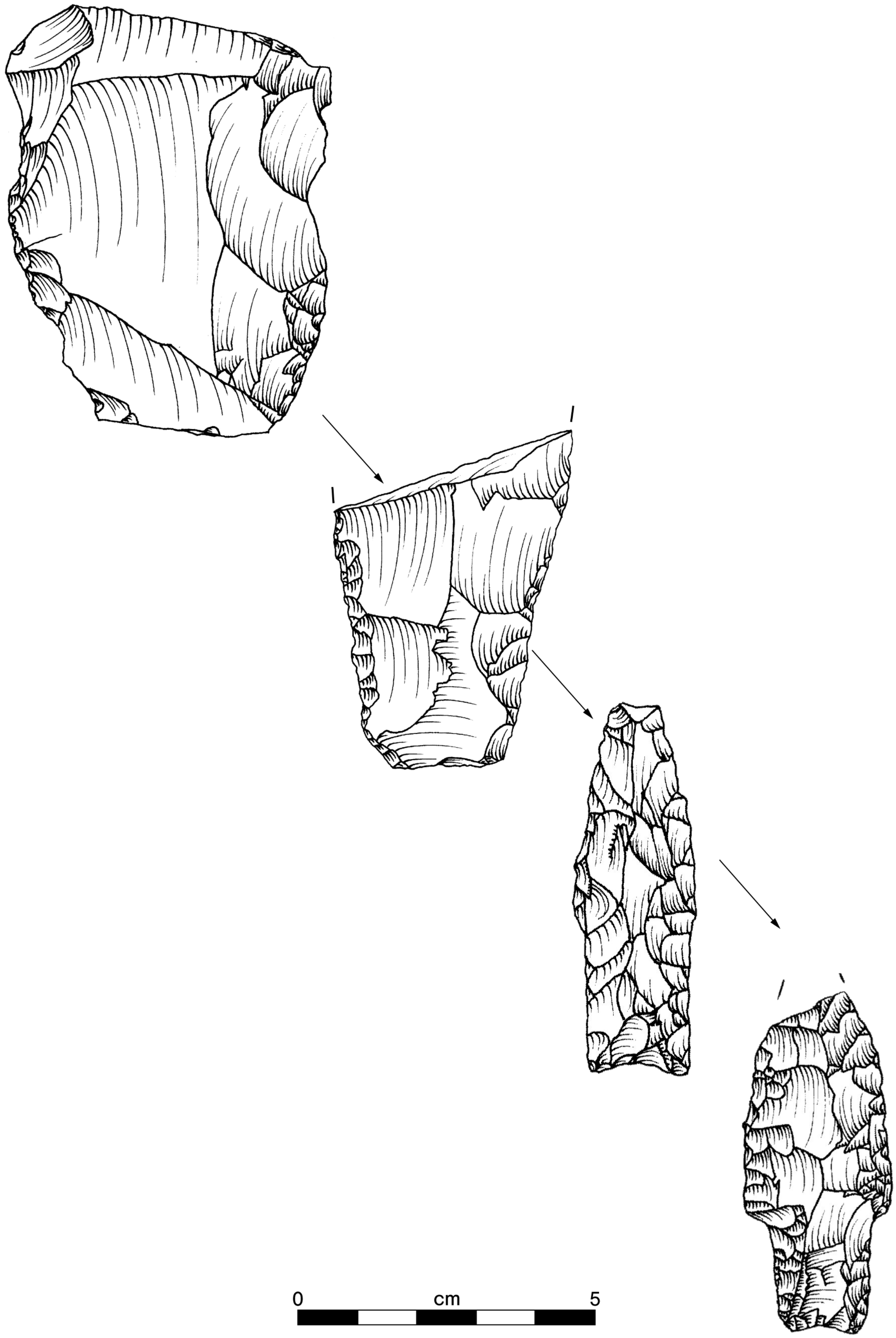

Figure 8. Life history of a Bajada point.

Figure 9. Reworked Jay and Sudden Side-Notched dart points.

Table 1. Attributes of Bajada, San Jose, and Sudden Dart Points from the Northern Rio Grande Region

Attribute	Bajada	San Jose	Sudden
Mean thickness (mm)	8.1 (n = 104)	6.7 (n = 48)	5.1 (n = 72)
Mean edge angle (degrees)	58.6 (n = 104)	55.6 (n = 50)	48.5 (n = 73)
Cross section: biconvex (percentage)	93.0 (n = 41)	65.0 (n = 13)	59.0 (n = 27)
Cross section: planoconvex (percentage)	7.0 (n = 3)	35.0 (n = 7)	41.0 (n = 19)
Ventral flake scar absent (percentage)	100.0 (n = 44)	100.0 (n = 20)	84.0 (n = 41)
Ventral flake scar present (percentage)	—	—	16.0 (n = 8)

Table 2. Attributes of Armijo and Late Archaic Period Stemmed and Corner-Notched Dart Points from the Northern Rio Grande Region

Attribute	Armijo	Late Archaic Period Stemmed	Late Archaic Period Corner-Notched
Mean thickness (mm)	5.0 (n = 39)	5.6 (n = 154)	5.3 (n = 95)
Mean edge angle (degrees)	49.6 (n = 44)	52.6 (n = 171)	48.2 (n = 107)
Cross section: biconvex (percentage)	59.0 (n = 20)	55.0 (n = 50)	41.0 (n = 14)
Cross section: planoconvex (percentage)	32.0 (n = 14)	45.0 (n = 41)	59.0 (n = 20)
Ventral flake scar absent (percentage)	88.0 (n = 30)	76.0 (n = 69)	68.0 (n = 23)
Ventral flake scar present (percentage)	22.0 (n = 4)	24.0 (n = 22)	32.0 (n = 11)

Table 3. Attributes of Stemmed, Corner-Notched, and Side-Notched Arrow Points from the Northern Rio Grande Region

Attribute	Stemmed	Corner-Notched	Side-Notched
Mean thickness (mm)	3.4 (n = 185)	3.5 (n = 97)	3.2 (n = 181)
Mean edge angle (degrees)	38.1 (n = 185)	40.2 (n = 97)	37.4 (n = 181)
Cross section: biconvex (percentage)	22.0 (n = 41)	27.0 (n = 26)	28.0 (n = 49)
Cross section: planoconvex (percentage)	78.0 (n = 142)	73.0 (n = 70)	72.0 (n = 125)
Ventral flake scar absent (percentage)	61.0 (n = 112)	70.0 (n = 67)	66.0 (n = 114)
Ventral flake scar present (percentage)	39.0 (n = 71)	30.0 (n = 29)	34.0 (n = 60)

on a sample of 1,233 relatively intact points collected from the Fort Bliss Military Reservation found that 83 percent had been damaged to some extent, whether a given point was missing only a small portion of the tip or had been damaged to a much greater degree, such as specimens that lacked parts of the blades, small portions of the shoulders or other haft elements, and/or parts of the basal margins. This problem is compounded by the fact that broken points were frequently reworked or retouched. Examination of the 1,233 Fort Bliss points found that 39 percent had been reworked to some extent. The most common locations of reworking were blade margins, basal edges, and shoulders or haft elements. The continual retouching of these locations resulted in the wide degree of variation in projectile point blade and haft morphologies that deviate from those of "classic" forms, as well as blurring of the distinctions between formally defined types. As Miller (2018) pointed out, the characteristics of lithic raw materials in the Jornada region and the high levels of mobility and site reoccupation contributed to the large number of observed incidences of point reworking.

By comparison, Vierra's (2013a) study in the NRG valley indicated long-term shifts in projectile point use life. For example, a study of Archaic period points revealed that 96 percent of Early Archaic, 66 percent of Middle Archaic, and 50 percent of Late Archaic period points exhibited blade resharpening (n = 409). That follows the transition from the use of bifaces to the use of flake blanks, as well as the tool-design transition from points designed for durability to those designed for penetration efficiency. It also raises the question of whether Early and Middle Archaic period points reflect a replacement-when-exhausted tactic, which would represent continuous use and high residential mobility, compared to the replacement-prior-to-failure tactic used during the Late Archaic period to increase hunting-success rates while focusing on particular target species, which is indicative of less residential mobility and greater logistical mobility (Kuhn 1989).

Chapter 3

Projectile Points of New Mexico

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Paleoindian Period Dart Points

Names like Clovis and Folsom, New Mexico, will always be integral parts of research focused on the Paleoindian period. But it was the Blackwater Draw site that yielded an occupational sequence that is critical to understanding the archaeology and paleoecology of the region (Bennett 2014; Cotter 1937, 1938; Haynes 1995; Haynes and Warnica 2012; Holliday 1997; Howard 1935; Meng 2022; Sellards and Evans 1960). Numerous Paleoindian period specialists have continued to conduct their research in New Mexico with respect to Clovis (Boldurian and Cotter 1999; Hamilton et al. 2013; Haynes and Warnica 2012; Holliday 1997, 2000; Holliday et al. 2009; Vierra and Heilen 2020), Folsom (Amick 2002; Amick and Stanford 2016; Holliday et al. 2006; Huckell and Kilby 2002; LeTourneau 2000; Meltzer 2006; Vierra and Heilen 2020), and Late Paleoindian period (Birkman et al. 2023; Blaine et al. 2017; Dello-Russo 2021; Fogle-Hatch 2015; Vierra and Heilen 2020; Vierra et al. 2012) archaeology.

Blackwater Locality No. 1 provided an ideal location on the western edge of the Llano Estacado (Southern Plains) for people to encounter animals. Initially supplied by springs, this location attracted animals with its consistent water source. Through time, the springs slowed, and the site's sediments document the changing environment and the water supply, which continued until much later, into the Archaic period. However, it was during the Paleoindian period that people dug wells to intersect the water table, which was falling as a result of climate change. First with mammoth and later with bison, Blackwater Locality No. 1 has provided direct evidence that people used this location as a kill site for larger mammals drawn to the water source in the Blackwater Draw drainage system for over 10,000 years.

The general stratigraphic sequence at Blackwater Draw is shown in Figure 10. As defined by Sellards and Evans (1960) and Haynes (1995), the sequence is separated into seven units: Units A–G. The chronological sequence, along with the associated dates and occupations, is presented in Table 4, which includes OxCal calibrations for the B.C. dates. The dates range from cal 9340 B.C. for Clovis materials (Unit C) to cal 3590 B.C.–A.D. 1340 for Archaic period materials (Unit G; Haynes 1995).

A discussion of the Paleoindian period projectile point sequence is provided below. The discussion of each point type consists of two parts: the first part is the typological description, and the second is the associated chronological information. This format will also be used for the rest of the sections that discuss projectile point types. In the Paleoindian period section, the dates are provided as radiocarbon years (rcy) before present (B.P.) and calibrated B.C., for comparison. In all the other sections, the dates are presented as calibrated B.C./A.D. Photographs and metric-attribute tables are provided for the points and include, respectively, images of and data for whole artifacts currently curated at the Blackwater Draw Museum at Eastern New Mexico University, Portales.

Clovis

Classification

Archaeologists working at the Clovis type site (Blackwater Locality No. 1, LA 3324, Roosevelt County, New Mexico) documented the Clovis point type as a large, parallel-sided, lanceolate biface (Boldurian and Cotter 1999; Hester 1972; Howard 1990; Sellards 1952). Cotter (1938) first documented this projectile point type in situ with extinct (Pleistocene) mammoth remains at Blackwater Locality No. 1. The classic fluted Clovis point exhibits a lanceolate shape in plan view, a concave basal cavity, straight to slightly excurved lateral margins, and a small number of flute scars on both faces.

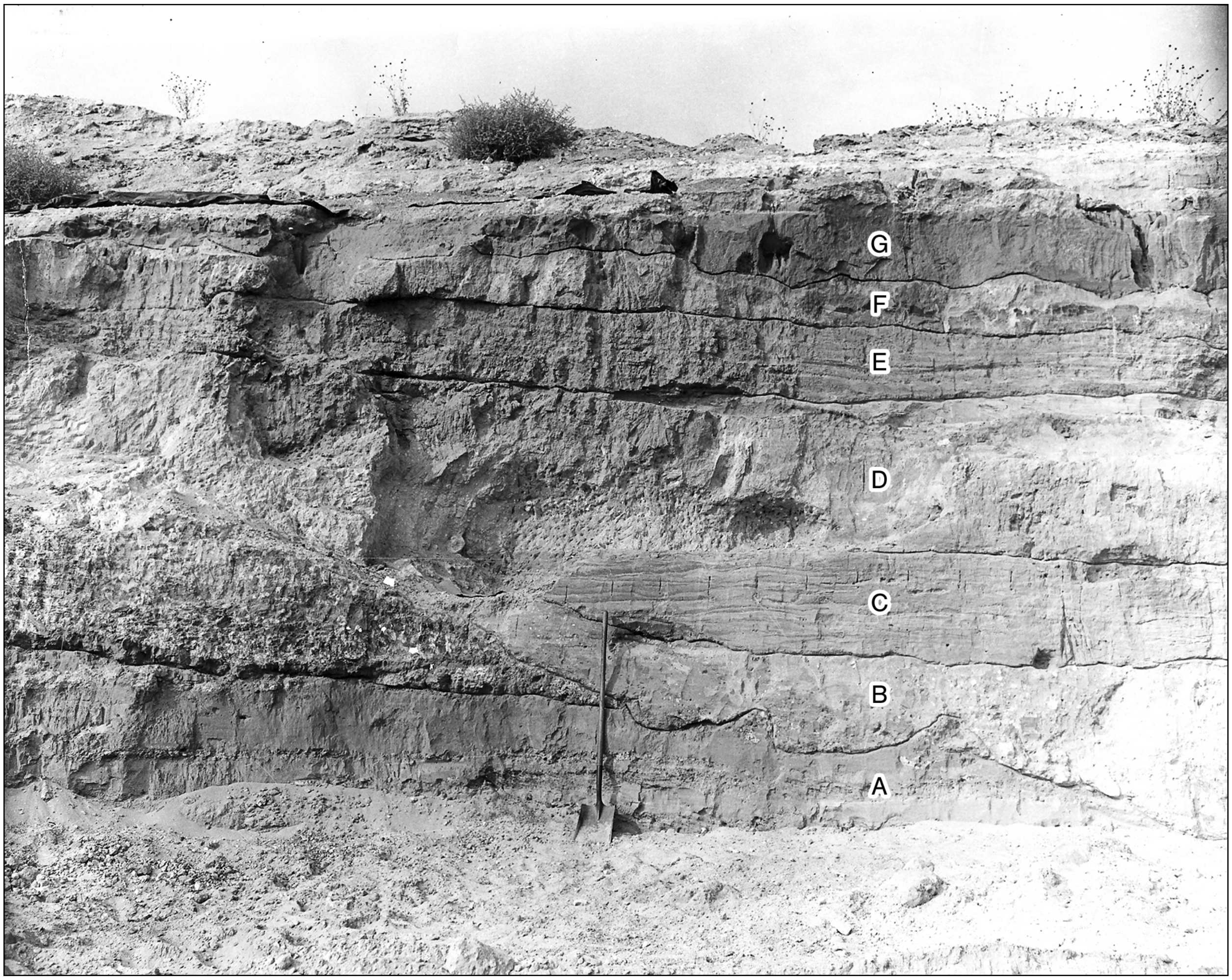


Figure 10. Stratigraphic sequence at Blackwater Draw.

Table 4. Chronological Sequence for Blackwater Draw

Unit	Date Range		Point Type(s)
	Radiocarbon Years before Present	Calibrated Date Range	
G. tan aeolian sand	4855–680	2904 B.C.–A.D. 270	Archaic period
F. dark-brown jointed sand	8500–8000	6550–6050 B.C.	Archaic period
E. carbonaceous silt	10,500–8500	8550–6550 B.C.	Scottsbluff, Milnesand, and Plainview
D. diatomaceous earth	10,900–10,200	8950–8250 B.C.	Agate Basin, Midland, and Folsom
C. brown sand wedge	ca. 11,290	9340 B.C.	Clovis
B. gray sand	12,790–12,330	10,840–10,380 B.C.	Rancholabrean fauna only
A. bedrock gravel	22,930–17,220	20,980–15,270 B.C.	

Note: From Sellards and Evans (1960) and Haynes (1995).

The basal flute flakes were removed by percussion flaking, and the flutes can be irregular in placement and size, leading to basal thinning without a distinct and long channel-flake scar (Figure 11). Many researchers (including Bradley et al. [2010], Haynes and Huckell [2007], Howard [1990], Slade and Meltzer [2021], Smallwood et al. [2022], and Smith [2023], among the latest) have provided general morphological descriptions of this type of point.

The Clovis point may be the most geographically extensive Paleoindian period point in the United States/North America (see Collins 1999; Haynes 1964). Its extensive geographical range does include morphological variations within the type. Howard's (1990) history of the point's descriptions begins with Wormington's (1957:263) description and includes Hester's (1972:97) description from his Blackwater Locality No. 1 monograph:

> Attributes of this type include leaf shaped blade, concave base, short flutes from the base on both faces, grinding on the base, ground edges near base, basal thinning, slightly contracting stem and bifacially worked utilizing both flaking and chipping. The points are typically thick and heavy with a lenticular cross-section. Size range: length 2.0 to 6.0 inches [5.1–15.2 cm]; width 1.0 to 2.0 inches [2.5–5.1 cm]; and thickness 0.2 to 0.4 inches [0.5–1.0 cm]. The flutes range in length from one-third to two-thirds the length of the point.

The treatment of the basal portion of the point sets it apart. The basal concavity is shallow across the point's base, producing almost-square or slightly rounded corners (Howard 1990:258).

Clovis point variation has been a fruitful research focus for several years. Howard (1990:259) provided some national trends. Clovis points range in length between 75.0 and 110.0 mm, in width from 25.0 to 50.0 mm, and in maximum thickness from 5.0 to 10.0 mm. Fluting is usually found on both faces of a point, and the flutes exhibit evidence of the removal of multiple flakes. Howard (1990:259) also noted that "flaking [is] frequently irregular in both size and orientation, often including large facet remnants of an early-stage reduction process."

Wernick (2015) indicated that Clovis points started with large, bifacially flaked cores that were subsequently reduced to large flakes that were then reworked into bifaces using an alternating opposed bifacial-thinning technique described by Bradley (1982) as the removal of large thinning flakes from the same face of a point by alternating the margins from which the flakes were detached. This flaking technique often resulted in intentionally overshot (i.e., *outrepassé*) flakes, which are argued to be diagnostic features of Clovis point production (Collins 1999; Eren et al. 2013). Further production employed opposed diving biface thinning, in which the flakes terminated along the midline of the long axis of a point (Bradley 1982; Wernick 2015). After reduction to a thin biface, the projectile point underwent final edge modification, fluting, and basal grinding.

The Blackwater Locality No. 1 collection contains Clovis points in a wide range of sizes; persistent reuse and edge rejuvenation appear to have reduced the overall point size (Table 5). Many of these points were made of nonlocal materials. For example, Hester (1972:192–200) noted four Clovis points made of Edwards chert, three made of Alibates dolomite, and one made of basalt. Also, Boldurian and Cotter (1999:56) recorded 10 Clovis points made of Edwards and Alibates chert. Lastly, most of the points included in Table 5 are made of Edwards (n = 8) or Alibates (n = 6) chert; points made of quartzite (n = 2), chalcedony (n = 2), Tecovas chert (n = 1), and chert (n = 1) are also included. Edwards, Alibates, and Tecovas chert sources are in Texas. The conservation of higher-quality lithic materials for these points indicates that the points were maintained until their eventual small size became problematic enough to warrant their discard.

Chronology

Clovis is dated to ca. 11,600–11,000 rcy B.P. (9650–9050 B.C.) on the Southern Plains (Huckell 2014). It is associated with Unit C at Blackwater Draw, which dates to ca. 9340 B.C. (Haynes 1995). Holliday and others (2009) dated the Clovis occupation at the Mockingbird Gap site to about 11,400–11,000 rcy B.P. (9450–9050 B.C.). Taking a larger geographic view, Waters and others (2020) recently reported 32 radiocarbon-date averages from Clovis sites that range from 13,050/12,750 to 11,100–10,800 B.C.

Folsom

Classification

Archaeological sites with Folsom points are mostly found in and near the Great Plains, but their distribution extends into the Rio Grande valley, western New Mexico, and northern Chihuahua, Mexico (Amick 1994; Judge 1973; LeTourneau 2000:138–139; Vierra and Heilen 2020). Folsom points are quite distinctive. They are lanceolate bifaces with concave bases. The bases are heavily ground, and the ground edges continue upward from the bases (for hafting). Bifacial reduction by percussion and pressure flaking generally thinned and shaped a preform in preparation for fluting.

Figure 11. Clovis dart points.

Table 5. Metric Attributes of Clovis, Folsom, and Midland Points

Attribute	Clovis			Folsom			Midland		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	60.6	26.7–130.3	20	35.2	28.6–48.7	9	37.8	30.4–46.3	7
Blade length	35.2	11.6–88.9	20	14.5	11.8–19.3	9	16.0	6.9–36.6	7
Shoulder width	24.8	15.7–36.4	20	18.3	14.6–21.8	9	19.8	16.2–21.7	7
Stem length	25.5	15.1–48.6	20	20.7	15.9–29.4	9	21.7	9.7–27.8	7
Basal depth	3.1	0.5–6.5	19	3.1	0–5.1	9	3.1	2.9–4.4	6
Thickness	6.8	4.1–9.7	20	3.8	2.5–4.5	9	3.6	3.3–4.4	7

The proximal portions of the blade edges are straight but can extend outward to give an ear-like appearance to the bottom corners. The point is bifacially fluted, and the channel-flake scar extends almost the entire length of the biface. The bifacial fluting resulted in a very thin biface with a clearly biconcave cross section. Folsom points were finished with very fine pressure flaking along the lateral edges. They can be distinguished by their very thin cross sections and intricate final pressure flaking (Figure 12). Hester (1972:190–196) noted that most of the Folsom points at Blackwater Draw appeared to be made of Edwards chert, and some made of undetermined chert and Alibates dolomite were also noted. The majority of the points included in Table 5 are made of Edwards chert (n = 8); one is made of Alibates chert.

In general, Folsom points average about 46.0 mm in length and have a maximum blade (shoulder) width of 22.0 mm. Basal widths average 18.0 mm, and thicknesses range from 4.0 to 7.0 mm. The Blackwater Draw sample has a mean length of 35.2 mm, and the mean length of the LRG-region sample (n = 7) is 32.6 mm. These examples are in the smaller size range (see Table 5). Amick (2002:186) described smaller-sized Folsom points present in the Tularosa Basin. Their smaller size was not due to resharpening, and he referred to them as Desert style. These Folsom points were typically made on local cherts.

Chronology

Folsom is dated to 10,900–10,100 rcy B.P. (8950–8150 B.C.) on the Southern Plains (Huckell 2014). Folsom at the Backwater Draw site is associated with Unit D and a date range of 8950–8250 B.C. (Haynes 1995). Meltzer (2006:299) stated that the mean age of the radiocarbon dates from the Folsom site was ca. 8500 B.C. The mean age from the Boca Negra Folsom site, near Albuquerque, was 8550 B.C. (Holliday et al. 2006).

Midland

Classification

The observation of a unique projectile point by Wendorf (1955; Wendorf and Krieger 1959) led to the recognition of a Paleoindian-aged type named "Midland." Midland points are thin, small to medium-sized, lanceolate points that exhibit flattened cross sections. The maximum lengths of points of this type in the Blackwater Draw sample range from 30.4 to 46.3 mm. The blade of the Midland point is excurvate in shape and widest in its top third. Bases can exhibit concave edges, or they can be straight. Whereas the lateral edges are ground to the widest part of the blade, the basal concavity is often unground or only lightly so. The overall flaking pattern on the blade ranges from horizontal to parallel oblique. The overall shape of the Midland point is similar to that of the Folsom point, but the Midland point is not fluted (Figure 13; see Table 5). The Midland points included in Table 5 are all made of Edwards chert. Most of the points from the Winkler-1 site were also made of Edwards chert (Blaine et al. 2017)

Chronology

Midland is dated to about 10,900–10.1007 rcy B.P. (8950–8150 B.C.) on the Southern Plains (Huckell 2014). Recently, Blaine and others (2017:20) reported Midland dates from the Winkler-1 site in southeastern New Mexico, which contained 48 points. Winkler-1 is a pure Midland site and yielded 7 radiocarbon dates on bison bone encompassing dates between 10,268–9628 and 9118–8636 B.C.

Figure 12. Folsom dart points.

Figure 13. Midland dart points.

Plainview

Classification

The Plainview point was defined by Sellards and others (1947) as part of the artifact assemblage recorded during their investigations at the Plainview archaeological site, along Running Water Draw at Plainview, Texas. This medium-sized unshouldered Paleoindian period lanceolate point generally exhibits a somewhat-flat to medial-ridged cross section. In general, the Plainview point can be long (45.0–95.0 mm) and has a blade (shoulder) width that ranges from 18.0 to 28.0 mm. The base can be wide (20.0–26.0 mm). A sample of seven Plainview points from the LRG valley exhibited a relatively shorter mean length of 39.7 mm and a mean blade (shoulder) width of 21.8 mm (Vierra and Heilen 2020). Base shapes of Plainview points range from straight to slightly convex, and the basal edges are ground upward through the hafting area. The basal area of the point was thinned by flaking on both faces (is not fluted). Pressure flaking on the face created a transverse parallel to collateral flaking pattern overall (Figure 14; Table 6).

For many reasons, the Plainview point was typologically defined to include a variety of morphologically similar unfluted, lanceolate points on the Great Plains. This has led to typological overlaps, uncertainty, and concern regarding consistency (Holliday 2000). Unraveling the morphological characteristics to more clearly define the Plainview point type has been an ongoing discussion for some time. Kerr's (2000; Bousman et al. 2004) study clearly defined the Plainview point and demonstrated its distinctiveness from Golondrina and Barber points and the validity of St. Mary's Hall points. However, reanalysis of the Plainview archaeological assemblage by Holliday and others (2017) suggested that many questions remain unresolved regarding the typology, technology, and morphology of the post-Folsom Paleoindian period record on the Great Plains. The Plainview points at the Williamson-Plainview site, in southeastern New Mexico, were made of Edwards chert, an undetermined chert, Alibates dolomite, and quartzite (Holliday et al. 2017). The single Plainview point included in Table 6 is made of Edwards chert.

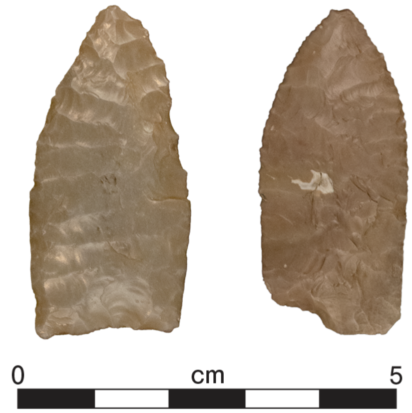


Figure 14. Plainview (*left*) and Milnesand (*right*) dart points.

Chronology

Plainview is dated to ca. 10,000 ± 200 rcy B.P. (8250 B.C.) on the Southern Plains (Huckell 2014). Holliday and others (2017) suggested that the best estimate for the Plainview type on the Southern High Plains and western Edwards Plateau is ca. 10,150–9350 B.C.

Table 6. Metric Attributes of Plainview, Agate Basin, and Milnesand Dart Points

Attribute	Plainview		Milnesand		Agate Basin		
	Metrics (mm)	No.	Metrics (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	42.7	1	42.5	1	67.8	39.1–88.7	7
Blade length	22.5	1	25.3	1	32.5	15.9–47.4	7
Shoulder width	20.9	1	19.8	1	21.5	18.0–28.5	7
Stem length	20.2	1	17.2	1	35.2	23.2–49.7	7
Basal depth	2.7	1	—	1	—	—	7
Thickness	5.3	1	25.3	1	7.0	5.6–8.8	7

Milnesand

Classification

In general, the Milnesand Paleoindian period point is a relatively thick, medium-sized (50.0–70.0-mm-long) unfluted, lanceolate point. Comparatively, the point from Blackwater Draw is in the smaller range. The cross section of a Milnesand point may range from lenticular (biconvex) to having a medial ridge. The blade is excurvate toward the tip and has parallel sides. The base is primarily straight to slightly convex. Milnesand points exhibit basal thinning and tapering that left the bases thinner than the tips. The point's lateral edges are heavily ground and extend from the base to halfway up the blade. Both faces of a point were finely worked with pressure flaking that formed a horizontal or parallel transverse flaking pattern on each (see Figure 14; Table 6).

Sellards (1955:343–344) and, later, Warnica and Williamson (1968) were the first to describe Milnesand points and to compare them to Plainview points. Holliday and others (2017) also described differences between the two. The Plainview point has a distinct basal concavity and was basally thinned by removal of one to six larger flakes. In contrast, the Milnesand point presents a generally straight base that was thinned by removal of five to nine smaller flakes. Also, the Milnesand point has a somewhat constricted stem, and the Plainview point generally has parallel sides. Others (e.g., Buchanon et al. 2007) consider Milnesand points to be more similar to Plainview points—that is, they consider the Milnesand point to be a variant of the Plainview type, rather than a separate type. Four Milnesand points from Blackwater Draw were classified as made of Edwards chert (Fogle-Hatch 2015:265–266). The Milnesand points from the Williamson-Plainview site were made of an undetermined chert, Edwards chert, quartzite, and Alibates dolomite (Holliday et al. 2017). The single Milnesand point included in Table 6 is made of Edwards chert.

Chronology

Evidence is strong that Milnesand points are contemporary with Plainview points. The Williamson-Plainview site is in southeastern New Mexico, near the Milnesand site. Collections from the site have included 82 Plainview and 42 Milnesand points. A new radiocarbon date of 10,115 B.C. is consistent with the age range for Plainview as previously noted by Holliday and others (2017). However, Milnesand was found in Unit E at Blackwater Draw, and Plainview points date to much later, ca. 8550–6550 B.C.—a range that is similar to the 8250 B.C. date provided by Huckell (2014).

Agate Basin

Classification

The Agate Basin point is a long and comparatively slender (narrow) Paleoindian period lanceolate point. There are technological similarities between Folsom and Agate Basin points (Frison 1991; Shelley and Agogino 1983). The Agate Basin point is characterized by an elliptical cross section, a transverse parallel flaking pattern, an unnotched blade, and a constricted stem. It is typically medium sized to large, ranging from 60.0 to 125.0 mm long, and has a width-to-thickness ratio of 2:1–3:1. The points in the sample from Blackwater Draw tend to be shorter, ranging from 39.1 to 88.7 mm (Figure 15; see Table 6). The transverse parallel flaking pattern resulted in flakes that terminated at the midlines of the blades. Frison and Stanford (1982) reinvestigated the Agate Basin site, and Wheeler (1954) provided the type description for the Agate Basin point. Boldurian and Cotter (1999:83) described an Agate Basin point from Blackwater Draw made of Edwards chert. The Agate Basin points included in Table 6 are made of Edwards, Alibates, and Tecovas chert; quartzite; and chert.

Chronology

Agate Basin dates to about 10,500–10,000 rcy B.P. (8550–8050 B.C.) on the Southern Plains (Huckell 2014). Unit D at Blackwater Draw dates to ca. 8950–8250 B.C. (Haynes 1995). The dates for this point type overlap with those for the Folsom and Plainview types. This type was found with Folsom points in Unit D at Blackwater Draw (Holliday 2000:257).

Scottsbluff

Classification

Originally found and reported by Barbour and Schultz (1932) and Schultz (1932), the Scottsbluff point is one of various square-based, slightly stemmed, lanceolate points associated in time and technology with the Cody Complex (Jepsen 1951; see also Wormington 1957) on the Great Plains. The Scottsbluff point is unfluted and has a face that exhibits horizontal parallel flaking that did not form a medial ridge (see Figure 15). Fogle-Hatch (2015:299) stated that there is

Figure 15. Agate Basin (*top*) and Scottsbluff (*middle*) points from Blackwater Draw and Eden points (*bottom*) from the Water Canyon site (with permission from Robert Dello-Russo).

little "qualitative or quantitative" difference between Firstview and Cody points and that, rather, both represent highly mobile bison hunters.

These are well-made, medium-sized to long, lanceolate spear points. The blade edges are usually parallel and have small but angular shoulders. The stems are typically straight but may expand slightly, and some have basal protrusions ("ears"). The haft-stem edges are usually ground. The study by Fogle-Hatch (2015:265–266) indicated that Scottsbluff points exhibit both lenticular (biconvex) and diamond-shaped cross sections. The Blackwater Draw Scottsbluff points are made of chert, and Boldurian and Cotter (1999:86) noted one made of Alibates chert. The Scottsbluff point included in Table 7 is also made of Alibates chert. The total lengths of points of this type from Blackwater Draw range from 43.7 to 70.8 mm.

Chronology

Scottsbluff points are associated with other artifacts (e.g., Eden points) and are considered parts of the Firstview or Cody Complex. Firstview is dated to ca. 9400–8200 rcy B.P. (7450–6250 B.C.) on the Southern Plains, and Cody is dated to 9400–8800 rcy B.P. (7450–6850 B.C.) on the Northern Plains (Huckell 2014). Holliday (2000:257) provided a date of 8470 rcy B.P. (6639 B.C.) for Scottsbluff at Blackwater Draw, and that date overlaps the date range for Agate Basin.

Other Late Paleoindian Period Dart Points

Late Paleoindian period points generally considered to be Cody have been identified across New Mexico. Two studies are of notable interest. Dello-Russo (2015; Dello-Russo et al. 2022) identified 2 Cody Complex points at the multicomponent Water Canyon site near Socorro (see Figure 15). One was made of a silicified rhyolite, and the other was made of oolitic chert. The rhyolite is locally available; however, the source of the oolitic chert is undetermined. The whole point was recorded in Locus 5, Stratum 6, in association with a bison-bone bed. A bulk soil sample taken near the in situ point was dated to ca. 8070 B.C. (Holliday et al. 2019). This date falls within the range of 9600–6785 B.C. provided by Knell and Muñiz (2013:13) for the Great Plains and the Rocky Mountains but is older than the previously noted date for Scottsbluff at Blackwater Draw. Therefore, the Water Canyon site is the oldest dated Cody site in New Mexico. However, the assemblage of the R-6 site, near Las Vegas, contains the largest collection of Cody points in the state, with 27. The materials used for these points included mostly hornfels and Madero chert; a few points of obsidian, quartzite, and Alibates dolomite were also recorded (Stanford and Patten 1984). Except for Alibates dolomite, the materials are available within the region.

The other notable study is from the NRG valley, where Vierra and others (2012) identified several Late Paleoindian period point types: Wide Concave Base (e.g., Belen or Plainview), Narrow Concave and Square Base (e.g., Cody or Eden), Foothill Mountain/Angostura, James Allen, Dalton/Sierra Vista, and Long Contracting-stem (e.g., Hell Gap or Agate Basin). These point types are illustrated in Figures 16–19. As they noted, the Square Base and Foothill Mountain types are most highly represented. By contrast, there are few examples of Hell Gap/Agate Basin points in the San Luis Valley, and such points are absent from New Mexico, as are Dalton/Sierra Vista points. The Wide Concave Base type is most highly represented at the southern end of the NRG valley, and examples decrease toward the north, into the San Luis Valley. Most of the points were made of obsidian, dacite, or chert; fewer were made of orthoquartzite, quartzite,

Table 7. Metric Attributes of Scottsbluff Points, by Study

Attribute	Boldurian and Cotter 1999:86		Fogle-Hatch 2015:265–267		
	Metrics (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	53.8	1	60.2	43.7–70.8	5
Blade length	37.0	1	43.8	26.3–60.8	5
Shoulder Width	23.3	1	21.1	17.2–24.5	5
Stem length	15.1	1	16.3	10.2–23.3	5
Stem width	21.5	1	19.4	14.1–23.1	5
Basal depth	—	1	—	—	5
Thickness	7.3	1	6.4	5.0–9.8	5

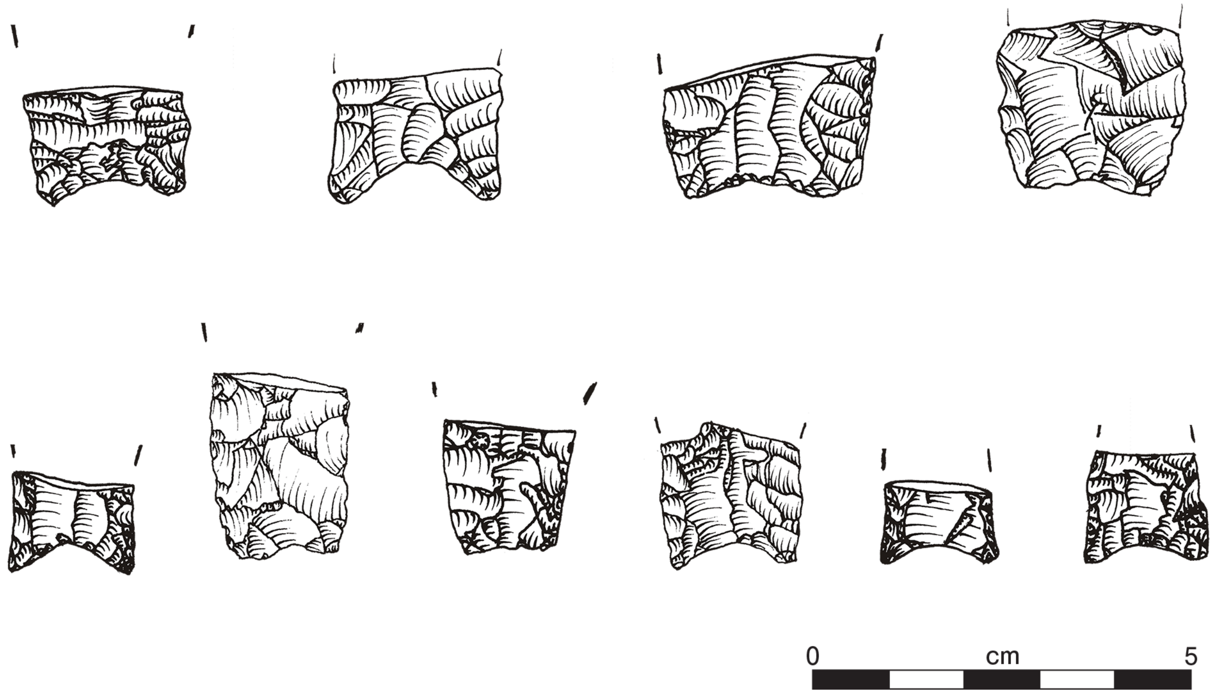


Figure 16. Late Paleoindian period Wide Concave Base (*top row*) and Narrow Concave Base (*bottom row*) points from the northern Rio Grande region (with permission from Bradley Vierra).

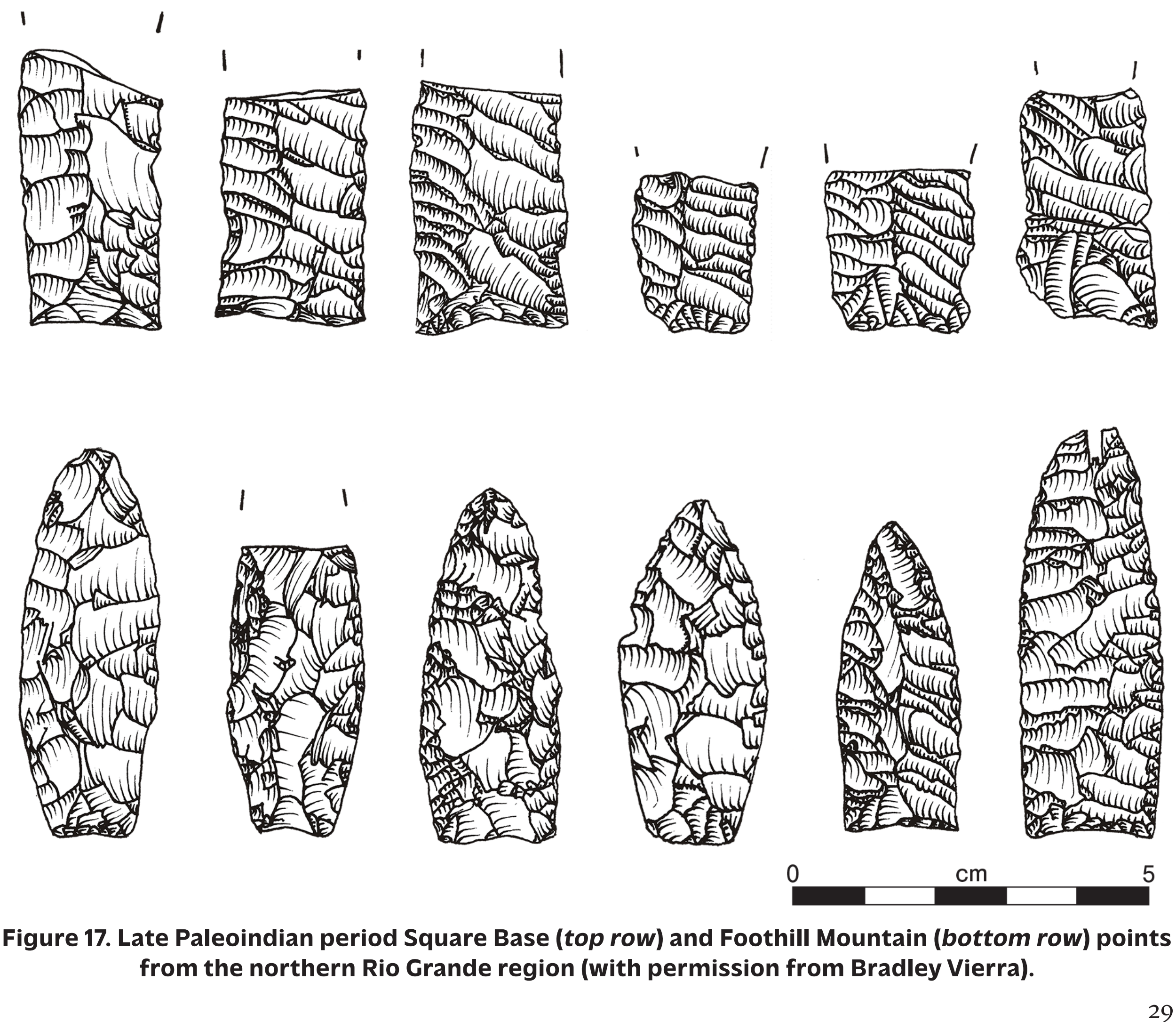


Figure 17. Late Paleoindian period Square Base (*top row*) and Foothill Mountain (*bottom row*) points from the northern Rio Grande region (with permission from Bradley Vierra).

