

## A CASE FOR DIFFERENTIAL PROJECTILE POINT USE AMONG THE PREHISTORIC NISENAN

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*In recovery from the Pendola fire of 1999, the Tahoe National Forest has begun investigations into forest restoration and fuels reduction projects, with site examination and test excavations at archaeological sites potentially impacted by these activities. Based upon forthcoming data, a hypothesis formulated concerning point types appears to potentially clarify a portion of the late prehistoric archaeological record of the western slope of the northern Sierra Nevada. It is possible that raw material selection, point design, use-life, and relative proportions of point types may be the result of distinct intentional usages by the Nisenan.*

Perhaps influenced by establishment of the Martis “culture” primarily based upon survey material (Heizer and Elsasser 1953), the train of thought concerning coarse-grained lithic materials, principally basalt and related fine-grained volcanics, still influences regional archaeological interpretation in the western slope of the northern Sierra Nevada (Western Slope). The preconception that, over time regional “points become lighter, basalt or other coarse-grained [sic] materials were used earlier than fine-grained silicates in projectile point manufacturing” has influenced chronology and possibly contributed to the regional impasse in archaeology (Humphreys 1969:9). For instance, although also defined upon surface, survey material, Norden Basal Notched points were interpreted as Martis-associated due to size and raw material manufacture and therefore suggested to date between 500 BCE and 500 CE (Claytor 1973; Justice 2002:288-290).

Krautkramer (2009:155-157) notes, as have others, difficulty even separating arrow from dart point styles by analysis in the Western Slope. Justice (2002:419) states of certain point types that “fine-grained basalt was the material of choice in this region and can be manipulated to produce almost any shape and size of arrow or spear point, yet, this does not explain the apparent size overlap of Archaic contracting stemmed points ubiquitous in Martis complex sites with ones which are determined here to relate to Gunther.”

The confusion over points manufactured from coarse-grained materials such as fine-grained volcanic (FGV) is potentially a self-perpetuating problem. Points suggested by commonly accepted local chronologies, often based upon surface material, to date 500 BCE may occur with others “dating” 500 CE and/or 1500 CE, for instance. Therefore, excavations may be interpreted to “reaffirm” stratigraphic mixing and that little interpretation can be made of the assemblages. So regional archaeology stands where it was fifty years ago... upon assumptions due to raw material use and rationalized standards for arrow point size, and survey-based temporal assignments.

The Bullard’s Bar Chronology is a commonly used local reference. Within it, Humphreys (1969:88) describes his point types 3, 4 and 5 as “the ‘Gunther’-like point style,” which form the heart of his FGV-dominated Bullard’s Bar II sequence. Considered an earlier part of the Bullard’s Bar II sequence, his similar, but larger, type 9 points include what appear Norden Basal Notched and Sierra Contracting Stem point types (Humphreys 1969:Plates 8A:a,b,d,e,h and 8B:c). Humphreys (1969:9, 33) states that the Bullard’s Bar II-III chronology is based upon the “stratigraphic relation between the established types [which ...]form a pattern with easily explainable exceptions,” and “from a material and weight consideration.” However, the Bullard’s Bar data graphically demonstrates that stratigraphic occurrence was not a factor in the Bullard’s Bar Chronology (Figure 1). Material type imparts the weight; Division of “Bullard’s Bar II” from “Bullard’s Bar III” was based upon material use alone.