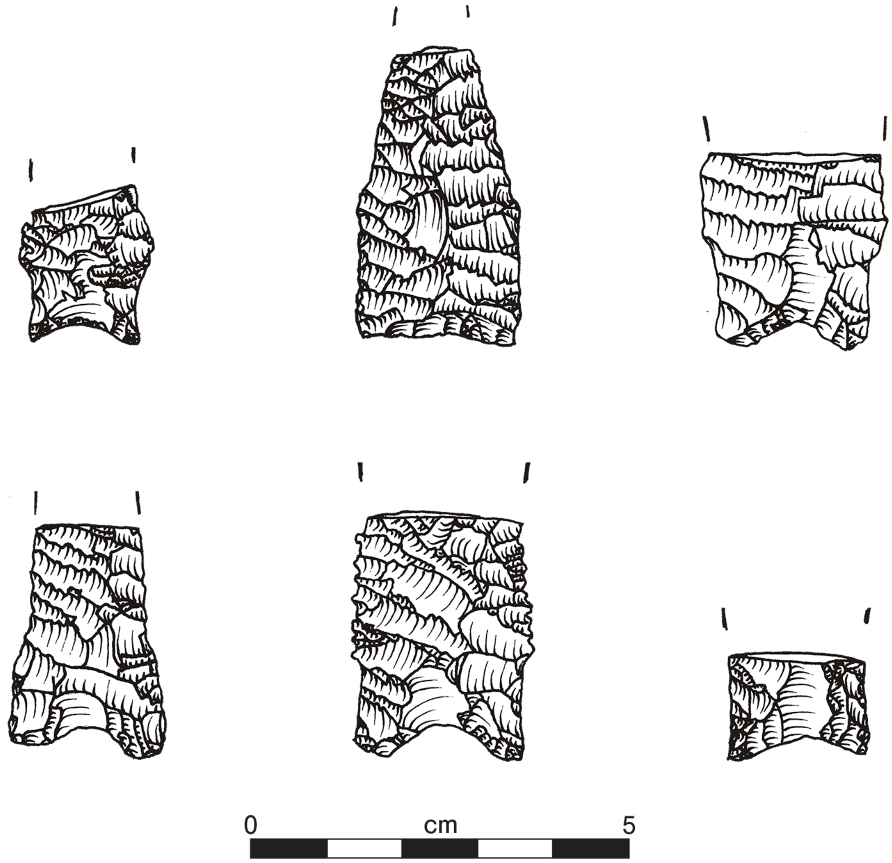


Figure 18. Late Paleoindian period Sierra Vista and James Allen (*top center*) points from the northern Rio Grande region (with permission from Bradley Vierra).

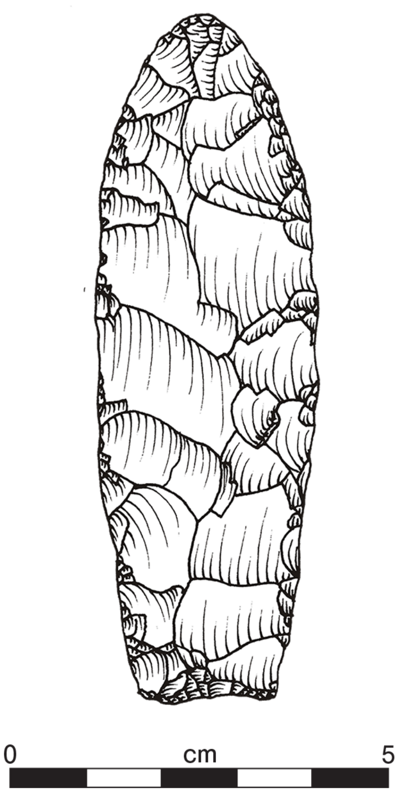


Figure 19. Late Paleoindian period Hell Gap point from the northern Rio Grande region (with permission from Bradley Vierra).

hornfels, or silicified wood, which are available within the region. The obsidian used to produce some Dalton/Sierra Vista points originated from a source in the Jemez Mountains, indicating a north–south pattern of movement along the valley. The variability exhibited in this sample of Late Paleoindian period points is similar to that observed by Pitblado (2003) in the southern Rocky Mountains but is much more diverse than that identified by Judge (1973) in the Albuquerque Basin.

Figure 20 illustrates Cody, Meserve, and Plainview points from the LRG valley (Vierra and Heilen 2020). Most of these points were made of local chert. Judge (1973:Figure 9) provided illustrations of Belen (Plainview) and Cody (Eden) points from the middle Rio Grande valley. Primarily, Belen points were made of chert, chalcedony, or quartzite, whereas most Eden points were made of chert, obsidian, or chalcedony. All these materials are available within the region.

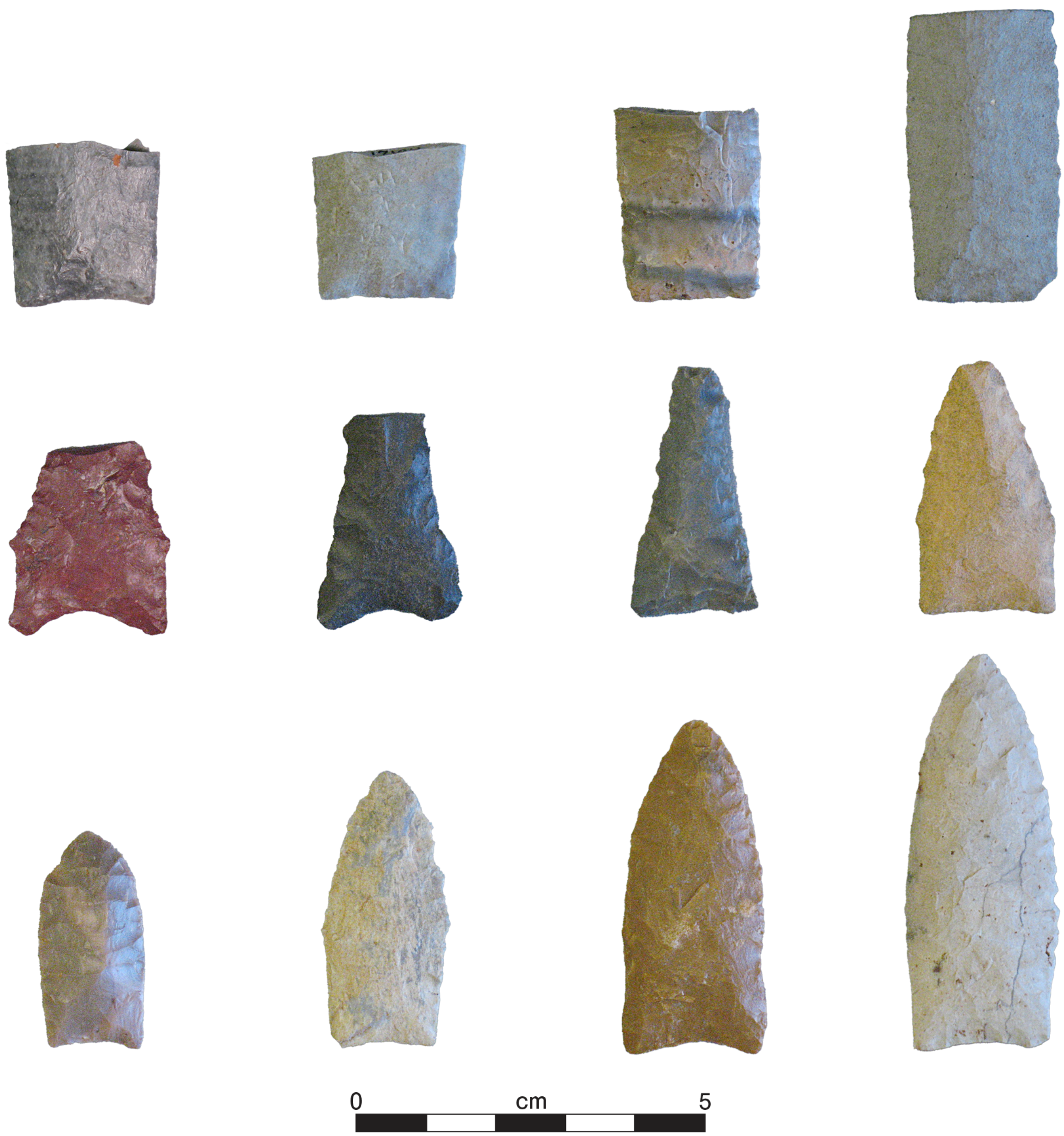


Figure 20. Late Paleoindian period points from the lower Rio Grande region: (*top row*) Cody, (*middle row*) Meserve, and (*bottom row*) Plainview.

Early Archaic Period Dart Points

Jay

Classification

The Jay projectile point was originally defined by Renaud (1942) and Honea (1969) as a Rio Grande point and was later included by Irwin-Williams (1973, 1979) in the Oshara Tradition, based on excavations conducted at Dunas Altas, near Albuquerque, where a Jay phase occupation was found overlying a Late Paleoindian period occupation (Chapin 2017:39; Judge 1973:44). Jay points have been found across New Mexico (Chapman 1977; Jelinek 1967:141, Plate XVI; Katz and Katz 1985:65; Moore 1999:Figure 3.5; Unruh et al., eds. 2023:892; Vierra 2018; Vierra et al. 2012). Honea (1969) defined the type as lanceolate and having small shoulders, a straight or slightly tapering stem with ground lateral edges, and a rounded, straight, or concave base. The concave base is characteristic of the Bajada type. Irwin-Williams (1973:5) described the type as "large slightly shouldered projectile points . . . reminiscent of those termed 'Lake Mojave'. . . ." Jay points are large Stemmed points with excurvate (convex) blades, slight shoulders, and straight to contracting stems (Figure 21). The stem margins are typically ground, and the bases are often, but not always, ground. The points were typically manufactured on biface blanks, generally by percussion flaking, and were sometimes finished with pressure flaking. Jay point length, width, and blade shape were often modified by resharpening; shoulders are sometimes absent from resharpened examples (R. Moore 1994; Moore and Brown 2002; Vierra 2013a; Vierra et al. 2012).

Comparison

Jay points were often made of durable materials. In the San Juan Basin, they were often made on fine-grained quartzite and were less frequently made on silicified wood or chert, whereas dacite was used in the NRG valley, and rhyolite was used in the LRG valley (Ayers and Sandefur 1998; R. Moore 1994; Moore and Anderson 1981; Moore and Brown 2002; Simmons 1982a:742; Vierra 2013a; Vierra and Heilen 2020; Vierra et al. 2012).

Table 8 presents metric information for Jay points in NWNM and the NRG and LRG valleys (Chapin 2017; Vierra 2013a; Vierra and Heilen 2020). (*Note:* In this case, "LRG valley" refers to the Fort Bliss Military Reservation in the southern Tularosa Valley.) The measurements provided exhibit similar ranges of variation. Jay points tend to be shorter in the NRG and LRG regions, which could be the result of increased resharpening. In addition, Jay points in the NRG region are thicker. Their stem-width and thickness measurements indicate that Jay points were hafted on relatively large-diameter shafts/foreshafts. Rebasing may account for the occasional point with a slightly concave base that lacks the basal thinning diagnostic of Bajada points. Jay points are generally larger than Bajada points, although the size ranges of the two types do overlap.

Chronology

Irwin-Williams (1973) originally defined the Jay phase as dating to ca. (uncalibrated) 5500–4800 B.C. Chapin (2017:89) noted that although the Jay phase date range may be accurate within the region, there are few reliable dates to support that. Therefore, he suggested an older Jay date range that is similar to the range suggested for Great Basin Stemmed points: 8700–5550 B.C. (Pitblado 2003:97). More recently, Kearns (2018) and Miller (2018; Miller and Graves 2019) included both Jay and Bajada points among Early Archaic period points and assigned them date spans of ca. 6100–3500 and 6500–6400/3500 B.C., respectively. The interpretation of the Jay point radiocarbon record is hampered by a paucity of associated dates, the common presence of multiple point types within the same dated contexts, problems with the contextual association of Jay points with reported dates, and misidentification of points in dated contexts as Jay.

It seems likely that a Stemmed-point technology moved out of the Great Basin region and into the northern Southwest during the middle Holocene. One study did identify the presence of relatively more Jay points in the San Luis Valley than farther south, in the Rio Grande valley (Vierra et al. 2012; Vierra 2013a). Of course, Irwin-Williams and Haynes (1970) originally argued that western-based foragers implementing a Lake Mojave–like technology moved eastward across the Southwest ca. 8500–5500 B.C. in response to climate change. It is also possible that Jay points are older in New Mexico than they are currently considered to be.

Bajada

Classification

The Bajada projectile point type was originally defined by Irwin-Williams (1973, 1979) as part of the Oshara Tradition. This was the prevalent style recorded at a site along the edge of the escarpment above La Bajada,

Figure 21. Jay dart points.

Table 8. Metric Attributes of Jay Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	58.4	34.6–78.2	14	49.7	32.0–74.3	13	46.3	33.1–60.4	16
Blade length			—	27.8	18.0–39.2	14	26.9	12.1–37.6	14
Shoulder width	26.2	19.3–33.3	32	22.9	16.8–34.0	25	22.7	10.4–36.0	22
Neck width			—	19.4	14.0–28.5	34	18.0	9.0–28.9	24
Stem length	25.5	12.5–41.7	41	22.9	11.4–53.3	30	22.1	11.0–55.6	26
Stem width	22.5	14.4–32.3	43	17.5	13.0–21.8	33	15.5	7.6–29.9	26
Basal depth			—	1.3	0.9–1.9	4			—
Thickness	7.3	5.3–13.1	45	8.1	5.5–11.3	34	7.6	4.4–15.0	26

on the Caja del Rio Plateau (Hicks 1982). Bajada points have been found across New Mexico (Chapman 1977; Formby and Frey 1986:117; Moore 1999:Figure 3.5; Unruh et al. 2023:892; Vierra 2018; Vierra et al. 2012). The type was distinguished from Jay "principally by the presence of a basal indentation and basal thinning" (Irwin-Williams 1973:7). Like Jay points, Bajada points are large Stemmed points with excurvate blades, slight shoulders, and straight to slightly expanding or contracting stems, and their stems and bases are typically ground. However, the notable difference is the presence of invasive basal thinning and a concave base on the Bajada point (Figure 22). There are a couple of points at the La Bajada site with straight, unground bases, but the presence of basal thinning distinguishes these points from those of the Jay type (Hicks 1984; R. Moore 1994; Moore and Brown 2002; Vierra 2013a; Vierra, personal communication 2024; Vierra et al. 2012). Chapin (2017:89) noted that the basal thinning on a Bajada point often extends between 10.0 and 15.0 mm from the edge of the base. The basal thinning on the Bajada points from the type site extends from 7.3 to 14.4 mm, and the bases range from 2.1 to 5.0 mm in depth. The shorter basal-thinning scars may be indications of rebasing.

Chapin (2017:90–91) divided the Bajada type into three variants based on the shapes of the stems as contracting or slightly expanding. The Stemmed A points exhibit no blade serration, and grinding is present solely along the stems, whereas the Stemmed B and C points exhibit some serration, and grinding is present on the stems and, in a few cases, on the bases. None of the points from the La Bajada type site exhibits serration; 6 exhibit grinding on the stems only, and 17 exhibit grinding along the stems and bases (Vierra, personal communication 2024).

Comparison

Like Jay points, Bajada points tend to be made on biface blanks of durable materials. In the San Juan Basin, basalt (dacite) and quartzite are common materials for points, and some points made of silicified wood, chert, and obsidian have been recorded, whereas dacite was used in the NRG region, and rhyolite was used in the LRG region and southwestern New Mexico (Kearns, personal communication 2024; R. Moore 1994:472; Moore and Anderson 1981; Moore and Brown 2002; Sandefur 1998:3.520; Simmons 1982a:742; Vierra 2013a; Vierra and Heilen 2020).

Table 9 presents metric information for Bajada points from NWNM and the NRG and LRG regions (Chapin 2017; Vierra 2013a; Vierra and Heilen 2020). Chapin's (2017:90) Bajada Stemmed A is included for comparison. Again, the types exhibit similar ranges of variation. However, NRG-region points tend to be a little shorter, and LRG-region points tend to be a little thinner and have narrower stems.

Chronology

Irwin-Williams (1973) originally defined the Bajada phase as dating to ca. (uncalibrated) 4800–3200 B.C. Chapin (2017:92) suggested that the Bajada point style has a date range of ca. 4780–3655 B.C. and possibly a little earlier or later.

Figure 22. Bajada dart points.

Table 9. Metric Attributes of Bajada Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Stemmed A; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	45.0	28.6–60.9	38	42.4	27.6–60.4	48	45.0	31.1–69.1	33
Blade length			—	23.4	6.9–43.2	50	27.2	13.8–45.7	35
Shoulder width	20.8	15.7–27.4	46	21.5	14.8–33.3	85	19.0	12.3–26.4	44
Neck width	15.7	11.8–19.9	47	17.1	12.2–23.0	104	15.3	8.3–19.7	49
Stem length	19.6	13.2–29.3	57	19.8	12.0–40.5	98	18.3	10.6–32.1	48
Stem width	17.7	12.8–23.3	49	17.1	11.4–22.0	108	13.5	6.6–20.2	44
Basal depth	2.3	0.6–5.0	49	3.0	0.7–6.0	104	2.8	1.0–4.7	46
Thickness	8.0	5.2–11.4	45	8.1	5.0–10.9	104	7.3	4.1–10.6	48

This would fit the latter range previously noted for the Early Archaic period by Kearns (2018) and Miller (2018): 6500–6400/3500 B.C. Bajada points could be considered the original southwestern dart points.

Pandale

Classification

Points of the Pandale type are distributed across the Trans-Pecos and have been identified in the LRG region. This type of point is defined as "a long, usually lanceolate point most easily recognized by the distinctive alternate beveling of the body which creates a peculiar corkscrew twist. Stems are also alternately beveled" (Turner et al. 2011:146). "Alternate beveling" refers to retouch on the dorsal and ventral surfaces, along opposite edges of a point. "Alternating beveling" refers to retouch on the dorsal and ventral surfaces along the same edge of a point (Inizan et al. 1999:129).

Gray (2013:39) described the Pandale type for the Trans-Pecos as long, slender, lanceolate, and sometimes shouldered. The type exhibits a distinctive alternate beveling that "creates a corkscrew twist." The base can be straight, concave, or convex.

One study in the LRG region (Vierra 2012) described Pandale points as most closely resembling Bajada points in general morphology. The points in the study had blades that were excurvate, like those of Jay and Bajada points, but longer than the blades of those types. Also, the stems were smaller and narrower, and the points were thinner. Vierra and Heilen (2020) suggested that this type was designed for greater penetration efficiency than that of Jay or Bajada points. Most of the Pandale stems are classified as expanding, partially because of the presence of ears at the corners of each base (Figure 23). All the points exhibit ground stems and/or bases with some basal thinning. Relatively fewer (33 percent) exhibit the diagnostic characteristic of beveling, which may indicate that this style reflects a regional variant of the Texas type. Pandale points tend to be made of chert, although some made of obsidian have been recorded in the LRG region. Table 10 presents metric attributes of Pandale points from the LRG region.

Chronology

These Pandale-like points have not been dated in the region but are tentatively classified among Early Archaic period points based on their similarities to the Pandale style (Miller and Graves 2019; Vierra and Heilen 2020). Gray (2013:39) considered the Pandale type in the Trans-Pecos to be Early Archaic period in age, having a date range of ca. 4245–2770 B.C. (Turpin 1991:28). More research needs to be conducted to fully understand this point type and its temporal placement.

Narrow Lanceolate

Classification

"Narrow Lanceolate" is a tentative designation for a type identified in the LRG region based on a few examples (Miller and Graves 2019). The Narrow Lanceolate point is longer, narrower, and thinner than Jay and Bajada points and may have been designed for greater penetration efficiency (Figure 24). The blade is excurvate and contracts toward the base, without distinctive shoulders. The base exhibits a slight concavity (Vierra 2012). This point type was referred to as "Early Archaic Unnamed" by Vierra and Heilen (2020). Points of this type were commonly made on chert. Table 11 presents metric information for Narrow Lanceolate points in the LRG region.

Chronology

The Narrow Lanceolate point type has not been dated in the region. It is tentatively classified among Early Archaic period points based on the general morphology, but that designation requires further evaluation.

Table 10. Metric Attributes of Pandale Points from the Lower Rio Grande Region

Attribute	Mean (mm)	Range (mm)	No.
Maximum length	45.8	34.8–60.4	13
Blade length	33.9	22.5–49.4	13
Shoulder width	17.5	14.3–19.9	15
Neck width	11.7	9.2–15.6	13
Stem length	12.2	8.5–18.6	16
Stem width	11.8	9.1–16.1	15
Basal depth	2.8	1.0–5.3	14
Thickness	6.5	4.3–9.2	16

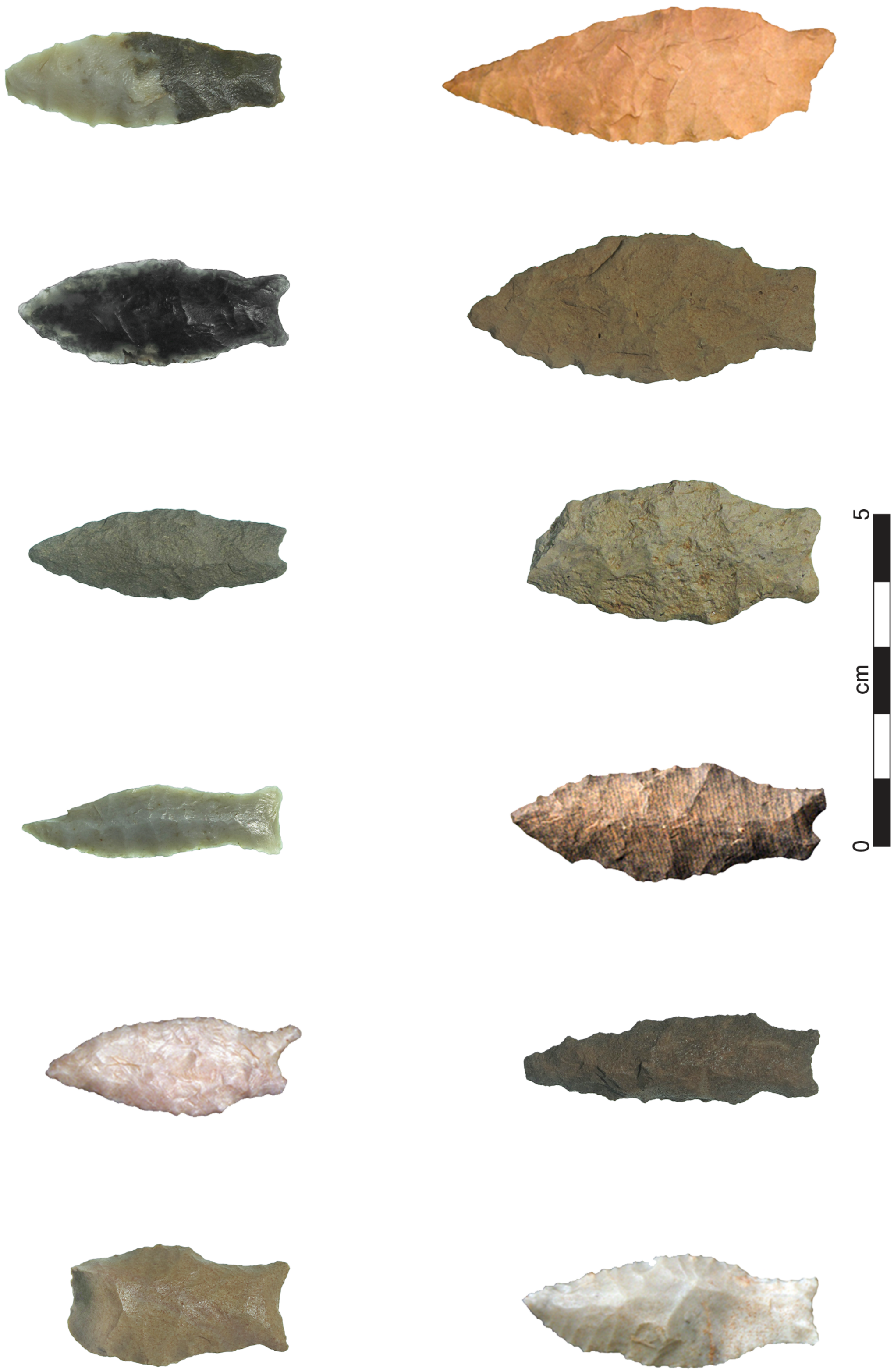


Figure 23. Pandale dart points.

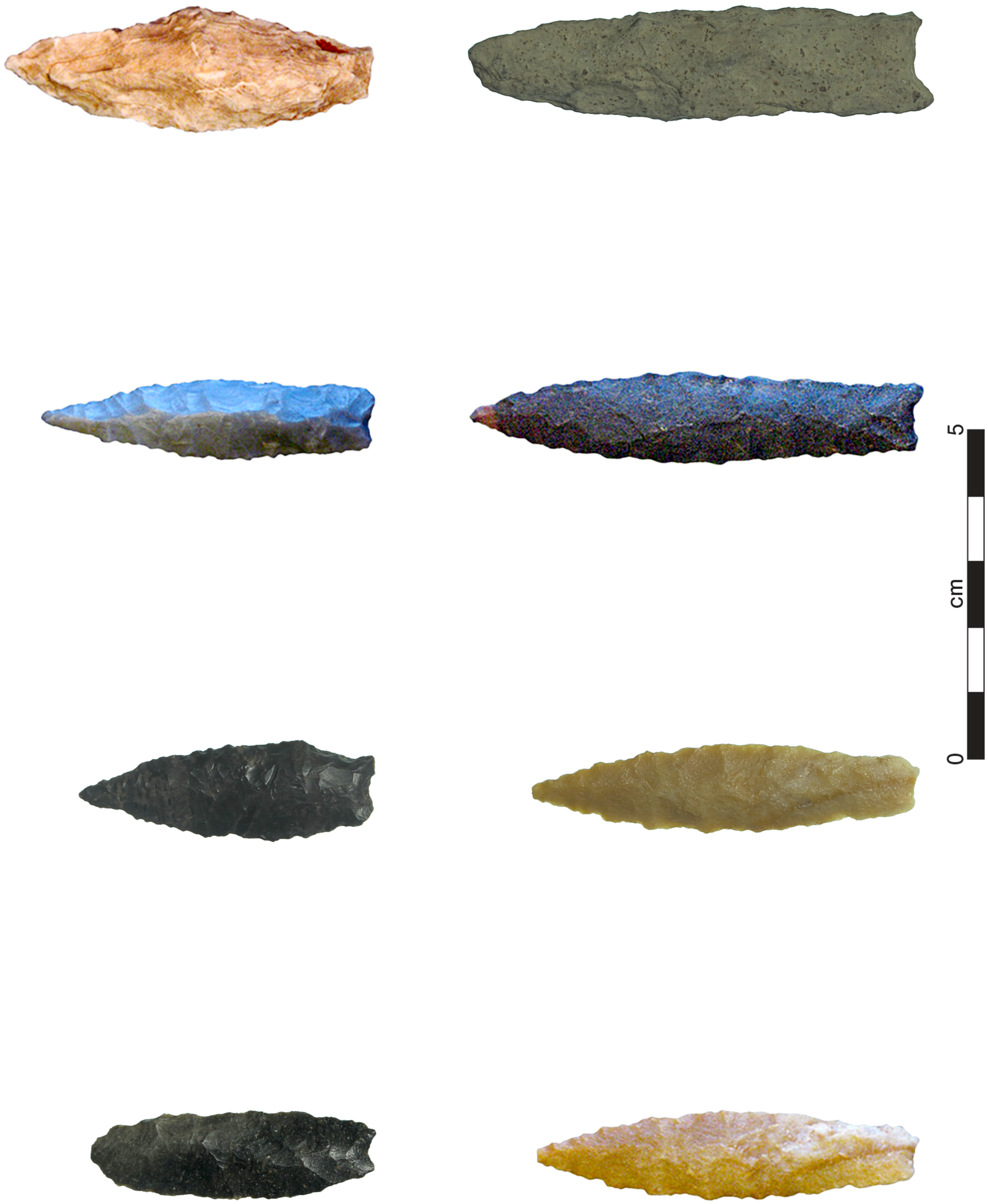


Figure 24. Narrow Lanceolate dart points.

Table 11. Metric Attributes of Narrow Lanceolate Points from the Lower Rio Grande Region

Attribute	Mean (mm)	Range (mm)	No.
Maximum length	57.1	47.8–69.6	6
Blade length	38.0	35.2–42.6	6
Shoulder width	17.6	12.8–25.1	6
Neck width	13.2	10.7–17.1	5
Stem length	18.1	10.4–30.6	6
Stem width	10.6	8.3–15.9	7
Basal depth	1.9	1.4–2.4	4
Thickness	7.0	5.5–8.2	7

Middle Archaic Period Dart Points

San Jose

Classification

The San Jose projectile point type was included in the Oshara Tradition by Irwin-Williams (1973, 1979). However, that was following earlier studies by Bryan and Toulouse (1943) and Agogino (1960; Agogino and Hester 1956, 1958), who referred to a group of sites in the general area of Grants and Santa Ana Pueblo as the San Jose "complex" based on the distinctive point type and an early radiocarbon date of ca. (uncalibrated) 4500 B.C. (see also Birkman et al. 2023). San Jose points have been found across New Mexico (Formby and Frey 1986; Jelinek 1967:Plate XVI; Kearns 2011; Leslie 1978:146, 148; Miller and Graves 2019:252; Turnbow 2014; Unruh et al. 2023:892; Vierra 2018). Irwin-Williams (1973:8) described the type as reflecting an "increasing use of serration along the blade and relatively shorter stem to blade ratio. Through time a trend develops toward decreased overall length, increasingly expanding stems, and increasingly marked serration" (R. Moore 1994; Moore and Brown 2002; Vierra 2013a). Figure 25 illustrates various examples of the San Jose point type.

Chapin (2017:92–93) divided the San Jose type into four variants. Stemmed A and B exhibit more-distinctive shoulder angles, shorter stems, medium-sized concave bases, and more blade serration than their Bajada counterparts. The Grants San Jose type, based on a review of the previously noted Grants sites, has a stem of similar length but has a distinctive "fishtail" formed by broadly concave, lateral, expanding margins. The blade is serrated (Chapin 2017:93). All three types exhibit stem grinding, but Stemmed A does not exhibit the basal grinding that characterizes the other two types. The fourth variant, San Jose Side-Notched, was used by Chapin to refer to the points originally defined as Armijo type (Irwin-Williams 1973). Herein, we continue to use the original "Armijo" type name, and we discuss that type in a separate section.

Vierra and Heilen (2020) also divided the San Jose type into four variants. Subtype 1 is the most common. It has a shorter, serrated blade; distinct shoulders; a shorter, expanding stem; and a concave base. These characteristics would fit Chapin's Stemmed A and B point types. Subtype 2 is generally smaller and thinner than Subtype 1 and has a wider, eared base and a deeper basal concavity. It resembles some examples of Chapin's Grants type. Subtype 3 is generally longer and narrower and has a shorter and narrower stem than the other two types have. It is thinner than Subtype 1 but similar to Subtype 2. Lastly, only three examples of Subtype 4 were identified; they are like Subtype 1 except that they have square, straight bases (Vierra 2012). This subtype could be classified as the Datil type.

San Jose points have been identified in southwestern New Mexico during several projects (Formby and Frey 1986; Kearns 2011; Hughes and Kurota 2010; Turnbow 2014). Although the Pinto type is similar to the San Jose type, the term "Pinto" is generally not used to describe points in New Mexico but is used to describe points in the Great Basin, on the northern Colorado Plateau, and in Arizona. See Sliva (1997:50) for descriptions of the San Jose and Pinto point types in Arizona.

Comparison

A variety of materials were used for San Jose points in the San Juan Basin, including chert, silicified wood, chalcedony, obsidian, and quartzite, whereas a mix of dacite and obsidian was used in the NRG valley. In the LRG valley, these points were mostly made of chert, and some were made of obsidian; in southwestern New Mexico, they were made of chert, obsidian, or basalt (Hughes and Kurota 2010; Vierra 2013a; Vierra and Heilen 2020).

Table 12 presents metric information for San Jose points from NWNM and the NRG and LRG regions (Chapin 2017; Vierra 2013a; Vierra and Heilen 2020). Chapin's (2017:94) San Jose Stemmed A and Vierra and Heilen's (2020) San Jose Subtype 1 are used for comparison. The sample size for the LRG region was much larger. The types generally overlap, although the LRG-region points tend to be shorter.

Discriminating Bajada stems from broken San Jose stems often poses a problem in identifying point types.

Figure 25. San Jose dart points.

Table 12. Metric Attributes of San Jose Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Stemmed A; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region (San Jose Subtype 1)		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	36.4	25.0–55.0	18	36.6	20.5–58.0	20	33.1	15.1–46.9	80
Blade length			—	22.5	9.6–43.0	31	22.2	8.1–39.1	80
Shoulder width	19.9	13.3–25.9	21	20.8	12.8–26.8	38	18.9	12.3–29.3	97
Neck width	14.3	11.5–18.3	21	15.9	9.7–22.9	48	13.9	8.5–19.9	94
Stem length	11.9	8.0–15.0	22	13.9	7.1–19.4	48	11.6	6.2–17.9	91
Stem width	15.1	12.0–18.9	21	17.3	10.7–22.2	43	16.1	14.1–24.5	99
Basal depth	2.3	0.9–3.8	21	3.7	2.0–6.8	43	3.0	1.0–6.5	100
Thickness	6.0	4.8–9.2	13	6.7	3.5–8.9	48	5.7	3.1–7.9	102

In general, Bajada stems are parallel (n = 34) or slightly expanding (n = 32), and fewer are contracting (n = 25). San Jose stems are usually expanding (n = 34); a few in the NRG region are parallel (n = 3) or contracting (n = 3). By contrast, in the LRG region, Bajada points primarily have contracting stems (n = 36), and fewer have expanding (n = 8) or parallel (n = 4) stems, whereas San Jose points are characterized by mostly expanding stems (n = 112), and fewer have parallel (n = 14) or contracting (n = 10) stems. Nonetheless, the presence of basal thinning is the diagnostic trait for identifying Bajada points. In addition, Bajada stems are generally longer than San Jose stems, and serrated stems are rare.

Chronology

Irwin-Williams (1973) originally defined the San Jose phase as dating to ca. (uncalibrated) 3200–1800 B.C. Chapin (2017:94–95) suggested that the San Jose style has a date range of ca. 3075–1685 B.C. but is possibly as old as 3625 B.C. More recently, Kearns (2018) and Miller (2018; Miller and Graves 2019) included San Jose points among Middle Archaic period points and assigned them date ranges of ca. 3500–1600 and 4000/3500–1400 B.C., respectively. The latter date range is associated with the Tularosa phase.

Split Stem

Classification

The Split Stem point is common in central Texas as the Pedernales type. However, Split Stem points have also been identified in the Trans-Pecos and the LRG region (MacNeish 1993:167; Miller and Graves 2019; Turner et al. 2011; Vierra and Heilen 2020). The type is defined as having "[A] body [that] is triangular with a more-or-less-rectangular, concave based stem. The stem is often thinned by a broad, or flutelike flake on one or both sides . . . [with the] lateral edges straightened" (Turner et al. 2011:146).

Vierra (2012) described a small sample of Split Stem (Pedernales) points. They tended to be shorter than San Jose points in NWNM and the NRG region. The points exhibited straight, nonserrated blades and distinct shoulders. Less than half exhibited beveled edges. The stem of each point was shorter and had narrow and parallel sides and a deeply concave base, creating the split (Figure 26). About half the points had ground stems and/or bases. All the points were made of chert. Table 13 presents metric information for Split Stem points from the LRG region.

Bifurcated points reminiscent of the Split Stem type have been reported from LA 16197, in the San Juan Basin of NWNM, and identified as Pinto (Elyea and Hogan 1993:Figures 5.1i and 5.2f) and San Jose Stemmed A (Chapin 2017:Figure 5.8QQ) points.

Chronology

These Split Stem points have not been dated in the region. They have been tentatively classified as Middle Archaic period based on similarities to Pedernales points. Turner and others (2011:148) dated them to ca. 3035–1730 and possibly as late as 705 B.C., which would be Middle to Late Archaic period in age. More research needs to be conducted to fully understand this point type and its temporal placement.

Northern Side-Notched

Classification

The Northern Side-Notched projectile point type was initially identified in the Intermountain West (Heizer and Hester 1978; Holmer 1978, 1980a, 1986; Schroedl 1976). In New Mexico, Northern Side-Notched points are largely restricted to NWNM and the NRG region. At the Moquino Site, east of Grants, morphologically similar points were originally grouped with other large Side-Notched points as Chiricahua points (Beckett 1973). Although Beckett (1997) subsequently acknowledged the resemblance of the Moquino point types to northern Colorado Plateau Archaic period points, the Chiricahua designation complicated the identification of Northern Side-Notched and other large Side-Notched projectile points in NWNM (Hogan et al. 1991:4.3–4.5; Kearns 1992:22–26; Vogler 1993:122–123). Most recently, points reminiscent of the Northern Side-Notched point type have been grouped with other large Side-Notched concave-based points in the Moquino point series (Chapin 2017:97–99).

The Northern Side-Notched point is large and has a triangular, straight to slightly excurvate blade and horizontal to slightly obtuse shoulders. The horizontally oriented C- or soft-V-shaped notches are relatively narrow and placed high enough to create a stem with straight, slightly contracting to (infrequently) parallel lateral margins; unless reworked, the proximal corners are angled, not rounded. The base is most often concave but can be flat (Figure 27). Although the blade is sometimes heavily reworked, the stem is typically the same width as the blade or slightly narrower. The blade is typically not serrated, and the stem and base are not ground.

Figure 26. Split Stem dart points.

Table 13. Metric Attributes of Split Stem Points from the Lower Rio Grande Region

Attribute	Mean (mm)	Range (mm)	No.
Maximum length	33.1	22.9–45.9	8
Blade length	24.8	22.5–49.4	8
Shoulder width	21.8	17.9–25.4	8
Neck width	13.1	10.6–16.6	8
Stem length	9.6	6.3–12.6	8
Stem width	12.9	11.2–14.2	8
Basal depth	3.9	2.5–6.6	7
Thickness	5.2	4.4–7.7	8

Figure 27. Northern Side-Notched dart points.

Comparison

In the San Juan Basin, Northern Side-Notched points were made of chert (including Chuska chert), silicified wood, quartzite, or obsidian, and in the NRG region, they were made of chert or obsidian. Table 14 provides metric information for Northern Side-Notched points from the San Juan Basin (Kearns, personal communication 2024).

The placement of the notches high enough to leave a straight edge below them distinguishes the Northern Side-Notched point from other large Side-Notched (e.g., Elko Side-Notched) points on which low-placed notches create triangular or acute-angled proximal stem corners (ears). The short (i.e., ≤10.0-mm), slightly contracting stem and concave base differentiate the Northern Side-Notched point from Sudden and San Rafael Side-Notched points. The abruptly angled corners on the lower stem margins and the typically narrow side notches distinguish the Northern Side-Notched point from points of the Chiricahua type.

Table 14. Metric Attributes of Northern Side-Notched Points from Northwestern New Mexico (San Juan Basin)

Attribute	Mean (mm)	Range (mm)	No.
Maximum length	36.5	24.5–61.0	5
Blade length	25.3	15.1–46.9	5
Shoulder width	21.4	16.4–24.0	7
Neck width	14.0	11.1–17.2	8
Stem length	11.3	8.8–16.0	7
Stem width	23.0	16.5–27.0	5
Basal depth	2.2	1.0–4.0	8
Thickness	4.9	4.5–5.2	3

Chronology

The Northern Side-Notched point is an Early and Middle Archaic period diagnostic artifact in the Intermountain West. The type may have continued into the early Late Archaic period in some regions, where it is dated to ca. 6010–2970 B.C. and possibly as late as 1730 B.C. (Heizer and Hester 1978; Holmer 1978, 1980a, 1986; Schroedl 1976). It is a diagnostic Middle Archaic period point in NWNM. Chapin (2017:97, 99) estimated a date range of 2825–1745 B.C. for the Moquino Concave point group, which includes Northern Side-Notched points. Radiocarbon dates for this point type in the San Juan Basin range from about 2600 to 2000 B.C. This includes radiocarbon dates of 2570 ± 50 cal B.C. at LA 80397 (Kearns 2007:4.12; Korgel 1998) and five dates within the range of 2420 ± 30–1970 ± 30 cal B.C. at LA 32949/NM-Q-3-66 (Miller et al. 2020). At the Moquino Site, points stylistically identical to Northern Side-Notched, San Rafael Side-Notched, and Chiricahua points were indirectly associated with a radiocarbon date of 2410 ± 155 cal B.C. (Beckett 1997:14; Berry and Berry 1986:290–291). A possible late presence in the Upper San Juan Basin was indicated at LA 70667 by one Northern Side-Notched point and a suite of five radiocarbon dates spanning 770 ± 100 cal B.C.–0 ± 60 cal B.C./A.D. (Sesler 2002a:44, 62, 71–73). These points are occasionally recorded at sites with Sudden and San Rafael Side-Notched points (see Beckett 1973; Miller et al. 2020:Figure 2.5).

Sudden Side-Notched

Classification

The Sudden Side-Notched projectile point type was originally grouped with the Northern Side-Notched type and was identified as a distinct Middle Archaic period diagnostic type in the Intermountain West following excavation of Utah's Sudden Shelter (Holmer 1978, 1980a, 1986; Schroedl 1976:63–64). Morphologically similar points have been described in NWNM and the NRG region (Alexander and Reiter 1935:27; Beckett 1973:141–142; Cordero 2020; Elyea and Hogan 1993; Hadlock 1962; Hogan et al. 1991:4.3–4.8; Kearns 1992:22–26; Miller et al. 2020; Seaman and Chapman 1993:Plate A6.12; Turnbow 1997; Vierra and Post 2023). Recently, Chapin (2017:96–98), citing their presence at the Moquino Site, designated Sudden Side-Notched–style points as Moquino Square Base points. We have retained the original designation because the distribution in New Mexico is contiguous with the recognized range for the Sudden Side-Notched point type and roughly contemporaneous with its date range in the Intermountain West.

The Sudden Side-Notched point is a medium-sized to large point with a triangular blade; high, horizontal notches; and a long, rectangular stem with a slightly convex to slightly concave base (Figure 28). The blade margins are straight to excurvate. The shoulders are straight to slightly sloping and, rarely, slightly barbed. The high side notches are generally at about one-quarter or more of the blade length above the base. The notches are typically C shaped, but the Sudden Side-Notched point often has slightly offset, relatively deep C- to soft-V- or U-shaped notches, with a narrow notch opposite a larger expanding notch. The stem margins are parallel, convex, or (rarely) slightly

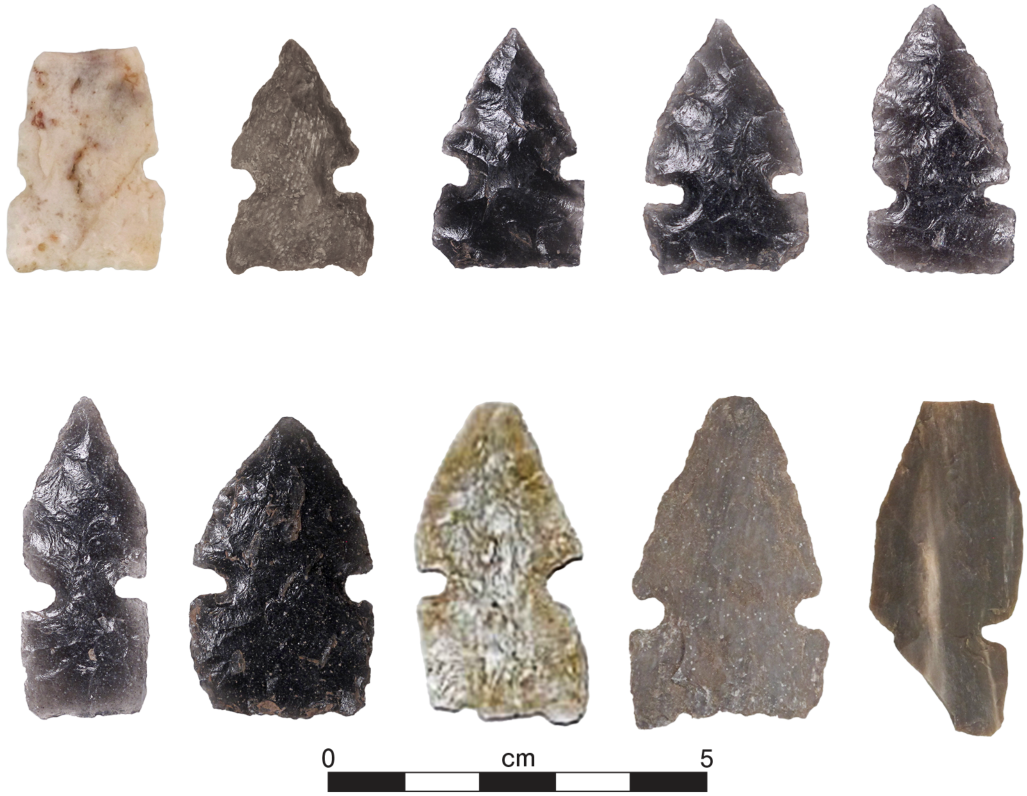


Figure 28. Sudden Side-Notched dart points.

contracting. The bases of New Mexico points are often straight but can vary from slightly convex to slightly concave (see below). Two small, subtle notches are sometimes evident along a straight base. The proximal stem corners approximate 90° to slightly acute angles but can be rounded on convex-based examples. The blades are not serrated, and the stem and base are not ground. The points have relatively thin cross sections and were commonly made on flake blanks. Examples with short, resharpened blades are common, and often, a point exhibits one straight margin opposite a convex margin.

The Sudden Side-Notched base was originally defined as slightly convex, although the illustrated examples include points with flat and slightly concave bases (Holmer 1978:Figure 17). Some researchers emphasize a convex or flat base (Brown et al. 1993:401, Figure 6.16A; Kearns 1982:119; Torres 1999:Figure 38); others include points with slightly concave bases (Geib et al. 2001:Figure 6.15; Tipps 1988:Figure 25d; Tipps and Hewitt 1989:Figure 13b; Turnbow 1997:Figure 16.13). The Moquino Square Base type has a straight base (Chapin 2017:97). We have decided to include points with shallow (generally less-than-2.5-mm-deep) concave base indentations in the Sudden Side-Notched definition. The San Rafael Side-Notched point is the only other large Side-Notched point with high notches and is differentiated by a distinctive V-notched base or a moderately to deeply concave base with an indentation generally more than 2.5 mm deep.

Comparison

Sudden Side-Notched points were made on a variety of fine-grained or siliceous materials, including chert, chalcedony, silicified wood, orthoquartzite, basalt (dacite), and obsidian in the San Juan Basin and obsidian, chert, and dacite in the NRG region. Table 15 presents metric information for Sudden Side-Notched points from the San Juan Basin, NWNM, and the NRG region.

There is a morphological continuum in the Northern Side-Notched series (Geib et al. 2001:199–200; Kearns 1982:191), and some points are difficult to classify—a circumstance exacerbated by breakage and reworking. Although the high placement of the notches (at 10.0 mm or greater above the base) is a diagnostic Sudden Side-Notched attribute, there is a subset with shorter stem lengths that most likely represent broken and rebased Sudden Side-Notched points. These often have the characteristic offset, different-sized side notches that create different stem lengths, rendering

Table 15. Metric Attributes of Sudden Side-Notched Points from the San Juan Basin, Northwestern New Mexico, and the Northern Rio Grande Region

Attribute	San Juan Basin			Northwestern New Mexico (Moquino Square Base; Chapin 2017)			Northern Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	36.5	24.9–62.0	29	36.6	26.0–87.5	18	32.8	25.3–44.5	33
Blade length	21.1	12.3–38.9	31			—	19.7	10.6–39.1	34
Shoulder width	20.2	14.2–29.0	49	19.8	14.4–25.6	18	19.8	11.4–30.6	47
Neck width	13.2	7.5–19.2	60	13.3	7.4–20.1	18	13.3	7.8–19.8	62
Stem length	15.8	8.4–30.3	57	12.1	8.4–19.1	18	13.8	9.2–24.6	61
Stem width	21.3	15.0–26.7	55	13.9	8.0–20.7	18	22.4	16.4–31.2	50
Basal depth	0.5	0.0–2.4	58			—	0.1	0–1.4	48
Thickness	5.7	4.6–9.0	11	4.5	3.3–5.9	18	5.0	3.7–6.8	67

one side of a given point longer than the other. The high notches generally differentiate Sudden Side-Notched points from Northern and Hawken Side-Notched points; points of all three types have short stems, but Sudden Side-Notched points have concave bases, and points of the other two types have straight bases.

Chronology

Sudden Side-Notched points are dated to roughly between 4400 and 2400 B.C. in the Intermountain West, where they were preceded by the Northern Side-Notched point type and followed by the San Rafael Side-Notched type (Holmer 1986:104, 105). Turnbow (1997:194) suggested a date span of 3500 B.C.–A.D. 200, and Chapin (2017:98) suggested a range of 2575 B.C.–A.D. 610 for the Moquino Square Base type, which includes the Sudden Side-Notched point. In NWNM and the NRG region, most radiocarbon assays date the Sudden Side-Notched point to between ca. 3800 and 1000 B.C.—that is, for much of the Middle Archaic and early Late Archaic periods. This range is slightly later than, but overlaps, the range for Sudden Side-Notched points in the Intermountain West and indicates that the point type lasted somewhat longer in New Mexico. If younger dates are accurate, the temporal lag in New Mexico may be even greater, with the date range extending to about 500 B.C., or roughly contemporaneous with the late Basketmaker II period.

In the San Juan Basin, 17 radiocarbon assays from 6 sites dated Sudden Side-Notched points to 3600–1190 B.C. (Beckett 1973, 1997; Cordero 2020; Dykeman and Wharton 1999; Honeycutt and Fetterman 1994; Miller et al. 2020; Post 1994; Solfisburg and Cordero 2016; Rohman 2003). In the NRG region, dates from 2 sites on the West Mesa, near Rio Rancho, ranged from 2860 to 2200 B.C. (Vierra and Post 2023). The GR2 rockshelter site, near Abiquiu, contained about 20 Sudden Side-Notched points that were bracketed by 2 date ranges, ca. 2290–1900 and 1700–1400 B.C. (Vierra, personal communication 2024).

Sudden Side-Notched points may also date somewhat younger. Two sites on the northern periphery of the San Juan Basin, 5LP1102 and LA 74802, are associated with four dates ranging from 745 to 55 B.C. (Fuller 1988:278; Hovezak 2002:544–545). At LA 73587, in the Upper San Juan Basin, an unusually small Sudden Side-Notched point was associated with five radiocarbon dates between 345 B.C. and cal A.D. 95 (Sesler 2002b:148–149). In the Jemez Mountains, at LA 66876, two Sudden Side-Notched points were associated with a feature dated to cal A.D. 525 ± 70, and at LA 66868, a surface-collected Sudden Side-Notched point was underlain by deposits that produced dates of 255 ± 110 and 150 ± 50 cal B.C. (Evaskovich, Coleman, et al. 1997:417; Evaskovich, Crollett, et al. 1997:513, 533; Turnbow 1997:194). Although prehistoric scavenging may have been a factor, if the date associations are valid, they indicate a late presence of the Sudden Side-Notched point type in New Mexico.

San Rafael Side-Notched

Classification

San Rafael Side-Notched was identified as a distinct Middle Archaic period point type in the Intermountain West following the excavation of Sudden Shelter, in central Utah (Holmer 1978, 1980a, 1986; Schroedl 1976). It is a Middle to Late Archaic period point type in New Mexico and is generally restricted to NWNM and the NRG region. Morphologically similar points from Bat Cave are included with Type 10A concave-based Side-Notched points and have been identified as Chiricahua (Dick 1965:Figure 21g, i). At the Moquino Site, near Grants, San Rafael Side-Notched points were designated Moquino 3, a point type with straight, nonserrated blades; abrupt shoulders; very deep lateral notches; unground, very greatly expanding stems; deeply concave bases; and biconvex cross sections (Beckett 1973:143, Plate XIII). In a recent reassessment of the Oshara Tradition, Chapin (2017:96–99) included San Rafael Side-Notched–style points in the Moquino Concave series. As with the Sudden Side-Notched point, we have retained the original designation because the distribution in New Mexico is contiguous with the recognized range of the San Rafael Side-Notched point type and roughly contemporaneous with its date range in the Intermountain West.

The San Rafael Side-Notched point is a medium-sized to large Side-Notched concave-based point with a triangular blade, high soft-V- to C-shaped side notches, and a long stem with straight parallel to expanding margins (Figure 29). The base has a moderate to deep V-shaped notch or concave indentation, resulting in long, triangular or acutely angled ears, although rounded terminations are sometimes present. The shoulders are straight to slightly sloping. The horizontal notches are high (at 10.0 mm or greater above the base) and occasionally exhibit the offset size disparity noted for the Sudden Side-Notched point. The stem sides and base are not ground, and serrated blades are rare. The bases are often wider than the blades, especially on resharpened examples. The points are characteristically thin and were made on flake blanks.

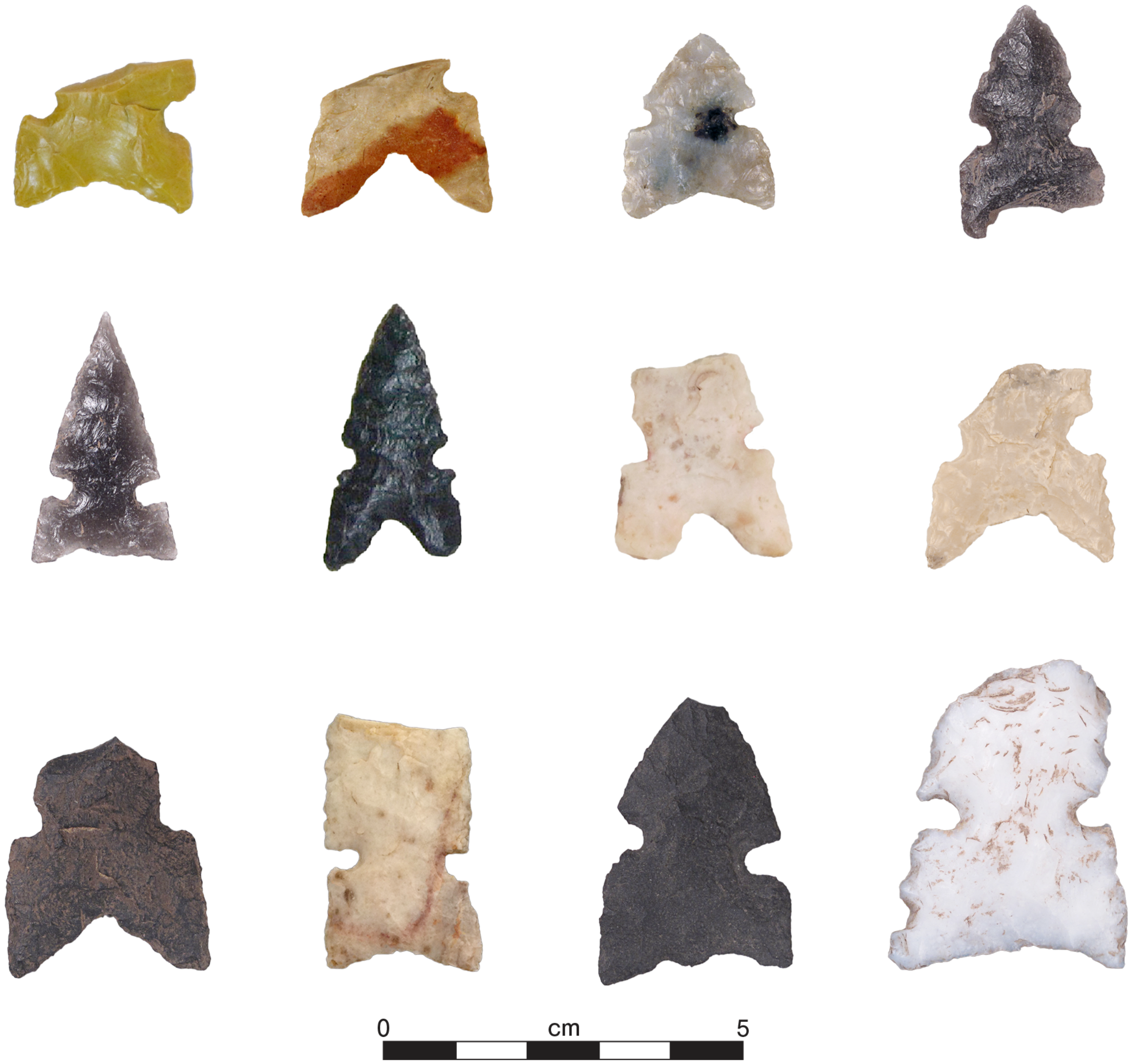


Figure 29. San Rafael Side-Notched dart points.

Comparison

San Rafael Side-Notched points were typically made on a variety of fine-grained or siliceous materials, including obsidian, chert, and dacite in the NRG region and chert, chalcedony, silicified wood, orthoquartzite, and obsidian in the San Juan Basin. Table 16 provides metric data for San Rafael Side-Notched points from the San Juan Basin, NWNM, and the NRG region.

The high, narrow side notches; long, parallel to expanding stem with triangular ears; and V-notched or indented concave base are hallmarks of the San Rafael Side-Notched point. The original San Rafael definition describes the base as concave but does not cite depth parameters or the shape of the indentation (Holmer 1978:49, Figure 18). The distinctive moderate to deep V-shaped basal notch is widely recognized as a diagnostic San Rafael Side-Notched attribute. In addition, some researchers identify points with slightly concave bases as San Rafael but do not cite depth values (Geib et al. 2001:201; Kearns 1982:190–191; Torres 1999:Figure 38, 2000:Figure 48, 2003:Figure 403c). For this study, the concave indentations are typically deeper (greater than 2.5 mm) on San Rafael Side-Notched points than on Sudden Side-Notched points. Along with the straight to slightly expanding stems of the former vs. the convex, straight, or (rarely) slightly contracting stems of the latter, the greater depth of the concave indentation of the San Rafael Side-Notched point distinguishes it from Sudden Side-Notched points. Figure 30 provides graphic illustrations of the features that define Northern, Sudden, and San Rafael Side-Notched points.

Table 16. Metric Attributes of San Rafael Side-Notched Points from the San Juan Basin, Northwestern New Mexico, and the Northern Rio Grande Region

Attribute	San Juan Basin			Northwestern New Mexico (Moquino Concave Base; Chapin 2017)			Northern Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	37.8	24.4–59.0	14	33.3	20.0–57.2	18	31.0	27.3–34.8	7
Blade length	23.2	12.2–41.9	13	—			18.4	14.2–23.6	7
Shoulder width	19.7	13.5–31.0	21	18.5	12.0–25.4	23	19.0	15.4–23.7	12
Neck width	14.3	8.7–21.9	27	13.1	8.1–17.9	28	13.7	8.9–18.3	23
Stem length	17.4	10.0–36.0	29	13.1	8.0–21.0	26	15.2	9.4–23.0	22
Stem width	23.4	16.0–28.3	23	13.4	8.5–18.6	26	23.8	19.1–32.9	21
Basal depth	5.2	2.5–10.0	28	3.4	1.1–8.7	28	3.8	2.5–8.1	21
Thickness	4.4	4.0–5.0	9	4.2	3.2–6.2	23	5.2	3.7–6.9	22

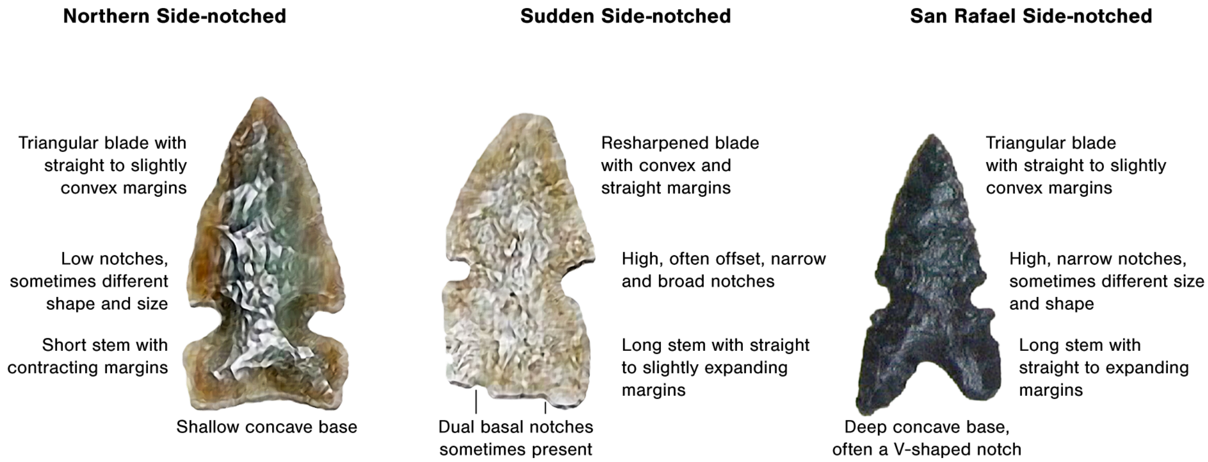


Figure 30. Comparison of Northern, Sudden, and San Rafael Side-Notched points (with permission from Timothy Kearns).

Chronology

In the Intermountain West, San Rafael Side-Notched points are thought generally to have replaced Sudden Side-Notched points ca. 2400 B.C. and to have lasted until 1600 B.C. (Holmer 1986:104). In northern New Mexico, the radiocarbon record places the San Rafael Side-Notched point between about 3500 and 1200 B.C. and possibly as early as 5500 B.C. This date range overlaps with the dates for Sudden Side-Notched points, and both types are sometimes found together at sites. This date range also indicates that the San Rafael Side-Notched type in New Mexico is roughly contemporaneous with, and may predate, the type in the Intermountain West. San Rafael Side-Notched points are diagnostic of the Middle or, possibly, Late Archaic period in New Mexico.

Chapin (2017:99) proposed a date range of 2825–1825 B.C. for the Moquino Concave Base point type, which includes San Rafael Side-Notched points. For the NRG region, Turnbow (1997:196) suggested a range of 2500–700 B.C. In the San Juan Basin, 21 radiocarbon dates from 8 sites placed the San Rafael Side-Notched point between 3480 and 1190 B.C., with outliers at 5525 and 4660 cal B.C. (Cordero 2020; Elyea 1995; Elyea and Hogan 1993:2–42; Miller et al. 2020; Phippen and Silberberg 2001; Post 1994; Rohman 2001, 2003; Solfisburg and Cordero 2016). Two San Rafael Side-Notched points and 1 Sudden Side-Notched point were recorded at the GR2 rockshelter, where they were associated with an occupation surface and a basin metate with a date of 3960–3670 cal B.C. (Vierra, personal communication 2024), which compares well with the previously noted outliers.

Jarilla Side-Notched

Classification

Jarilla Side-Notched points are present in the LRG region (Carmichael 1986:Plate 5). They exhibit excurvate blades with continuous and serrated edges, often with beveling and rarely with resharpening. The stems are expanding or parallel, and the bases are slightly concave. Most of the stems and/or bases are ground, and they exhibit shallow basal thinning (Vierra 2012). They tend to be larger and thicker than their NWNM and NRG-region Sudden and San Rafael Side-Notched counterparts (Figure 31). Vierra and Heilen's (2020) study indicated that their "Moquino" type was most like the San Jose type in that it was designed for greater durability. These points were primarily made of chert, although some were made of obsidian. Table 17 presents metric information for Jarilla Side-Notched points from the LRG region.

Table 17. Metric Attributes of Jarilla Side-Notched Points from the Lower Rio Grande Region

Attribute	Mean (mm)	Range (mm)	No.
Maximum length	38.6	26.2–60.4	7
Blade length	26.8	14.9–42.8	7
Shoulder width	20.1	16.4–24.2	10
Neck width	15.4	12.0–17.8	12
Stem length	12.1	6.3–17.6	12
Stem width	20.7	18.8–22.5	12
Basal depth	2.6	1.7–3.2	12
Thickness	5.8	4.4–8.6	12

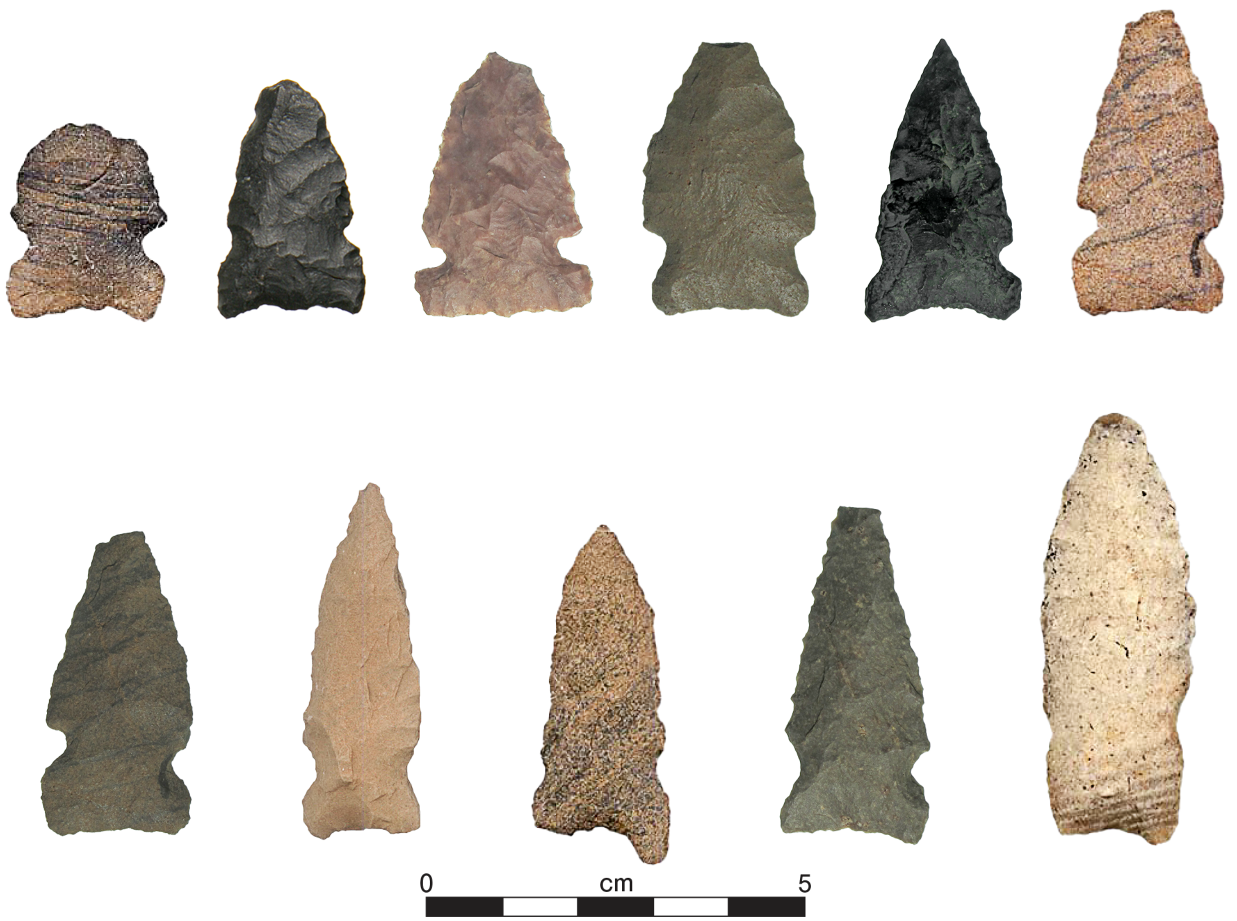


Figure 31. Jarilla Side-Notched dart points.

Chronology

Miller and Graves (2019) identified a "Misc. Side-Notched" point that appeared to span the Middle to Late Archaic period (Keystone to Fresnal phase) boundary and to have had its peak ca. 1400–1200 cal B.C. Certainly, more work is needed to clarify the temporal placement of this point type.

Chiricahua

Classification

The Chiricahua point type was originally identified in southeastern Arizona as a Middle Archaic period point diagnostic of the Cochise Culture (Sayles 1983; Sayles and Antevs 1941). In New Mexico, an early reference to the Chiricahua projectile point style was made in relation to the Wet Leggett Site, west of Reserve (Martin et al. 1949). The "short, stubby corner-notched point with a slightly concave base . . . most closely resembles one of the points intrusive into the Chiricahua stage at Sonora F:10:31 (Sayles and Antevs 1941:Plate XIc)" (Martin et al. 1949:60, 62–63, Figure 17). The point type was subsequently documented at Bat Cave (Dick 1965:Figure 21), NAN Ranch Ruin (Dockall 1991:Figure 25P), and the Moquino Site (Beckett 1973). This point type is typically identified in southwestern New Mexico but has also been reported to the east, in the LRG region, and to the north, near Grants (Beckett 1973; Hughes and Kurota 2010; Kearns 2011; Miller and Graves 2019:253; Moore 1999:Figure 3.5; O'Hara 1988:Figure A.10.5; Roney and Hard 2020).

Dick (1965:26–27) described the Chiricahua point as having a triangular outline, shallow notches in the upper or middle part of the blade, a deep and wide concave base, an expanding base wider than the blade, and prominent or flaring ears. Chiricahua points are large Side-Notched points made on triangular preforms. They have triangular, straight to excurvate blades; sloping shoulders; relatively broad, shallow, horizontally oriented, C-shaped notches; wide necks; and expanding stems with broad, concave bases that are characteristically as wide as the blades or wider. The ears are typically rounded but, in some cases, may be square or angled. Many of the points have reworked blades, which contributed to their being described by Martin and others (1949:60, 62–63) as "stubby" (Figure 32).

Comparison

Dick (1965:27) reported that the Chiricahua points at Bat Cave were mostly made of obsidian or chalcedony, which is consistent with Hughes and Kurota's (2010:348–349) reporting of the use of chert and obsidian at sites in the New Mexico bootheel. In southern Arizona, the points were made on a variety of cryptocrystalline or fine-grained igneous or metamorphic materials.

Table 18 presents metric information for a sample of Chiricahua points from southeastern Arizona, southwestern New Mexico, Bat Cave, and the LRG region. The sample is quite variable in regard to morphology. This was also the case for Wills's (1988:22) sample of points from the San Augustine Plains (n = 17), which had a mean neck width of 13.8 mm and a mean stem width of 18.0 mm.

The broad, shallow side notches; shorter stem; rounded ears; and greater ratio of base width to blade (shoulder) width distinguish the Chiricahua point from square- or sharp-eared Northern, Sudden, and San Rafael Side-Notched points.

Chronology

Chiricahua points are generally considered to date to ca. 4295–2580 B.C. in Arizona (Bayham 1986). A radiocarbon date of 2789–2024 cal B.C. obtained at the Moquino Site, near Grants, New Mexico, was associated with morphologically similar points (Beckett 1973). In the LRG region, Miller (2018; Miller and Graves 2019) considered the presence of Chiricahua points to be associated with the Keystone phase, dating to a later segment of the Middle Archaic period, ca. 2500–1000 B.C., but these radiocarbon dates appear to be later than the date range typically associated with this point type and are more similar to the 2825–1825 B.C. date range proposed by Chapin (2017:99) for Moquino Concave. The temporal trend for the LRG region is an overlapping sequence of San Jose to Augustin to Chiricahua points (Miller and Graves 2019).

Figure 32. Chiricahua Side-Notched dart points.

Table 18. Metric Attributes of Chiricahua Side-Notched Points from Southeastern Arizona, Southwestern New Mexico, Bat Cave, and the Lower Rio Grande Region

Attribute	Southeastern Arizona			Southwestern New Mexico			Bat Cave (Type 10B)			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	33.2	27.4–45.9	7	27.5	20.0–40.0	4		22.2–44.0	—	39.1	31.9–46.9	4
Blade length	22.8	16.6–25.6	7			—			—	27.0	19.5–33.1	4
Shoulder width	17.4	12.2–19.9	11	19.9	17.0–26.0	12		15.0–24.0	—	16.8	15.5–19.1	4
Neck width	15.5	11.6–22.9	13			—			—	15.4	13.3–18.6	5
Stem length	9.6	7.8–11.5	11			—			—	13.7	9.5–20.6	5
Stem width	19.5	15.2–22.3	9			—			—	20.6	19.6–23.2	5
Basal depth	3.5	1.2–5.4	12			—			—	6.5	5.3–8.2	5
Thickness	4.9	3.4–6.2	11	5.1	4.0–7.0	12		4.0–7.0	16	5.7	4.3–7.0	5

Middle to Late Archaic Period Dart Points

Augustin

Classification

The Augustin point type was originally defined as Type 13A by Dick (1965) at Bat Cave. He described the point as "[d]iamond-like in outline; stem usually triangular; base pointed to slightly rounded; edge commonly serrated; shoulders are slight projections to knobs on serrated specimens; on some, shoulder on one side is smaller and lower than the opposite" (Dick 1965:27).

Dick did distinguish this type from the Gypsum style, noting that the possible examples of the latter are plano-convex in cross section and have shorter and more-rounded bases (Dick 1965:28). Nonetheless, as Chapin (2017:193) pointed out, the Augustin type could be considered a regional variant of the broader Gypsum style originally defined by Harrington (1933) at Gypsum Cave in Nevada (see also Coulam 2022; Figure 33). Irwin-Williams (1973:Figure 6) included an example of this type in her En Medio phase. The Augustin point has been found across New Mexico (Chapin 2017; Dick 1965; Formby and Frey 1986; Hughes and Kurota 2010; MacNeish 1993; Miller and Graves 2019:253; Vierra and Heilen 2020). Another regional variant has been reported for the Trans-Pecos (Langtry; Turner et al. 2011:128).

As defined by Chapin (2017:103), the type consists of "medium-sized dart points with a short contracting stem and pointed or rounded base, an abrupt shoulder and a triangular blade." Although Dick (1965:27) noted that the type is "commonly serrated," it seems that both serrated and nonserrated forms are represented. The stems/bases do not exhibit grinding, and occasionally, a base may have an indentation.

Comparison

Augustin points were primarily made of chert, silicified wood, or quartzite in the San Juan Basin and obsidian and chert in the NRG and LRG regions, respectively (Ayers 1998; Beal 1984; Honeycutt 2007; Honeycutt and Fetterman 1994; Klausing-Bradley 1990; Reed 1991; Sandefur 1998; Shanks and Robinson 2011; Silverman 2001; Vierra 2013a; Vierra and Heilen 2020). Hughes and Kurota (2010:347–348) reported the use of chert and obsidian for points at sites in the New Mexico bootheel, and obsidian and some chalcedony were used at Bat Cave, in the Mogollon Highlands (Dick 1965:25; Formby and Frey 1986).

Table 19 presents metric information for Augustin points from NWNM and the NRG and LRG regions (Chapin 2017; Vierra 2013a; Vierra and Heilen 2020). The metrics appear to overlap between areas, except that Augustin points from NWNM tend to be slightly smaller and have a greater mean stem width. There are also some examples of Augustin points in the LRG region that are quite large. The metrics do overlap with those provided by Wills (1988:25) for this point type on the San Augustine Plains.

Chronology

Chapin (2017:103) suggested a possible date range of 1685–465 B.C. for this point type. An Augustin point was found with Sudden and San Rafael Side-Notched points dating to 2150–1880 cal B.C. at LA 172328, in the San Juan Basin (Cordero 2020). Miller (2018; Miller and Graves 2019) considered the presence of Contracting-stem points to be the hallmark of the Keystone phase, dating to the later segment of the Middle Archaic period, ca. 2500–1000 B.C. The shift in point technology overlaps with the use of the Chiricahua and Pelona styles. Coulam's (2022) radiocarbon study of Contracting-stem points across the Great Basin, the Colorado Plateau, and the Southwest provides some recent insight into dating the type. Her study confirms the widespread use of this point design starting about 2200 B.C. and continuing until ca. 700 B.C. The shift from San Jose– to Augustin-style points may have been associated with a period of severe drought (Coulam 2022; Vierra and Post 2023).

Leaf-Shaped Points

Classification

Leaf-shaped (Pelona and Maljamar) points are found across New Mexico. Dick (1965:27) defined the Pelona type (Type 12A) as lozenged or ovate in outline and having a pointed or slightly rounded base. The width of the point is greatest near the center, and some points exhibit slight projections (spurs) at their midpoints. Serrations may also be present on some examples. Irwin-Williams (1973:Figure 6) included an example of this type in her En Medio phase. Corley and Leslie (1963:23) identified these points as their Maljamar type (Types 10A and 10B). The point was described as leaf shaped in outline and having convex serrated blade edges with spurs wider than those on the blade, forming a contracting stem and a convex base. However, there also is a variant with wide

Figure 33. Augustin dart points.

Table 19. Metric Attributes of Augustin Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	32.2	24.4–40.7	22	36.2	29.3–41.6	7	36.5	30.2–48.1	22
Blade length			—	26.4	18.1–33.6	8	26.8	20.3–39.1	21
Shoulder width	17.5	11.0–22.9	23	20.6	17.0–32.7	16	22.4	15.5–30.4	26
Neck width	7.3	4.5–11.6	23	11.7	8.6–16.5	18	12.1	8.2–16.4	20
Stem length	7.3	3.2–11.9	23	10.4	8.0–12.6	15	10.2	7.2–14.1	26
Stem width	11.9	7.3–15.7	23	9.4	6.3–18.0	15	8.0	3.5–12.6	26
Basal depth			—	3.7	2.7–4.7	2			—
Thickness	5.3	3.8–7.3	9	5.8	4.6–8.2	18	5.7	3.7–8.3	24

side notches that create an expanding stem and a half-moon-shaped convex base (Type 10C; Alkins et al. 2015:128; Dick 1965:27; Leslie 1978:137–142; Moore 1999:33; Smith 1974; Turnbow 1997:196–197; Figure 34).

Chapin (2017:104) gave a similar description of the Pelona point, with the exception that he located the widest part of the blade at about one-third of the length from the base rather than at the midpoint. These points do not exhibit ground stems and tend to be whole and to have mostly serrated blades in the NRG region and southeastern New Mexico (Leslie 1978; Vierra 2013a).

Comparison

Leaf-shaped points were primarily made of obsidian in the NRG region and at Bat Cave, whereas chert and some obsidian were used in the LRG region, and rhyolite was used in southwestern New Mexico (Dick 1965:27; MacNeish 1993:172, 190; Turnbow 1997:196–197; Vierra 2013a; Vierra and Heilen 2020).

The ovate form has been referred to as the Pelona type in the NRG region and southwestern New Mexico and as Maljamar in the LRG region and southeastern New Mexico, although it appears that the points from the LRG region tend to be somewhat larger and have greater blade lengths than their northern counterparts (Table 20). The Pelona type appears to be rare in the San Juan Basin (Vierra et al. 1986:58). Leslie's (1978) Type 10C stemmed form has been referred to as Maljamar and is limited to the LRG region and southeastern New Mexico.

Chronology

Miller (2018; Miller and Graves 2019) considered the Pelona type to be associated with the Keystone phase, dating to a later segment of the Middle Archaic period, ca. 2500–1000 B.C. This is similar to Coulam's (2022) dates of 2200–700 B.C. for Augustin points. Chapin (2017:104) noted that the Pelona type has a similar date range or dates to slightly later. Wills (1988:25) stated that Pelona-style points are often found at sites with Augustin points on the San Augustine Plains. A radiocarbon date from a hearth with a calibrated date range of 2460–2276 B.C. was associated with a Maljamar point at LA 155316, in the southern Tularosa Basin, north of El Paso (Graves et al. 2022). This date also fits with the later segment of the Middle Archaic period.

Bipointed Points

Lerma

Bipointed projectile points are occasionally found in southeastern New Mexico and are considered parts of the Augustin and Leaf-shaped (Pelona) groups (Miller and Graves 2019). This style has been recognized in the Trans-Pecos and southern Texas as the Lerma type. These points are described as slender, symmetrical, bipointed points that have been thinned at either end. Some examples may have convex bases (Figure 35; Gray 2013:27; MacNeish 1993:166; Turner et al. 2011:129).

Figure 34. Leaf-shaped dart points: (*top row*) Pelona and (*bottom row*) Maljamar.

Table 20. Metric Attributes of Leaf-Shaped Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Pelona; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	31.3	21.2–46.4	22	32.8	21.1–46.1	39	39.6	28.0–52.5	20
Blade length			—	22.3	13.9–29.5	19	30.5	25.2–39.9	11
Shoulder width	16.5	14.2–20.1	22	17.5	12.7–26.9	42	17.4	14.5–22.4	20
Neck width	6.0	1.7–14.1	22	15.0	11.6–18.4	24	13.1	9.3–18.0	10
Stem length	9.7	5.2–15.1	22	11.6	8.0–18.8	25	12.9	9.4–21.0	12
Stem width	15.5	13.4–19.3	22	10.9	4.0–16.9	24	9.4	4.4–14.1	20
Basal depth			—			—			—
Thickness	5.1	3.4–7.3	5	5.5	3.4–7.5	45	6.0	4.1–9.1	21

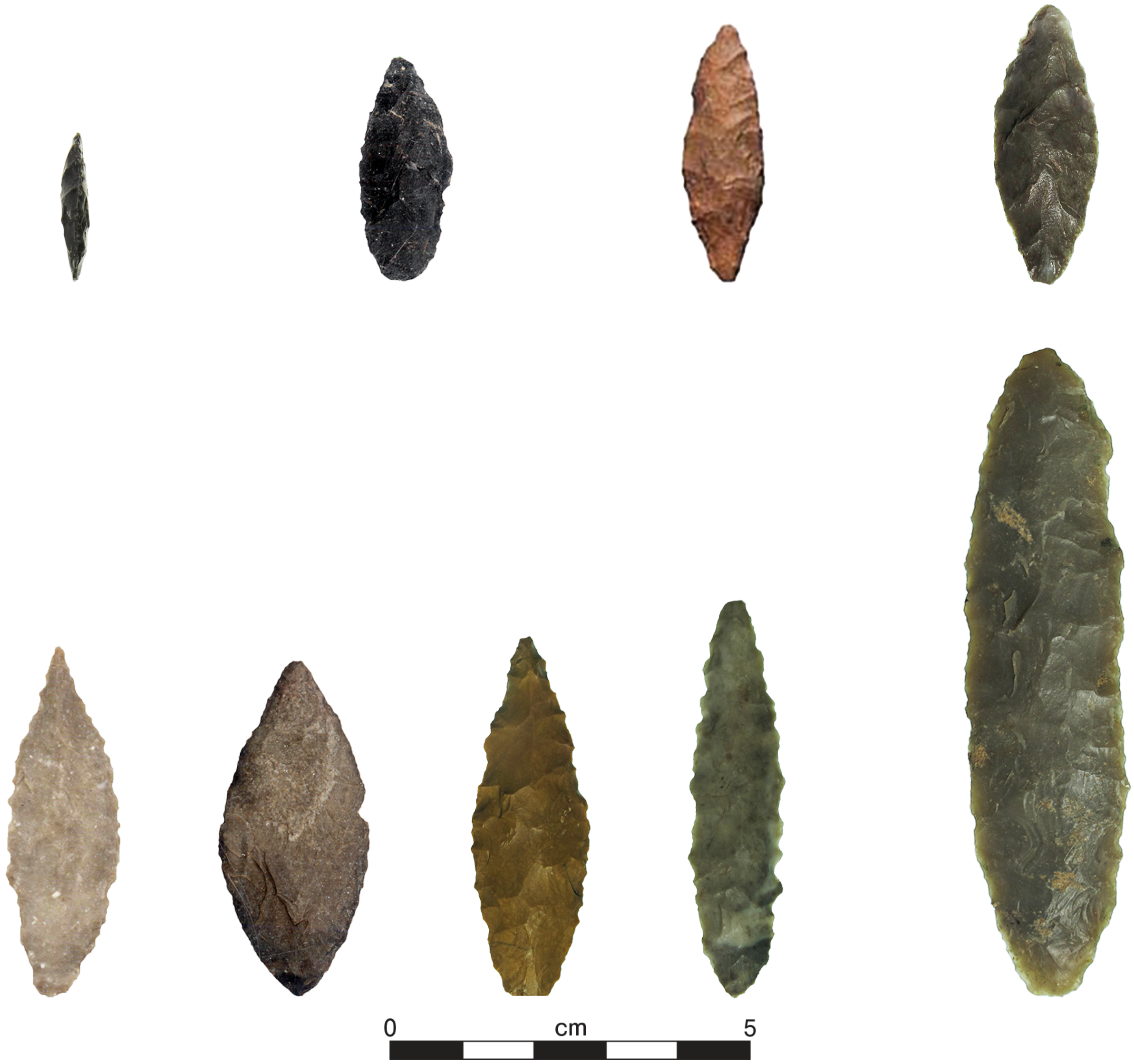


Figure 35. Bipointed dart points.

Chronology

Miller and Graves (2019) considered the Lerma style to be associated with the Keystone phase, dating to a later segment of the Middle Archaic period, ca. 2500–1000 B.C. The estimated age of the Lerma type ranges from the Paleoindian period to the Archaic period in the Trans-Pecos and southern Texas, although most are found in Archaic period contexts (Turner et al. 2011:129).

Cortaro

The Cortaro point type was defined by Roth and Huckell (1992). Points of this type are primarily found in southern Arizona and southwestern New Mexico, and they are rare in other parts of the state (Hovezak & Sesler 2002:Figure 2.20f–h; Hughes and Kurota 2010:349–350; Knight 2003; Miller and Graves 2019; Roney and Hard 2020; Sliva 2015:11; Vierra and Heilen 2020). The point is an unnotched triangular point with excurvate blade edges and a straight to concave base (Sliva 2015:11). The points are variable in morphology and flaking quality, and few reflect “well controlled, pressure finishing” (Roth and Huckell 1992:357; Figure 36).

Comparison

In southern Arizona, Cortaro points were made on a range of materials, including rhyolites and other

Figure 36. Cortaro dart points (with permission from John Roney, Robert Hard, and R. J. Sliva).

fine-grained igneous rock, metasediments, quartzites, and cherts. Many have asymmetrical outlines, thick edge angles, and thick blades, leading Sliva (2005:93) to suggest that they also may have been used as hafted knives. In southwestern New Mexico, they were made of a variety of materials, including chert, chalcedony, basalt, and rhyolite (Formby and Frey 1986; Hughes and Kurota 2010:349–350; Knight 2003).

Table 21 presents metric information from Roth and Huckell (1992), Knight (2003), and Sliva (2015), who provided similar ranges for the dimensions of these points.

Chronology

Roth and Huckell (1992) suggested that the Cortaro point spans the Middle to Late Archaic period and possibly dates to between ca. 2440 and 880 B.C. If so, this would be similar to the date range identified for Augustin points. However, Roney and Hard (2020:231) noted the presence of Cortaro-style points at LA 162023, in southwestern New Mexico, in association with corner-notched dart points dating to ca. 930 B.C.–A.D. 825, which is later in time. In NWNM, two dates from LA 70667 dated Cortaro-like points to 1285 and 1240 B.C. (Sesler 2002a). Sliva (2015:14) noted that although the type has been recorded in Cienega phase assemblages dating to approximately 800 B.C.–A.D. 50 in southern Arizona, it does not appear to have been actively produced after the earlier portion of the San Pedro phase, approximately 1000 B.C.