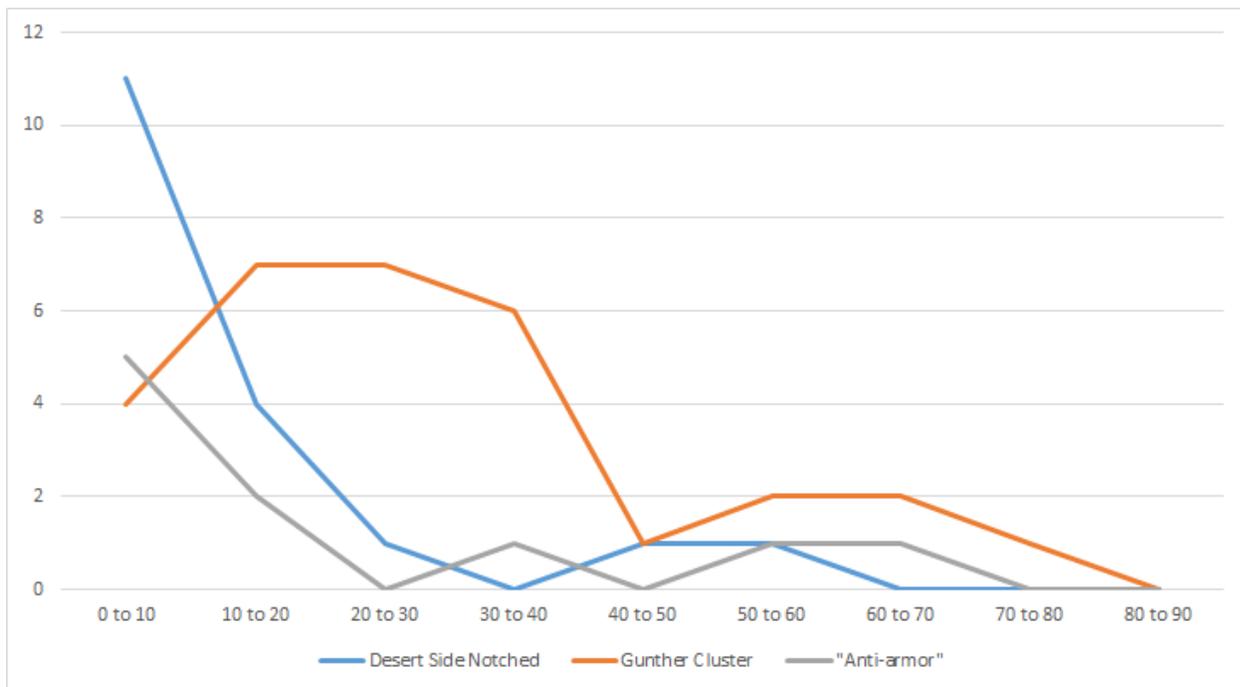


Figure 1. “Bullard’s Bar II” (Gunther-like: Types 3, 4, 5, plus points here suggested anti-armor, including Sierra Contracting Stem and Norden Basal Notched: Type 9) and “Bullard’s Bar III” (Desert Side Notched: Types 1 and 1a) stratigraphic occurrence in cm (Data in Humphreys 1969:Tables 1, 9 and 12).

Due to soil creep, potential for erosional episodes due to fire, and floralturbation from occurrence in forest, area stratigraphy is suspect and likely “fuzzy” at best. However, the occurrences of the point forms discussed here consistently co-occur in the same stratigraphic sequences. Interpretation of assemblages based upon inaccurate point date ranges may be the major stratigraphic problem on the Western Slope.

As with much of archaeology, the combined accumulation of archaeological evidence, in comparison with available ethnographic information directly, or indirectly, through relevant or closely affiliated cultures helps refine hypotheses towards understanding or at least acceptable theory (Chase-Dunn 1992:144). Sparsity of ethnographic information on the prehistoric Maiduan peoples requires drawing supportive statements from other, neighboring, culturally similar peoples, including the Atsugewi, Achumawi, and Hill Miwok. Acceptance requires assumption that nearby cultural beliefs were similar enough to be potentially applicable to Maiduan peoples in the Western Slope.

In recognition of the problematic situation, expected ages of the point types at issue are disregarded and here lumped as they are argued to primarily represent: warfare points. That being primary, within the warfare points two broad types occur, the use of which are suggested to be functionally distinct. The first, Gunther and/or small Gunther-like points, versus larger points of similar overall morphology. This subgroup of larger points can be differentiated into two forms that would likely classify within Sierra Contracting Stem and Norden Basal Notched.

Treatment of the lithic raw materials for purposes of this paper is basically as the prehistoric inhabitants appear to have differentiated them: abundant, hard, gray, coarse-grained material which is difficult to break and knap, as opposed to uncommon, brittle, often brightly colored, cryptocrystalline, “flinty” material which is easy to both break and knap. In the former case, gray to near black, rough rock, lacking luster, here lumped as FGV, since ideally that type rock was likely the intended selection of the prehistoric knapper in manufacturing a warfare point. In the latter case, chert, including chalcedony, opal,

and other “flint-like” rocks, was reserved for hunting, Desert Side Notched Series, points. Put simply, targeted use of FGV versus chert.

The observations and hypotheses presented here are based upon the raw, preliminary data from small excavation samples, but display consistency in raw material use, apparent use-life of diagnostic tools, general morphology of diagnostic types, and general stratigraphic occurrences. Most importantly, the information can be correlated with some of the rather vague ethnographic comments we have been allowed of the circumstances surrounding the cultural disintegration due to the mass invasion spurred by the California Gold Rush. Opinions, observations, and hypotheses expressed herein do not necessarily represent those of the Pendola Post-Fire Restoration Project, the Tahoe National Forest, or the United States Forest Service.

### **POINT DESIGN AND INTENDED USE**

Projectile points follow generalities based upon intended use. A result of physics, heavier projectiles equate to greater kinetic energy and momentum for impact force, and penetration capability of a projectile. Wood-tipped arrows are generally reserved for small game since little kinetic energy or penetration is required. In a comprehensive ethnographic study of stone projectile use by bow and arrow hunters, Christopher Ellis found that “stone-tipped projectiles are used almost exclusively on ‘large game,’ with large game defined as prey in excess of 40 kg,” (Ellis 1997:40). Requiring only extension of the definition of “large game,” stone points, then are used for large game and warfare (Loendorf 2012:38-52; Waguespack et al. 2009:789-796). In review of projectile points from the Middle Gila River of Arizona, Loendorf et al. (2015b:940) state:

Ethnohistorical and ethnographic observations from around the world indicate that projectiles were often made differently for warfare and hunting. Using experiential archaeology and analysis of a thousand years’ worth of data from the middle Gila River in Arizona, the authors argue that side notched arrow points were produced for hunting large animals and were designed to be retrieved and reused, while unnotched points were intended for single use and for another purpose: to kill people.