Armijo

Classification

The Armijo projectile point type was originally defined by Irwin-Williams (1973) as part of the Oshara Tradition, based on excavations conducted at various sites, including Armijo Shelter. Armijo points are found across New Mexico, except on the Eastern Plains (Vierra 2018). Irwin-Williams (1973:11) described the Armijo point as an evolved form of the "San Jose style with short widely expanding stems and concave or (later) straight bases." Turnbow (1997:179, Figure 16.7) designated this type Armijo Corner-Notched, and Moore and Brown (2002) designated it Armijo Stemmed A. Chapin (2017) reclassified the Armijo type as San Jose Side-Notched, noting that the type was originally referred to as "Late San Jose" and is more similar to the San Jose type in its style and date range. He considered it similar to

Table 21. Metric Attributes of Cortaro Points from Southern Arizona and Southwestern New Mexico

Attribute	Southern Arizona (Roth and Huckell 1992)		Southwestern New Mexico (Knight 2003)			Desert Archaeology, Inc., Sites (Sliva 2015)			Desert Archaeology, Inc., Database and Arizona State Museum Collections		
	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	36.9–45.1	39	43.2	36.0–45.8	6	37.0	22.7–55.7	34	37.9	26.1–54.8	28
Maximum width	17.5–21.3	39	21.3	17.2–28.1	9	19.5	14.2–28.7	47	20.6	16.3–27.1	42
Basal depth	1.44–2.31	39			—	2.2	0.7–4.8	45	2.1	0.8–4.9	39
Thickness	6.5–7.2	39	6.7	5.1–9.8	6	7.1	4.6–13.0	47	7.1	5.4–9.8	30

the Grants San Jose style but with a shorter overall length, a shorter stem, and a more-flaring or eared base. Like San Jose points, Armijo points have blades that are serrated and stems and bases that are ground (Figure 37). This point type is commonly identified as Armijo in NWNM and the NRG region (see Chapman 1977:Figure 11.10; Elyea and Hogan 1993:Figure 5.1; Kearns and Silcock 1999:6–12; Kemrer and Heinsch 1983:Figure 5.3; Moore 1985; Moore and Brown 2002; Randolf and Snell 1998:Figure 3.232; Sessions 1979:Figure 31; Simmons 1982b:Figure 32; Vierra 2013a), and Vierra and Heilen (2020) identified the Armijo point type in the LRG region. Consequently, we have retained the original "Armijo" type designation.

Comparison

In the San Juan Basin, a variety of fine-grained and cryptocrystalline siliceous materials were used for Armijo points, including chert, chalcedony, silicified wood, orthoquartzite, and obsidian. These points were mostly made of obsidian in the NRG region and chert in the LRG region (R. Moore 1994; Moore and Brown 2002; Vierra 2013a; Vierra and Heilen 2020).

Table 22 presents metric information for Armijo/San Jose Side-Notched points from NWNM and the NRG and LRG regions (Chapin 2017; Vierra 2013a; Vierra and Heilen 2020). We agree that Chapin's San Jose Side-Notched style includes bases that are similar to those of the original Armijo type—that is, short, wide, and eared and having relatively deep concavities—but Armijo points are generally shorter, narrower, and thinner than San Jose points. Overall, the record shows decreases in the stem lengths of Bajada (18.3–19.8 mm), San Jose (11.9–13.9 mm), and Armijo (6.4–9.3 mm) points over time.

Chronology

Irwin-Williams (1973) originally defined the Armijo phase as dating to (uncalibrated) 1800–800 B.C. Chapin (2017:96) suggested an older date range of 3075–1685 B.C. based on excavations conducted at Armijo Shelter. Armijo points are more common at Armijo Shelter than San Jose points and have been found in the lower Strata G–I. The Armijo type is generally considered to date to the Late Archaic period, per Irwin-Williams (1973); however, it seems more likely that its date range covers the Middle to Late Archaic period transition. Indeed, it is possible that Chapin's San Jose Side-Notched was earlier and that its date range overlaps with that of the Armijo type. This appears to be the case for his San Jose and Armijo Side-Notched types at Armijo Shelter.

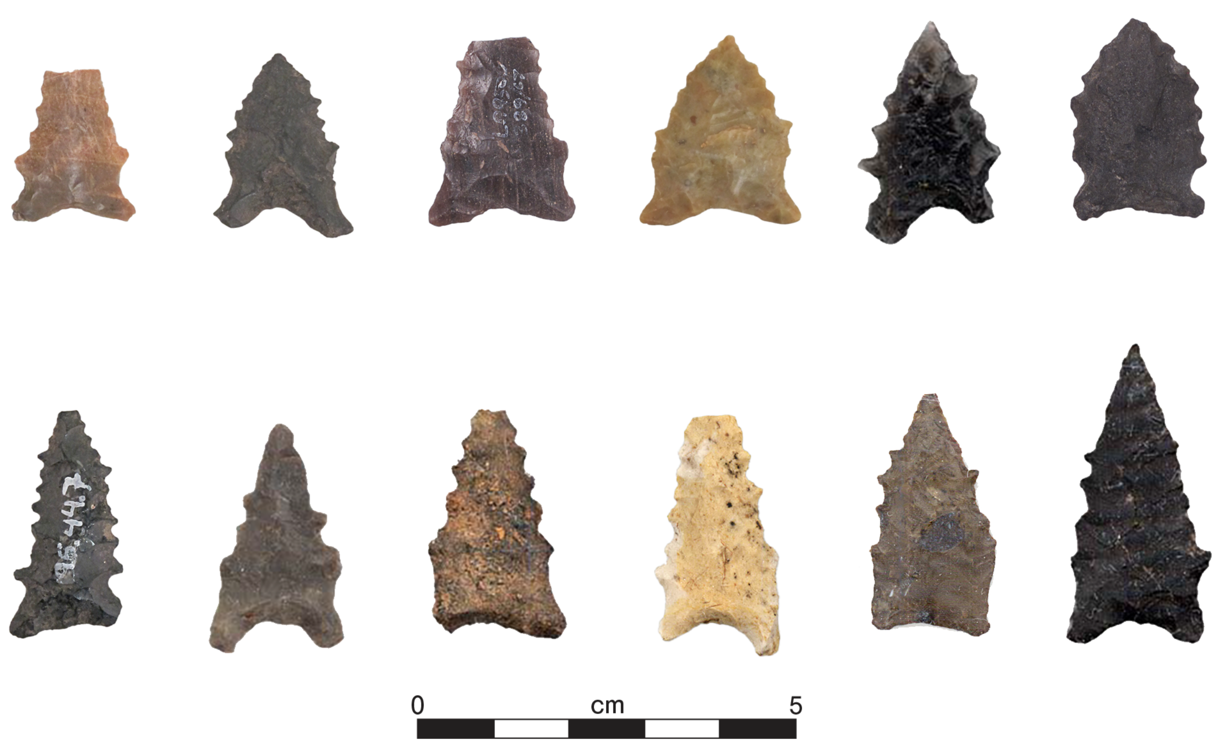


Figure 37. Armijo dart points.

Table 22. Metric Attributes of Armijo/San Jose Side-Notched Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (San Jose Side-Notched; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	28.9	20.0–50.0	49	29.2	20.9–47.0	13	27.2	17.1–40.1	14
Blade length			—	21.6	11.9–34.0	15	17.8	10.7–31.3	14
Shoulder width	15.2	10.8–21.1	55	16.6	10.8–26.7	32	16.3	11.9–19.4	15
Neck width	12.0	8.4–16.8	55	13.2	8.8–19.4	39	15.4	11.4–17.3	15
Stem length	6.4	4.6–8.5	55	8.3	5.0–13.0	34	9.3	6.4–12.1	15
Stem width	12.4	8.4–17.6	54	16.9	11.6–28.9	36	16.6	11.9–20.2	15
Basal depth			55	3.2	1.8–6.2	33	2.8	1.7–5.2	12
Thickness	4.3	3.2–6.2	32	5.0	3.5–7.7	39	4.6	3.2–7.3	14

Datil and Fresnal

Classification

Dick (1965:28–29) described Datil Type 14 as having a modified rectilinear outline with excurvate to straight blade edges, spurs at the shoulders created by blade serration, and a straight, square base. The serrations that ultimately end as larger spurs at the shoulders are distinctive traits of this type (Dick 1965:28–29; Dockall 1991:Figure 25q; Jones 1990:72–73). This description is not particularly well supported by the accompanying illustrations (Sliva 2015:55). Indeed, some Datil points exhibit incurvate blade edges that may be beveled and have straight to slightly expanding stems and straight to slightly convex bases (Figure 38).

Datil points are superficially similar to the roughly contemporaneous Empire points of southern Arizona and northern Sonora but differ in their shoulder knobs and their blade (shoulder) widths, which are greater than the widths of their stems (Stevens and Sliva 2002). Chapin (2017:101–102) defined an Armijo Stemmed point type with a serrated blade that is like the Datil style. It exhibits a triangular to elongated blade, an abrupt shoulder, a slightly expanding stem, and a straight or convex base that is not ground.

The Datil style has also been referred to as Fresnal (Jones 1990:75–76; MacNeish 1993:180; MacNeish and Beckett 1987:18) and was referred to as the Wide-Stemmed Straight Base type by Miller and Graves (2019; see also Thoms 1977:Type 8; Vierra and Heilen 2020 [San Jose Subtype 4]). The Fresnal type exhibits a triangular blade with a finely serrated, straight to slightly excurvate blade edge. The barbs point slightly downward at the shoulders, and the stem is square (Figure 39). It is possible that some Datil points are resharpened Fresnal points. Miller and Graves (2019:236) noted that Fresnal points are relatively uncommon in the LRG region, southeastern New Mexico, and the Trans-Pecos, and they are sometimes referred to as Bulverde or Carrolton points when encountered in Texas (Turner et al. 2011).

Comparison

The Datil points at Bat Cave were made of rhyolite and basalt, whereas Armijo Stemmed points were made of obsidian and chert, and Fresnal points were made of chert and rhyolite (Chapin 2017:100; Dick 1965:29; Jones 1990:75). Table 23 provides metric information for Datil and Fresnal (MacNeish 1993:180) points from the LRG region. The sample sizes are quite different, but the metrics are similar.

Chronology

Miller (2018; Miller and Graves 2019) considered the Datil point style to span the Middle to Late Archaic period (Keystone to Fresnal phase) boundary and to have had a peak ca. 2400–1200 B.C., which is similar to the date range for LRG-region Side-Notched points and that ascribed to Bulverde and Carrolton points (Turner et al. 2011:67, 70). Chapin (2017:392) stated that his Armijo Stemmed type postdates Armijo Side-Notched A and B, is contemporaneous with Augustin, and predates the Pelona (Leaf-shaped) type at Armijo Shelter. He suggested a date range of 1700–705 B.C. for Armijo Stemmed.

Figure 38. Datil dart points.

Table 23. Metric Attributes of Datil and Fresnal Points

Attribute	Datil			Fresnal (McNeish 1993)		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	39.1	36.7–47.8	5	37.2	32.5–45.0	26
Blade length	28.9	23.2–38.1	5			—
Shoulder width	22.5	17.2–24.6	6	22.4	18.2–27.0	26
Neck width	12.4	11.1–13.5	6			—
Stem length	10.6	8.8–12.7	6	10.6	8.0–13.4	26
Stem width	12.1	10.4–13.5	6	11.8	9.1–14.0	26
Basal depth			—			—
Thickness	6.4	5.4–8.2	6	6.0	5.0–7.1	26

Figure 39. Fresnal dart points.

Late Archaic Period Dart Points

Side-Notched Points

Classification

Side-Notched dart points have been associated with early agriculture in the southern and northern Southwest, including New Mexico (Matson 2007; Miller 2018; Sliva 2015), although there is considerable variability in this point type across the state. Dick (1965:25) originally defined San Pedro Side-Notched Type 6 as "triangular in outline" and having a "convex base; wide, medium-deep side notches . . . [and a] base as large as the body or larger"—a definition that included multiple variations on the Side-Notched point template (Dick 1965:Figure 20). Leslie (1978:135–136) classified Side-Notched points in southeastern New Mexico as Type 9. Irwin-Williams (1973:Figure 6c) included an example of this type in her En Medio phase.

In NWNM, large Late Archaic period notched point styles have type names with origins in the Oshara Tradition, and those from more-distant regions are simply identified as Late Archaic or Basketmaker II period or are assigned nondiagnostic type names (e.g., Type 1, Type 2). The Elko series, a point group with origins in the Great Basin and the Intermountain West, is sometimes used to identify large Side- or Corner-Notched points in NWNM, but we have chosen not to use "Elko" as a type name, in favor of more regionally appropriate designations.

Armijo Side-Notched

Armijo Side-Notched A and B are two Side-Notched dart-point types defined by Chapin (2017:99–100; see also Brown 1993; Turnbow 1997:179, Figure 16.8; Vierra 2013a). These points are primarily found in northern New Mexico, and there are a few examples in southern New Mexico. The small to medium-sized Armijo Side-Notched A points have long blades relative to their stem lengths. The blades are slightly convex or straight and are often serrated (Figure 40). The low, horizontal notches are shallow, and the short, expanding stems are roughly equal in width to the shoulders. The horizontal ears are rounded or, less frequently, pointed. The bases are straight and often ground. Armijo Side-Notched B points also have slightly excurvate or straight blades that are long relative to their stems. They are distinguished by greater variability in their notch and stem shapes and by their bases, which vary from flat to convex and are significantly narrower than their blades. Also, the notches are wider, and the blades are less often serrated and less commonly ground. Chapin's (2017:97) Moquino Small Side-Notched point could be considered a variant of the Armijo Side-Notched type.

En Medio Side-Notched

Chapin (2017:108) characterized the En Medio Side-Notched point as a medium-sized to large Side-Notched point with an expanding convex base that is typically only slightly narrower than the shoulder width (Figure 41). The blade is straight to excurvate, and serration and stem grinding are generally absent. En Medio Side-Notched points are large relative to Armijo Side-Notched variants; the shoulders and bases are wider, the stems are longer, and the notches are deeper and wider. The convex base differentiates En Medio Side-Notched from Armijo Side-Notched A points, and En Medio Side-Notched and Armijo Side-Notched B points can have similar morphologies, but size is the distinguishing variable (Chapin 2017:100). Notch-orientation angle is another distinguishing attribute; the En Medio notch angle (albeit greater than 65°) is not as horizontal as that of the Armijo or Moquino Side-Notched type. Chapin considered the En Medio Side-Notched type to be most like the San Pedro style (see also Brown 1993; Turnbow 1997:182–186; Vierra 2013a).

Western Basketmaker Side-Notched

In NWNM, there are large to medium-sized Side- and Corner-Notched points similar to San Juan Basketmaker/Western Basketmaker, Colorado Plateau, and Arizona Transition Zone point types (Geib 1996:Figure 19, 2011:Figures 3.14 and 5.37; Guernsey and Kidder 1921:Plates 34 and 35; Kidder and Guernsey 1919:Figure 90; Morris and Burgh 1954:56, Figure 29; Sliva 2015). These points are differentiated from the En Medio series by their narrower, lanceolate blades and narrower necks—traits they share with the Armijo Corner-Notched type (Figure 42). Like Elko-series points (Holmer 1980a:67, 1986), there is a continuum of notch placement from corners to sides on otherwise-comparable points (Geib 1996:63). Also, notch placement, orientation, and/or shape may differ from side to side on a given point.

Sliva (2015:78–85) defined three Western Basketmaker II subtypes: White Dog, Crescent, and Triangle. All three types are long relative to their widths and typically have slightly convex or straight

Figure 40. Armijo Side-Notched dart points.

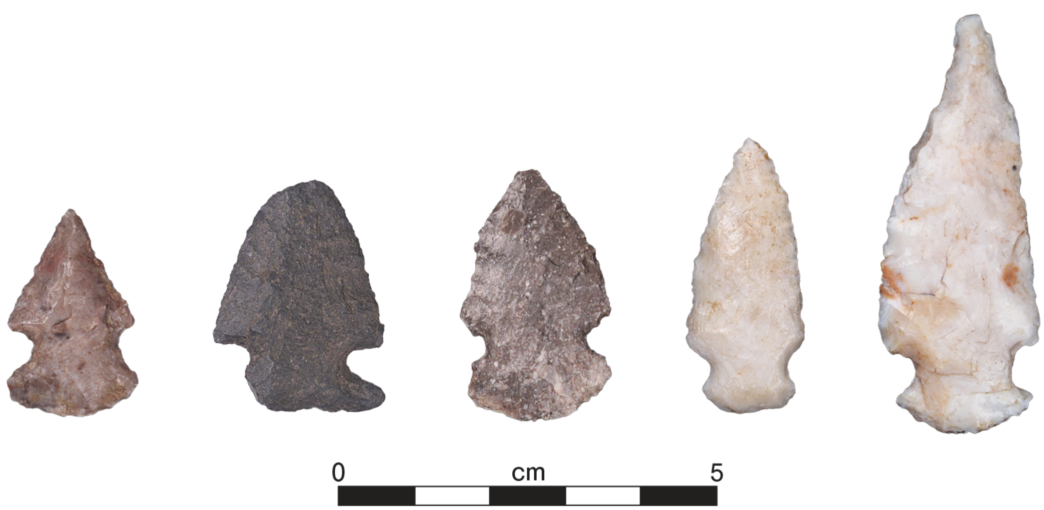


Figure 41. En Medio Side-Notched dart points.

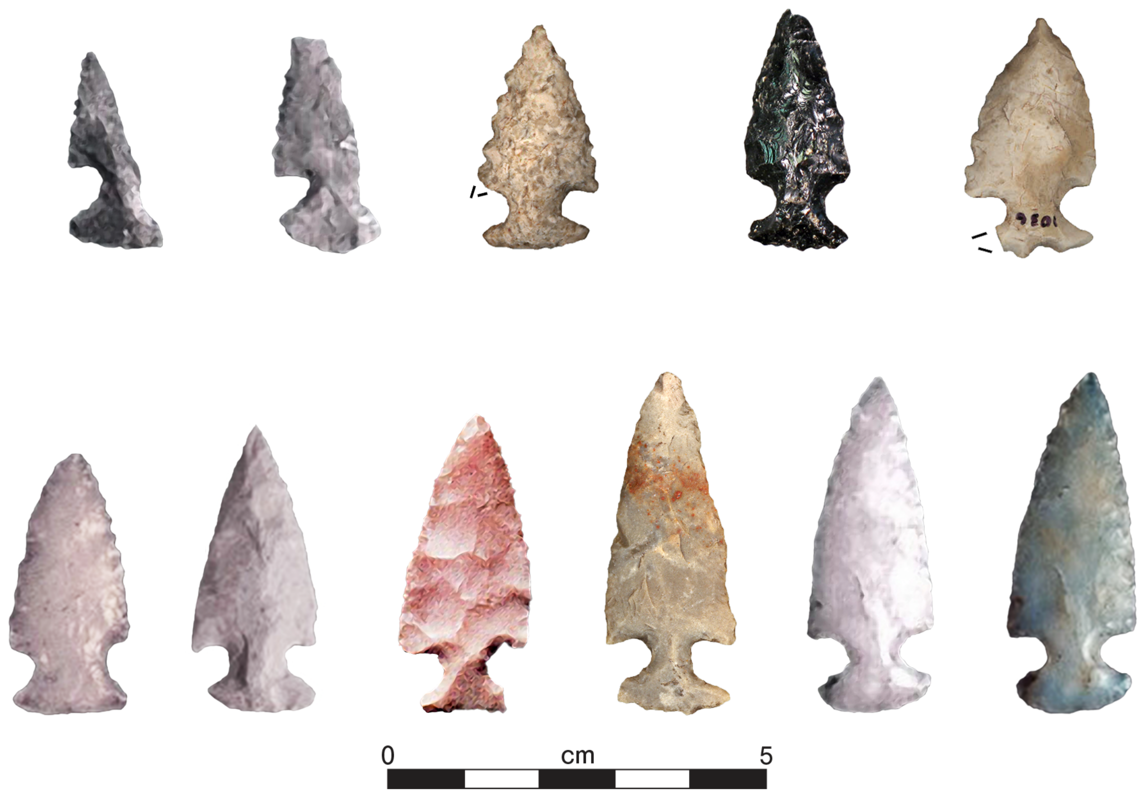


Figure 42. Western Basketmaker Side-Notched dart points.

blades and relatively narrow, lanceolate shapes, in contrast to the more-triangular En Medio form (Sliva 2015:Figure 2.67). Basketmaker White Dog points have horizontal shoulders, C- or very-open-V-shaped horizontal notches set just above the proximal corners; distinctive, parallel-sided, narrow necks; and straight bases that are narrower than the blades (see also Geib 1996:62–64; Moore and Brown 2002). Points similar to the White Dog type have been recorded in NWNM (Morris 1980:Figure 34y; Sliva 2015:81).

Western Basketmaker Crescent points have relatively long, narrow, straight to slightly convex blades; long, narrow necks; short, expanding flanges; and slightly convex bases (Sliva 2015:80–82, Figure 2.67). The Western Basketmaker Crescent point is distinguished from the Western Basketmaker White Dog point by its horizontally oriented, deep, C-shaped side notches that create a crescentic base that curves up into narrow, pointed ears. Somewhat similar points have been recorded in the southern Chuska Valley and the Upper San Juan Basin (Kearns and Silcock 1999:Figure 6.33; Whitten 1993:Figure 3.15g). Other lanceolate, narrow-neck dart points with expanding stems and convex bases that do not precisely match the Basketmaker White Dog or Crescent form have been documented in the southern Chuska Valley (Kearns 2007:Figure 4.34 [*top row, middle two*]; Kearns and Silcock 1999:Figures 6.31 and 6.32).

Side-Notched points similar to unnamed Basketmaker II period points from southeastern Utah (Kidder and Guernsey 1919:Figure 90b) also have been recorded in NWNM (Hadlock 1962:Figure 6i). They are medium-sized points with triangular, slightly excurvate blades and horizontal/straight shoulders. They are distinguished by their narrow, diagonal, U-shaped notches set just above the basal corners; expanding stems with sharp corners; and straight/flat bases that are as wide as the blades. They lack the parallel-sided necks characteristic of White Dog points.

Guernsey and Kidder (1921:37) and Guernsey (1931:73) noted that almost all the dart points that they encountered were notched at right angles to their long axes, whereas the knife blades were notched at acute angles. Therefore, Basketmaker Side-Notched points were presumably used as darts, whereas the Corner-Notched points were used as darts and knives.

San Pedro

The San Pedro point originally was defined by Sayles and Antevs (1941) simply as having a “straight base and wide, lateral notches." Haury (1950) soon refined the definition to include the "expanding stem, sharp lateral barb, [and] shallow lateral notches often creating a stem with a long neck." In New Mexico, it was Dick (1965:25) who described the San Pedro point as triangular in outline and having medium-sized to wide side notches and a convex base that is as large as the body or larger. These generic type descriptions have led to some confusion around the morphological continuums of several different attributes of large Side- and Corner-Notched points that are common throughout the Late Archaic period (see Hard and Roney 2020:94–102).

The San Pedro–style point is properly characterized by a broad blade with either well-defined shoulders or downward barbs, a relatively wide neck, and distinctive horizontally oriented notches that are either C or half-heart shaped (Sliva 2015). The San Pedro phase point in southern Arizona (1200–800 B.C.) is characterized by true side notches placed low on the lateral edges of the preform, with the bottoms of the notch openings set at or just above the corners, resulting in a basal width that equals or exceeds that of the blade. San Pedro phase bases are almost uniformly flat, reflecting preforms with sharp basal corners. Several variations on the basic San Pedro design template emerged in the later San Pedro phase (after 1000 B.C.) and incorporated different combinations of notch sizes and base-shape attributes. During the subsequent Cienega phase (800 B.C.–A.D. 50), the notches were centered on the corners, with the top of each notch opening intersecting the lateral edge of the preform and the bottom intersecting the base, resulting in basal widths that are narrower than the blade (shoulder) widths. Cienega phase point bases are often convex, indicating that the preform shape changed, as well.

San Pedro Norte and San Pedro Centro are the only reliable subtypes identified at this time for the San Pedro phase (Sliva 2015). However, most of the San Pedro points in southern Arizona do not conform to either subtype (Figures 43 and 44). This also appears to be the case for the LRG region and southeastern New Mexico. Some points have half-heart-shaped

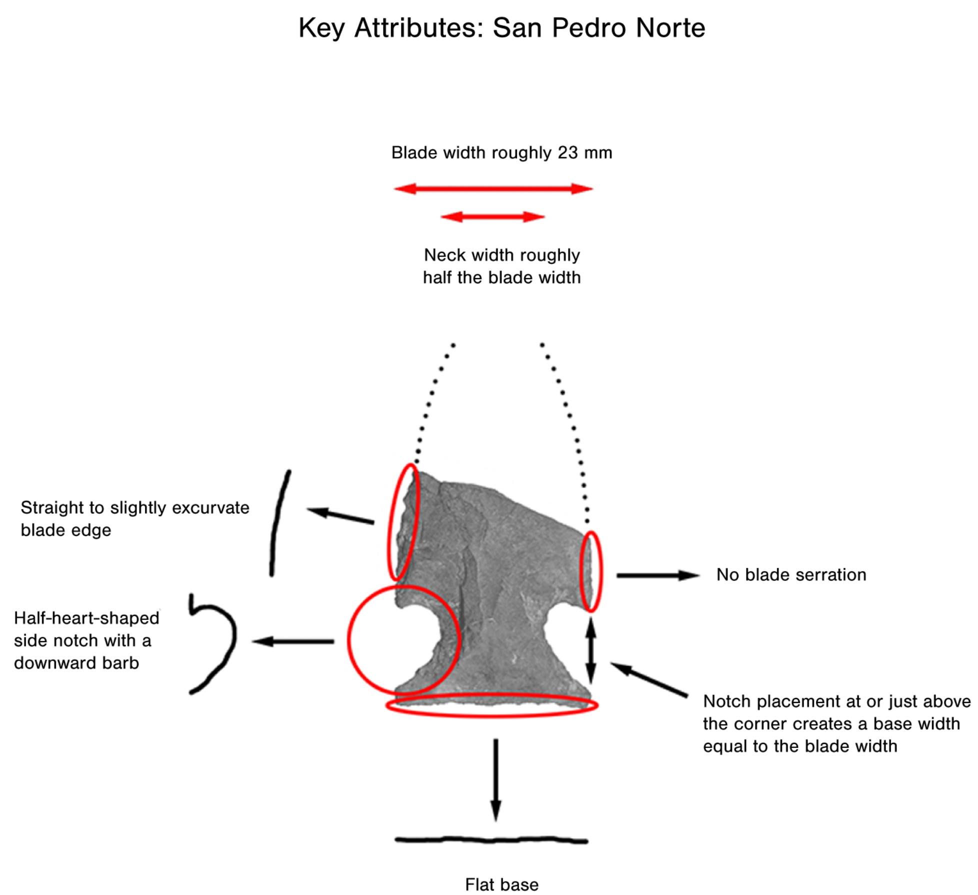


Figure 43. Key attributes for identifying San Pedro Norte points (with permission from R. J. Sliva [2015:18]).

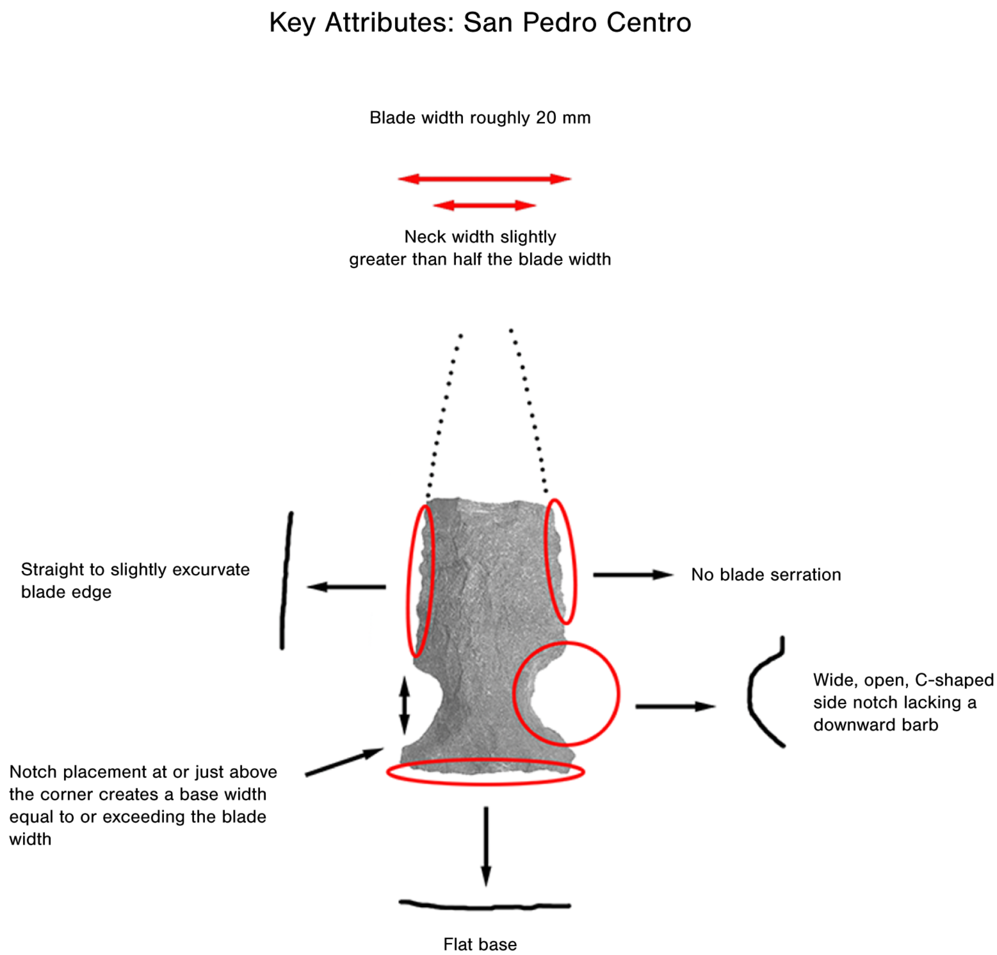


Figure 44. Key attributes for identifying San Pedro Centro Points (with permission from R. J. Sliva [2015:26])

notches that are proportionally too small or stems and bases that are too narrow to allow the points to fit readily within the Norte subtype, whereas others have C-shaped side notches that are too closed and bases that are too rounded for the Centro subtype. Regardless of how the variations are categorized, all San Pedro points, with their continuums of metric and morphological attributes, are unified by their C- to half-heart-shaped notches (to the exclusion of V- and U-shaped notches), blade (shoulder) widths under 30.0 mm, and basal widths equivalent to those of the blades. Figure 45 illustrates some examples of the San Pedro type from southwestern New Mexico and the LRG region, and Figure 46 illustrates some Late Archaic period Side-Notched points from the LRG region.

Notch shape and orientation are the keys to differentiating San Pedro points from superficially similar points. San Pedro points from any time period should not be confused with points that have diagonally oriented, deep, U- or V-shaped notches at their corners or bases, which are common on points from the southern Colorado Plateau and the Mogollon Highlands. Also, they should not be confused with points from the Durango/San Juan region of southwestern Colorado and NWNM, which have C-shaped notches but bases that are rounded and significantly narrower than their blades (see Morris and Burgh 1954:Figures 81.3, 81.4, 82.1, and 82.3). San Pedro points also should not be mistaken for early Western Basketmaker II points from the Colorado Plateau. The primary distinguishing features of Western Basketmaker II points are their far-narrower necks (usually not exceeding 10.0 mm) and gracile design, and their mean weight (under 3 g) is half that of San Pedro phase San Pedro points (Sliva 2015).

Figure 45. San Pedro dart points.

Figure 46. Lower Rio Grande–region Side-Notched dart points.

Side-Notched Points: Comparison

In the San Juan Basin, Side-Notched dart points were mostly made of fine-grained or siliceous materials, including chert, silicified wood, chalcedony, quartzite, and, occasionally, obsidian (Kearns, personal communication 2024). Obsidian and chert points are prevalent in the NRG region, and mostly chert and some obsidian points are present in the LRG region. Obsidian, basalt, rhyolite, and chalcedony points have been recorded at Bat Cave (Dick 1965:25; Vierra 2013a; Vierra and Heilen 2020).

Table 24 provides metric data for Armijo Side-Notched A and En Medio Side-Notched points from NWNM and Side-Notched points from the NRG and LRG regions. Overall, the Armijo Side-Notched point is relatively smaller than points of these other types, which are larger and more like each other, except the Side-Notched point with the distinctive convex base, which seems to be limited to the south.

Side-Notched Points: Chronology

Chapin (2017:99–100) suggested that his Armijo Side-Notched A and B types postdate the San Jose type and partially temporally overlap with the Augustin and Pelona (Leaf-shaped) types at Armijo Shelter. Kearns (2018) dated the Late Archaic period to ca. 1500 B.C.–A.D. 500, and Miller (2018) dated it to 1400 B.C.–A.D. 300–500. However, Miller (2018; Miller and Graves 2019) stated that the San Pedro style marks the initial definition of the Fresnal phase, ca. 1400 B.C., and was followed by the Corner-Notched style associated with the Arenal and Hueco phases, beginning ca. 750 B.C. and ending ca. A.D. 500. Chapin (2017:107–108) also noted a slightly later date range for the En Medio Side- and Corner-Notched types: ca. 154 B.C.–A.D. 582.

In the San Juan Basin, 59 radiocarbon dates from 13 sites place Late Archaic period Side-Notched point types between ca. 1420 B.C. and A.D. 180 (Bargman et al. 1999;

Table 24. Metric Attributes of Armijo and En Medio Side-Notched Points from Northwestern New Mexico and Side-Notched Points from the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Chapin 2017)						Northern Rio Grande Region			Lower Rio Grande Region		
	Armijo Side-Notched A			En Medio Side-Notched								
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	29.2	16.4–50.0	24	37.0	22.1–56.0	19	33.9	21.8–55.9	21	36.6	22.3–48.8	13
Blade length			—			—	24.9	12.9–44.5	21	27.3	13.6–41.0	13
Shoulder width	14.7	12.2–18.0	28	22.2	15.4–32.4	21	18.2	12.3–38.4	33	17.7	14.2–24.3	15
Neck width	11.6	9.0–14.5	27	13.8	9.6–18.4	21	13.1	8.1–14.8	41	13.8	11.9–15.6	9
Stem length	6.0	3.5–7.5	28	9.8	7.7–11.7	21	9.1	6.3–10.4	41	10.4	6.71–13.0	15
Stem width	11.9	9.5–15.0	27	15.3	10.1–21.3	21	17.2	11.7–20.3	41	17.1	12.7–23.3	15
Basal depth			—			—	2.2	1.8–2.5	2	2.0	2.0	1
Thickness	4.5	4.0–4.7	4	5.8	3.7–7.5	10	5.6	3.3–6.9	41	5.6	4.8–7.7	15

Brown et al. 1991; Freuden 1998; Hancock et al. 1988; Honeycutt and Fetterman 1994; Hovezak and Sesler 2002; Lakatos 2014; Kearns and Moore 1988; Kearns et al. 1998; Korgel 1998; Murrell and Lengyel 2014:8; Railey 2008; Whitten 1993). Dates associated with Armijo Side-Notched A points range from ca. 740 B.C. to A.D. 180, and Armijo Side-Notched B points are dated to ca. 1420–150 B.C. Dated contexts with En Medio Side-Notched points range from ca. 775 B.C. to A.D. 25. The narrow, lanceolate, narrow-neck points similar to San Juan or Western Basketmaker points are associated with dated contexts ranging from ca. 1135 B.C. to A.D. 25.

The New Mexico dates correspond to dates on the northern periphery of the San Juan Basin in Colorado and those to the west, on the southern Colorado Plateau (Geib 2011:208, 272; Hammack and Walkenhorst 1991).

Corner-Notched Points

Classification

The Corner-Notched dart point has often been considered a hallmark of the Late Archaic period and the transition to agriculture in the northern Southwest and New Mexico. These points are typically identified as En Medio or Basketmaker II period points (Chapin 2017:104; Irwin-Williams 1973; Kearns 2018:232; Morris and Burgh 1954). The archetypical Corner-Notched point is medium sized to large and has a triangular excurvate blade that extends into barbs below the neck. These barbs can extend the total length of the blade, as much as 6.0 mm, providing a much longer cutting edge. The blades are typically not serrated, and the stems and bases are not ground. The bases can be straight or convex and are rarely concave (Dick 1965:25; Irwin-Williams and Tompkins 1968:Figure 7; Thoms 1977; Vierra 2013a).

In NWNM, most straight- or convex-based variants are identified as En Medio Corner-Notched or the concave-based variant, En Medio Eared (Chapin 2017:104–108; Turnbow 1997:182–184). Kearns (2018:232) noted that in the San Juan Basin, some large Basketmaker II period Corner- and Side-Notched points resemble Elko-series points (see also Brown et al. 1991:534, Figure 7.9, 1993:405; Thoms 1977; Turnbow 1997:182–191; Hovezak and Sesler 2002:75–78; Wegener et al. 2005:20.9). The Elko Corner-Notched and Eared types are comparable to the En Medio Corner-Notched and Eared styles, respectively. Brown (1993:404–405) and others (Hovezak and Sesler 2002:76; Moore and Brown 2002; Turnbow 1997:182, 187) have cited notch-opening differences to distinguish En Medio Corner-Notched points (with notch widths of greater than 5.0 mm) from Elko Corner-Notched points (with notch widths of less than 5.0 mm). However, points of both forms can be present at the same site, share a common temporal span, and appear to "represent slight variants of a common temporal type" (Turnbow 1997:188).

In the Intermountain West, there is a range of variation in Elko-series points, and the temporal intervals are not generally equivalent to those of large Corner-Notched points in New Mexico (Berry and Berry 1986:Figure 14; Holmer 1978:Table 10, 1980a:80–81, Figure 42, 1986). We concur with Chapin (2017:105) and discourage the use of "Elko" in northern New Mexico unless it is used for points recorded in early occupation areas (i.e., older than ca. 1000 B.C.) comparable in age to those in the eastern Intermountain West (see Holmer 1986:101–104, Figures 6, 12, and 23).

Two Corner-Notched point types have been defined for southern New Mexico: the Carlsbad and Hueco types. The latter also has been identified in the Trans-Pecos (MacNeish 1993:182; Mallouf 2013:205–209; Miller and Graves 2019:256; Miller et al. 2016:305).

En Medio Corner-Notched and En Medio Eared

Chapin (2017:106–107, Figure 5.12) defined the En Medio Corner-Notched point as a large to medium-sized Corner-Notched point with wide, barbed shoulders; an expanding stem; and a flat or convex base (see also Brown 1993; Turnbow 1997:182–186). The En Medio Eared point is essentially an En Medio Corner-Notched point with a concave base. The notches are typically C or soft-V shaped, but they vary in size and shape from long (deep) and narrow to shallow and broad. The diagonal notches originate at the proximal corners or slightly into the base. The triangular blades are typically broad, have straight to convex margins, and are rarely serrated. The bases are wide but not as wide as the blades. The bases and stems are not ground (Figure 47).

The size of most En Medio points indicates use as dart points; however, morphologically similar, albeit smaller, points dating to the late Basketmaker II period (i.e., post–A.D. 300) are considered arrow points (Irwin-Williams 1973:13; Reed 2012:19; Reed and Kainer 1978; see also Trujillo Corner-Notched points). Chapin (2017:106–107) included smaller versions with minimum neck widths of 8.0 mm in the En Medio Corner-Notched type.

Although most En Medio Corner-Notched points are characterized by barbed shoulders and expanding, concave-based stems, there is considerable variation within the large Corner-Notched point series in

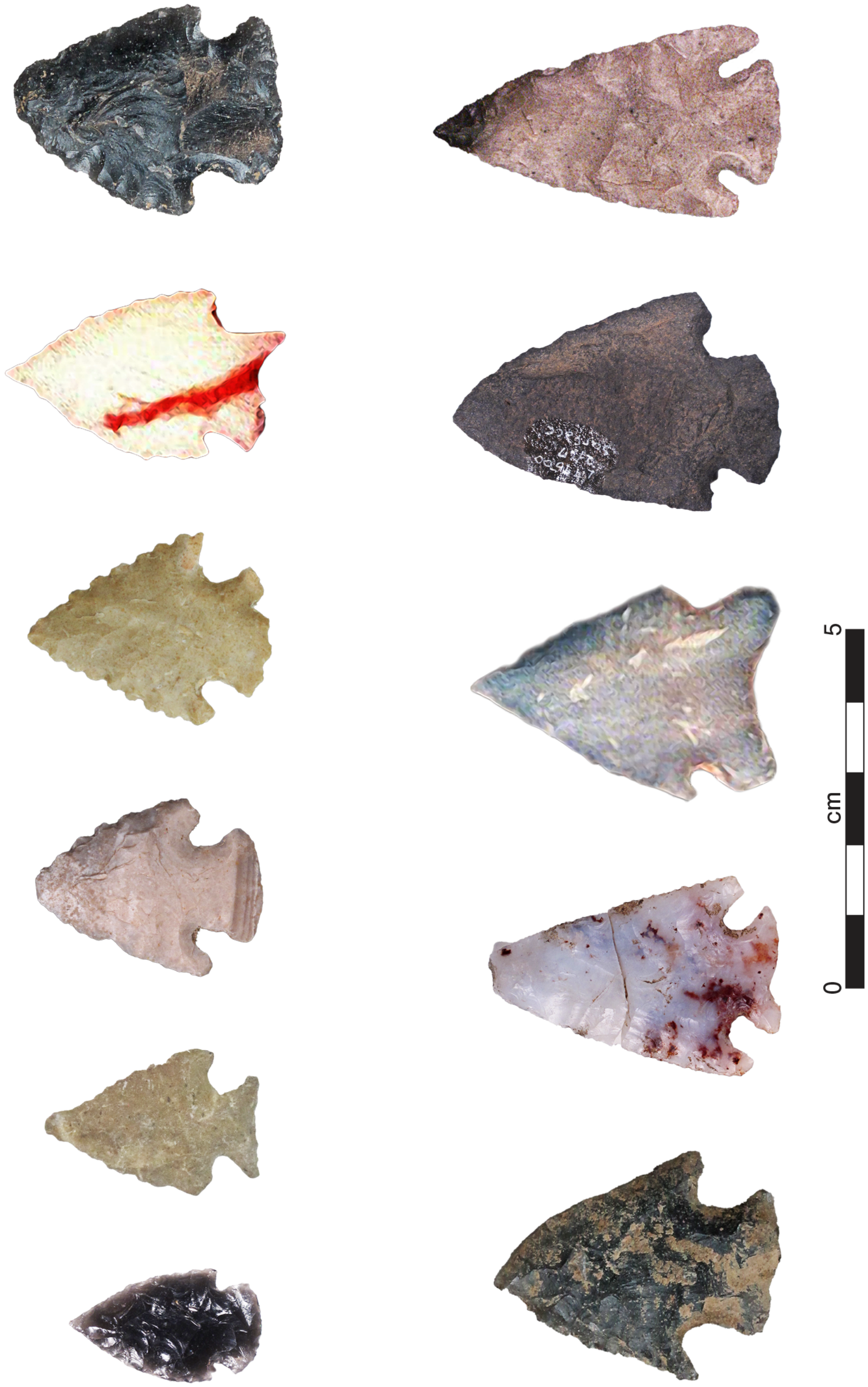


Figure 47. En Medio Corner-Notched and Eared dart points.

width, shoulder morphology (straight or barbless and short to long barbs), stem shape (slightly to greatly expanding), and base width (see also Morris and Burgh 1954:Figures 29, 81, and 82). Some of the variation is undoubtedly due to breakage and resharpening.