Since humans would equate to large game possessing enhanced abilities to armor themselves, remove projectiles and shoot back, requirements for points intended against them necessitate modification of the design. Warfare points represent a “potent symbol of the maker’s cultural identity” that the maker does not normally expect to recover upon use. The lower recovery rate of warfare points should result in more complete points, or those broken during manufacture at archaeological habitation sites, and reworked points would likely result from salvaging suitable candidates broken during manufacture (Loendorf 2012:44, 96, 101).

Warfare points are designed to detach and remain inside a wound to increase a wound’s gravity. Certain design elements facilitate a point’s remaining embedded, including pointed tangs or barbs and a pointed or wedge-like stem to split the shaft upon impact. Wider point designs with wider bases reflect expectations of unarmored targets, although practical width is regulated by the increased likelihood of encountering bone and overall lower penetration potential with any width increase. A lack of notching, coupled with barbs and a short, contracting, wedge-like stem demonstrates not only a complete lack of intent of point recovery, but even further, intended impossibility of retraction (Loendorf 2012:37-46, 97).

Since the use of even hide armor basically renders an enemy arrow proof, the possibility of encountering an armored enemy alters a utilized warfare design. Where the possibility of encountering an armored enemy looms, “narrow, deep penetrating designs” with narrower bases are expected, and accordingly, barb size and prominence decreases and may even disappear, as seen in European “Bodkin” type arrows (Halpin 1997:58-9; Loendorf 2012:43-46). Since penetration is more difficult against an armored enemy, higher projectile weight, equating to higher kinetic energy and momentum, might also be expected.

In contrast to warfare points, hunting points are predicted to be triangular with side notching on lower third to protect hafting during penetration, which elucidates the intent of securing the point for recovery and reworking after use. Due to recovery after use, hunting points at habitation sites are also much more likely to be represented as discarded, unusable, impact-damaged specimens, as well as obviously resharpened and reused points (Loendorf 2012:44-46).

### **The Practice of Warfare among the Hill Nisenan**

The Hill Nisenan would have most likely experienced warfare in the form of feuding, raids, or ambushing trespassers on small scales, with occasional larger scale raids against villages, at least as often with neighboring Maidu people as trespassing foreigners. The most commonly encountered foreign enemy would have been the Washoe. Although permission was periodically asked and granted for Washoe passage to gather acorns and other task-oriented ventures into Nisenan territory, smaller scale intrusions, such as hunting parties, easily provoked violence and counter violence. More unusually, multi-village gatherings would assemble for formal battles, both among other Maidu peoples, as well as neighboring tribes that also practiced formal warfare (Beals 1933:366; Dixon 1905:205; Du Bois 1935:39; Faye 1923:43; Kroeber 1925:400-401; Powers 1877:321).

The Maidu peoples were among the most southerly extension of a Northwest Coast cultural trait: formal warfare (Figure 2). Armor-use in association with formal warfare was documented among the Shasta, Modoc, Achomawi, Atsugewi, Wailaki, Maidu, Valley Konkow, Hill Konkow, Hill Nisenan, Hill Patwin, River Patwin, Cahto, Yuki, Sinkyone, Nomlaki and Wintu/n (Dixon 1905:205; Du Bois 1935:124; Garth 1978:238; Klimek 1935:43; Kroeber 1922:299; 1925:400; LaPena 1978:329; Riddell 1978:379). Armor use among the Nisenan, “authenticated only for the hills[, was] either an elk hide tunic from neck to knees, possibly with sleeves; or a waistcoat of rods twined with cord and filled with pitch [shielding] from hips to armpits, perhaps partly over the face (Kroeber 1932:299).”

In general terms, formal warfare as practiced in northern California involved a recognized, strictly adhered to group of rules. When grievance was determined to warrant such action, a number of arrows was delivered to the offending village indicating the number of days before an appointed battle, at an appointed locality. The appointment at a later date permitted recruitment of allies for both sides (Beals 1933:367). Presumably, larger engagements were those permitting more time for the collection of allies, with calls expanding to as many “friendly” villages as practical, and could be planned accordingly.

If last-minute negotiations failed at the appointed time and place, each side formed battle lines facing each other at an unknown, but close distance, within arrows’ range. A battle commander for each side stood apart to one side of the battle line, possibly with a shaman for attention to wounded. This command unit was off limits for targeting as long as they did not participate in the fighting. Within the battle lines however, warriors selected for ability as subcommand, often wearing elk hide or wooden rod armor for protection, “stood at intervals along the battle line and on the ends” to direct and support within the lines (Dixon 1905:205; Garth 1978:238). Volleys of often-poisoned arrows were then exchanged, expected, or hoped, to be dodged or deflected. Losses were generally low, and “time outs” could be called by either side to assess situations, or address capitulation, and compensation, due to casualties. The most highly sought targets during these formal battles were the armored, directing warriors of renown (Du Bois 1935:39; Garth 1978:238-239; Kroeber 1925:400; 1932:298; LaPena 1978:329-330; Riddell 1978:379).