Armijo Corner-Notched

Chapin (2017:102, Figure 5.10) defined the Armijo Corner-Notched point as a small to medium-sized Corner-Notched dart point with a narrow neck; a relatively wide, barbed shoulder; a serrated blade; and a straight-based, expanding stem. The blades are triangular with straight to slightly convex margins. The stems vary from slightly to sharply expanding, and the bases range from slightly concave to convex; ground stems are rare. Some examples have neck widths as narrow as 5.9 mm and may represent arrow and not dart points.

Though similar to the En Medio Corner-Notched point, the Armijo Corner-Notched point is distinguished by its generally smaller size, serrated blade, and narrow neck. Turnbow (1997:179, Figure 16.7) previously used the Armijo Corner-Notched designation for points we identify as Armijo. Moore and Brown (2002) assigned comparable points to their Hidden Valley point type, citing neck widths less than or equal to one-half the maximum point widths and barbed shoulders with distal angles of less than 180°.

Western Basketmaker Corner-Notched

In NWNM, there are other, relatively narrow Corner-Notched dart points that approximate the general definition of the Armijo Corner-Notched type but lack the characteristic serrated blade margins and are comparable to, or represent variations of, points identified elsewhere as San Juan Basketmaker or Western Basketmaker types (Berry 1984; Geib 1996:Figure 19) and Early Agricultural period types from the Arizona Transition Zone and the southern Colorado Plateau (Sliva 2015). These points exhibit differences in notch shape and orientation, shoulder treatment, and base shape and lack blade serration. These points include those that resemble the Payson point, an Arizona Transition Zone type distinguished by a narrow, triangular blade and diagonal, U-shaped notches set on or just above the proximal corners, forming downward shoulder barbs and a narrow neck (Figure 48; Honeycutt and Fetterman 1994:Figure 6.24; Sliva 2015:85–87). Somewhat-similar Corner-Notched points have triangular, excurvate blades; barbed shoulders; diagonal, U- to V-shaped notches; relatively narrow necks; expanding stems; and convex bases that are narrower than the blades (Hovezak and Sesler 2002:Figure 2.36d; Sesler 2002b:Figure 3.9). These points are similar to but distinct from the Arizona Transition Zone Geronimo and Posos point types (Sliva 2015:86–90).

Figure 48. Western Basketmaker Corner-Notched dart points.

Other points are variations on the U-Shaped Notch point series (Kearns 2007:Figure 4.34 [*bottom row*]; Kearns and Silcock 1999:Figures 6.16 and 6.17; Sliva 2015:93–95, Figure 2.77g). They were made on isosceles-triangle preforms and have long, narrow, diagonal, U-shaped notches set at or below the corners of the points, creating sharply barbed shoulders, and expanding triangular stems with straight bases. Another set of points is reminiscent of the Western Basketmaker II Triangular subtype (Sliva 2015:82, Figures 266 and 267) or the Arizona Transition Zone V-Shaped Notch subtype (Sliva 2015:97, Figure 2.77). They have triangular blades with straight to slightly convex margins, expanding stems, and straight to slightly convex bases. The notches are deep, open vees centered on the corners of the blanks and oriented to form slightly barbed or horizontal shoulders with sharply defined corners and moderately narrow necks that lack the vertical drop characteristic of the Western Basketmaker White Dog point. Some New Mexico examples approximate the Western Basketmaker II Triangular template (Moore 1983:Figure 9.7f); others are differentiated by slightly wider necks and stems that more closely approximate the Arizona Transition Zone V-Shaped Notch template (see Figure 48; Honeycutt and Fetterman 1994:Figures 4.36i and 18.16).

Carlsbad and Hueco Corner-Notched

Variants of the Corner-Notched dart type have been referred to as Carlsbad and Hueco in the LRG region, southeastern New Mexico, and the Trans-Pecos (MacNeish 1993:182; Mallouf 2013:205–209; Miller et al. 2016:305). "Carlsbad" as a point style refers to Leslie's (1978) Type 8D in southeastern New Mexico. It is a triangular point with straight, convex, or concave blade edges that often exhibit evidence of resharpening (Figure 49). It has pronounced barbs; deep, wide corner notches; and an expanding stem. Most of the points

Figure 49. Carlsbad Corner-Notched dart points.

exhibit pronounced convex bases, although some straight bases have been recorded. It is possible that the Carlsbad style was created from an ovate preform that retained the convex base (Miller et al. 2016:305).

The Hueco point is also found in southeastern New Mexico and the Trans-Pecos (Cosgrove 1947; Lehmer 1948; Mallouf 2013). It is characterized by a broad leaf shape and excurvate blade edges (Figure 50). The barbs are angled downward, and the corner notches are small relative to the overall size of the point. This results in a short, expanding stem with a convex base (Mallouf 2013:207). Mallouf (2013:208) asserted that the Corner-Notched points described by Lentz (2006:Figure 9.1) as his Group 6 at High Rolls Cave, in the Sacramento Mountains, could be classified as Hueco.

Corner-Notched Points: Comparison

In the San Juan Basin, large Corner-Notched point materials include chert, chalcedony, silicified wood, orthoquartzite, quartzite, and obsidian (Honeycutt and Fetterman 1994; Hovezak and Sesler 2002; Kearns, personal communication 2024). In the NRG region, these points primarily consist of obsidian but may be made of dacite or chert, and most of them in the LRG region and southeastern New Mexico are chert. Dick's (1965:25) Type 5 is a Corner-Notched dart point made of obsidian, basalt, rhyolite, or chalcedony (Vierra 2013a; Vierra and Heilen 2020).

Table 25 provides metric data for Late Archaic period Corner-Notched dart points from NWNM and the NRG and LRG regions. Overall, they exhibit similar metric ranges, except for En Medio Corner-Notched points from NWNM, which appear to have slightly shorter and narrower stems, and LRG-region points, which tend to have slightly greater overall lengths and longer blades. Leslie (1978) reported a range of 30.0–60.0 mm and a mean of 50.0 mm for Carlsbad points, and Mallouf (2013) reported a range of 28.0–50.0 mm and a mean of 38.8 mm for Hueco points, whereas En Medio Corner-Notched points exhibit a mean length of 34.2 mm.

Corner-Notched Points: Chronology

In the San Juan Basin, large Corner-Notched points are associated with the Armijo and En Medio phases and the Basketmaker II period. Seventy-five radiocarbon dates from 25 sites date the use of large

Figure 50. Hueco Corner-Notched dart points.

Table 25. Metric Attributes of Late Archaic Period Corner-Notched Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (En Medio Corner-Notched; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	34.2	21.0–30.0	54	33.6	21.9–50.2	43	35.6	23.1–66.5	45
Blade length			—	23.8	11.7–38.9	44	25.9	13.7–49.7	46
Shoulder width	23.5	15.8–35.4	68	24.0	15.5–42.9	73	24.1	6.5–34.9	63
Neck width	12.7	8.3–18.4	77	13.5	8.5–22.0	95	12.0	6.8–17.8	58
Stem length	9.1	5.7–13.7	73	10.0	6.3–14.6	91	11.0	7.0–21.6	63
Stem width	14.6	9.3–21.1	74	17.4	8.9–26.5	80	16.0	10.6–24.0	58
Basal depth			—	2.9	2.3–3.9	10	2.6	2.6	1
Thickness	5.0	3.1–6.4	31	5.3	3.5–8.3	95	5.4	3.8–8.6	64

Corner-Notched points to ca. 1830 B.C.–A.D. 445 (Brown et al. 1991; Cordero 2020; Elyea 1995; Freuden 1998; Honeycutt and Fetterman 1994; Hovezak and Sesler 2002; Irwin-Williams and Tompkins 1968; Kovacik 2000; Lakatos 2014; Moore 1988; Rohman 1998; Vierra 1980; Vogler 1993). The 2 earliest dates (ca. 1830 and 1800 B.C.) are associated with Armijo Corner-Notched points. En Medio Corner-Notched point dates range from ca. 1430 B.C. to A.D. 445. Two sets of dates place En Medio Eared points between ca. 775–345 and ca. 1405–1360 B.C. A point similar to the Arizona Transition Zone Payson type was associated with a suite of 8 dates ranging from ca. 755 B.C. to A.D. 25. Two dates from a site containing a point with diagonal, U-shaped notches were ca. 150 and 55 B.C., and 3 dates associated with a quasi-triangular Stemmed point ranged from ca. 740 to 150 B.C. The New Mexico dates overlap with, but are somewhat earlier than, radiocarbon and tree-ring dates for large Corner-Notched points on the northern periphery of the San Juan Basin in Colorado, ca. 400 B.C.–A.D. 500 (Breternitz 2002; Charles 2011; Charles et al. 2006; Hammack and Walkenhorst 1991; Morris and Burgh 1954), and on the western periphery in Arizona, ca. 1275 B.C. (Schermer 1979).

There are only five Armijo Corner-Notched points in the Armijo Shelter assemblage, and they were recorded in Units C, E, and F. Chapin (2017:69) noted that arrow points were recorded in upper Units A–D. A separate analysis also found that most of the arrow points were present in Units B and C, and fewer were present in Units A and D–I (Vierra, personal communication 2024). The arrow points recorded in units below Unit C probably represent vertical displacement to lower levels. Unit B contained Stemmed and Corner- and Side-Notched points, and Unit C contained mostly Stemmed points and fewer Corner- and Side-Notched points. A date of ca. A.D. 750 has been assigned to Unit C below Unit B.

Miller (2018; Miller and Graves 2019) stated that the Corner-Notched style is associated with the Arenal and Hueco phases, beginning ca. 750 B.C. and ending at A.D. 500. Chapin (2017:107–108) dated the range for the En Medio Corner-Notched points at Armijo Shelter to ca. 154 B.C.–A.D. 582—younger than Turnbow's (1997:186) estimate of ca. 1000 B.C.–A.D. 400. Mallouf (2013:209) suggested a date range of ca. 1000 B.C.–A.D. 700/800 for the Hueco point style. Direct radiocarbon dating of a foreshaft with a Carlsbad-style point provided a date range of cal 400–205 B.C. (Miller et al. 2024).

Stemmed Points

Classification

Stemmed dart points can be found across New Mexico, are common in the state, and tend to have been chronologically followed by Corner-Notched, Side-Notched, and Leaf-shaped styles (Vierra 2013a; Vierra and Heilen 2020), although some of the points in the study by Vierra and Heilen (2020) might also reflect broadly notched points (e.g., San Pedro and Carlsbad). Stemmed dart points vary in morphology, exhibiting triangular or elongated blades that can be straight or excurvate but are usually without serration. They can have parallel or expanding stems. The stems and bases are typically not ground, and the bases can be straight or convex but are rarely concave (Miller and Graves 2019:257; Thoms 1977; Vierra 2013a, 2013b; Vierra and Heilen 2020; Figure 51).

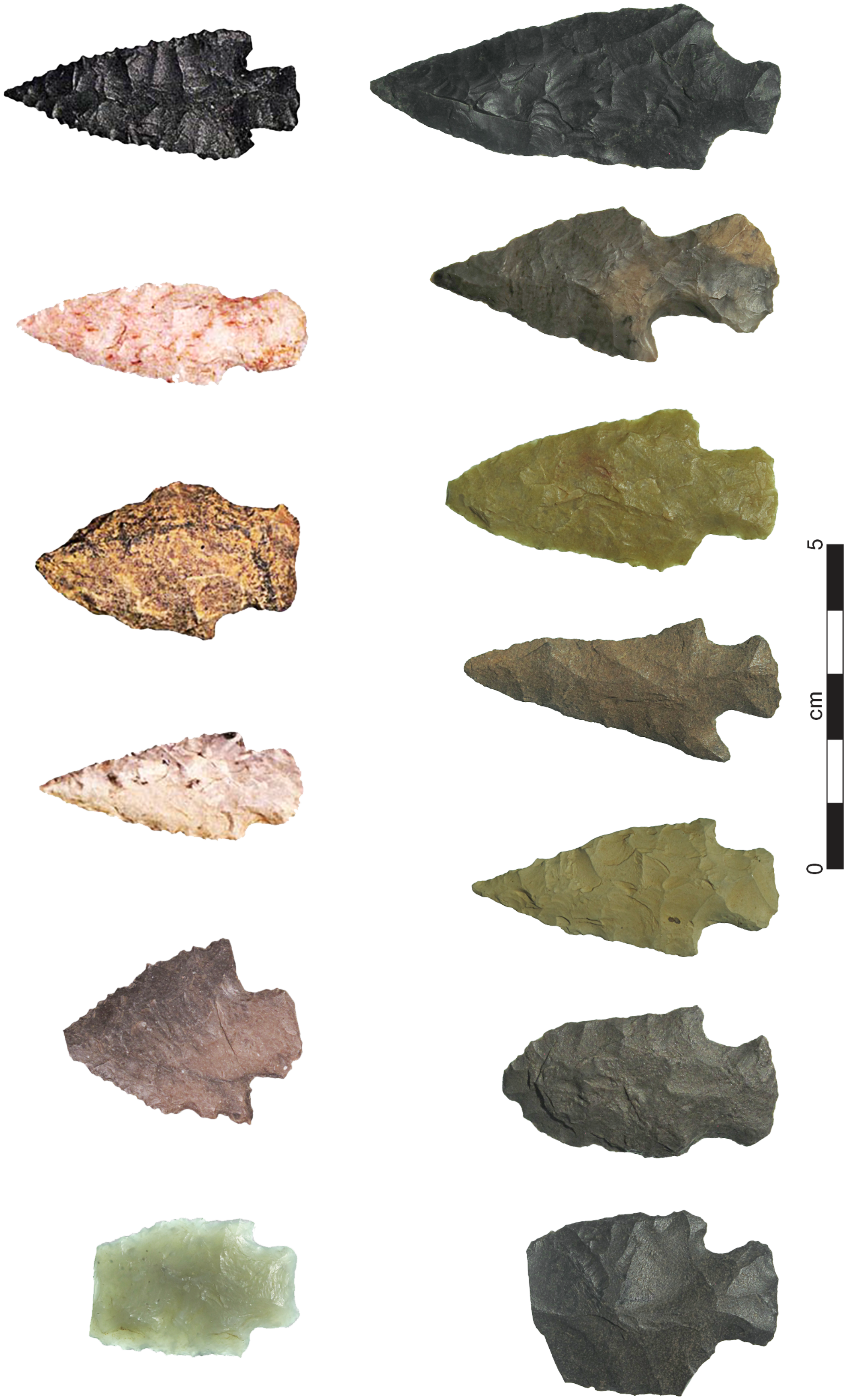


Figure 51. Stemmed dart points.

Vierra and Heilen's (2020) study of Late Archaic period points indicated that Stemmed points tend to be wider and thicker than Side-Notched points, which are generally narrow and thin, and Corner-Notched points, which are wider, partly because of their distinctive barbs. Vierra and Heilen's (2020) analysis divided Stemmed dart points into those with straight bases and those with convex bases, although all the points exhibited similar overall dimensions. Stemmed points also can be separated with respect to expanding vs. straight stems. Stemmed points with straight bases exhibit expanding (n = 69) or parallel (n = 37) stems, whereas Stemmed points with convex bases predominantly have expanding stems (n = 63); few have parallel-sided stems (n = 8). Some of the expanding-stem points exhibit broad, half-heart-shaped "notches" similar to those exhibited by points classified as San Pedro in southern Arizona (Miller and Graves 2019; Sliva 2015:34).

Otero Stemmed

The Otero (previously known as Pendejo) point type is quite different from most of the Stemmed point types. The type was first illustrated by Cosgrove (1947:Figure 131F) and has also been described by MacNeish (1993:183–184; MacNeish and Wilner 2003:242–243; O'Hara 1988:303 [BS1, Type 1]). The point has a long, slender, triangular blade with straight or sometimes slightly excurvate or incurvate edges that are finely serrated. The barbs tend to project downward. The short, expanding stem is narrower than the shoulders, and the base is straight or slightly convex (Figure 52).

Stemmed Points: Comparison

Chert, silicified wood, obsidian, and quartzite were the most common materials used to make large Stemmed points in the San Juan Basin, but chalcedony, orthoquartzite, quartz, siltstone, and basalt were also used (Ayers and Sandefur 1998; Brown et al. 1991; Chapman 1977; Firor 2001; Honeycutt and Fetterman 1994; Kearns, personal communication 2024; Reynolds et al. 1984; Shanks 2011; Shanks and Robinson 2011). Stemmed points were often made of obsidian in the NRG region and of chert in the LRG region (Vierra 2013a; Vierra and Heilen 2020).

Table 26 presents metric data for Stemmed dart points, comparing Armijo Stemmed points to Stemmed points from the NRG and LRG regions. Armijo Stemmed points tend to be shorter and a little narrower at the shoulders and have shorter stems (Chapin 2017:102). LRG-region Stemmed points generally have greater maximum lengths, including the blade lengths, which are similar to those of LRG-region Side-Notched points.

Otero points do not resemble the Empire designs of the early San Pedro phase in southern Arizona and northern Sonora, which lack notches and have lanceolate blades, and their stems, when present, are only slightly narrower than the blades and are separated from them by slight horizontal to sloping shoulders (Sliva 2015:Figure 2.22). Also, the Otero point does not conform to the Datil type, which was defined by Dick (1965:29) as having a straight base, parallel blade edges, and small knobs at the shoulders formed by the last pair of serrations, which are larger than those on the rest of the blade.

Table 27 presents metric data for Otero points (MacNeish 1993; O'Hara 1988). As can be seen, they tend to exhibit greater overall lengths, longer blades, and shorter stems than the previously discussed Late Archaic period dart points.

Stemmed Points: Chronology

Stemmed dart points date to ca. 1500–800 B.C. and possibly as late as A.D. 500 (Chapin 2017:102; Miller 2018; Miller and Graves 2019). A direct radiocarbon date of cal A.D. 130–155 was obtained on a foreshaft with an Otero-style point (Miller et al. 2024).

Basal-Notched Points

Basal-Notched (Collier and Shumla) dart points are present across New Mexico (Carmichael 1986:Plate 4; Chapin 2017; Miller and Graves 2019). Chapin (2019:108) identified this style as Collier Basal-Notched and described the points as having a triangular shape similar to that of Corner-Notched points but with deep notches originating from the bases. The barbs often are rounded, curve inward, and extend nearly down to the base of the point. The stems are not ground, and the bases are either straight or convex (Figure 53). In the Trans-Pecos, Turner and others (2011:162) characterized the Shumla point type as exhibiting a triangular blade with straight or excurvate edges that are sometimes serrated. The basal notches often form a rectangular stem with short to long barbs. "Collier" tends to be used to identify points in northern New Mexico, and "Shumla" tends to be used to identify points in the southern portion of the state.

Figure 52. Otero Stemmed dart points.

Table 26. Metric Attributes of Late Archaic Period Stemmed Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Armijo Stemmed; Chapin 2017)			Northern Rio Grande Region			Lower Rio Grande Region		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	32.1	25.0–40.0	13	32.0	16.1–55.3	60	36.2	21.1–75.2	145
Blade length			—	23.2	11.4–40.9	87	25.4	10.5–60.9	146
Shoulder width	18.7	15.2–22.8	16	20.4	11.8–35.2	144	20.2	12.7–30.5	175
Neck width	12.7	9.7–15.7	16	13.1	8.1–21.3	154	11.7	7.7–18.9	158
Stem length	8.6	5.8–12.3	16	10.0	3.7–17.2	151	11.4	6.0–18.0	182
Stem width	13.8	11.1–17.1	16	14.9	4.3–22.9	138	13.8	7.8–22.8	179
Basal depth			—	3.0	2.1–4.7	12	3.1	2.0–4.3	2
Thickness	6.4	5.4–7.3	5	5.6	3.2–8.7	154	5.9	3.4–10.4	181

Table 27. Metric Attributes of Otero Points from the Lower Rio Grande Region, by Study

Attribute	MacNeish 1993			O'Hara 1988		
	Mean (mm)	Range (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	51.00	41.00–75.00	8	48.10	29.50–79.20	21
Blade length			—			—
Shoulder width	21.10	18.00–25.00	8	21.30	16.40–30.00	21
Neck width			—	9.10	5.60–13.32	21
Stem length	7.50	6.10–10.70	8	6.60	4.50–8.70	21
Stem width	14.10	9.20–16.10	8	12.50	6.40–18.80	21
Basal depth			—			—
Thickness	7.30	5.10–8.20	8			—

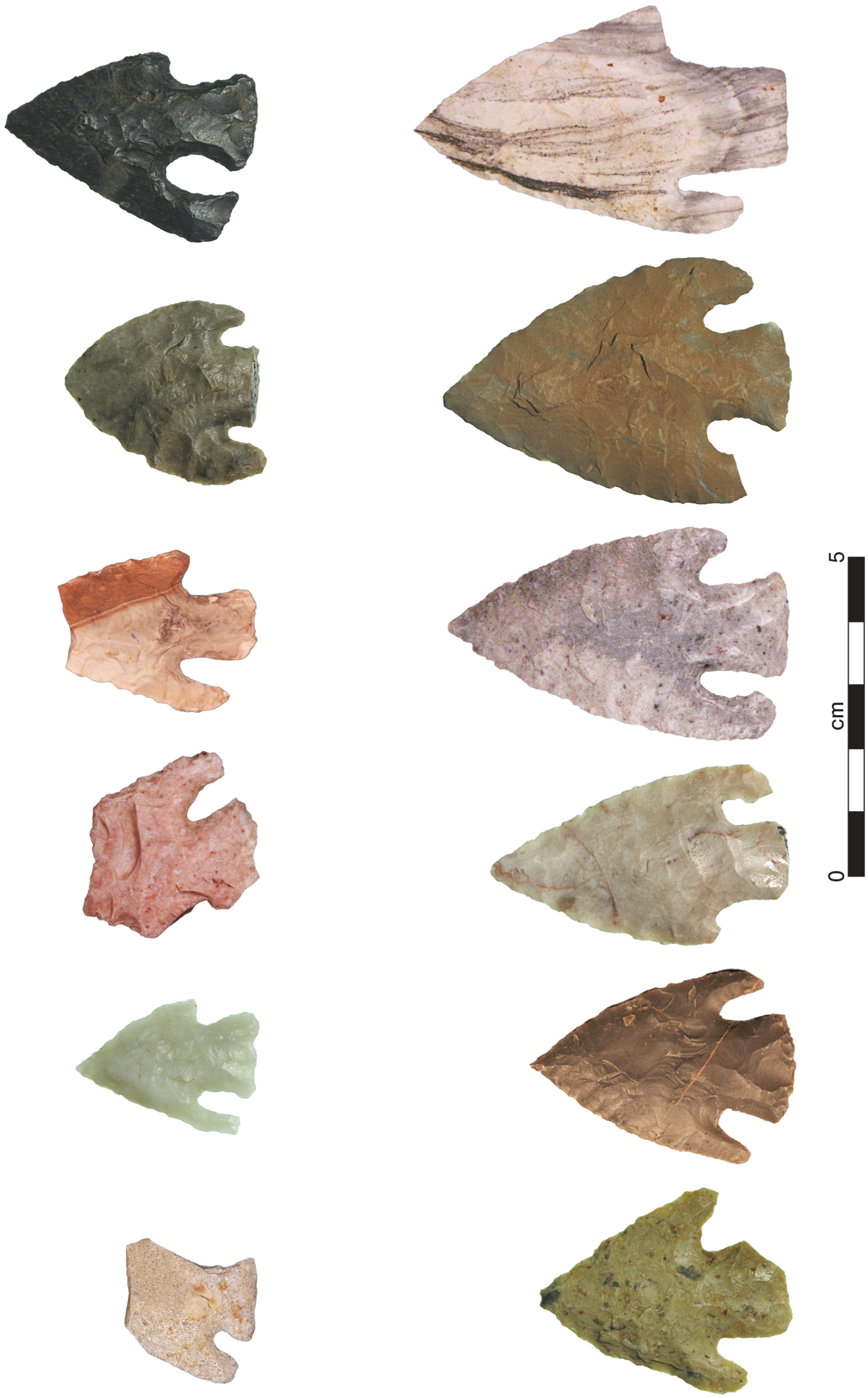


Figure 53. Basal-Notched dart points.

Comparison

Shumla points in the NRG and LRG regions were often made of chert. Table 28 presents metric data for the Basal-Notched points in NWNM and the LRG region. These points tend to be longer than Corner-Notched points and have wider shoulders and narrower stems, whereas Corner-Notched points tend to have shorter, pointed barbs and expanding stems.

Chronology

Chapin (2019:109) tentatively assigned the Collier type to the late Middle Archaic period in NWNM, prior to and ca. 2440–1700 B.C.. By contrast, Turner and others (2011:62) considered the Shumla point to be a Late Archaic period point dating to ca. 1180–300 B.C. in the Lower Pecos region of Texas. This date range is still older than the one provided by Miller and Graves (2019), who dated the type to about 200 B.C.–A.D. 400 in the LRG valley. The temporal trend for the LRG valley is Side-Notched to Corner-Notched to Basal-Notched points (Miller and Graves 2019).

Formative Period Arrow Points

Stemmed Points with Regional Variants

Pueblo Stemmed

The current evidence from the Southwest indicates that the introduction of the bow and arrow occurred on the Colorado Plateau ca. A.D. 200–300 (Geib 2011:281–284; Geib and Bungart 1989; Reed and Geib 2013). The earliest dated point style in northeastern Arizona has a short stem and a long blade (Geib 2011:282). Subsequently, several variants of the Stemmed arrow point were developed. In the San Juan Basin, a diverse group of roughly contemporaneous small Stemmed points with triangular blades collectively represent the Pueblo Stemmed type of arrow point (see Kearns and Silcock 1999:Figures 6.39–6.47; Lekson 1977:Figures 4.1 and 4.3a–c; Moore 1981:Figure 5). This point series incorporates various combinations of blade shapes (straight, slightly excurvate, or slightly incurvate), shoulder treatments (straight, sloping, or barbed), and stem shapes. The shoulders, barbed or barbless, are often asymmetrical, one side longer than the other. The stems are formed by broad corner notches or deep basal notches; they are often straight but can vary from contracting to slightly expanding (i.e., proximal shoulder angles of ca. 70°–110°) and are typically narrow (i.e., 3.0–6.0 mm) and rarely wider than 7.0–10.0 mm. The base is generally straight but can be convex. Some Stemmed arrow points, particularly early variants (i.e., ca. the A.D. 500s), are characterized by minimal investment in their manufacture, often exhibiting only enough retouch of the flake blanks to produce straight stems and triangular blades. Others are well-made, bifacially flaked points with long barbs that extend almost the lengths of the stems. Collectively, there is a wide range of variation in this point type. Some are morphologically similar to Rose Spring– and Eastgate- or Rosegate-series points of the Great Basin and the Intermountain West (Heizer and Hester 1978; Holmer 1986; Holmer and Weder 1980; Thomas 1981).

The Pueblo Stemmed type in the NRG region is characterized by a triangular blade with straight edges, slight barbs, and a narrow stem (tang). The tangs can exhibit parallel sides or slightly expanding

Table 28. Metric Attributes of Basal-Notched Points from Northwestern New Mexico and the Northern and Lower Rio Grande Regions

Attribute	Northwestern New Mexico (Collier; Chapin 2017)			Northern Rio Grande Region		Lower Rio Grande Region (Shumla)		
	Mean (mm)	Range (mm)	No.	Metrics (mm)	No.	Mean (mm)	Range (mm)	No.
Maximum length	39.9	26.8–50.0	14		—	47.8	44.7–59.7	2
Blade length			—		—	36.2	33.0–41.4	4
Shoulder width	30.4	22.6–37.4	14		—	25.8	24.1–27.6	2
Neck width	13.0	9.9–15.4	15	10.3	1	13.5	10.7–18.0	4
Stem length	9.2	6.5–11.9	12	8.4	1	11.5	6.0–18.3	3
Stem width	14.8	11.5–17.4	13	13.2	1	13.6	11.4–16.3	3
Basal depth			—		—			—
Thickness	4.7	2.9–6.0	8	5.0	1	4.6	3.4–6.5	4

stems; the stems are rarely contracting. The blades are mostly continuous and rarely serrated. The bases may be straight or excurvate, although wide stems tend to have straight bases (see Moore 2013; Thoms 1977; Walth 1999:Figure 9.26; Figure 54).

Pueblo Stemmed points, like the other arrow points in the region, vary in maximum length, coming in shorter and longer varieties. Figure 55 illustrates the distributions for Stemmed (n = 109), Corner-Notched (n = 49), Side-Notched (n = 103), and Triangular (n = 54) points in the NRG region. The figure is divided into 20.0-mm units, and for example, "16/17" represents points with lengths ranging from 16.0 to 17.9 mm. As can be seen, there appear to be three general modes in the distribution. All four point types are represented in the size ranges of small and medium sized, but only Side-Notched and Triangular points are represented in the largest mode. Overall, most of the points range from about 2.0 to 26.0 mm in maximum length, although there is some variability within this range.

Moore (1981) documented maximum-length ranges of about 16.0–45.0, 24.0–51.0, and 12.0–54.0 mm for Stemmed, Corner-Notched, and Side-Notched arrow points, respectively, from a broader sample area that included the San Juan Basin. A smaller sample from the southern Chuska Valley indicated a maximum-length range for Stemmed, Corner-Notched, and Side-Notched points of about 11.0–40.0 mm; the record shows decreases in mean point length from Stemmed (25.1 mm) to Corner-Notched (20.0 mm) to Side-Notched (16.7 mm) points.

Livermore, Diablo, and Neff Stemmed

Livermore, Diablo, Neff, and Means are four types of Stemmed points that share the attributes of serrated blades and pronounced barbs but exhibit slight variations in the shapes of their barbs and bases. Mallouf (2013) separated these variations into three types, whereas Justice (2002) lumped them together within the Livermore cluster.

Livermore and Diablo Stemmed points are represented in southeastern New Mexico. They are Texas types defined as long, slender points with triangular blades that tend to be straight or slightly convex. The blade is serrated and occasionally has notches just above the barbs. The barbs are the widest parts of the point, extending outward as arching curves or at right angles. The points are corner notched and have expanding to contracting stems that are slightly bulbous (Mallouf 2013:194–198; Turner et al. 2011:198; Figure 56). Mallouf (2013:194–198) considered the Diablo type to have downward-turning "wing-like" barbs, as opposed to the Livermore type, which tends to have barbs that extend outward horizontally from the blade (Figure 57). Wiseman (1971:21) described a Neff-style point from the area of the Sacramento Mountains, and this style appears to be similar to the Livermore and Diablo types.

Means Stemmed

The Means type has a long, narrow, and deeply serrated blade with straight sides. The blade is occasionally beveled. The distinctive lateral barbs are wider than the blade and roughly equal to the stem width and extend outward at a 90° angle. The point can be considered side notched and has a deep neck; a short, expanding stem; and a straight to convex base (Mallouf 2013:198–201; Turner et al. 2011:203; Figure 58).

Sacramento Serrated

Some arrow-point styles may exhibit finely serrated blades. However, deeply serrated points are much more distinctive and are identified as belonging to a specific type. Knight and Miller (2003) identified a Sacramento Serrated type in the southern Tularosa Basin that is like the Means type described for the Trans-Pecos (Mallouf 2013). They described the point style as exhibiting a straight-sided and deeply serrated blade. The blade is distinguished from the stem by a barb with side notching. The point has a short, expanding stem and a rounded base (Figure 59; see also Adler and Speth 2004:Figure 15.3; O'Hara 1988:Figure A.10.5 [23.1]; Vierra et al. 2013:Figure H7). Similar deeply serrated arrow points have rarely been observed in the NRG region and are included in collections from the Carson National Forest and the site of Howiri (Fallon and Wening 1989:Figure 32n).

Perdiz

Perdiz points are also represented in southeastern New Mexico and are considered diagnostic of the Toyah phase in central and southern Texas (Kenmotsu and Boyd 2012). The Perdiz type is characterized by long, slender Stemmed points with straight to concave blade edges that are sometimes serrated. The distinctive barbs are angled back toward the stem, which contracts and ends in a narrow, convex base (tang). The notches tend to be broad and deep (Mallouf 1987; Turner et al. 2011:206; Figure 60). Miller and Graves (2019) suggested that Livermore, Perdiz, and Scallorn points could be considered as belonging to a slightly larger point-size group than the group that would comprise Washita, Harrell, Fresno, Garza, and Toyah.

Figure 54. Pueblo Stemmed arrow points.

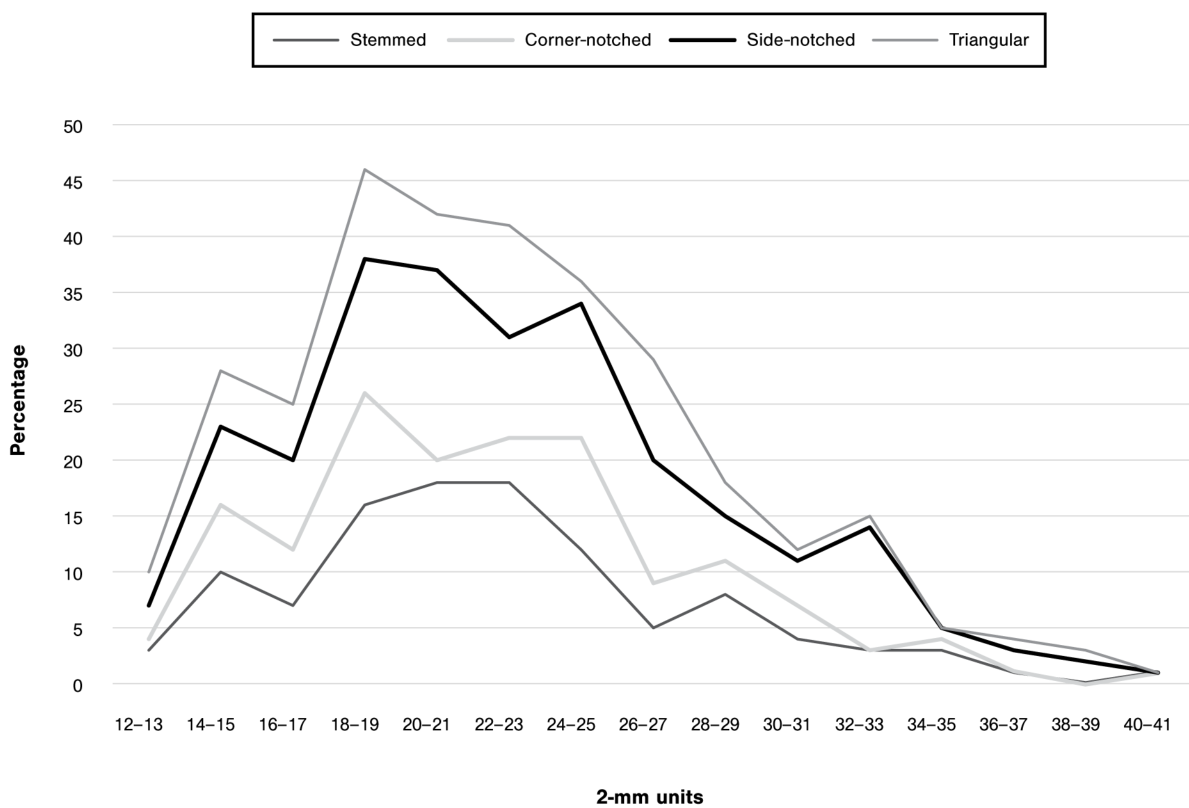


Figure 55. Distribution of maximum point lengths for Stemmed, Corner-Notched, Side-Notched and Triangular points.

Figure 56. Livermore arrow points.

Figure 57. Diablo arrow points (southeastern New Mexico; with permission from Robert Mallouf).

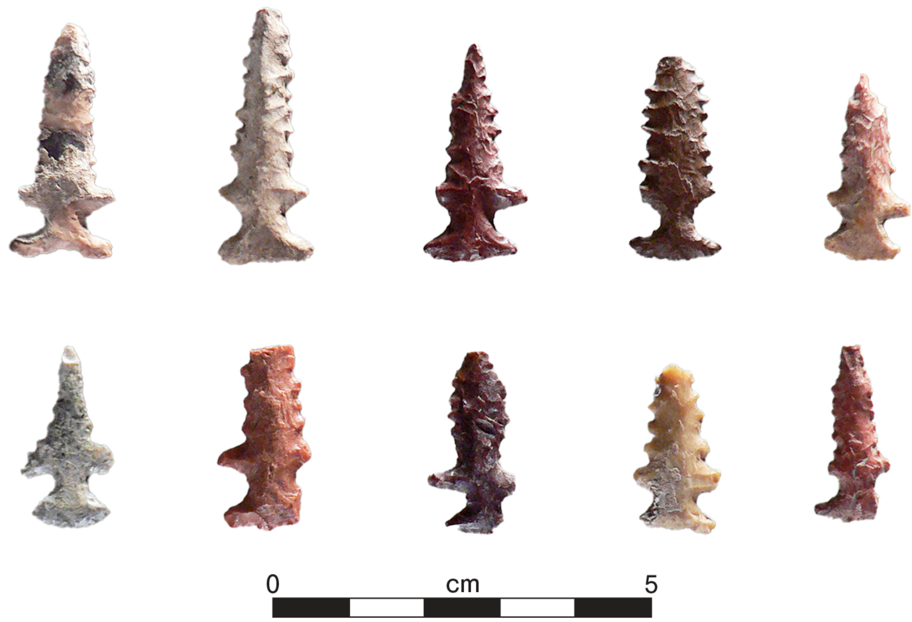


Figure 58. Means arrow points (with permission from Robert Mallouf).

Figure 59. Sacramento Serrated points.

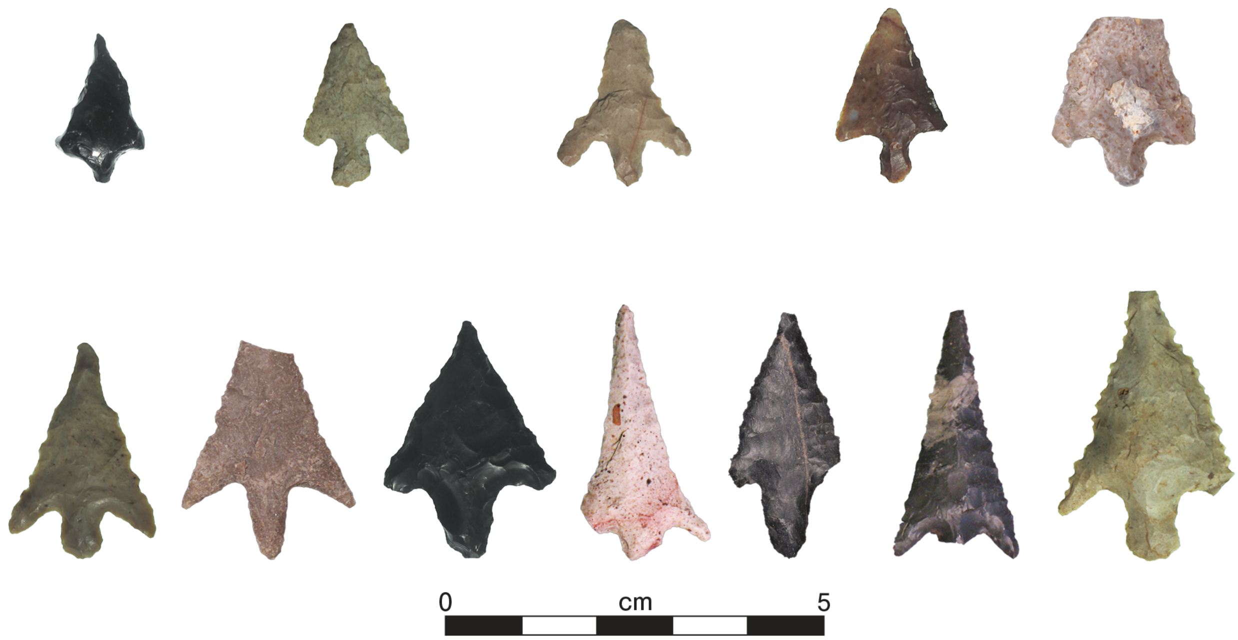


Figure 60. Perdiz arrow points.

Stemmed Points with Regional Variants: Comparison

A variety of fine-grained and siliceous materials were used in the San Juan Basin for Pueblo Stemmed points, including chert (including Chuska and Zuni Mountain chert), chalcedony, silicified wood, obsidian, quartzite, and orthoquartzite (Kearns, personal communication 2024). Chalcedony, chert, and some obsidian were used for these points in the NRG region (Moore 2013; Thoms 1977). Livermore, Diablo, Means, and Perdiz points were primarily made of chert in the LRG region and southeastern New Mexico.

Stemmed Points with Regional Variants: Chronology

Lekson (1977) described the general sequence of arrow points at Chaco Canyon as Stemmed to Corner-Notched to Side-Notched points and dated the Stemmed variety to the Basketmaker III/Pueblo I period (ca. A.D. 500–920; see also Hayes and Lancaster 1975:144–145; Moore 1981:23; Morris 1939:Plates 125 and 126). A similar sequence is evident in the Tohatchi Flats area, north of Gallup (Kearns and Silcock 1999; Kearns et al. 2000). Stemmed arrow points were most prevalent during the early Basketmaker III period (ca. A.D. 500–600) and continued into the late Basketmaker III (ca. A.D. 600–750) and early Pueblo I (ca. A.D. 750–850) periods, when they were replaced by Corner-Notched points as the dominant style. Although the shifts in the proportionate use of Stemmed, Corner-Notched, and Side-Notched arrow points through time are parts of a pattern established for the San Juan Basin, all three styles were present throughout the Ancestral Puebloan sequence. Side-Notched points are present in limited numbers in early contexts, and Stemmed point forms continued into later periods, albeit in reduced proportions (Kearns and Silcock 1999; Lekson 1977:Table 4.3; Moore 1981). At En Medio Shelter, in NWNM (Irwin-Williams and Tompkins 1968:8–9), two small, straight-stemmed points overlay a hearth dated to cal A.D. 85. An early appearance of small Stemmed arrow points in NWNM is supported by radiocarbon dates of cal A.D. 435 and 440 from 5LP1104, on the northern periphery of the San Juan Basin (Fuller 1988:Figure 165). The three points are of the wide-stem (ca.-7.0–7.5-mm) variant with straight, slightly expanding and slightly contracting stems and sloping and barbed shoulders. Arrow points with wide stems and slight barbs are also represented in the assemblage at LA 109129, which is near Zia Pueblo and dates to ca. A.D. 400–600 (Walth 1999).

This general evolutionary trend in small point styles is also evident from the study conducted by Moore (2013) in the NRG region. Stemmed and

Corner-Notched points were dominant during the Early Developmental period (A.D. 600–900). Then, Stemmed points appear to have disappeared. Corner-Notched points dominated during the early Late Developmental period (A.D. 900–1000), and Side-Notched points dominated during the middle to late Late Developmental period (A.D. 1000–1200), when there were fewer Corner-Notched points. Also, excavations in the Taos area indicated the use of Side-Notched points ca. A.D. 1000–1200 at Valdez phase sites (J. Moore 1994:330), although the Cerrita pithouse site contains Stemmed and Side-Notched styles and a few Unnotched Triangular forms. Lastly, studies at the GR2 rockshelter, near Abiquiu, revealed that Stemmed points dominated the arrow-point assemblage dating to ca. A.D. 600–1300, which contained fewer Corner-Notched and Unnotched Triangular points (Vierra, personal communication 2024). Side-Notched points do not appear in contexts at the site that are dated to before the arrival of farmers in the Chama Valley during the A.D. 1300s (Hibben 1937; Vierra, personal communication 2024; Wendorf 1953).