### **Hill Nisenan Use of Arrow Poison**

The practice of formalized warfare, the use of armor, and the use of poisoned weapons is something of a package deal. In cultural situations in which an enemy might be equipped with armor rendering one’s arrows of little effect, the addition of poison to the arrows provides an effective counter. Jones (2007:66) states that:

there is an almost 100 percent correlation between the wearing of armor and the presence of poisoned arrows[...] ‘skilled [archers]’ would be relatively helpless against an enemy

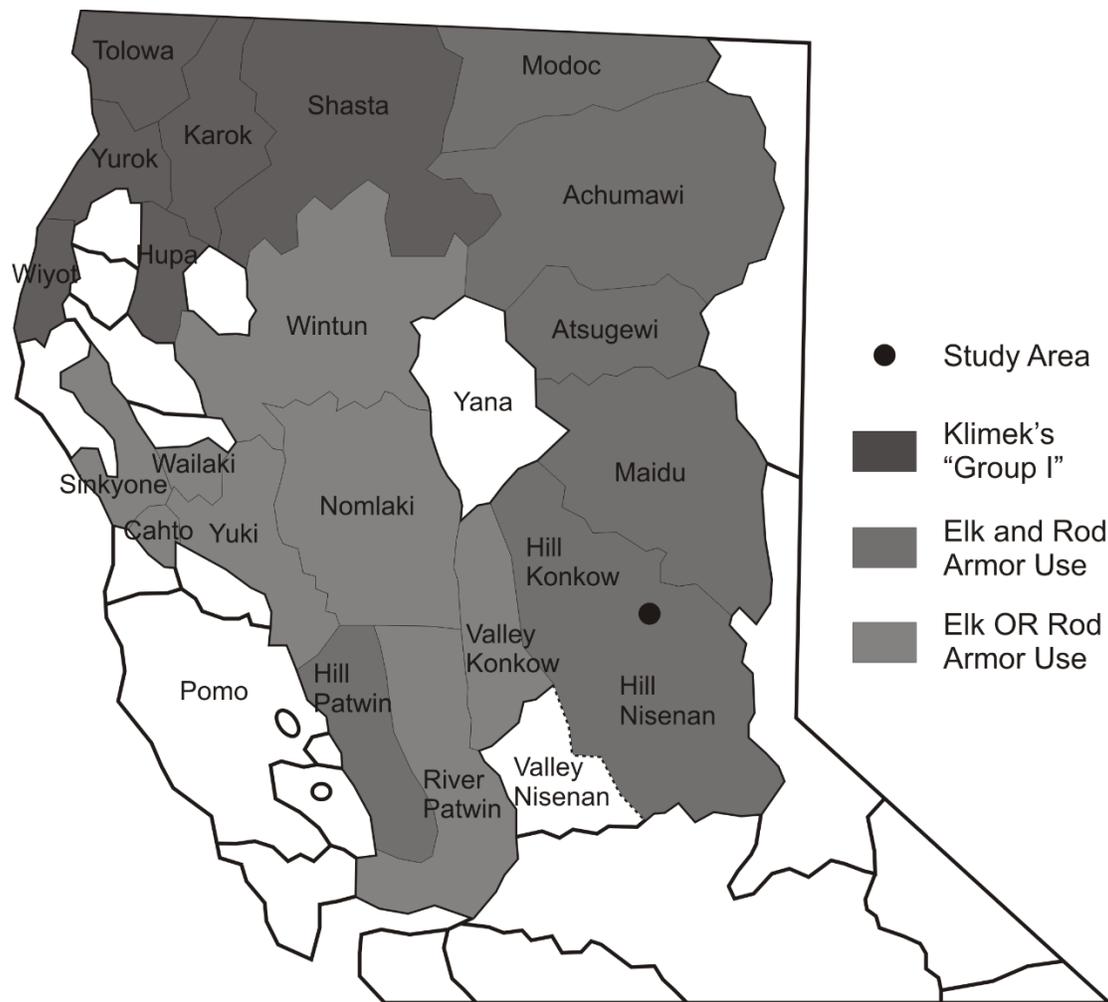


Figure 2. Armor use associated with formal warfare in Northern California (After Klimek 1935; Kroeber 1925).

adorned with multilayered rawhide cuirass[...] however, with poisoned arrows, a fighter had merely to inflict a scratch, which was much more likely than a deep penetration of rod, slat, or quilted multi-ply rawhide armor.

The Nisenan utilized perhaps the most widespread form of arrow poison in North America, which was a biological weapon: envenomation of bacteria-laden, putrefied, animal liver daub. Ethnographic records indicate that arrows treated thus could cause a gruesome death in days with as little as a scratch (Beals 1933:340-341; D’Azevedo 1986:477; Dixon 1905:204-205; Jones 2007:3, 34-42 Justice 2002:31; Kroeber 1925:417).

The Nisenan added hemotoxic venom from the Northern Pacific Rattlesnake (*Crotalus oreganus oreganus*) to the medium by which the venom was collected and transferred to the arrow point: putrefied liver (Juckett and Hancox 2002; Mackessy 2008; Stebbins and McGinnis 2012). The putrefied liver itself provided the main toxic contribution “by inducing gas-gangrene, tetanus, and other severe infections (Jones 2007:64).” Tetanus infection and induced neurotoxin poisoning are documented globally as a biological weapon in putrefied animal poisons, which are unlikely that to be used upon anything intended for consumption (Carus 2015:223; Holthouse 1986:141; Jones 2007:2-3, 41).