The Livermore and Diablo types are dated to ca. A.D. 800–1450 in the LRG region (Miller and Graves 2019), although an early date of cal A.D. 690–890 was attributed to a Livermore point in western Texas (Cloud 2004:156). Mallouf (2013:198, 200) provided a similar date range for the Diablo and Means types in the Trans-Pecos: ca. A.D. 700/800–1350.

It appears that Perdiz types date to much later than their northern Stemmed counterparts. Livermore points are dated to ca. A.D. 800–1450, and Perdiz points are dated to ca. A.D. 1300–1600s (Kenmotsu and Boyd 2012:10; Mallouf 2013:198; Miller and Graves 2019).

Corner-Notched Points with Regional Variants

Trujillo Corner-Notched

Corner-Notched arrow points are associated with the Trujillo phase of the Oshara Tradition (ca. A.D. 400–600; Irwin-Williams 1973). Irwin-Williams (1973:13, Figure 6) described the earliest arrow points as "made like miniatures of the En Medio dart points." Her pictured examples (1973:Figure 6h, i) are small Corner-Notched points with broad, triangular blades; straight and barbed shoulders; wide necks; and expanding stems with straight bases that are almost as wide as the blades (see also "AEM 1" points in Irwin-Williams and Tompkins 1968:9, Figure 7 [*top row*]). This style is referred to as Trujillo Corner-Notched in northern New Mexico. It has been described as having a triangular blade with straight to slightly convex margins that are usually continuous but sometimes have serration. The shoulders are barbed, and the notches are narrow. The stems are expanding and have straight or convex bases (Moore 2013; Thoms 1977; Turnbow 1997:202; Figure 61).

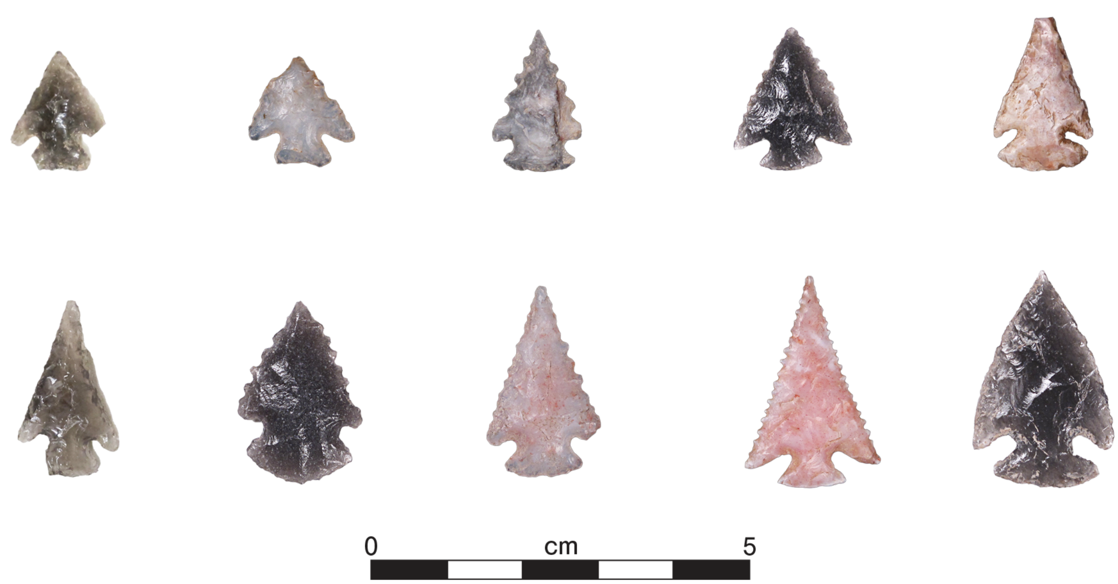


Figure 61. Trujillo Corner-Notched arrow points.

Corner-Notched arrow points from Ancestral Puebloan contexts in the San Juan Basin and the adjacent Mesa Verde region include Trujillo Corner-Notched-type points that resemble diminutive versions of the En Medio Corner-Notched point, both the wide- and narrow-notched variants, and a variety of more-slender Corner-Notched points (Kearns and Silcock 1999:Figures 6.48–6.54; Lekson 1977:Figures 4.1 and 4.3c, d, f; Moore 1981:Figure 5). Collectively, they are identified as Pueblo Corner-Notched in the San Juan Basin. The more-slender Corner-Notched varieties include small points with triangular blades that are often straight but range from slightly incurvate to slightly excurvate. The shoulders are typically barbed, but straight-shouldered forms are also present. The oblique U- or soft-V-shaped notches are characteristically narrow but can be open. The necks are relatively narrow, averaging ca. 4.0–8.0 mm wide, and the expanding stems (with proximal shoulder angles generally greater than ca. 110°) have straight edges and straight to slightly convex bases that often result in triangular ears. The base width can vary from relatively narrow to almost equal to the width of the barbs. The points are typically bifacially flaked, but some examples retain portions of the ventral faces of the flake blanks.

Mimbres Corner-Notched

The Mimbres Corner-Notched type was first described by Shafer (1986:37) as Group 3 from the NAN Ranch Ruin, in the Mimbres Valley of southwestern New Mexico, and later was formally designated the Mimbres point by Dockall (1991:224–227, Figure 24j–l; see also Shafer 2003:196–198, Figure 11.1j–o). It is described as a small Corner-Notched arrow point with a convex to straight base (Figure 62). Although Shafer (1986) noted that the most diagnostic attributes of the type are the deep corner notches and convex base, Dockall's (1991) type description provided room for more variability and included straight bases while noting that the convex base was most prevalent. Although the corner notches are typically deep and narrow, some points exhibit broader, C-shaped notches that form expanding stems with straight to concave edges. The blade margins are straight to slightly excurvate but, rarely, may be concave or slightly recurved. A few specimens exhibit additional notches in the blade. The necks vary from narrow to moderately broad. The basal ears usually conform to the preform but occasionally are rounded. Most were made by pressure flaking of small flakes, which left the specimens biconvex or plano-convex. The specimens at the NAN Ranch Ruin ranged in length from 12.0 to 23.0 mm and had a mean length of 19.9 mm.

The Mimbres Corner-Notched type is spatially identified across southwestern New Mexico. Since the type was formally named, Mimbres Corner-Notched points have been recognized in the Mimbres and Gila River valleys and in the Black Range (Roth 2010:88, 2015:212–213; Taliaferro 2004, 2014:274, 276, Figure 8.1; Turnbow 2015, 2024:192–193, Figure 6j–q), and points of this type are illustrated in archaeological reports of earlier studies in the Mimbres, Gila River, and San Francisco valleys (Cosgrove and Cosgrove 1932:Plate 50a, c; Haury 1936:332; LeBlanc 1984:240–241, Figures 16.1h, n and 16.2e, x; Lekson 1990:Figure 3.17c, g, l, z; Wheat 1955:127–130, Figure 9f). Swarts Ruin yielded a Corner-Notched specimen with extra blade notches on one margin and a Mimbres Black-on-white sherd that exhibited painted images of the type (Cosgrove and Cosgrove 1932:Plate 232j). Though stylized, these painted points have serrated or nonserrated blades, deep corner notches, and straight to slightly convex bases.

Moore (1999:39, 41) identified two descriptive types in the Mogollon Highlands that are close in appearance to the Mimbres type: a "Small Corner-Notched" point with either a straight or convex base and a "Small Corner-Notched Point with Long Blade." Both forms are comparable to the Mimbres Corner-Notched style.

Figure 62. Mimbres Corner-Notched arrow points.

Diablo Corner-Notched

The Diablo Corner-Notched type was defined by Turnbow (2009:16, Figure 1, 2015) from Early Pithouse period, Georgetown phase, occupations at Diablo Village (LA 6538), on the West Fork of the Gila River, in southwestern New Mexico. It is characterized by a broad, triangular blade; long, sharp barbs; deep, broad corner/basal notches; a small, expanding stem; and a straight to slightly concave base (Figure 63). The triangular blade has straight to slightly concave margins. The maximum width of the point is nearly equal to the total length. The workmanship is excellent, exhibiting fine pressure flaking that produced a thin, biconvex cross section. The deep corner/basal notching forms a small, expanding stem with concave edges and a straight to slightly concave base. The stem is less broad than the shoulder barbs, and the neck is narrow. The thin, delicate barbs probably broke quickly, causing specimens to be reworked into other shapes. The Diablo type differs from the Mimbres Corner-Notched type in its wider blade, smaller stem, and straight to slightly concave base. Diablo points have a mean length of 21.3 mm, a mean width of 17.5 mm, and a mean neck width of 5.1 mm.

The type is rare in the Mimbres region and is present in the upper Gila River and upper Mimbres Valley areas and the Black Range of southwestern New Mexico (Turnbow 2009, 2015, 2024:192–193). Originally sorted into the Mimbres Corner-Notched type, an illustrated example of a Diablo point from the NAN Ranch Ruin was provided by Shafer (2003:197, Figure 11.1m). In the Reserve area, Moore (1999:41) identified the "Small Corner-Notched Point with Long Blade" type, which somewhat resembles the Diablo type in its triangular blade and acute barbs but differs in that the blade is at least twice as long as wide, the stem typically expands to nearly the width of the blade (shoulders), and the base is either concave or convex.

The Diablo type bears resemblance to points recorded at McAnally and Thompson, two late Early Pithouse period occupations in the Mimbres Valley (Diehl and LeBlanc 2001; LeBlanc 2001:Figure 9.1a, i, j). Those points exhibited wide, triangular blades and broad corner notches that essentially formed expanding stems with straight bases. Some were large enough to suggest that they were darts (LeBlanc 1984:87), and others were within the size range of arrow points. A similar point at the Gila Cliff Dwelling was described as Type 10 (Teague 1986:150, Figure 7.2n).

Scallorn Corner-Notched

Scallorn Corner-Notched is a type referred to in southeastern New Mexico. This style conforms to Leslie's (1978) Types 3A and 3B, which are triangular and have convex blades, corner notches, expanding stems, and straight or convex bases. In Texas, the type is described as a triangular point with corner notches, straight or convex blade edges, distinct barbs, and expanding bases that are often as wide as the barbs (Turner et al. 2011:209; Figure 64). Scallorn points have been reported by multiple researchers (Alldritt and Oakes 2000:154; Greenwald 2008:501; Miller and Graves 2019; Oakes 2004:81; Rocek 2013; Wiseman 1996:81).

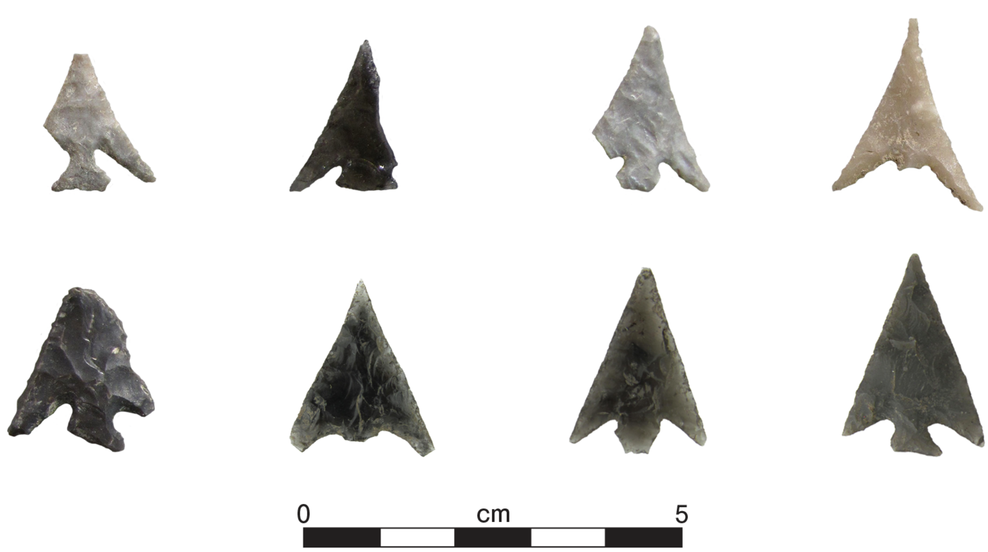


Figure 63. Diablo Corner-Notched arrow points (southwestern New Mexico).

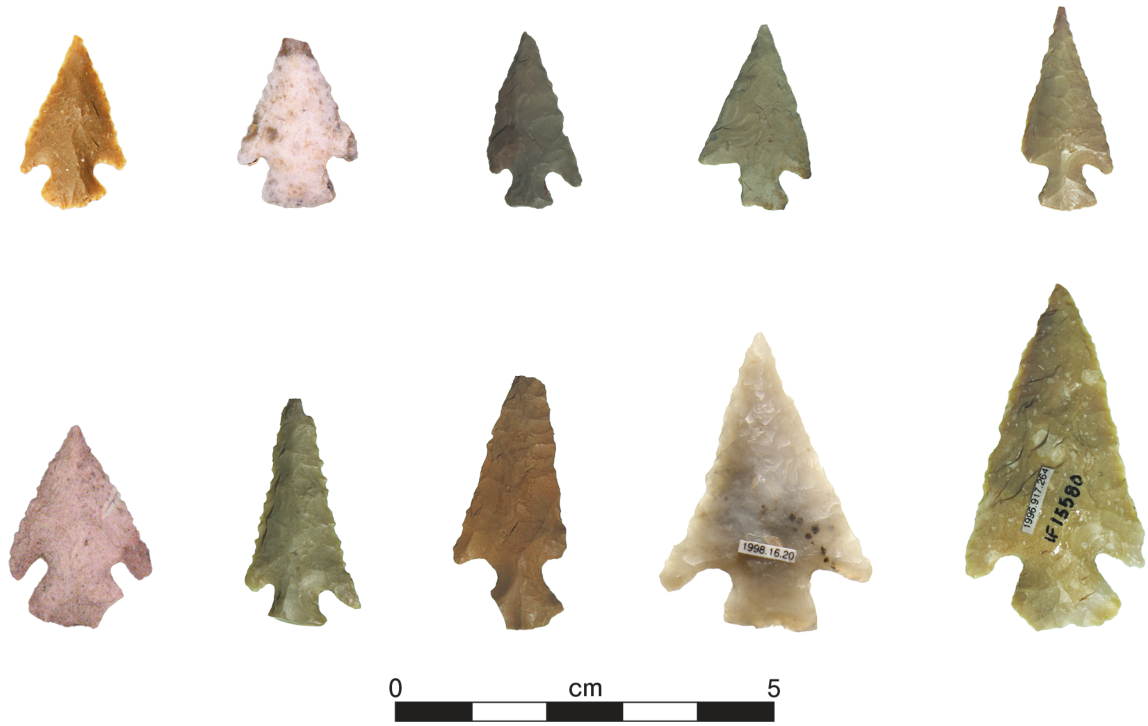


Figure 64. Scallorn Corner-Notched arrow points.

Corner-Notched Points with Regional Variants: Comparison

In the San Juan Basin, fine-grained and siliceous materials were commonly used for Trujillo Corner-Notched points, including chert (including Chuska and Zuni Mountain chert), chalcedony, silicified wood, and obsidian, along with occasional use of vitrophyre and shale (Hancock et al. 1988; Kearns, personal communication 2024; Kearns and Silcock 1999; Klausing-Bradley 1990; Larralde 1991; Lekson 1977; Potter and Gilpin 2007; Skinner 1999; Western Cultural Resource Management 2012; Yost 1997). In the NRG region, chalcedony or chert and obsidian were used, and in the Mimbres region, obsidian and chert were used. In the LRG region, small obsidian nodules are limited to surface gravels in the southern Tularosa Basin and the terraces along the Rio Grande, whereas several obsidian sources are present in the Mogollon Highlands (Church 2000; Church et al. 1996; Dolan et al. 2017, 2020; Shackley 2005, 2021; Taliaferro et al. 2010).

Corner-Notched Points with Regional Variants: Chronology

Corner-Notched points cover a broad temporal span depending on the type and the region. In the northern Southwest, small Corner-Notched points are contemporaneous with the diffusion of the bow and arrow on the northern Colorado Plateau, ca. A.D. 300–350 (Holmer 1980b:38, 1986:107; Holmer and Weder 1980:60). On the northern periphery of the San Juan Basin, small Corner-Notched points at the Tamarron Site were associated with a radiocarbon date of cal A.D. 310 (Reed 2012; Reed and Kainer 1978). Generally, in the San Juan Basin, small Corner-Notched points were in use during the early Basketmaker III period (ca. A.D. 500–600), constituted the predominant form during the late Basketmaker III (ca. A.D. 600–750) and Pueblo I (ca. A.D. 750–900) periods, and were replaced as the dominant points by Pueblo Side-Notched points by the end of the Pueblo II period (ca. A.D. 900–1100; Kearns and Silcock 1999; Lekson 1977; Moore 1981).

This is a similar trend to the one previously described by Moore (2013) for the transition from Pueblo Stemmed to Trujillo Corner-Notched points in the NRG region.

Based on comparison and mounting contextual data for southwestern New Mexico, Corner-Notched arrow points probably appeared by the mid–A.D. 400s/500s, during the Early Pithouse period (Turnbow 2024:192–193), and continued to the end of the Late Pithouse period, during the A.D. 1000s, when they were replaced by Side-Notched arrow points (Shafer 2003:198). In deep middens of the NAN Ranch Ruin, Mimbres-type specimens were recorded in San Francisco and Three Circle phase deposits overlain by Classic Mimbres period deposits containing points of the Swarts and Cosgrove types (Dockall 1991:225; Shafer 1986:37–38). Martin (1943:206–207, Figure 72b) illustrated small Corner-Notched points from pre–Georgetown phase pit structures at the SU site, in the Reserve area, that conformed to the Mimbres type, and the type has since been recognized on the floors of Georgetown phase pit structures at the Diablo Complex, in the Gila River Forks (Turnbow 2009, 2015, 2024), and at Cuchillo, in the Black Range (Turnbow 2015).

The dates for the Diablo Corner-Notched type range from A.D. 550 to around 700 (Turnbow 2024:192–193); the type seems to tightly date to the Georgetown phase and perhaps slightly earlier. As with the Mimbres type, Diablo points have been recognized on the floors of Georgetown phase pit structures at the Diablo Complex and Cuchillo (Turnbow 2009, 2015, 2024:192–193). Calibrated radiocarbon dates from Georgetown phase floors at Cuchillo ranged between A.D. 630 and 680 (Turnbow 2015).

Scallorn points generally have a date range of ca. A.D. 200–500. However, they have also been reported as dating to A.D. 240–900, 500–800, and 1000–1300, depending on the study (Alldritt and Oakes 2000; Greenwald 2008; Miller and Graves 2019; Rocek 2013; Turnbow 2009, 2015, 2024:192–193; Vierra 1998, 2011; Wiseman 1996).

Side-Notched Points with Regional Variants

Pueblo Side-Notched

Pueblo Side-Notched is a type referred to in northern New Mexico. It is characterized by a triangular blade with a straight, nonserrated edge. The blade can be short or elongated (isosceles) and has horizontal side notches placed low at the neck. Rarely, extra notches are placed along one side of the blade. The stem generally comprises about a third of the point length and has parallel sides and a straight or slightly concave base (Figure 65), although there are examples with deeper basal concavities (Kocer and Ferguson 2017; Moore 2013; Moore 1981; Shelley 2006; Snow 2020; Thoms 1977; Turnbow 1997:205). For example, Figure 66 illustrates two variants recorded in the same provenience at Pot Creek Pueblo. As seen previously

Figure 65. Pueblo Side-Notched arrow points.

Figure 66. Side-Notched arrow points from Pot Creek Pueblo.

Figure 67. Temporal Side-Notched arrow points.

in Figure 55, this point type can be divided into three size groups based on maximum lengths.

Temporal Side-Notched

The Temporal point was first defined by Brook (1972:83–88) from specimens recorded at the Temporal site, near Tularosa, New Mexico. Because of the obscure nature of Brook's publication, Dockall (1991:221–222) later defined the contemporaneous and nearly identical Cosgrove Side-Notched type from the Classic Mimbres period occupations at the NAN Ranch Ruin, in the Mimbres Valley. Brook recognized the Temporal point type throughout southern and southwestern New Mexico. Perino (1985:375) stated that the type is common in the Tularosa Basin region of southern New Mexico, into western New Mexico and east-central Arizona, and from Las Cruces to the Guadalupe Peak, Texas, but it appears that the type is actually rare in the Tularosa Basin and more common in the nearby Rio Grande valley.

The Temporal type is a small Side-Notched arrow point with an expanded, convex base with rounded tangs and, often, one or more extra notches on the blade (Figure 67). In his original description, Brook characterized the type as a small Side-Notched arrow point that displayed an additional notch on the blade and almost always had a convex base. When present, the additional notch is on the lower margin of the blade; less often, two notches or serrations are present. It is possible that the extra notch was related to hafting and that serration was added for cutting purposes.

The triangular blade typically has straight margins, but slightly excurvate or incurvate (concave) margins may be present. The base is the widest portion of the point. The haft is characterized by low side notches that are usually narrow and 1½ times deeper than they are wide; however, wider, U-shaped notches also have been noted. Notches vary from 1.0 to 3.2 mm in width and from 1.0 to 3.0 mm in depth, averaging approximately 2.0 mm. The specimens often retain elements of the flakes from which they were produced, resulting in plano-convex to biconvex cross sections. The type ranges in length from 12.0 to 37.0 mm (with a mean of 21.1 mm), in width from 10.0 to 14.0 mm (with a mean of 11.0 mm), and in thickness from 2.1 to 4.1 mm (with a mean of 2.9 mm; Brook 1972).

Morphologically, the Temporal and Cosgrove types are the same, except that Cosgrove points are described as having straight to convex bases, and the Temporal points exhibit predominately convex bases. Given the types' similarities, Gilman and LeBlanc (2017:219) concluded that the Cosgrove specimens at the Mattock Ruins were essentially the same as the Temporal points. Indeed, with or without blade notching, the points at the Cuchillo site (Schutt et al. 1994), on the eastern flanks of the Black Range, that were originally classified by Turnbow (2009:12, 2015) as belonging to the Cosgrove type would be better sorted into the Temporal type.

Cosgrove Side-Notched

The Cosgrove Side-Notched type was recognized by Shafer (1986:35) as comprising Group 1 points from the NAN Ranch Ruin assemblage, in the Mimbres Valley of southwestern New Mexico. It was further described and formally named by Dockall (1991:222–223, 227) based on 71 points from the same site (see also Shafer 2003:196–198). It is present at Classic Mimbres period and Reserve phase sites throughout the region.

The type is characterized as a small Side-Notched arrow point distinguished primarily by the presence of one or more blade notches, regardless of variation in the hafting morphology (Figure 68). The blade margins are straight, and one edge exhibits a notch. More rarely, one edge has multiple notches or is partially or entirely serrated. In a few cases, both edges are serrated. The side notching is low and either U or C shaped. The bases are predominantly straight to slightly convex and have rounded barbs. A few points have concave bases, and some well-made specimens exhibit straight bases with squared ears similar to those observed on points of the Dry Prong type from Reserve phase occupations in east-central Arizona (Olson 1960:198, Figure 5; Perino 1985:68; Shafer and Judkins 1997). The lengths of specimens from the NAN Ranch Ruin vary from 12.0 to 37.0 mm (with a mean length of 21.1 mm).

Two contemporaneous point types, the Temporal Notched (Brook 1972:83–88; Justice 2002:250–251, 256; Perino 1985:375) and Dry Prong (Olson 1960:196, 198; Perino 1985:68) types, have morphological characteristics that are very closely similar to those of the Cosgrove type. All three types are primarily distinguished by an additional notch in the blade, although their bases vary. First recognized near Tularosa, New Mexico, the Temporal type almost always has a convex base, and the Dry Prong type, defined from Reserve phase occupations in east-central Arizona, usually has a straight base. The Dry Prong point closely resembles the Pueblo III period Double Side-Notched type defined by Sliva (2006:59–60). The Cosgrove descriptions note that the bases vary from straight to slightly convex and are rarely concave (Dockall 1991:222; Shafer 2003:198).

Figure 68. Cosgrove Side-Notched arrow points.

Although blade notching alone cannot distinguish these types recorded in southwestern New Mexico, the extra blade notch seems to have been popular across the Southwest for only a brief period between A.D. 950 and 1150 (Justice 2002:250; Perino 1985:68). However, Sliva (2006:59–60) did suggest that Pueblo III period Double Side-Notched points may also date later, to ca. A.D. 1150–1350.

Swarts Side-Notched

The Swarts arrow-point type was originally defined by Shafer (1986:37) as Group 2 at the NAN Ranch Ruin, in the Mimbres Valley of southwestern New Mexico. Dockall (1991:226–227, Figure 24m–o; Shafer 2003:197–198, Figure 11.1d–f) later formally named the type based on the same collection. It is distinguished by a small, triangular blade; low, horizontal side notches; and a straight or, less commonly, slightly convex base (Figure 69). The blade margins are straight to slightly excurvate. The base may be straight with rounded tangs or may form a smooth, convex arc below the notches, and it is typically the widest portion of the point. The notches are moderately wide and U shaped. The points were made from flakes by pressure flaking. Specimens from the NAN Ranch Ruin have lengths ranging from 12.0 to 28.0 mm and a mean length of 19.2 mm.

The Swarts type was considered diagnostic of the Classic Mimbres period at the NAN Ranch Ruin, contemporaneous with the Hinton and Cosgrove point types from the same deposits. According to the type descriptions, the Swarts type does not exhibit the concave base characteristic of the Hinton point type or the extra notch on the blade of the Cosgrove type. Dockall noted that the Swarts type displays more morphological variation than his Cosgrove type but overall resembles that type, except for the lack of extra blade notches. This led Gilman and LeBlanc (2017:219) to question whether the Swarts and Cosgrove types should be considered two separate types or a single type of which some exhibit the supplementary notch on the blade. In fact, the Dry Prong Side-Notched arrow-point type described by Olson (1960) and Perino (1985:68) as dating to the Reserve phase in west-central Arizona is nearly identical to the Swarts type, but the blade of a Dry Prong Side-Notched point may or may not exhibit the extra notch. The same may be said of the Temporal point (Brook 1972; Perino 1985:375).

The Swarts type is recognized across southwestern New Mexico. It is present in the Mimbres, Gila River, and San Francisco valleys (Cosgrove 1947:Figure 130b, c, h, j; Cosgrove and Cosgrove 1932:47–48, Plate 50f, g; Gilman and LeBlanc 2017:218–220, Figure 5.2; Taliaferro 2014:274, 276, Figure 8.1; LeBlanc 1984:Figures 16.1b, c and 16.2c, j, r; Lekson 1990:64, Figure 3.17t, ff; Turnbow 2024:198, Figure 9). In the Reserve region, the type was recorded at Late Pithouse period (Martin and Rinaldo 1950a:339, Figure 127f) and Reserve phase (Martin et al. 1954:126, Figure 64k, o, s, u; Martin and Rinaldo 1950b:482–483, Figure 184c) sites. Moore (1999:40–41, Figure 3.12a–l) also recognized a small Side-Notched type from the Reserve area that closely resembles the Swarts type but includes points with straight, convex, and concave bases.

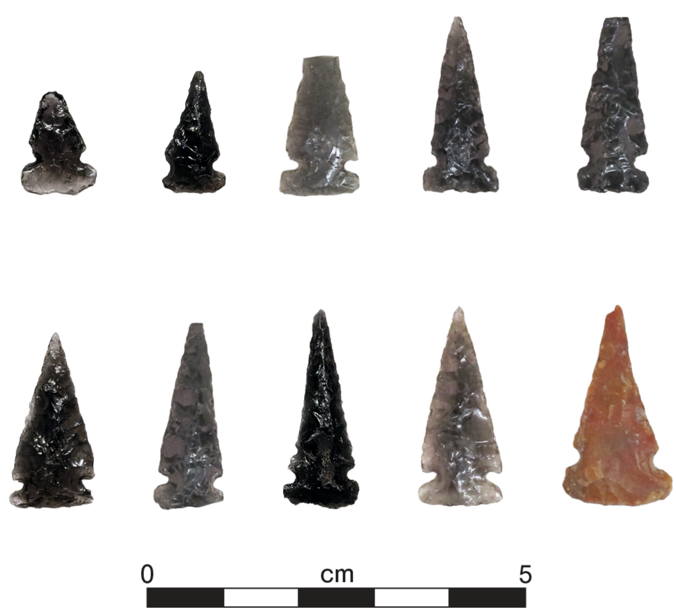


Figure 69. Swarts Side-Notched arrow points.

Side-Notched Points with Regional Variants: Comparison

Side-Notched points at Chaco Canyon were generally made of chert (including Chuska chert) or obsidian. Chert, chalcedony, and petrified wood were used at Salmon Ruins (Cameron 2001; Lekson 1977; Shelley 2006). Elsewhere in the San Juan Basin, chert (including Chuska chert), chalcedony, silicified wood, obsidian, quartzite, orthoquartzite, and, rarely, basalt were used to make Side-Notched arrow points (Beal 1984; Hancock et al. 1988; Hovezak and Sesler 2002; Kearns, personal communication 2024; Kearns and Silcock 1999; Klausing-Bradley 1990; Larralde 1991; Skinner 1999; Vierra 1993; Yost 1997). Chalcedony and some obsidian were primarily used in the NRG region, and chert and some obsidian were used in the LRG region. Obsidian and chert were used in the Mimbres region.

Side-Notched Points with Regional Variants: Chronology

As stated above, the Pueblo Side-Notched type varied in relative frequency through time but became prevalent during the A.D. 1000s. This style dominates collections from Pueblo villages in Chaco Canyon dating to the A.D. 1000s–1200s and collections from the NRG region dating to about A.D. 1300–1600, including those from Howiri, Riana Ruin, Sapawe, and Te'ewi (Fallon and Wening 1987; Hibben 1937; Lekson 1977; Moore 2013; Moore 1981:23; Wendorf 1953; Windes and McKenna 2018). Lekson (1977), Moore (1981), and Shelley (2006) all noted a shift from mostly straight- to concave-based points over time in the San Juan Basin. In the NRG region, at the Classic period site of Sapawe, most of the recorded points were Side-Notched points (n = 62, or 85 percent), and there were approximately even numbers of straight and concave bases (Vierra, personal communication 2024). The Side-Notched points at Pecos Pueblo mostly exhibited concave bases (Kidder 2003:20).

Temporal and Cosgrove points have a date range of perhaps A.D. 950–1130/1180, and Swart Side-Notched points date to slightly later, ca. the A.D. 1000s–1150 (Dockall 1991; Shafer 1986; Taliaferro 2014). In Shafer's (1986) and Dockall's (1991) studies of arrow points from the NAN Ranch Ruin, they noted a sharp transition from Corner- to Side-Notched forms at or near the beginning of the Classic Mimbres period (ca. A.D. 1000). Swarts, Hinton, and Cosgrove point types were recorded in Classic Mimbres period middens and rooms at the NAN Ranch Ruin, stratigraphically overlying deposits containing Mimbres Corner-Notched arrow points (Shafer 1986). Taliaferro (2004:78, 2014:277) noted that Swarts Side-Notched points were exclusively associated with the Classic and Terminal Classic period deposits at both the NAN Ranch Ruin and Old Town (A.D. 1000–1130/1180) and were absent from contexts dating to the subsequent Black Mountain phase (A.D. 1180–1300).

Side-Notched Concave-Based Points with Regional Variants

Hinton Side-Notched

Dockall (1991:223–224, Figure 24g–i) originally defined the Hinton arrow-point type based on the collections excavated at the NAN Ranch Ruin, in the Mimbres River valley of southwestern New Mexico. The type exhibits a small, triangular blade; side notching low on the blade; and a deep, concave base that typically has rounded ears (Figure 70). The blade is straight and relatively long and narrow. A few examples have an extra blade notch each (Cosgrove and Cosgrove 1932:Plate 50a; Gilman and LeBlanc 2017:219). The haft notches are straight, wide, or rounded, and the hafting elements range from straight and expanding to rounded. The distinguishing characteristic of this type is the deep basal edge that varies from a V- or U-shaped notch to a simple concavity. These points were made almost exclusively from flakes, by pressure flaking. Hinton-type points from the NAN Ranch Ruin range in length from 15.6 to 35.6 mm and have a mean length of 24.6 mm.

Figure 70. Hinton Side-Notched arrow points.

The type is distributed throughout southwestern New Mexico. It has been identified in the Mimbres, Gila, and San Francisco River drainages (Cosgrove 1947:Figure 130d; Cosgrove and Cosgrove 1932:Plate 50a; Dockall 1991; Gilman and LeBlanc 2017:219, Figure 5.5; Lekson 1990:63–64, Figure 3.17i, p; Moore 1999:41–42, Figure 3.13c–i; Nesbitt 1931:Plate 37m; Turnbow 2024:196, Figure 9). The Hinton point somewhat resembles the Arizona Basal-Notched type discussed by Sliva (2006:56, Figure 2.6) and found at the Salado phase Dinwiddie site, in southwestern New Mexico (Ryan in press; Figure 71).

Washita Side-Notched

Washita Side-Notched points are recognized in southeastern New Mexico. Defined as Leslie's (1978) Types 2B and 2C, they are triangular and have straight blades, side notches, and either concave or straight bases. In Texas, they are defined as triangular points with convex or straight blades, deep side notches, slightly contracting stems that are the widest parts of the points, and concave or straight bases (Turner et al. 2011:215). Miller and others (2019:296) identified Washita Side-Notched points at the Merchant Site, east of Carlsbad (Figure 72). Similarly to Pueblo Side-Notched points, these points range in length from 15.0 to 30.0 mm and have a mean length of 25.0 mm.

Washita points have also been reported at sites in the LRG region, the Fort Sumner area, the Roswell area, and the Sacramento Mountains (Adler and Speth 2004; Alldritt and Oakes 2000:154; Jelinek 1967:152; Kelley 1984:212, 275; MacNeish 1993:198; Miller and Graves 2012, 2019; Newlander and Speth 2012; Parry and Speth 1984; Seymour 2002:268; Speth 1983:35–37; Wiseman 2002, 2013).

Side-Notched Concave-Based Points with Regional Variants: Comparison

Obsidian and, less commonly, chert were used for these points in the Mimbres region and southwestern New Mexico. Mostly chert and some obsidian were used in the LRG region, and chert was used in southeastern New Mexico.

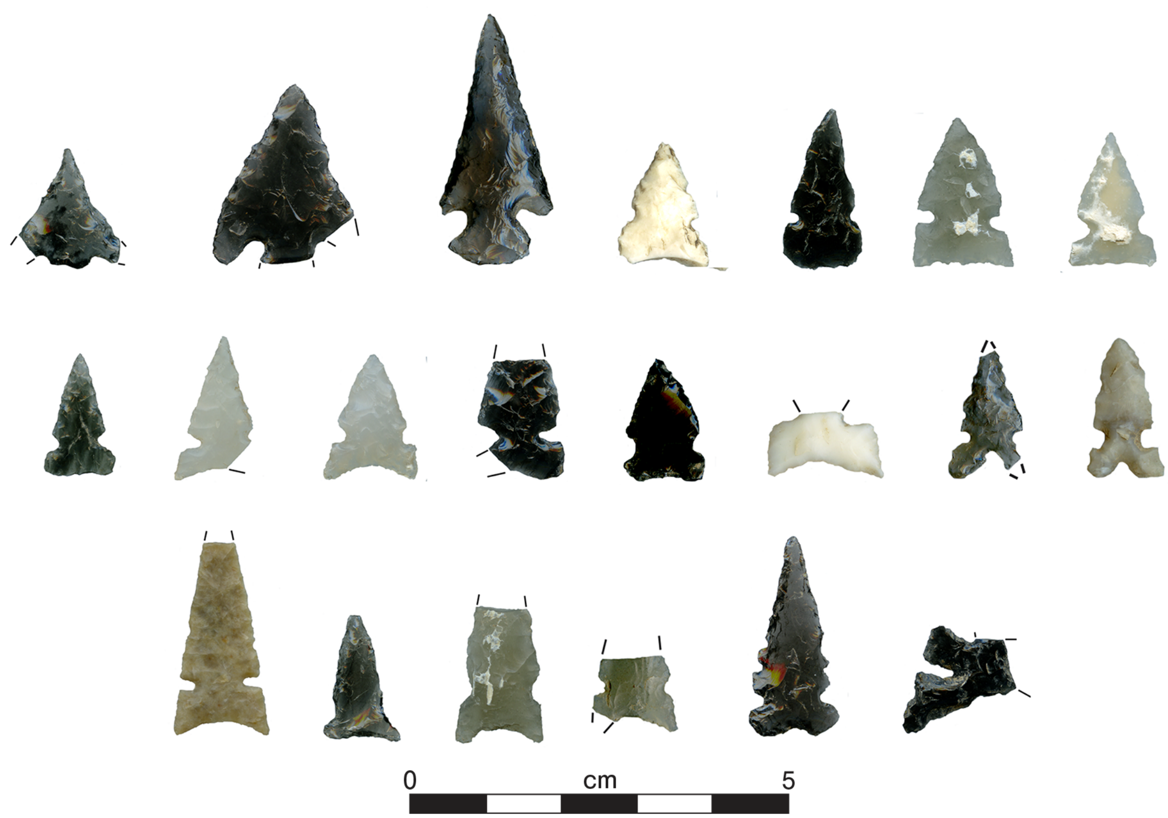


Figure 71. Corner- and Side-Notched arrow points from the Dinwiddie site (with permission from Karen Schollmeyer).

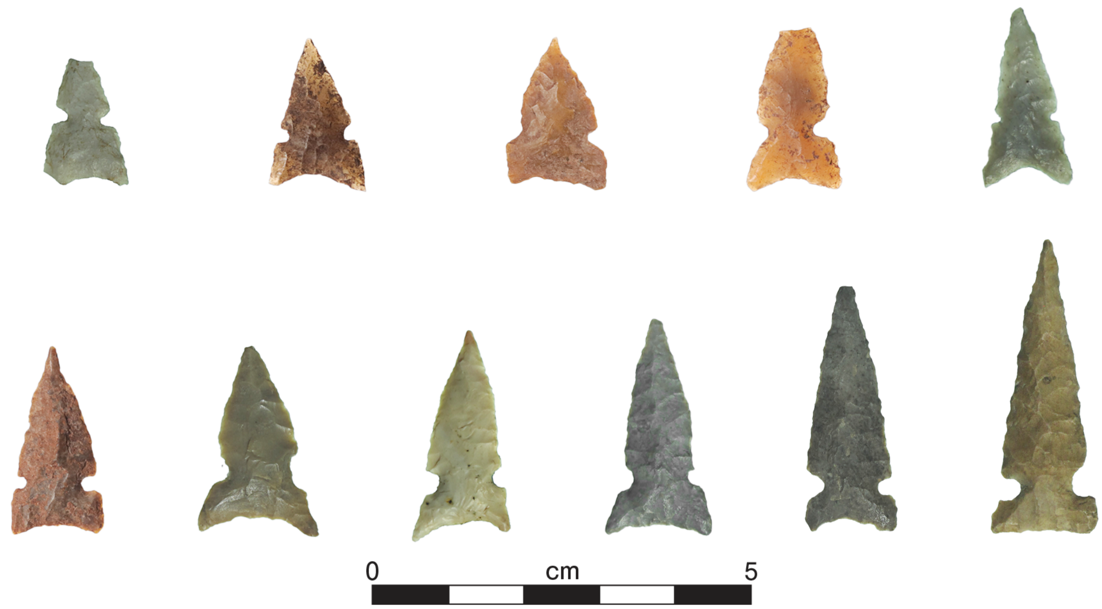


Figure 72. Washita Side-Notched arrow points.

Side-Notched Concave-Based Points with Regional Variants: Chronology

The Hinton point has a proposed temporal range between the A.D. 1100s and 1300. At the NAN Ranch Ruin, Dockall (1991:222–223) noted that the type was recorded in Classic Mimbres period contexts (A.D. 1000–1130/1150), although it was not as common as other Classic Mimbres period arrow-point types. Taliaferro's (2004:75, 2014:227) analyses of projectile points at Old Town, only 16 km (9.9 miles) from the NAN Ranch Ruin, indicated that the type was only affiliated with Terminal Classic Mimbres period (A.D. 1130/1150–1180) and later Black Mountain phase (A.D. 1180–1300) occupations. At the Classic Mimbres period Little Devil site, Hinton points were found in direct association with Swarts and Cosgrove points in a floor feature in the room block (Turnbow 2024:196, Figure 9). A few similar specimens may date to as late as the Salado Cliff and Tularosa phases (Moore 1999; Ryan in press).

Washita Side-Notched points have been recorded at Pueblo settlements across southeastern New Mexico dating to ca. A.D. 1300–1450. Miller and Graves's (2019) study indicated that this point type possibly dates to as early as A.D. 1000, was certainly present at village sites by A.D. 1150, and has a terminal date of ca. A.D. 1450 (Miller et al. 2016:243–245, 308).

Side-Notched Points with Basal Notches

Harrell Side-Notched

The Harrell point is a Side-Notched point with a notched base that is recognized in southeastern New Mexico. Conforming to Leslie's (1978) Types 2D and 2E, this style is triangular and has a straight or slightly convex blade, side notches, and a straight or concave base with a notch. In Texas, the type is defined as a triangular Side-Notched point with a basal notch. The blade occasionally exhibits fine serration (Turner et al. 2011:196). Miller and others (2019) and Adler and Speth (2004) provided studies of Harrell Side-Notched points recorded at the Merchant Site, east of Carlsbad, and the Henderson Site, near Roswell (Figure 73). In the Merchant Site assemblage, these points range from 15.0 to 30.0 mm in length and have a mean length of 22.0 mm—the same mean length of the points at the Henderson Site (Adler and Speth 2004:353; Miller et al. 2019:299, 308). These lengths are similar to those of Pueblo and Washita Side-Notched points. Harrell points also have been reported at sites in the LRG region, the Roswell area, and the Sacramento Mountains. Harrell points tend to be made on chert; some points in the LRG region were made on obsidian, and chert was used in southeastern New Mexico (Alldritt and Oakes

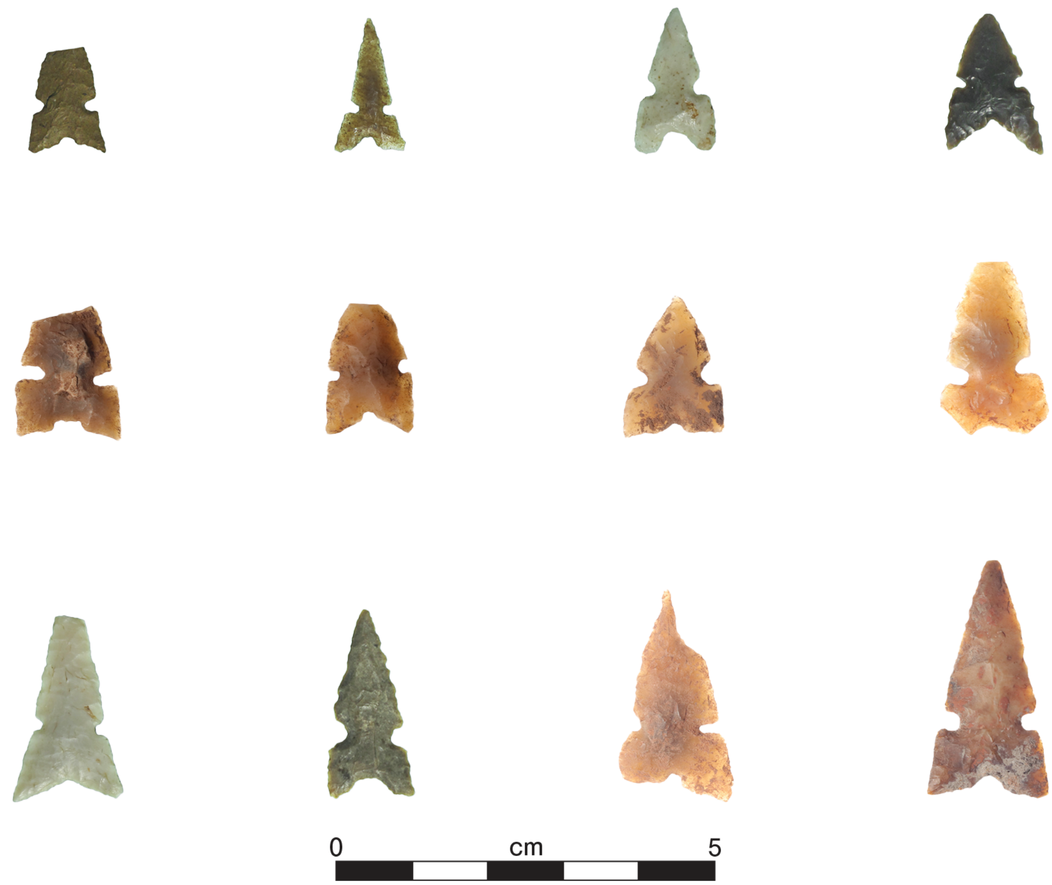


Figure 73. Harrell Side-Notched arrow points.

2000:154; MacNeish 1993:198; Miller and Graves 2012, 2019; Seymour 2002:268; Speth 1983:35–37; Speth and Newlander 2012; Wiseman 2002, 2013).

Chronology

Harrell Side-Notched points have been recorded at Pueblo settlements across southeastern New Mexico dating to ca. A.D. 1300–1450—a date range similar to that of Washita points (ca. A.D. 1000–1450; Miller and Graves 2019; Miller et al. 2016:243–245) but, as Miller and Graves (2019) pointed out, somewhat earlier than the range of A.D. 1200/1300–1500 provided for these points in Texas (Turner et al. 2011:196).

Multi-notched and Deeply Serrated Points

Arrow points with multiple notches or deeply serrated (notched) blades are often associated with the Side-Notched style. Points that exhibit one to three notches along one side of each blade have been reported from the Chaco Canyon, NRG, and LRG regions and southwestern New Mexico. In southwestern New Mexico, these have been referred to as belonging to the Cosgrove or Temporal Side-Notched type. The Pueblo Side-Notched style rarely exhibits multiple notches (Dockall 1999:227; Hayes 1981:Figure 133; Knight and Miller 2003; Kocer and Ferguson 2017:Figure 2; Lekson 1977:Figure 4.3; Moore 1999:42; Shafer 1986:35; Snow 2020). It appears that Washita points from southeastern New Mexico also may not exhibit additional notches (Adler and Speth 2004:Figure 15.1; Miller et al. 2016:Figures 12.6 and 12.7).

Deeply serrated arrow points appear to be rare, except in the LRG region, southeastern New Mexico, and the Trans-Pecos. These include the Livermore, Diablo, Means, Neff, and Sacramento Serrated types. A few examples have been documented in the NRG region at Pot Creek Pueblo (Figure 74). Eccentric specimens also appear to be rare. One example from Sapawe is a Side-Notched point with a blade that is curved like a snake's body and broken at the tip.

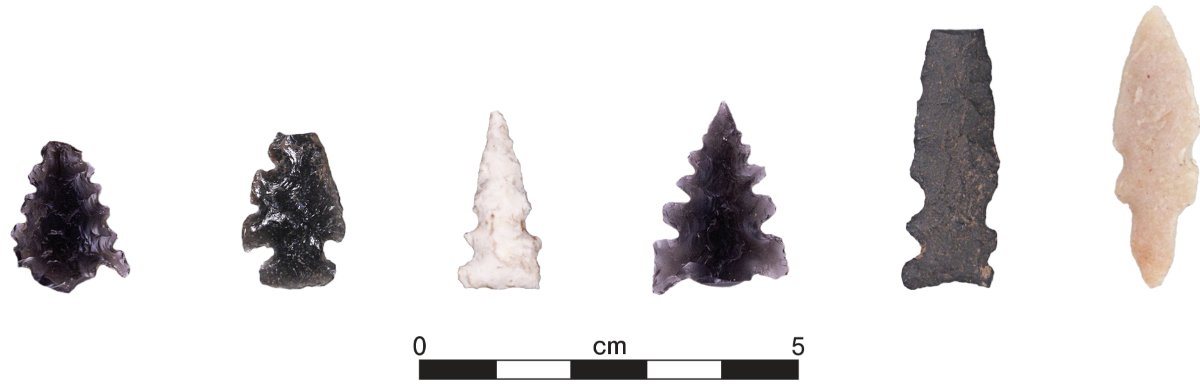


Figure 74. Multi-notched and Deeply Serrated arrow points.

Chronology

Arrow points with extra blade notches seem to have been popular across the Southwest between A.D. 950 and 1150 (Dockall 1991; Justice 2002:254–257; Lekson 1977:669; Perino 1985:68; Shafer 1986). However, extra notching or serrations on blades are present throughout much of the arrow-point sequence, though infrequently, and continued until possibly as late as the 1500s (Hayes 1981:Figure 133; Kidder 2003:Figure 8; Purdon 2024:Figure 8.12).

Unnotched Triangular Points

Pueblo Triangular

The Pueblo Unnotched Triangular type is represented in northern New Mexico. The point of this type has an isosceles- or equilateral-triangle shape, straight blade margins, and a straight, convex, or concave base (Figure 75; Kocer and Ferguson 2017; Moore 2013). The type was divided into three subtypes based on the widths of the bases during an analysis of artifacts at the GR2 rockshelter (Vierra, personal communication 2024). Type 1 was defined as less than 16.0 mm wide, Type 2 was defined as 16.0–20.0 mm wide, and Type 3 was defined as greater than 20.0 mm wide. The overall mean width for Types 1 and 2 was 14.2 mm, and the mean length was 22.5 mm. These two types exhibited impact fractures and burinations indicative of their use as points, whereas the Type 3 bifaces appeared to be preforms that could have been used to produce any of several point styles.

Lekson (1977), Thoms (1977), and Turnbow (1997) did not identify this point type. However, Kocer and Ferguson (2017) identified a Triangular point style at Gallina sites that also contained Side-Notched, Stemmed, and Corner-Notched types. Also, Hawley-Ellis (1988:177) identified Triangular and Corner-Notched point styles at Gallina sites in the Chama Valley. A mix of mostly Triangular and Side-Notched points was recorded at Pot Creek Pueblo, near Taos, and at Pecos Pueblo (Kidder 2003:18–20). Excavations at Gran Quivira revealed mostly Triangular (n = 54) and Side-Notched (n = 54) points and fewer Corner-Notched points (n = 26; Hayes 1981:109), and Chilili Pueblo contained a mix of Side-Notched (n = 18) and Triangular (n = 13) points but no Corner-Notched points (Purdon 2024). By contrast, only 3 of the 62 points recorded at Sapawe were Triangular points; the majority were Side-Notched points (Vierra, personal communication 2024).

Southwest Triangular

The Southwest Triangular arrow-point type was first recognized in southern and central Arizona by Sliva (2005) as the Classic Long Triangular type and was later identified as the Arizona Triangular type (Sliva 2006:56, Figure 2.6a). Ryan (2020, in press) and Clevenger and Denoyer (2023) subsequently renamed the type based on its widespread distribution at Salado Cliff phase sites in southwestern New Mexico. Sliva (2005, 2006:Figure 2.6b) separated this type from the Arizona Short Triangular (now called Southwest Short Triangular) type, which is less than 20.0 mm in length and has a length-to-width ratio of 2:1 or less.

The point of this type is described as a small, thin biface that lacks notches and stem-hafting elements. The blade typically has an isosceles-triangle shape and non-serrated, straight margins, although slightly excurvate to slightly concave margins are present on minor numbers of these points (Figure 76). The base is prominently straight but may be very slightly concave. These points were made almost exclusively from flakes, by pressure flaking. This type is distinguished by a length of 20.0 mm or more and a length-to-width ratio of 2.5:1.0.

Figure 75. Pueblo Triangular arrow points.

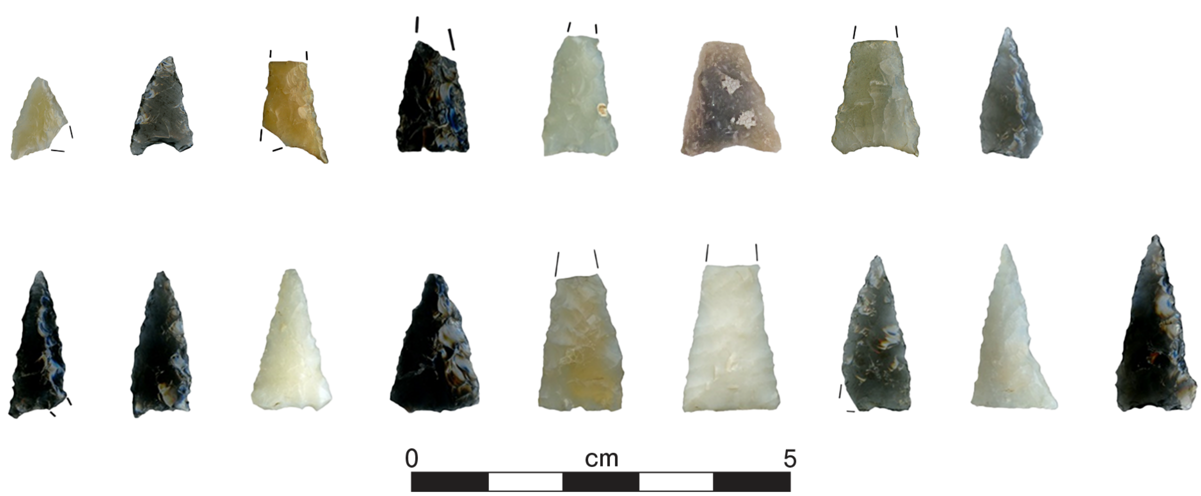


Figure 76. Southwest Triangular and Concave Base arrow points.

The Southwest Triangular arrow point is the most common at Cliff phase Salado sites in the Gila and San Francisco River drainages (Clevenger and Denoyer 2023; Ryan 2020:Figure 4.2a–d, in press) and in the Mimbres Valley (Nelson 1986:Figures 8.1 and 8.3). The type is also present at Tularosa phase sites in the Mogollon Highlands (Martin et al. 1956:Figure 53a–c; Moore 1999:Figure 3.14b–q, t; Teague 1986:Figure 7.2l, o) and at Animas phase sites (McCluney 1962:Figure 27; Skibo et al. 2002:27) in extreme-southwestern New Mexico.

Low frequencies of other triangular to oval arrow forms without notching or stems date to prior to the A.D. 1200s but vary from the Southwest Triangular type. Typically, they tend to be less well-made and have straight to slightly excurvate blade margins and, most commonly, convex bases. Examples have been recorded at the NAN Ranch Ruin (Dockall 1991:Figure 25a–c) and at LA 47821, in the Sapillo Creek drainage (Solfisburg et al. 2021:Figure 9.5).

Southwest Concave Base

The Southwest Concave Base Triangular point was first described by Sliva (2006:Figure 2.6d) in Arizona as the Arizona Concave Base Triangular point. The type name was changed when it was observed in the area of a Salado Cliff phase occupation in southwestern New Mexico (Ryan 2020). It appears as a small, thin biface with no notches or stem-hafting elements and is distinguished from the Southwest Triangular point type by its deeply concave base (see Figure 76). The triangular blade typically has straight to slightly excurvate margins. The type tends to be less than 25.0 mm long and has a length-to-width ratio of 2.5:1.0.

In southwestern New Mexico, this type has been recorded in association with the Southwest Triangular type at the Salado Cliff phase sites of Dinwiddie (Ryan in press) and 3-Up (Ryan 2020:Figure 4.1b, c). Other similar specimens from the Animas phase Clanton Draw site (McCluney 1962:Figure 13) and the Tularosa phase Gila Cliff Dwellings (Teague 1986:Figure 7.2m) have been illustrated.

Fresno

Unnotched Triangular points are often ascribed to the Fresno type in southeastern New Mexico. Leslie (1978) identified these as Types 1A–1C. They are described as triangular to leaf shaped and having convex or sometimes straight blades and straight, convex, or concave bases. The Texas Fresno point is defined as a Triangular point with a straight or convex blade and a convex or slightly concave base that is over 20.0 mm in length (Turner et al. 2011:191). Miller and others (2016) identified Unnotched Triangular points at the Merchant Site (Figure 77) that represented all three of Leslie's subtypes and ranged from 15.0 to 30.0 mm in length (with an average length of 25.0 mm; Miller et al. 2016:290–293, 307). Triangular points have also been reported at sites in the LRG valley, the Roswell area, and the Sacramento Mountains (Adler and Speth 2004; Alldritt and Oakes 2000:154; Kelley 1984:212, 275; MacNeish 1993:194; Miller and Graves 2012, 2019; Parry and Speth 1984; Seymour 2002:270–271; Speth and Newlander 2012; Wiseman 2002).

Unnotched Triangular Points: Comparison

Pueblo Triangular points were made of chalcedony, chert, or obsidian at Gran Quivira and Chilili Pueblo, in the Salinas District, east of Socorro (Hayes 1981:109; Purdon 2024; Vierra, personal communication 2024). Southwest Triangular and Southwest Concave Triangular points were often made of obsidian in the Mimbres region, of chert or (some) obsidian in the LRG region, and of chert in southeastern New Mexico, for Fresno points (Dockall 1999:228; Miller et al. 2016; Moore 1999:78).

Adler and Speth (2004:352–354) suggested that the Fresno Triangular points at the Henderson Site were preforms and not points (see also Wiseman 1996:87). Overall, Fresno points are generally larger than Washita points, except that Washita points are slightly longer—that is, more "streamlined"—than Fresno points, which are "squatter." The mean length of 25.0 mm reported from the Merchant Site is slightly longer than the 21.0- and 22.0-mm mean lengths reported for the Fresno and Washita points, respectively, at the Henderson Site. Miller and others (2016; Miller and Graves 2019) reported evidence of impact fractures indicative of their use as projectile points. This corresponds to observations made at the GR2 rockshelter, in the NRG region (Vierra, personal communication 2024), and noted by Moore (1999:76) for the Mogollon Highlands.

Overall, the points at the Henderson, GR2 rockshelter, and Merchant sites have mean lengths of 21.0, 22.5, and 25.0 mm and mean widths of 12.0, 14.2, and 15.0 mm, respectively (Adler and Speth 2004:353; Miller et al. 2016:291; Vierra, personal communication 2024). The size ranges of the points at these three sites presumably include both larger and smaller versions. The Southwest Triangular type does closely resemble the contemporaneous Fresno type from the Tularosa Basin and southeastern New Mexico (Miller and Graves 2019:260; Miller et al. 2016:Figure 12.14).

Figure 77. Fresno arrow points.

Unnotched Triangular Points: Chronology

The Pueblo Triangular type dates to about A.D. 900–1200 in the NRG region (Moore 2013). The Gallina sites exhibited a date range of about A.D. 1100–1300. With the date of ca. A.D. 1300 from Pot Creek Pueblo included, these points represent a date range of roughly A.D. 900–1300. By contrast, this point style continued to be used from ca. A.D. 1300 to the 1500s at Gran Quivira.

The Southwest Triangular type has been recorded in contexts dated to as early as A.D. 900 but became the most common point type from the mid–A.D. 1200s to around 1350/1400, during the Salado Cliff and Tularosa phases, in southwestern New Mexico (Clevenger and Denoyer 2023; Moore 1999:66; Ryan in press). The type correlates to the Unnotched Triangular or Fresno form in southern and southeastern New Mexico, which could date to as early as A.D. 950, but is present in occupation areas dated to A.D. 1150–1450. This is similar to the date range for Washita and Harrell points, which date to ca. A.D. 1000–1450 (Miller and Graves 2019; Miller et al. 2016:243–245). Indeed, Washita, Harrell, and Fresno points are all present in the assemblage at the Garnsey bison site, which was dated to ca. A.D. 1450–1500 (Speth 1983:35–37, 48), although a recent review of the radiocarbon dates from the site indicated a later average date of cal A.D. 1570 ± 50 (C. Britt Bousman, personal communication 2024).

Formative/Postcontact Period Arrow Points

Side-Notched Points with Regional Athabaskan Variants

Navajo (Desert Side-Notched)

Small, triangular Side-Notched points with straight, concave, or notched bases are diagnostic of the Late Formative and Postcontact periods. In NWNM, they are commonly identified as Desert Side-Notched points (Brown et al. 1991:538–540; Brown et al. 1993:407,

Figure 6.16b; Honeycutt and Fetterman 1994:31.27; Hovezak and Sesler 2002:133; Kearns 1996:136; Torres 2003:217, 229; Turnbow 1997:166, 206–208; Wegener et al. 2005:20.11). The designation originated in the Great Basin and California and is commonly applied to post–Fremont phase points in the Intermountain West (Baumhoff 1957; Baumhoff and Byrne 1959; Heizer and Hester 1978; Holmer 1986; Holmer and Weder 1980; Thomas 1981). Turnbow (1997:208–209) noted the presence of Desert Side-Notched–style points at Precontact period Pueblo, Navajo, Apache, Ute, and Paiute sites. In the San Juan Basin, the Desert Side-Notched point is considered an Ancestral Navajo point that is often found in contexts that also contain Dinetah Brown and Gobernador Polychrome ceramics.

Two additional terms are proposed for Desert Side-Notched–style points: Chacra and Diné Side-Notched. Brugge (1986:125–126) designated early Navajo points in Chaco Canyon Chacra points, noting that they have "straight to convex sides, rarely somewhat concave (one example only), straight to concave bases, shallow side-notches and usually wide tangs. They are frequently curved or at least more humped on one surface, often being semi-uniface. They are short relative to width, the length not exceeding twice the width." Torres's (2003:Figure 117) illustrated points include examples of straight, slightly concave, and notched bases. Torres identified the features that distinguish Diné Side-Notched points from Chacra points as "very fine pressure flaking, although not necessarily bifacial; deep, often square side notches; very low mass to length ratio (.0–1.5 g:15–30 mm)." The illustrated points include V-shaped basal indentations and examples of notched, slightly concave, and straight bases (Torres 2003:229–230, Figure 117; Figure 78).

The Desert Side-Notched point has an isosceles- to equilateral-triangle shape and a straight to slightly convex blade. The horizontal notches are generally placed well below midpoint and are typically narrow, deep, and soft-V or C shaped. The points often have slightly offset, opposing side notches of different shapes and sizes. The stems can be parallel or expanding. Desert Side-Notched subtypes differ primarily in their basal morphologies, which include straight to slightly convex bases, concave and V-shaped indented bases, and notched bases. The base modification dictates the stem design. Points with straight to slightly concave bases have parallel to slightly expanding stems with abrupt, right-angle to slightly acute-angle proximal corners. Points with deeper concave or V-shaped indentations have parallel to expanding stems and long, triangular ears. The basal-notched form has a narrow, U-shaped notch centered along the base or a similar notch centered in a concave basal indentation. The former style typically has a parallel or slightly expanding stem with square or right-angle proximal corners; the latter often has triangular ears and sometimes exhibits a narrow "neck" between the basal and side notches that creates a trowel- or spade-shaped ear. The subtypes all share a similar size range of 12.0–31.0 mm in total length. However, mean lengths vary among the subtypes. The mean length of points with straight bases is 17.8 mm, the mean length of points with concave bases is 18.7 mm, the mean length of points with basal notching is 19.9 mm, and the mean length of points with V-shaped basal notching is 21.4 mm. These mean lengths are smaller than those observed for Corner-Notched (21.7 mm), Unnotched Triangular (22.0 mm), Stemmed (23.0 mm), and Side-Notched (24.0 mm) arrow points from the NRG region. The different varieties of Desert Side-Notched points are contemporaneous and have been recorded together at sites, often in contexts also containing small Triangular Cottonwood-series points.

Vierra (1995:128–130) analyzed a sample of 18 projectile points recorded at 5 Navajo Pueblito sites in the Gobernador Canyon area: Frances Canyon, Hooded Fireplace, Large School, Split Rock, and Tapacito. The arrow points consisted of 9 Side-Notched points with straight, concave, or notched bases and 6 Triangular points with straight bases (Figure 79), in addition to 3 Archaic period dart points.

Jicarilla

Eiselt (2006:292–293, 2012:224) reported the use of stone arrow points by Jicarilla groups in the Chama Valley north of Española, along the Rio del Oso. These points were recorded at nineteenth-century sites associated with Apache rings and pottery. Besides stone points, the Jicarilla were also using metal points during this period (Eiselt 2012:221–222; Johnson et al. 2009). The recorded stone arrow points included two Desert Side-Notched types: the basal-notched variant and the shallowly or deeply concave-based variant (Eiselt 2006:292–293). Both forms are isosceles-triangle-shaped preforms with side notches placed relatively high on their straight to slightly convex blades. The size range (ca. 18.0–30.0 mm) is similar to that of Desert-Side-Notched–style points at ancestral Navajo sites. Although the sample size was small, the placement of the side notches near the midpoints may differentiate Jicarilla points from most Navajo Desert Side-Notched–style points, which have notches well below their midpoints. Like assemblages at many early Navajo sites, the Jicarilla assemblage includes points scavenged from earlier contexts.

Figure 78. Early Navajo arrow points (Torres 2003:Figure 117; with permission from the Navajo Nation Heritage and Historic Preservation Department).

Figure 79. Navajo Pueblito arrow points.

Cerro Rojo

Evidence of Apache use of Desert Side-Notched, Washita, or Harrell-like points in southern New Mexico has been reported by Seymour (2002:Figures 7.14 and 7.15, 2004:Figure 19, 2012:Figure 5.9, 2017:Figure 8), although she preferred to divide these types into the local variants of Gileño Side-Notched, Cibola Side-Notched, and Luna Tri-notched, respectively. The points of this type are associated with rock rings and pottery at the Cerro Rojo Complex, which is possibly related to the Mescalero Apache (Figure 80). Seymour (2004:174) characterized the points as "small, very thin side-notched and tri-notched forms, often between 20 and 25 mm long." She compared the Gileño Side-Notched point, a shallowly side-notched, straight-based triangular form, to the Desert Side-Notched type, noting that, though rare east of the Rio Grande, they are common in the mountains of southern New Mexico and Arizona, and she suggested that it is probably a Chiricahua Apache form (Seymour 2004:174). The Luna Tri-notched point is similar to the notched-base Desert Side-Notched and Harrell Tri-notched variants.

Seymour (2004:175) noted sufficient stylistic variability to merit several type or subtype designations—variability that is also characteristic of the Desert Side-Notched and Harrell types. This included differences in base morphology (notched vs. concave bases and bases with notched basal indentations) and side-notch attributes (notches vs. indentations). Illustrated examples include points with side notches placed well below the midpoints and those with side notches at the midpoints or higher (Seymour 2004:Figure 19, 2012:Figure 5.9). The latter form is a long-stemmed variety reminiscent of reported Jicarilla points (Eiselt 2006:293). The Cibola Side-Notched point is differentiated by its shallow to moderately deep concave basal indentations and the placement of its side notches well below the midpoint and is comparable to concave-based Desert Side-Notched and Washita points.

Two rhyolite points recorded at a rock-ring site north of Las Cruces are comparable to other late Side-Notched and concave-based points (Karl Laumbach, personal communication 2024). Both points were made on isosceles-triangle-shaped preforms and are characterized by highly placed, narrow side notches and long stems. One point has an expanding stem and a shallowly concave base reminiscent of the concave-based Desert Side-Notched, Washita, and Cibola Side-Notched types. The other has an expanding stem and a deep basal notch like some notched-base Desert Side-Notched and Harrell variants.

Piedra Lumbre

The Piedra Lumbre type was defined by Schaafsma (1979, 2002) as possibly representing the Navajo occupation of the Chama Valley ca. A.D. 1700. Based on excavations conducted at Abiquiu Reservoir that included the AR4 site complex, which contains residential and storage structures, animal pens, and various activity areas, although there were multiple groups residing in the region during that period, including Tewa, Jicarilla, Ute, and Navajo (Wozniak et al. 1992). Schaafsma (1979:207, 2002:172–175) identified four point types based on his studies (Types A–D), but all of them are variants of a Side-Notched style that primarily includes a concave or deeply notched base. His illustration of the Type D point fits the general description of a Desert Side-Notched or Chacra point (Schaafsma 1979:Figure 118, 2002:Figure 5.9). He made a distinction between Piedra Lumbre and Pueblo Side-Notched points, the latter of which typically have straight or slightly concave bases.

Side-Notched Points with Regional Athabaskan Variants: Comparison

In the San Juan Basin, Desert Side-Notched points were typically made on fine-grained cryptocrystalline or siliceous materials, including chert (including Chuska Chert), chalcedony (including Pedernal chert), silicified wood, silicified tuff, orthoquartzite, quartzite, obsidian, and basalt. In the Upper San Juan Basin, the proportionate use of obsidian increased during the Dinétah to Gobernador phase interval (Hovezak and Sesler 2002:139). Most of the points at Pueblito sites in the Gobernador region were made of obsidian or chalcedony; some were made of chert or silicified wood (Vierra 1995). In the Chama Valley, Jicarilla sites contain Pedernal chert, and Piedra Lumbre sites contain chalcedony, chert, and obsidian (Eiselt 2006). In the south, Cerro Rojo points were made of obsidian, fine-grained rhyolite, chert, or, occasionally, quartz (Seymour 2004).

Precontact and Postcontact period Athabaskan groups utilized a variety of projectile point forms that often included points recycled from earlier contexts, but three arrow-point styles—Triangular, Side-Notched, and Side-Notched with a basal notch (Tri-notched)—are consistently encountered at Athabaskan sites throughout New Mexico (Brugge 1986; Eiselt 2006, 2012; Kearns 1996; Schaafsma 1979, 2002; Seymour 2004, 2012; Turnbow 1997). All three types

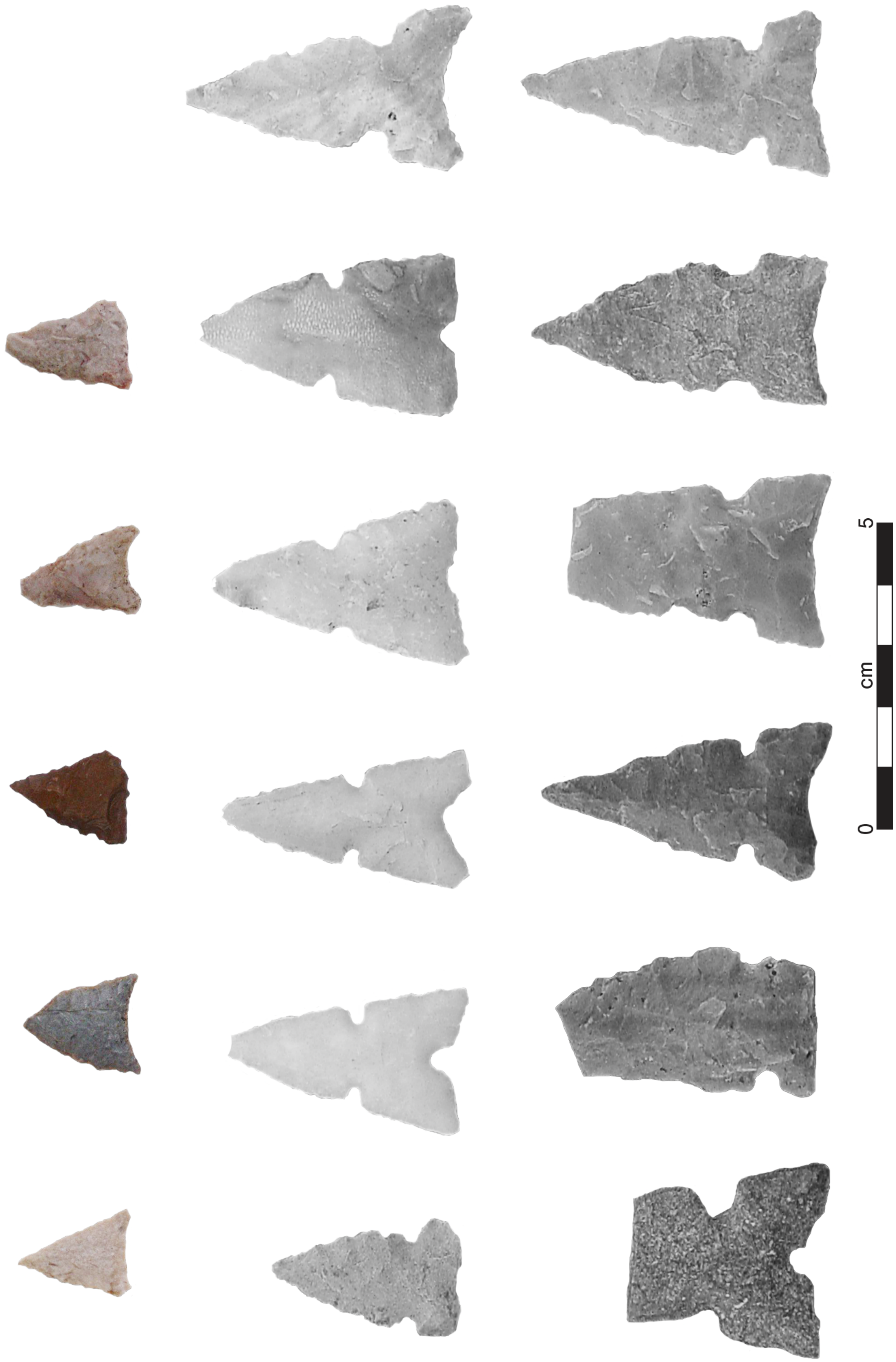


Figure 80. Cerro Rojo arrow points (with permission from Deni Seymour).

were made on triangular flake blanks of fine-grained materials. Although there is some variability, the points have similar size ranges: ca. 15.0–31.0 mm long, 12.0–17.0 mm wide at the bases, and 1.4–4.4 mm thick. The small, triangular points are generally isosceles- to equilateral-triangle-shaped points lacking notches and stems. They are comparable to the Formative/Postcontact period Unnotched Triangular series (e.g., Pueblo Triangular, Southwest Triangular, and Fresno types). The Athabaskan variants are identified as Cottonwood Triangular points in NWNM and as Chihuahua or Bliss points in southern New Mexico (Kearns 1996:136; Seymour 2004). Cottonwood Triangular points typically have straight or slightly convex bases and lack serration. The Chihuahua point is serrated and has an uneven, convex or slightly concave base. The Bliss point has a shallow, concave base and lacks serrated blade margins.

The Side-Notched varieties are generally isosceles-triangle-shaped points and typically have narrow side notches, expanding stems, and straight or slightly concave bases. The Tri-notched varieties are similar, but a Tri-notched point is distinguished by its relatively deep, concave or V-shaped basal indentation and, often, a distinct notch centered on the base. Collectively, they are comparable to Formative period Side-Notched and Side-Notched concave-based points (e.g., Pueblo Side-Notched, Washita, and Harrell points). In NWNM, small Side-Notched and Tri-notched points at early Navajo sites are commonly identified as Desert Side-Notched, Chacra, or Diné points. Similar points are present at Jicarilla sites in the NRG region, and in the Abiquiu area, they are included in the Postcontact period Piedra Lumbre point group. In southern New Mexico, comparable points found at early Apache sites are identified as Gileño Side-Notched (small, triangular, straight-based points with shallow side notches), Cibola Side-Notched (small Side-Notched points with concave bases), and Luna Tri-notched (small points with side and basal notches). Although there is a range of variability, some Jicarilla and southern New Mexico Apache side- and basal-notched points are distinguished by the relatively high placement of their side notches (i.e., at one-third of the point length or more above the base), a feature rarely noted on early Navajo points in the San Juan Basin.

Side-Notched Points with Regional Athabaskan Variants: Chronology

Desert Side-Notched–style points are distinctive components of Dinetah phase (A.D. 1500–1690), Gobernador phase/Pueblito period (A.D. 1690–1765), and early Cabezon phase (A.D. 1765–1860) Navajo assemblages (Ayers and Sandefur 1998:101–103; Brown et al. 1991:538–540; Elyea and Eschman 1985:253; Farmer 1942:73; Honeycutt and Fetterman 1994; Hovezak and Sesler 2002:132–140; Kearns 1988:231–235; Keur 1941; Kotyk 1999; Marshall 1985:92, 120, 128; Reed and Horn 1990:287; Rohman et al. 2003; Rollefson 1984; Skinner 1999:56–59; Torres 2003). Torres (2003:229) identified the Diné arrow point as a "late-period" type. In Chaco Canyon, stone projectile points are only common at eighteenth-century Navajo sites, and Brugge's (1986:74) Desert Side-Notched–style Chacra points have the highest frequency. Schaafsma (2002:187) considered Piedra Lumbre sites to date to ca. A.D. 1650–1710, prior to the construction of the majority of the Pueblitos, which occurred between A.D. 1720 and 1760 (Towner 1996:163). Seymour (2012:110) suggested a date range of ca. A.D. 1300–1850 for Cerro Rojo Complex sites. As previously noted, the Jicarilla sites date to the nineteenth century.

Unnotched Triangular Points

Cottonwood

Small Triangular points lacking stems and notches are commonly encountered in Formative and Postcontact period contexts in the American West (Haury 1950:274; Heizer and Hester 1978:11–12; Holmer 1986:107–108; Loendorf and Rice 2004:44; Reed 1988:84). In NWNM, they can be found at Ancestral Puebloan sites and are sometimes identified as arrow-point blanks or preforms (see Brown et al. 1991:540, 1993:407–408; Lekson 1977:680; Morris 1939:125). They are common at Navajo sites and are often identified as Cottonwood Triangular points (see Brown et al. 1991:539–541, 1993:407–408; Hovezak and Sesler 2002:133; Kearns 1996:136; Kearns and Silcock 1999:6-2; Torres 2003:229–230).

Cottonwood Triangular points are isosceles- or equilateral-triangle-shaped points without notches and stems and with straight to slightly convex blades (see Figure 78). Different base shapes create several varieties: straight-based points with rounded or angular corners; concave-based points with wide, shallow, concave basal indentations, sometimes with barbed proximal corners; and convex-based points with rounded (convex) bases. Cottonwood Triangular points in the San Juan Basin range in length from 15.0 to 30.0 mm (with a mean length of 22.4 mm) and in width from 12.0 to 17.0 mm (with a mean width of 4.0 mm). These dimensions fall within the ranges previously described for Formative period Unnotched Triangular points. In fact, they match the metrics of points from the GR2 rockshelter. Cottonwood Triangular points in the San Juan Basin were commonly made of chert, chalcedony, silicified wood, orthoquartzite, quartzite, or obsidian.

Chronology

The Cottonwood Triangular variant of the Small Triangular point series is diagnostic of Dinetah phase (A.D. 1500–1690), Gobernador phase (A.D. 1690–1765), Pueblito period (A.D. 1720–1760), and early Cabazon phase (A.D. 1765–1860) Navajo assemblages (Brown et al. 1991:539–541; Farmer 1942:73; Honeycutt and Fetterman 1994:31.27; Hovezak and Sesler 2002:133–140; Kearns 1988:235; Keur 1941:Figure 4b; Marshall 1985:92, Figure 13.8d–h; Rohman et al. 2003; Rollefson 1984; Torres 2003:229–230).

Side-Notched Concave-Based Points with Serration

Toyah

The Toyah type is represented in southeastern New Mexico. It is defined by Leslie (1978) as a Type 2F triangular point with straight to slightly convex blade edges that are sometimes serrated. It has shallow side notches and an indented or deep-V-notched base (Figure 81). The type is a Texas style described as a small, triangular point with straight, serrated blade edges. The side notches are often near the deeply concave bases, which have parallel to expanding stems (Miller et al. 2016:300; Seymour 2002:269; Suhm and Jelks 1962:291; Turner et al. 2011:213). Toyah points were primarily made of chert.

Chronology

The Toyah point type has a date range similar to those of Washita, Harrell, and Fresno points, dating to ca. A.D. 1000–1450 (Miller and Graves 2019). Corrick (2000) reported a mean date of A.D. 1260 ± 60 for three charcoal samples associated with Toyah point-manufacturing activities at 41BS188, at the Big Bend National Park.

Triangular Basal-Notched Points

Garza Variant

The Garza variant is represented in southeastern New Mexico. It is defined as Leslie's (1978) Type 1D, which is Triangular and has excurvate or straight, nonserrated blade edges and an indented or deep-V-notched base. Leslie suggested that his Type 1D may be a preform for his Type 2F (Toyah). Miller and Graves (2019:237–238) have referred to a Triangular Basal-Notched type with a distinctive notch in an angular concave base.

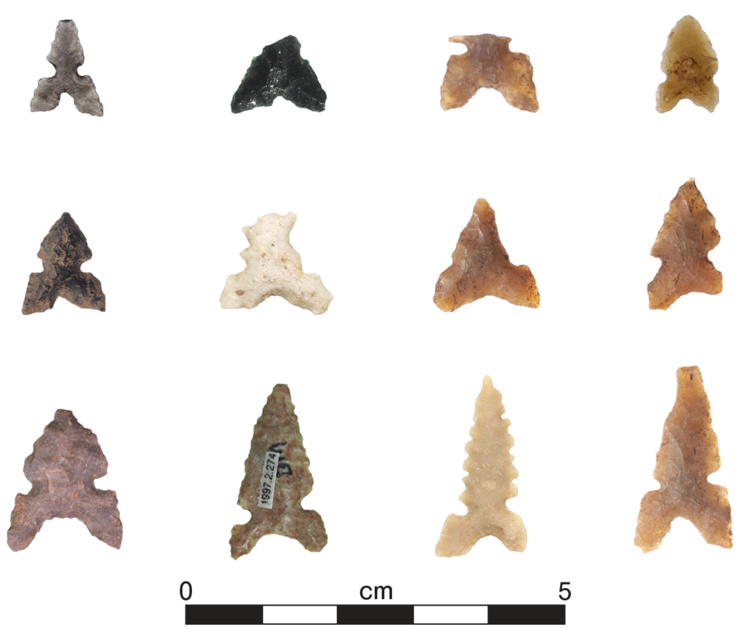


Figure 81. Toyah arrow points.

Several obsidian points at Fort Bliss were derived from the Mule Creek source and could represent a western variant of the Garza type (Miller et al. 2017).

Garza is also a Texas style described as a triangular point with straight to excurvate, serrated blade edges and a notched base (Runkles 1984; Turner et al. 2011:193; Figure 82). Garza points have been found at the Garnsey Spring Campsite and in small numbers at the Henderson and Merchant Sites (Adler and Speth 2004:Figure 15.3; Miller et al. 2016:310–314, Figure 12.5; Parry and Speth 1984:Figure 29). Most of these points were made of chert.

Turner and others (2011:193) considered that the Garza type may be a regional variant of the Toyah type in the El Paso area, but Miller and others (2016:294) stated that the Soto style found in the Trans-Pecos, in western Texas, should be considered a regional variant of the Garza type. Harlan (2017:130) noted that Soto points do not exhibit serration like their eastern counterparts, Lott points. Lastly, Seymour (2002:270–271) identified a point like the Garza type as a Mesilla point that she distinguished from the Soto point (see also Alldritt and Oakes 2000:155; Parry and Speth 1984). Her Mesilla points tend to have notched bases, whereas Soto points tend to have deep, concave bases with ears, like Lott points (Seymour 2017:Figure 2). Harlan's (2017:131) study of southwestern arrow points indicated that the Garza, Soto, Mesilla, and Lott point types in his analysis all clustered together and represented similar forms.

Chronology

The Garza point type has a date range similar to those of Washita, Harrell, Fresno, and Toyah points: A.D. 1000–1450 (Miller and Graves 2019). The assemblages at both the Henderson and Merchant Sites contain a few Garza points (Adler and Speth 2004:354; Miller et al. 2016). The Henderson Site dates to ca. A.D. 1200/1250–1400/1450, and the Merchant Site dates to about A.D. 1300–1450 (Miller et al. 2016:245; Rocek and Speth 1986). However, the old excavations at the Merchant Site may tentatively illustrate a point sequence that would represent a possible shift from straight- to notched-base points—that is, the earlier occupation primarily contained Washita and Fresno points, whereas the later occupation contained Garza, Harrell, and Toyah points.

No Garza points were recorded at the Garnsey Bison site, which dates to about A.D. 1450–1500 (Speth 1983:35–37, 48). However, Garza points are present in the assemblage at the Garnsey Spring Campsite. Parry and Speth (1984:30, 56) suggested that these points are associated with a later occupation during the sixteenth or seventeenth century. An OxCal calibration of the "Garza Hearth" date of A.D. 1565 ± 62 supports a sixteenth-century occupation (Bousman, personal communication 2024). This date also corresponds to dates for Garza points at the Lubbock Lake site, which were originally attributed to the A.D. 1600s (Johnson et al. 1977). However, recalibrations of those dates indicated a range from A.D. 1556 to 1634, which would include the Garnsey Spring Campsite date (Bousman, personal communication 2024). Therefore, the date range for the Garza point type probably extends into the sixteenth and seventeenth centuries.

Coronado Site Point

A single stone point was recorded during excavations of the Coronado campsite, near Bernalillo and Rio Rancho. The point was described as a triangular, side- and basal-notched point made on a thin chert flake (Figure 83). It is considered similar to the Desert Side-Notched and Harrell point types. However, it is also like the Teotihuacan or Texcoco point style in Mexico and may have been associated with the Indigenous contingent of the expedition (Vierra 1989:122, 1992; Vierra and Hordes 1997). A Mesoamerican blade fragment made of Pachuca obsidian from central Mexico was also recorded at the site.

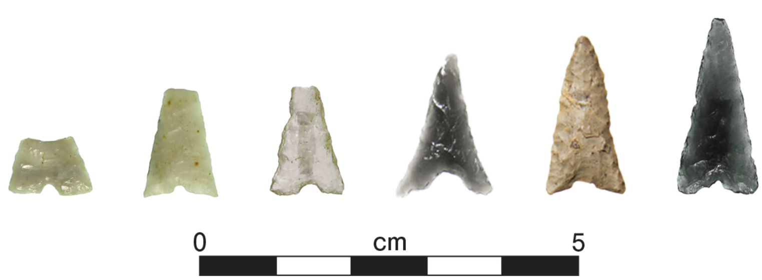


Figure 82. Garza arrow points.

Figure 83. Coronado (*left*) and Indio-Hispano arrow points.

Chronology

The Coronado expedition visited the Bernalillo and Rio Rancho area from A.D. 1540 to 1542 (Vierra 1989, 1992; Vierra and Hordes 1997).