As ethnographically described, physical qualities of lithic materials indicated to the prehistoric Nisenan archer which points required the addition of poison, by default, in defining which lithic materials were believed to possess naturally, or supernaturally, inherent “poisonous” qualities. Naturally “poisonous” lithic materials were identifiable by white and, especially, red coloration (Beals 1933:340; Dixon 1905:164; Du Bois 1935:125; Justice 2002:31; LaPena 1978:334), and as “flint,” the designation of which included “cherts and chalcedony occurring in the area,” (Garth 1953:154; Olmstead and Stewart 1978:229). The only ethnographic statement potentially relating to FGV was that gray was particularly effective for hunting bear. However, it was also specifically stated that no poison was added when used on bear, as though gray was generally a color to which poison was added (Beals 1933:340; Du Bois 1935:125; LaPena 1978:334).

Lithic material color and flint-like texture, then, provided criteria specifying use and, conversely, non-use of poison. Given the qualifications, clear lines are drawn. Material used for Desert Side Notched hunting points makes them naturally poisonous exclusive of color, which reinforces the quality. The default criteria for poison use indicates that the material used for warfare-type points makes them candidates for the addition of poison. Thrusting spears, which were only rarely used in warfare, were also noted to have had poison applied (Beals 1933:341).

The criteria suggest that the distinction ultimately reflects segregated use of chert and FGV. Lithic resources the Pendola area Nisenan prominently utilized can be divided into two apparent groups. On one hand, FGV, metavolcanic and metacherts, which are doubtful to have been distinguished by the prehistoric knapper and here lumped in terms of color and material qualities. On the other, silicified wood, specifically in the form of chalcedony and opal, and other less clearly known cherts. Both of these groupings are all locally available as Yuba River gravel, the likely typical source for knappers. Of these materials, silicified wood is the prominent material used for Desert Side Notched points, while FGV is prominently used for Gunther-like points, each proposed here to represent distinct-use hunting and warfare points, respectively.

Heat treating, which generally adds a reddish hue to the material, was often performed on the material selected for hunting points. Less transparent samples of local chalcedony or opalized wood might also possibly be misdiagnosed as jasper in archaeological literature. As a result, heat treating the chert made it then qualify doubly: both as “flint” and the reddish hue imbued. Conversely, none of the Gunther-like, or warfare types in general, display evidence of heat treating, even when made of material seen in use for Desert Side Notched points.

Due to the color change, heat treating also “may have had consequences well beyond the manufacture process” including economic benefit (Justice 2002:31). As noted, red-colored lithic material was believed to possess a naturally “poisonous” quality. Beals (1933:341) notes that “certain colored stone points [were] especially lucky; [and] would trade 4 or 5 to 1 for [...the] lucky colors.” A noted distinction of Delta Side Notched points focused in the San Joaquin/Sacramento delta of the Central Valley is manufacture from high quality red cherts. It is plausible that at least some of these points could have been produced from heat-treated, Sierran, silicified wood and traded into the Central Valley as a commodity.

By ethnographic suggestion, it appears possible that the deeper penetration potential of the Gunther-type points may also have made them suited for use upon very large, and/or potentially dangerous game without the addition of poison, since they might be consumed. Warfare points were also stated of the Miwok to have been used on very large game (Barrett and Gifford 1933:217-218). Although not specified, it remains possible that the same type points might have been used on elk without poison, as well. The Nisenan are widely noted to have used poison upon arrow points, but it appears by default that the practice was limited to treatment of warfare points with intended human targets.

### **Observations on Points at Pendola**

Serration is commonly represented among all Pendola arrow points. Just under half of Desert Side Notched and 62% of the lumped warfare types are serrated. Within the warfare grouping, 50% of Gunther-like, up to 88% of Sierra Contracting Stem and virtually all Norden Basal Notched bear serration. Loendorf (2012:18, 104-105) says arrow points in the Middle Gila River area are commonly serrated, and

experimental data suggests arrow accuracy, wound size and point durability were not significantly affected by serration. However, “serrated points did tend to penetrate slightly deeper and it is possible that this characteristic may affect other aspects of performance,” (Loendorf et al. 2015a:441). The points with functions reflecting greater penetration requirements bear the highest occurrence of serration.

Serration upon Pendola Gunther and Sierra Contracting Stem is generally fine and often not readily apparent. Serration on the Norden Basal Notched is coarse, prominent and obvious. This, general morphological similarities, and possible transitional specimens within the variations of each suggest that the Norden Basal Notched could have developed in the Sierras associated with formal warfare from Sierra Contracting Stem. Justice (2002:288-290) groups Norden Basal Notched points with Sierra Contracting Stem, and believes that Norden Basal Notched could have developed from Sierra Contracting Stem. It is argued here that is the case, later than previously thought and for a specific reason, but insufficient sample size precludes more than the suggestion.

Within the main hunting versus warfare divisions, use damage conforms to Loendorf’s (2012) noted expectations. In addition, point condition appears to potentially emphasize identification of localities as likely domestic, versus generally adult male-only areas, perhaps identifiable with sweat lodges.