Indio-Hispano Points

Classification

Evidence of Spanish Colonial stone-tool working is mostly limited to strike-a-lights and gunflints; few projectile points have been recorded. Moore (2017:113) described these points as tending to be "rather crude in appearance, with marginal flaking and shallow side-notches." Examples of these points have been observed in the NRG region from Albuquerque to the Abiquiu and Taos areas, at Casitas Viejas, Embudo, GR2, La Puente, LA 25323, and San José de Las Huertas (Atherton 2013:207; Severin N. Fowles, personal communication 2024; Moore 2005, 2017; Moore et al. 2004; Rancier et al. 1986:9.52 [Type 2]; Sunseri 2017; Vierra, personal communication 2024). These points typically were made on flakes with intact ventral surfaces and exhibit dorsal-surface beveling to shape the blades. They have shallow notches, expanding stems that are wider than their blades, and concave bases. The stems and bases were minimally retouched (see Figure 83). This type can be made of obsidian, chert, or chalcedony.

A similar-style point was illustrated by Miller (2001:Figure 11 [*third row from the top and the two points on the left*]). It is associated with the Ysleta WYC site at El Paso. Schaafsma's (2002:175, Figure 5.9) Type C point also appears to resemble the Indio-Hispano type.

Vierra (1997) described two points from a colonial site near Valencia. However, they were small, stemmed arrow points with roughly triangular blades. The edge margins of each point exhibited steep, abrupt alternate retouch. That is, one edge margin of a flake had been crushed, and then the flake had been turned over and crushed along the opposite edge, to shape the blade. They appeared to be expedient points made with little effort, on chalcedony.

Chronology

The Indio-Hispano point type appears to date to the eighteenth and nineteenth centuries. These points have been observed at settlements with Pueblo and mixed Indian and Hispanic (*Genizaro*) occupations (Atherton 2013; Fowles, personal communication 2024; Moore 2005, 2017; Moore et al. 2004; Rancier et al. 1986; Sunseri 2017). It should be noted that some Pueblo Side-Notched–style points may have continued to be produced at Pecos Pueblo and Gran Quivira by their Pueblo inhabitants during the seventeenth and possibly eighteenth centuries and therefore may overlap in time with Indio-Hispano points (Hayes 1981:109; Kidder 2003:20). The two points from the Ysleta WYC site are associated with the Pueblo Revolt period, from A.D. 1680 to 1725 (Miller 2001). Schaafsma's (2002) Type C point is associated with the Piedra Lumbre phase, dated to A.D. 1650–1710. Therefore, they appear to predate the Indio-Hispano style recorded in the NRG region but would be contemporaneous with the previously mentioned Pueblo points.

Postcontact Period Metal Points

The presence of metal marked a significant departure from the traditional use of stone for weaponry in New Mexico, but that departure was uneven through time and space and was due, in large part, to the colony's chronic insufficient supplies of wrought-iron stock

(Simmons and Turley 1980:16–17; Weber 1992:319). That scarcity necessitated the continuation of Native lithic-arrow-point fabrication, which was also carried out by some members of iron-poor Colonial communities (Cobb 2003; Moore 2001:78). San Marcos Pueblo, which included a Spanish ore-processing component, still fabricated obsidian arrow points up until its ca.-1680 abandonment (Ramenofsky and Schleher 2017:175, Table 10.19). The Jicarilla Apache used both metal and lithic arrow points, the latter of which were scavenged from prehistoric sites (Eiselt 2006:292). Both lithic and metal arrow points have been recovered from eighteenth-century Gobernador phase Navajo sites in NWNM. Over time, Native people placed less emphasis on the production and maintenance of bifacial tools as they adopted metal arrow points and knives; however, the lithic-reduction tradition continued in one respect, with the fabrication of gunflints and strike-a-lights (Eiselt 2006:290–294; Kearns 1996:145; Moore 2001; Vierra 2016:266–267).

Unlike the stone projectile points in the previous discussions, metal points are associated with the Postcontact period; therefore, historical documents can provide an array of insights into the use of the then-new metal-point technology. The following text discusses variations in the fabrication of metal points as an idiosyncratic task. A point's fabricator determined its shape based on the type (iron, copper), characteristics (strap/ribbon stock, barrel hoop, native copper, etc.), and quality of the metal; the desired point dimensions; and the available tools, such as chisel, hammer, file, and possibly hand anvil and sheet-metal shears. Fortunately, metal arrow points have been discovered in spatial association with certain artifact types that are diagnostic of specific time periods and tribal groups.

Additionally, intersite comparisons of artifact collections derived from tribal-specific habitation sites indicate that metal points in these collections share certain morphological traits (e.g., collections from Apache rancherias; for comparisons, see Adams et al. [2000a, 2000b] and Haecker [2013]). Regional distributions of metal points that share these traits may approximate the traditional core areas of particular tribes. Using these complementary data, it is possible to identify a broad evolution of metal-point morphologies within the various culturally and geographically defined subregions of New Mexico through time and space, keeping in mind the underlying idiosyncratic aspects of their fabrication.

The authors analyzed 58 metal arrow points as well as 25 other metal-projectile-point types associated with the Coronado expedition, the latter including copper and iron crossbow-bolt heads and javelin/atlatl dart points. To address the changes in metal-point morphological traits through time and space, we applied arbitrary chronological groupings: ca. A.D. 1540–1600, ca. A.D. 1600–1700+, ca. A.D. 1700+–1800+, and ca. A.D. 1800+–1900+. We emphasize the fact that the metal-point types that largely characterize a given chronological grouping were likely still in use during the succeeding chronological grouping. In fact, metal points reflective of different chronological periods are occasionally found at Native domestic sites on the same relative-dated living surfaces (see Schaafsma 2002:177). Both stone and metal tools, including projectile points, spanned the seventeenth through nineteenth centuries.

Early Spanish Exploration, ca. A.D. 1540–1600

The 1540–1542 Vázquez de Coronado expedition introduced metal to Native peoples who occupied the geographic region now delineated by New Mexico. Unfortunately for many of them, their introduction to metal often took the form of iron and copper projectile points and lead shot. The expedition's European weaponry included crossbows that fired bolts made either from wrought iron produced in Spain or from Mexican copper (Figure 84a–c). These bolt heads constitute an artifact type diagnostic of the Coronado expedition because by ca. 1550, the crossbow as a weapon of war had been largely replaced by firearms (Arnold 2001:72–73; Hutchins 2014:68–69).

The Coronado expedition included an estimated 1,800 Native allies (aka *Indios amigos*), a large contingent of whom were Mexica warriors from the Basin of Mexico. Their traditional projectile-related weapons included the bow and arrow, javelin (see Figure 84d, e), atlatl dart, and sling stone. Comparative studies of these weapons indicate that each possesses strengths and weaknesses in terms of their respective effective ranges, depths of penetration, and accuracy. The typical Mexica order of battle, as reported by the Spanish during the early sixteenth century, included mass launchings of these projectiles in ordered succession, which enhanced their tactical effectiveness (Hassig 1988). The Coronado expedition's Native allies may have employed the same battle tactic when comingled with the expedition's Spanish men-at-arms, though perhaps in a more-simplified format.

The Native allies used projectile points initially fabricated from Mexican-sourced lithic materials. During the expedition's 2-year trek through the American Southwest and the Southern Plains, replacement projectile points were made of materials from local lithic sources. One of the projectile point types utilized by the Native allies was the Teotihuacan lithic arrow point, which is a regional and chronological

Figure 84. Copper artifacts from the Coronado entrada and Native allies.

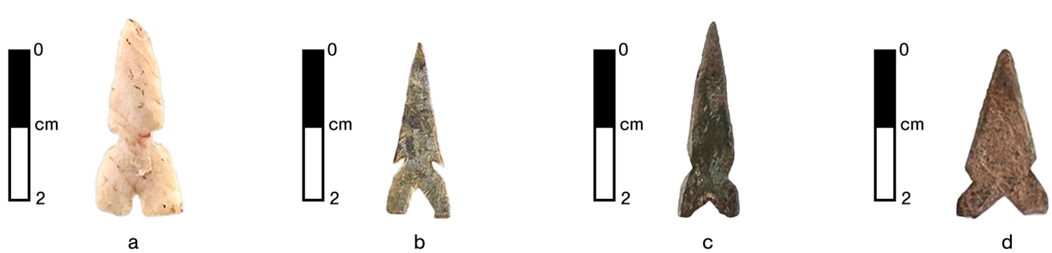
subvariant of the overarching Mesoamerican Texcoco lithic-point type characteristic of the post-Classic and early Colonial periods in central Mexico (MacNeish et al. 1967; projectilepoints.net 2024).

Teotihuacan points were recorded at the site of the 1541 Spanish-Caxcan battle of Peñol de Nochistlán (Medrano Enríquez 2012) and at four New Mexico archaeological sites associated with the Coronado expedition: the ancestral Zuni pueblo of Hawikuh, which was attacked and occupied by the expedition in 1540; LA 54147, a 1540–1541 Native-ally encampment in the middle Rio Grande valley (Vierra 1989:122; see Figure 83); Piedras Marcadas, a Tiguex Province pueblo in the middle Rio Grande valley to which the Coronado expedition laid siege in 1540–1541 (Schmader and Vierra 2021); and Pecos Pueblo (Figure 85a; Scott et al. 2014), which was held under siege by elements of the Coronado expedition in August–September 1541 (Kessell 1979:24).

Coronado's Native allies also acquired 1.0-mm-thick iron from their European comrades-in-arms, from which they produced thin-bladed, edge-sharpened arrow points. These morphological traits produced deeper and deadlier penetration wounds than their lithic counterparts did. Another advantage of metal points was that unlike lithic points, they were rarely damaged through impact. The outlines of these metal arrow points generally adhere to that of the Teotihuacan point. They are present in quantities at San Geronimo III (aka Suya), a frontier villa established in 1541 approximately 40 km (24.9 miles) north of the present-day city of Nogales, Arizona. San Geronimo III functioned in part as a supply base for the Coronado expedition; it was attacked and destroyed by Sobaípuri O'odham warriors in late 1541 or early 1542 (Flint 2002:8, 30, 522). Deni J. Seymor (personal communication 2024) assigned the nomenclature "San Geronimo" to this metal variant of the Teotihuacan arrow point (see Figure 85b). San Geronimo arrow points are present in the villa's surrounding battle area, as are copper and iron bolt heads, iron javelin and/or atlatl-dart tips, and lithic arrow points, most of the last of which are attributed to Sobaípuri O'odham attackers (Seymour, personal communication 2024).

A San Geronimo–type copper arrow point was recorded during Alfred Kidder's (2003:307, Figure 250; see Figure 85c) excavations of Pecos Pueblo. The San Geronimo metal point is evidently a rare artifact type associated with a single event—that is, the Coronado expedition. The presence of a San Geronimo iron point in this region of New Mexico, in the Lincoln National Forest, approximately 350 km (217.5 miles) southeast of the closest known Coronado expedition site (Adams, personal communication January 2024; see Figure 85d), is inexplicable. Continuing assessment of artifact collections curated by museums and federal and state agencies may identify additional examples of, and greater areal extent for, this unique arrow-point type.

The javelin is a lightweight spear that is manually tossed and has a 15–20-m effective penetration range. By the thirteenth century, Spanish light cavalry (*janeta*) rarely, if ever, used javelins, having replaced them with lances. Mesoamerican armies used both the javelin and the atlatl; the latter was used to hurl a fletched javelin into which a dart had been inserted. When used by an expert, an atlatl has an effective penetration range of well over 60 m (196.9 feet). The expedition's Native allies likely used both the javelin and the atlatl, because these were traditional Mesoamerican weapons (see Figure 85d, e). At least some javelins and atlatl darts were metal tipped. Examples of this artifact type have been identified at San Geronimo III and within the surrounding environs of Pecos Pueblo (Scott et al. 2014). The authors



Teotihuacan type
Pecos National Historic Park
Chalcedony stone point, side notched, notched concave base
27-mm length, 12-mm width, 3-mm thickness, 1.5-g weight
PECO 34388

San Geronimo original type
San Geronimo III (aka Suya), Arizona
Copper-alloyed arrow point, chisel cut, side notched, V-notched base
29.67-mm length, 12.57-mm width, 0.93-mm thickness, 1.25-g weight
S-1251

San Geronimo type
Pecos National Historic Park
Copper arrow point, chisel cut, side notched, notched concave base
26-mm length, 8.4-mm width, 0.8-mm thickness, 1.2-g weight
PECO 11097, Peabody Museum 69275

San Geronimo type
Dark Canyon, New Mexico
Iron arrow point, chisel cut, side notched, notched concave base
23-mm length, 13-mm width, 2-mm thickness, 2-g weight
FS No. 03

Figure 85. Teotihuacan stone and San Geronimo metal point types.

of the resultant Pecos Pueblo report identified these projectile points as awls; later analysis by Haecker and Adams indicated otherwise.

Copper bolt heads have been recorded at Ancestral Pueblo sites that experienced hostile encounters with the Coronado expedition: Hawikuh, Piedras Marcadas, Santiago, Kuaua, Pecos, Puaray Pueblo (Ellis 1957:208–214), and San Ildefonso. One iron bolt head was recorded at Sevilleta, a Piro Province pueblo near the confluence of the Rio Grande and the Rio Puerco and approximately 40 km (24.9 miles) north of the present-day town of Socorro. This artifact is an indicant that the Coronado expedition extended its explorations south of the Tiguex Province and into the central region of the Rio Grande valley.

Spanish Colonial Period, ca. A.D. 1600–1700+

Mimbreño and Gila Apaches may have acquired metal through direct contact with members of the Coronado expedition and possibly by scavenging abandoned expedition campsites (Hutchins 2014:242). Also, Native peoples followed the rear guard for several days south of Hawikuh to obtain discarded baggage (Flint and Flint 2024:11). An archaeological survey of four Apache rancheria sites in the Black Range region of southwestern New Mexico yielded a number of metal artifacts attributed to the Coronado expedition. Also present were metal artifacts obtained by this Gila Apache band (Adams, personal communication 2024). Included in the collection are two iron points (Figure 86a, b), both of which were crudely made, suggesting that their fabrication occurred during the Gila Apache Protohistoric period, when metal was an unfamiliar, exotic material. Another crudely made iron point was recorded in the midden area surrounding Pecos Pueblo, outside the pueblo's defensive perimeter wall. This point may be attributable to a seventeenth-century Plains Apache attack against the pueblo (Haecker and Moss 2016:26). Like the Gila Apache band who fabricated the abovementioned iron points, the attackers evidently had yet to master the skills needed to sufficiently shape a metal point.

New Mexico lacked a dependable supply of metal prior to the establishment of the Santa Fe Trail in 1821. Native copper, however, was used by Mimbreño/Gila/Copper Apaches during the eighteenth century. Copper points have been attributed to the Mangus Coloradas band (Tevis 2007). A copper arrow point found in the Mimbres Valley may be attributed to the Mangus Coloradas band (Adams, personal communication with Anthony Romero, 2024; see Figure 86d). On one side of the copper point are three closely aligned chisel indentations that may be the fabricator's identification mark.

During this period, the province's economic lifeline was the Camino Real. Traveling some 2,575 km (1,600 miles) between Mexico City and Santa Fe, carreta caravans brought a variety of goods, including consignments of wrought iron. From that iron, New Mexico blacksmiths fabricated various essential objects, including points. The scarcity of firearms, gunpowder, and lead shot made the bow and arrow and lance necessities for colonists, both military and civilian. The iron points are leaf or diamond shaped and approximately 2.0 mm thick—presumably the traits that typified metal points made in Mexico during the preceding century.

Although archaeological and documentary evidence is lacking, it is probable that blacksmiths turned out quantities of metal points for both Spanish settlers and Native peoples. Because they can be formed cold with a hammer and chisel and then filed, these points could be produced by anyone to whom suitable metal was available (Simmons and Turley 1980:177). Nomadic tribes eventually obtained metal points, as well as the hand tools to make them, through trade and raiding. Given the chronic scarcity of metal in Spanish Colonial New Mexico, it is likely that lithic points were predominant in these areas well into the eighteenth century. The pueblos acquired through trade a variety of metal objects, probably including iron points. It is not known with certainty whether any of the pueblos made iron points; however, it is possible that they did, because small amounts of iron slag have been observed in pueblo assemblages where Franciscan missions had introduced metallurgy (Lycett and Thomas 2007:1651–1658).

Few seventeenth-century metal points have been archaeologically recorded, relative to the number of metal points dating to the eighteenth and nineteenth centuries. That paucity may have been a result of the general scarcity of iron in New Mexico at that time. Also, very few seventeenth-century Spanish Colonial sites in New Mexico have been archaeologically identified and comprehensively investigated, resulting in a concomitant paucity of metal artifacts in collections dated to the seventeenth century. Seventeenth-century metal points in private collections typically include only the broadest geographic information regarding where they were discovered. Nonetheless, the imperfect locational data correlate to what is known regarding seventeenth-century Spanish Colonial settlement patterns. Seventeenth-century metal-point isolates have been found in the Gila Mountains of southwestern New Mexico and presumably reflect Apache hunting or possibly seventeenth-century Spanish slaving incursions directed against the Gila Apache. In contrast to the two aforementioned arrow points

a

Miquelet Site, New Mexico
Early iron arrow point shaped by folding and weakening the metal to give it its shape (preform stage, not finished)
40-mm length, 21-mm width,
2.1-mm thickness, 4-g weight
SCAP No. 83/LA 37785, Turner/Ladder Ranch

b

Dos Cuchillos Site, New Mexico
Early iron arrow point shaped by folding and weakening the metal to give it its shape; appears to have been ground and abraded on sandstone
32-mm length, 17-mm width,
1.5-mm thickness, 2-g weight
SCAP No. 29/LA 37767, Turner/Ladder Ranch

c

Descanso Site, New Mexico
Early iron arrow point shaped by chisel cuts and abrading on sandstone
60.5-mm length, 18-mm width,
2-mm thickness, 2-g weight
SCAP No. 29, Gila National Forest

d

Fort Webster No. 2, Mimbres Valley, New Mexico
Copper arrow point, chisel cut, with three chisel-stamp markings
26.5-mm length, 16-mm width,
2-mm thickness, 2.5-g weight
Romero collection

Figure 86. Seventeenth-century metal arrow points.

(Figure 86a, b), one seventeenth-century leaf-shaped iron arrow point found in the Gila Mountains region (Figure 86c) was well-made. A steel chisel had been used to roughly shape a 2.0-mm-thick piece of wrought-iron sheet into an arrow-point preform. Then, using a sandstone abrader, the fabricator had removed any rough surfaces and sharpened its cutting edge. Also of note, a leaf-shaped copper arrow point was recorded at a Navajo habitation site in the Chama Valley, and radiocarbon dates indicated that the site had been occupied between ca. A.D. 1650 and 1710 (Schaafsma 2002:177).

Toward the end of the seventeenth century, leaf- and diamond-shaped metal points were gradually replaced by points with different morphological traits. Native peoples had acquired chisels and files to produce their own cold-chiseled points, the morphological traits of which do not necessarily adhere to those of the Spanish-favored leaf- and diamond-shaped points but reflect the shift in manufacturing technology. Metal points came to have short, thin, triangular heads with sloping to rounded shoulders and straight to slightly expanding stems (Turnbow 1997:228). Presumably ribbon iron, possibly including iron from barrel hoops, was used for making cold-chiseled points that are approximately 1.0 mm thick and 20.0–30.0 mm wide.

Spanish Colonial Period, ca. A.D. 1700+–1800+

Despite New Mexico's chronic iron shortage, metal points became more common during the eighteenth century. Trade fairs at Taos and Pecos pueblos and Comanchero trading communities on New Mexico's Eastern Plains provided nomadic tribes with varieties of metal items, including iron and brass kettles, for making points. The Taos trade fair intermingled members of various nomadic tribes with Hispanic, Puebloan, and French traders (Weber 1970:10, 22, 29). A wide range of goods were exchanged, including perhaps both ready-made metal points and the metal for fabricating them. It is likely that the long-established interregional trade network was for Native groups the primary means of acquiring highly valued goods such as iron, chisels, files, and rasps.

To secure a modicum of peace with nomadic tribes, Spanish governors gifted chiefs with desired goods. If the variety, quality, and quantity of the gifts were deemed inadequate, some nomadic bands responded by raiding New Mexican villas, farmsteads, ranches, pueblos, and Camino Real caravans (John 1975:226–232). Regionwide distribution of metal points would have occurred when nonlocal warriors raided and hunted well beyond their homelands. Spoils of war would have included quivers full of enemy arrows, and punitive Spanish campaigns obtained quantities of enemy arrows when they pillaged the encampments of nomadic people.

Because of this intermixing of interregional arrow-point types, one should not assign cultural identity to a historical-period site in New Mexico based solely on the morphology of the metal points that may be found there. With this qualification in mind, a characteristic range of point morphologies may be prevalent within the traditional boundaries of a tribe's heartland. For example, the Comanche Tribe's heartland approximated the range of the Southern Plains bison herds, which extended into New Mexico's Eastern Plains region. The Comanche aggressively searched for, attacked, and drove out non-Comanche bison hunters (Hämäläinen 2008); therefore, the latter would have had limited opportunities to deposit their metal-tipped arrows within the Comanche homeland and, by extension, New Mexico's Eastern Plains region.

By the early eighteenth century, the Comanche Tribe had become one of the major Native powers in the Southern Plains region and eventually dominated the interior of North America well into the nineteenth century. Specific to New Mexico, the Comanche enforced their economic and political interests through mutually beneficial trade relations punctuated by calculated terror attacks. In exchange for bison products, eighteenth-century French traders provided the Comanche with tools and iron to fabricate points (Harris et al. 1967:18–32). Various allied Southern Plains tribes sometimes joined the Comanche in their New Mexico attacks (Hämäläinen 2008:179, 220), which potentially resulted in the deposition of metal-point types that are atypical in terms of what would normally be found in New Mexico.

The north–south fur-trading route developed during the early eighteenth century provided the Comanche with a wide array of trade goods that originated in French Canada, including iron, files, and chisels (Brown and Taylor 1989:11). After 1763, British and, later, American traders replaced the French in the Mississippi Valley region and were dependable sources of goods for the Comanche, including iron. By the late eighteenth century, some Comanche bands were iron rich in comparison to New Mexican colonists, who obtained iron via the Camino Real (Hämäläinen 2008). Barrel hoops may not have been available in quantities during this period; however, they appear in the archaeological record in Texas during the late eighteenth and early nineteenth centuries and were coveted for fabricating iron points.

Since New Mexico's late Precontact period, various Ute and Navajo bands claimed the NRG valley as part of their respective hunting areas. Also, during the eighteenth century, Hispanic settlements appeared in the upper Rio Grande and Chama valleys. The inevitable Navajo-Ute-Hispanic conflict over control of these areas was exacerbated by Comanche raids throughout the NRG and Chama Valley regions during this period. Iron and copper/brass points found in these regions have morphologies comparable to those associated with Southern Plains tribes, and the same types of arrow points have been found at eighteenth- and nineteenth-century-dated Ute and Comanche encampment sites in south-central and southeastern Colorado (Brown 2016, 2022; Martin 2016; Martorano et al. 2014).

Two conical, socketed copper points identified as Kaskaskia-type points have been identified and possibly date to the eighteenth century (Figure 87a, b). One of these points derives from Carnue, a Spanish villa in Tijeras Canyon, east of Albuquerque, founded in 1763 and then abandoned in 1771 because of Comanche attacks. This metal point has an interior socket diameter of around 7.0 mm, which is appropriate for fitting onto an arrow shaft (see Figure 87a). In contrast, the interior socket diameters of copper bolt heads average 11.0 mm. The second conical arrow point (see Figure 87b), recorded in the Pecos National Historic Park, was observed outside a two-room structure that may have been a seventeenth- or eighteenth-century presidio guard station (Nordby 1993). The arrow point was fabricated from a copper coin that had been pounded to 1.0 mm in thickness and then wrapped to form its conical shape. Like the other point, its interior socket diameter measured 7.0 mm. A capital letter "C" and an asterisk-shaped decorative motif were barely discernable on it. Both conical arrow points may be Comanche related.

The Mescalero, Lipan, Jicarilla, Gila, Warm Springs, and Mimbreño Apache Tribes fabricated metal points during the late seventeenth, eighteenth, and nineteenth centuries, and examples have been recorded throughout their respective homelands. These points were typically made from cold-chiseled, 1.0-mm-thick ribbon and/or barrel-hoop iron. Metal points made from trade brass kettles also have been found but are fewer than those of wrought iron.

Late Spanish Colonial, Mexican, and Territorial Periods, ca. 1800+–1900+

Morphologies characteristic of cold-chiseled metal points made by New Mexico Apache Tribes during the eighteenth century continued into the nineteenth century. Boyer (2012) presented data regarding the use of metal arrow points in northeastern New Mexico based on archeological research conducted by Kirkpatrick (2010) and Eiselt (2006:288–290) in the Cimarron and Rio del Oso areas, respectively. Their findings indicated that the Jicarilla Apache and Moache Utes who inhabited the region were fabricating metal points by at least the early nineteenth century. Boyer (2012:32) theorized that "replacing lithic points with metal points required other technological considerations and was not merely a matter of changing materials" and that consequently,

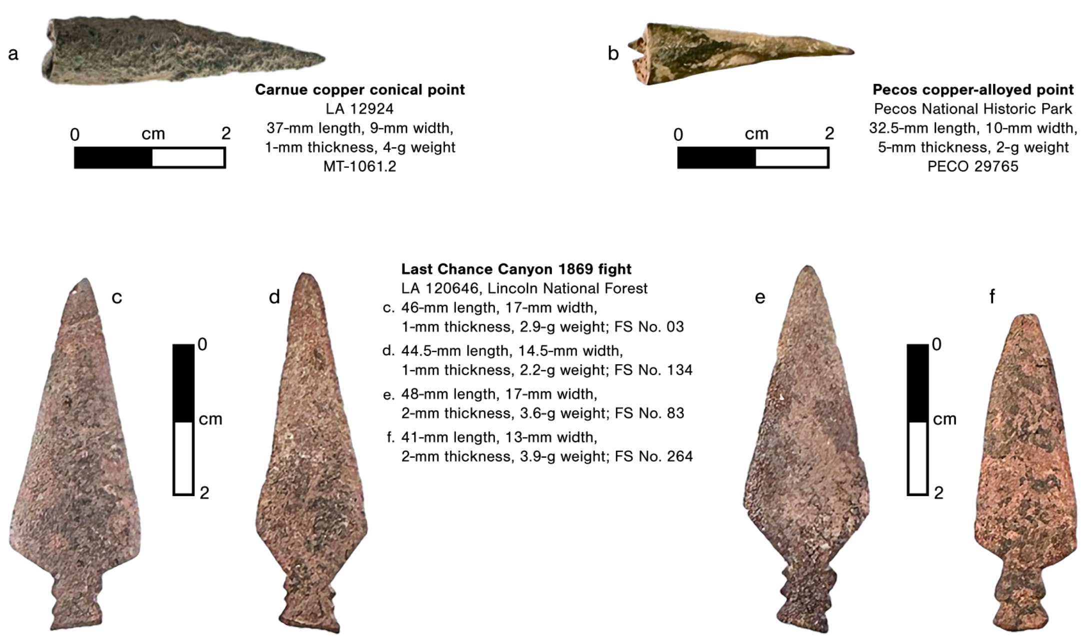


Figure 87. Conical and Apache arrow points.

metal arrow points were not adopted in northeastern New Mexico until the nineteenth century.

It is possible that, unlike the various enemy tribes that surrounded them, the Jicarilla Apache in northeastern New Mexico eschewed the adoption of metal arrow points. Yet by the 1730s, the Comanche had acquired French trade items, including iron for making metal points (Hȁmȁlȁinen 2008; Harris and Harris 1967). During this period, the Comanche, armed with metal-tipped lances and arrows, drove the Mescalero Apache out of northeastern New Mexico (Hȁmȁlȁinen 2008:40). It is likely, therefore, that Comanche-fabricated metal points dating to the latter half of the eighteenth century are present in northeastern New Mexico, possibly intermixed with Jicarilla lithic points.

Mescalero Apache iron points derive from the 1854 Jicarilla–U.S. Dragoons battle of Cieneguilla, south of Ranchos de Taos (Johnson et al. 2009); ca. 1855–1875 Mescalero encampments in the Rio Bonito valley, east of the Capitan Mountains (Haecker 2013:76); Mescalero Apache–U.S. Cavalry battles associated with the 1869 Lieutenant Howard Cushing campaign in the Guadalupe Mountains (Adams et al. 2000a, 2000b; see Figure 87c–f); and the 1880 Mescalero and Warm Springs Apache–U.S. Cavalry battle of Hembrillo, in the center of the San Andres Mountains (Laumbach 2001:49). Most of the arrow points from these conflicts share morphological traits.

Establishment of the Santa Fe Trail in 1821 resulted in a remarkable flow of American-manufactured trade goods into the New Mexico economy, including barrel hoops. Barrel hoops may have been available to Hispanic and Native peoples of New Mexico during the seventeenth and eighteenth centuries, but we are unaware of any written accounts or archaeological finds to indicate that Mexican- or European-manufactured barrel hoops were available in the region during that time.

Comanche, Apache, and Hispanic peoples salvaged barrel hoops from various sources along the Santa Fe Trail. Apache and Comanche bands also acquired barrel hoops by attacking frontier homesteads and ranches that developed along the Santa Fe Trail corridor. By the early nineteenth century, the Navajo were also fabricating metal points from barrel hoops (Kluckhohn et al. 1971:40; Letherman 1856:283). It is probable that Ute bands that frequented northern New Mexico likewise utilized barrel hoops around that time. To make arrow points, a barrel hoop was cut into 3.0-by-1.5-inch (7.6-by-3.8-cm) strips, and each rectangle was then cut diagonally from corner to corner, which produced two blanks, the ends of which were cut, leaving narrow stems. The metal points were then filed to produce sharpened edges and, if desired, serrated stems (Kluckhohn et al. 1971:40; Lynn 2014:200).

We suspect that the relative abundance of nineteenth-century-type metal arrow points in New Mexico is directly tied to this post-1821 cornucopia of barrel hoops. Commercially manufactured iron points also began to make an appearance in New Mexico but were rare compared to the large numbers produced from easily acquired barrel hoops. Comanchero traders in New Mexico's Eastern Plains region also provided both ready-made iron arrow points and barrel hoops to their Comanche partners (Kenner 1969:85). Late-eighteenth- and nineteenth-century metal arrow points were fabricated by the Comanche and Kiowa, whose hunting ranges included New Mexico's Eastern Plains region, and these points were typically made from barrel hoops. Also, the Comanche and Kiowa were adept at fabricating points from a variety of thin metal objects that they acquired through trade and raids and by scavenging encampments along the Santa Fe Trail.

Metal points from the Texas Panhandle and the Eastern Plains region of New Mexico vary widely in shape, size, and stem treatment. The blade shoulders are typically angled, but rounded and sharp-cornered arrow points are also present. The average length is 60.0 mm, widths range between 14.0 and 24.0 mm, and thicknesses range between 1.0 and 2.0 mm. The stems are rectilinear and either serrated or unmodified/straight. The tips can be thin and sharp but may be blunt or absent as a result of hard impact. The overall shape of a given point is asymmetrical, which is appropriate for having been fabricated by cold chiseling and filing (Baker and Campbell 1959:51; Brown and Taylor 1989; Cruse 2008:173–174, 209; Lynn 2014:199–200). A Comanche-Kiowa point type, minus its stem, was recorded at LA 4481, a Navajo encampment on the 1864–1868 Bosque Redondo Navajo Reservation. This point may have been deposited as a result of one of the many Comanche attacks against Navajo encampments on the reservation (Johnson 1973:228).

Blacksmiths at Bent's Fort likely produced metal points along with a variety of other wrought-iron trade goods offered at the fort and at their Santa Fe and Taos subposts. If a point is symmetrical in its shape and beveled on both sides, has a ridge down the center of each side, and is approximately 2.0 mm thick (arrow points made from barrel-hoop iron are uniformly 1.0 mm thick), then it probably was manufactured by a blacksmith (Hanson 1972:4).

Commercially produced metal points are common in collections of nineteenth-century Plains Indian artifacts. Hundreds of thousands of commercial arrow points were reportedly produced every year by various eastern-U.S. manufacturing companies for the Plains Indian bison industry (Clark 1885:48–49; Hanson 1972:4). Based on their shapes, there are at least five basic types of commercially manufactured arrow points, the most common of which has a triangular blade, straight shoulders, and a rectilinear serrated stem. Commercial arrow points are rarer in New Mexico than those made from barrel hoops. Two commercially made metal points are from the Last Chance Canyon 1869 Apache/Cavalry battle site (Figure 88a). Another, similar point is from the Seco Creek Apache Creek Project on the Ladder Ranch (see Figure 88b).

The fabrication of points using barrel hoops continued into the twentieth century. Thompson (1980) examined Apache metal points whose context indicated deposition after ca. 1900; barrel-hoop iron had been used to fabricate these points. A metal-point preform made from a segment of barrel hoop was found alongside a portion of the Camino Real–La Bajada switchback west of Santa Fe. The switchback was widened in 1909 by a labor crew composed of members of the Cochiti and Santo Domingo Pueblos (Bauer and Haecker 2015:25,88), and it is conceivable that a member of that crew fabricated the preform.

Finally, three metal-tipped arrows from the Massai Apache collection at the Geronimo Springs Museum are the last known metal points that were in use while New Mexico was still a territory. Each of these arrow points has a convex blade with right-angled shoulders. The three metal-tipped arrows are unique to their owner, Massai (see Figure 88c). Massai was an Apache warrior/scout who, in 1885, escaped an Apache-prisoner train bound for Florida. After a trek of some 1,200 miles, he returned to his Black Range homeland in southwestern New Mexico. Massai practiced traditional Apache lifeways until he was killed in 1906 in the Apache Kid Wilderness of the Cibola National Forest.

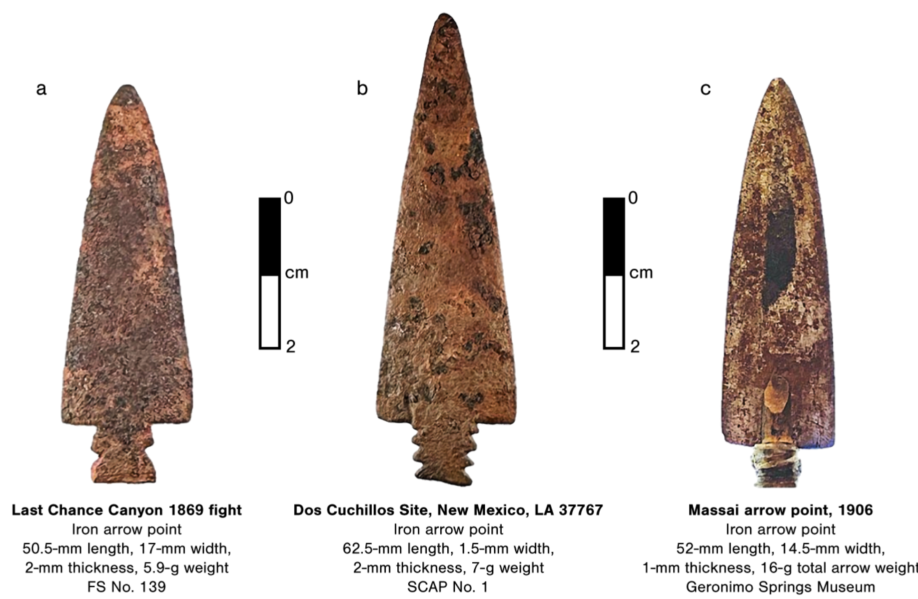


Figure 88. Nineteenth-century arrow points.

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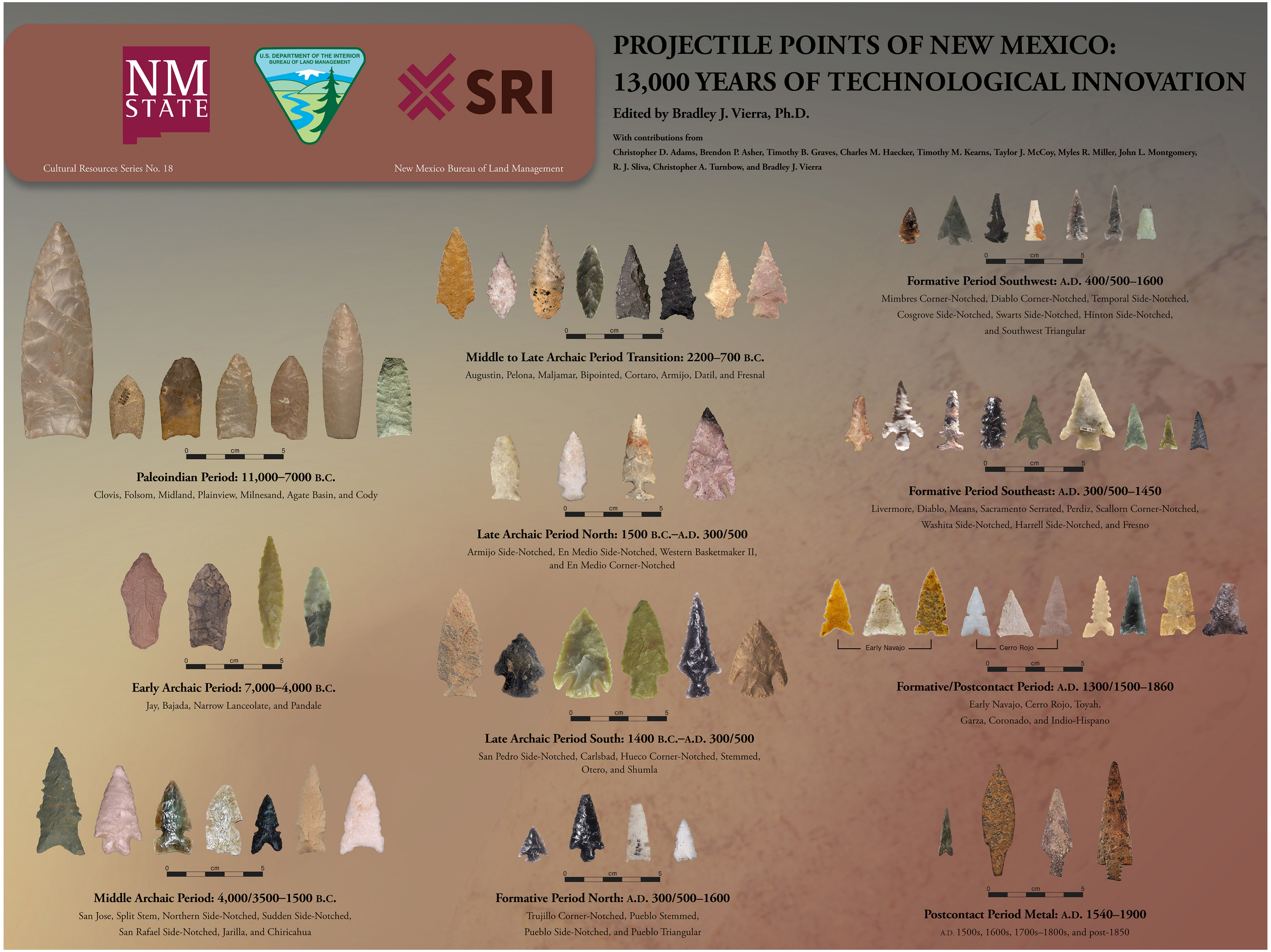
Projectile Points of New Mexico: 13,000 Years of Technological Innovation

Bradley J. Vierra

New Mexico Lithic Sources

Bradley J. Vierra, Phillip O. Leckman, and Andrew Saiz

To assist archaeologists with identification and documentation of projectile points in New Mexico, the authors prepared two posters that summarize variation in point morphology over time and the geographic distribution of lithic raw material sources. The authors anticipate that the posters included in this appendix can be used independently on electronic devices in the field, in the laboratory, in the classroom, and in museums.


NM STATE
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
SRI
Cultural Resources Series No. 18
New Mexico Bureau of Land Management
PROJECTILE POINTS OF NEW MEXICO:
13,000 YEARS OF TECHNOLOGICAL INNOVATION
Edited by Bradley J. Vierra, Ph.D.
With contributions from
Christopher D. Adams, Brendon P. Asher, Timothy B. Graves, Charles M. Haecker, Timothy M. Kearns, Taylor J. McCoy, Myles R. Miller, John L. Montgomery, R. J. Sliva, Christopher A. Turnbow, and Bradley J. Vierra
Paleoindian Period: 11,000–7000 B.C.
Clovis, Folsom, Midland, Plainview, Milnesand, Agate Basin, and Cody
Early Archaic Period: 7,000–4,000 B.C.
Jay, Bajada, Narrow Lanceolate, and Pandale
Middle Archaic Period: 4,000/3500–1500 B.C.
San Jose, Split Stem, Northern Side-Notched, Sudden Side-Notched, San Rafael Side-Notched, Jarilla, and Chiricahua
Middle to Late Archaic Period Transition: 2200–700 B.C.
Augustin, Pelona, Maljamar, Bipointed, Cortaro, Armijo, Datil, and Fresnal
Late Archaic Period North: 1500 B.C.–A.D. 300/500
Armijo Side-Notched, En Medio Side-Notched, Western Basketmaker II, and En Medio Corner-Notched
Late Archaic Period South: 1400 B.C.–A.D. 300/500
San Pedro Side-Notched, Carlsbad, Hueco Corner-Notched, Stemmed, Otero, and Shumla
Formative Period North: A.D. 300/500–1600
Trujillo Corner-Notched, Pueblo Stemmed, Pueblo Side-Notched, and Pueblo Triangular
Formative Period Southwest: A.D. 400/500–1600
Mimbres Corner-Notched, Diablo Corner-Notched, Temporal Side-Notched, Cosgrove Side-Notched, Swarts Side-Notched, Hinton Side-Notched, and Southwest Triangular
Formative Period Southeast: A.D. 300/500–1450
Livermore, Diablo, Means, Sacramento Serrated, Perdiz, Scallorn Corner-Notched, Washita Side-Notched, Harrell Side-Notched, and Fresno
Early Navajo
Cerro Rojo
Formative/Postcontact Period: A.D. 1300/1500–1860
Early Navajo, Cerro Rojo, Toyah, Garza, Coronado, and Indio-Hispano
Postcontact Period Metal: A.D. 1540–1900
A.D. 1500s, 1600s, 1700s–1800s, and post-1850


New Mexico Lithic Sources
Bradley J. Vierra, Ph.D.; Phillip O. Leckman, M.A.; and Andrew R. Saiz, B.A.
With a little help from my friends: Robert Dello Russo, Dennis Gilpin, Winstone Hurst, Matthew Lewis, Myles R. Miller, John Montgomery, John Roney, Cherie Scheick, Heather Smith, and the SMU Archaeology Research Collections
Texas types:
Alibates
Edwards
Tecovas
Plateau types:
Owl Rock (AZ)
Brushy Basin (UT)
Baldy Hills chert
Hornfels
McGaffrey Ridge chert
Dacite
Obsidian
Pedernal chert
Orthoquartzite
Cumbres chert
Petrified wood and chert
Chuska chert
Tucumcari quartzite
Tecolote chert
Madera chert
Sandia chert
Rio Grande gravels
Chert
Mountainair chert
Mesa gravels
Chalcedony
Fingerprint chert
Spotted yellow chert
Pecos gravels
Black Canyon rhyolite
Purple quartzite
Opalized caliche
Fossil chert
San Andres chert
Yeso chert
Thunderbird rhyolite
Rhyolite
Rancheria chert
Canadian River
Pecos River
Rio Chama
Rio Grande
Rio Puerco
San Juan River
Taos
Santa Fe
Las Vegas
Albuquerque
Las Cruces
El Paso
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