The two sites most likely to represent domestic use areas, sites FS 05175300450 and FS 05175300788, feature the most variation in the condition of Desert Side Notched (Figure 3). Out of a total of the 33 referenced points from these two sites, Desert Side Notched represent 64% (21). Of these, over half are impact fractured fragments (11; Figure 4:B-E), and 19% (4; Figure 4:F) are resharpened, depleted discards. Only 14% (3) are complete specimens (Figure 4:A).

The warfare division at these sites represent 36% (12) of the 33-points. Within the warfare types, 50% (6) are general purpose Gunther. Of the six proposed anti-armor types, 17% are unfinished, 33% complete, 33% non-diagnostic, possibly manufacture, broken, and 17% resharpened. The sole resharpening of a warfare type appears to have originally been a Sierra Contracting Stem resharpened into a generalized Gunther form.

Perhaps more reflecting an adult male only area, site FS 05175300493’s assemblage includes 22 of the represented points (Figure 5). Warfare points represent 95% (21) of the assemblage, and the sole Desert Side Notched is a resharpened specimen. Within the warfare grouping, 64% (14) are general purpose Gunther, and the anti-armor types feature the most variation. Among the points identifiable as Norden Basal Notched, one (20%) is possibly impact fractured (Figure 4:N) and another (20%) reworked (Figure 4:L).

The sole use of chert within the lumped warfare point assemblage in Pendola excavations, was manufactured from gray chert of an unknown, apparently uncommonly used source, possibly Shoo Fly Complex chert that bears no evidence of heat treating. As a result, the color was deemed appropriate for the use by the knapper. The ethnographically relayed information that color was used in material selection apparently accurately described practice. Every warfare point is made from material that is a shade of gray and lacking evidence of heat treatment. Every DSN is made from chert, ranging from white, yellow, gray to near black, most with reddish hue due to heat treatment.

It is likely that at least some warfare points were kept poisoned, just in case. If waiting until notified of a formal warfare appointment to add poison to arrows, it is unlikely that sufficient time would have been available to prepare the poison. Since the anti-armor types would be impractical for use in almost any other way, they are perhaps those most likely to have been kept poisoned. Apparent segregation of warfare points, especially the anti-armor forms, from the areas where high proportions of Desert Side Notched points occur might also suggest that pre-poisoned warfare points were maintained in adult male only areas, such as near sweat lodges for family protection. Site FS 05175300450, the locality bearing the strongest evidence of domestic use, features the largest number of Desert Side Notched points (14) and five complete, small, general-use, Gunther-like points and none of the possible anti-armor points.

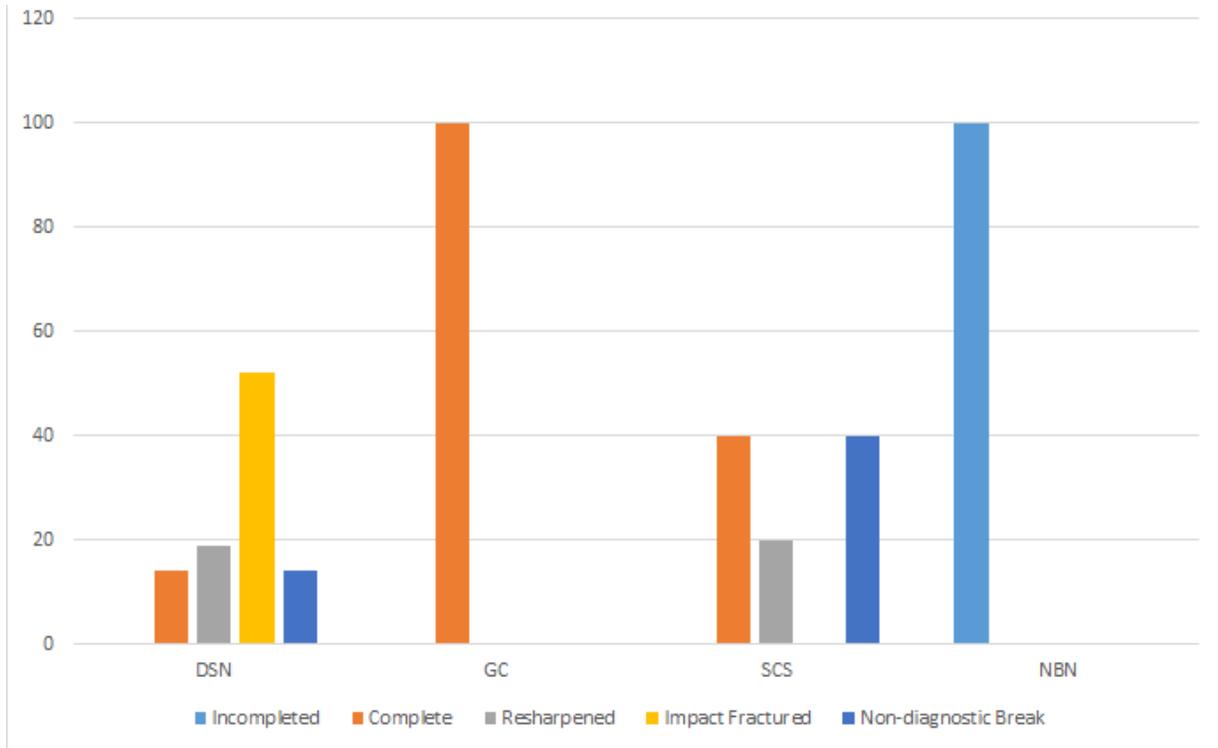


Figure 3. Percentages of point condition at possible domestic habitation localities, Sites FS 05175300450 and FS 05175300788, combined. Abbreviations: DSN=Desert Side Notched, GC=Gunther Cluster, SCS=Sierra Contracting Stem, and NBN=Norden Basal Notched.

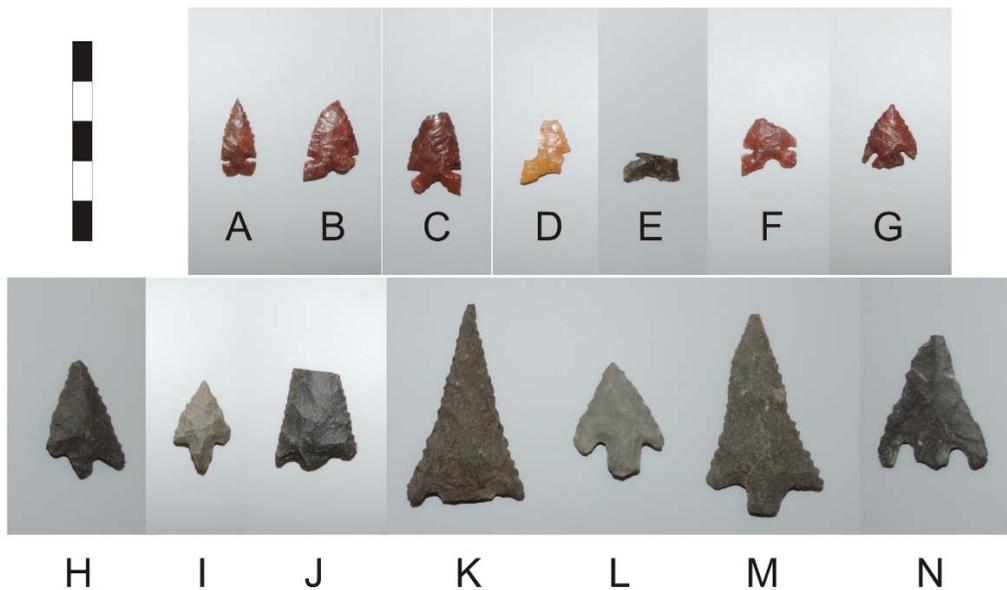


Figure 4. Representative points to scale in cm from Pendola excavations. Complete Desert Side Notched (A), Impact fractured Desert Side Notched (B-E), Depleted, resharpended Desert Side Notched (F), Undifferentiated Rosegate Series (G), Gunther-like (H-I), Sierra Contracting Stem (J, O-Q), and Norden Basal Notched (K-N).

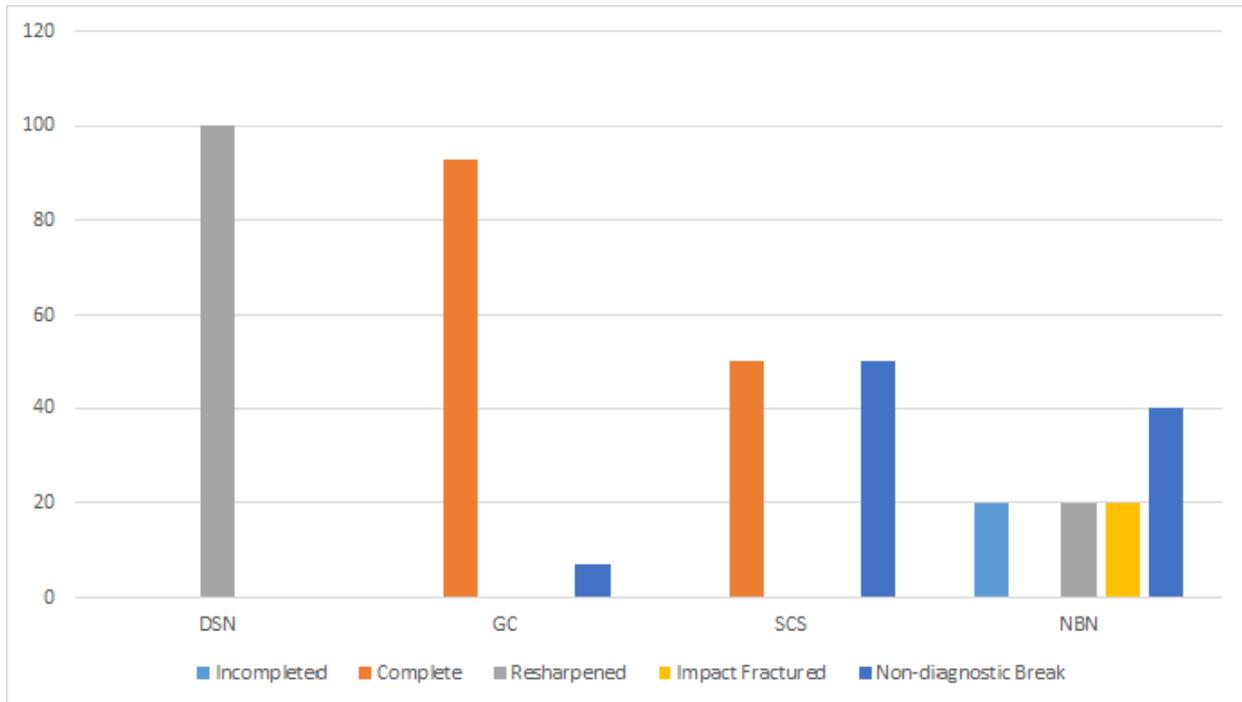


Figure 5. Percentages of point condition at a possibly adult male-only locality, site FS 05175300493. Abbreviations: DSN=Desert Side Notched, GC=Gunther Cluster, SCS=Sierra Contracting Stem, and NBN=Norden Basal Notched.

### Stratigraphic Occurrences

The general trends in occurrence of the point types discussed here appear consistent within the small sample (Figures 6, 7, 8, and 9). Rosegate Cluster points occur in very low numbers throughout the late prehistoric, from well below the appearance of Gunther to the surface. Based upon stratigraphic occurrence, Gunther Cluster points represent the earliest of the points that are subjects of this paper. Next, appearance of Desert Side Notched and the Sierra Contracting Stem-like anti-armor points seem to closely correlate. Finally, perhaps a reason it was diagnosed from surface material, Norden Basal Notched points represent the latest added point type in the sequence, in contrast to previous chronological suggestion. Occurrence of all types, except Rosegate, seems to increase over time.

Data from Pendola appears consistent with Kowta's (1988) late prehistoric model. In accord with his chronology, Rosegate Cluster points do appear early in late prehistoric sequences, perhaps as Washoe points, followed primarily by Gunther-like warfare points, and thereafter, Desert Side Notched arrow points appear in the Western Slope. It is suggested that Maiduan people occupied the Central Valley prior to occupation of the Western Slope during the late Medieval Climatic Anomaly, circa 1300 CE. Possibilities also exist that Penutian peoples arrived into Northern California by one or more migration events, perhaps from the north or northeast. The Desert Side Notched point type, formal warfare and armor use could all have potentially arrived with a population influx from either direction, but the practice of formal warfare suggests more influence from the north rather than the east for this cultural trait. It appears perhaps more likely that adoption of the Desert Side Notched point type was a result of contact with Great Basin peoples, notably the Washoe, after Maiduan occupation of the Western Slope. The actual situation is likely a combination of events (DeLancey and Golla 1997:178-180; Kowta 1988).

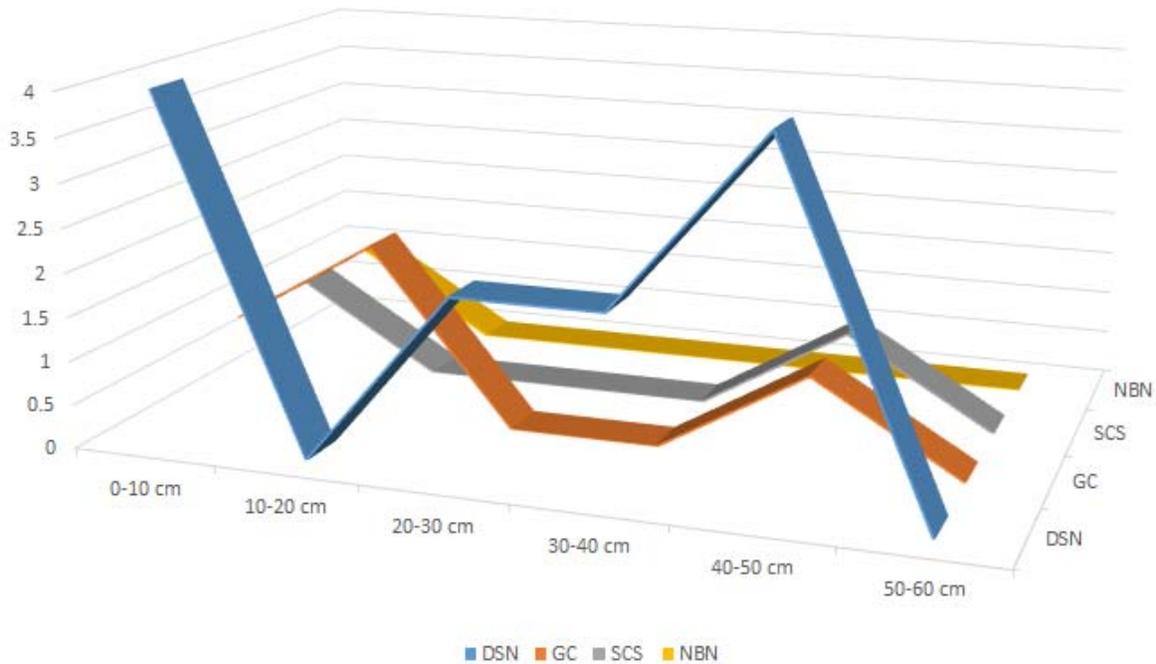


Figure 6. Site FS 05175300450 point stratigraphic occurrence in 10 cm levels for Desert Side Notched (DSN), Gunther Cluster (GC), Sierra Contracting Stem (SCS) and Norden Basal Notched (NBN).

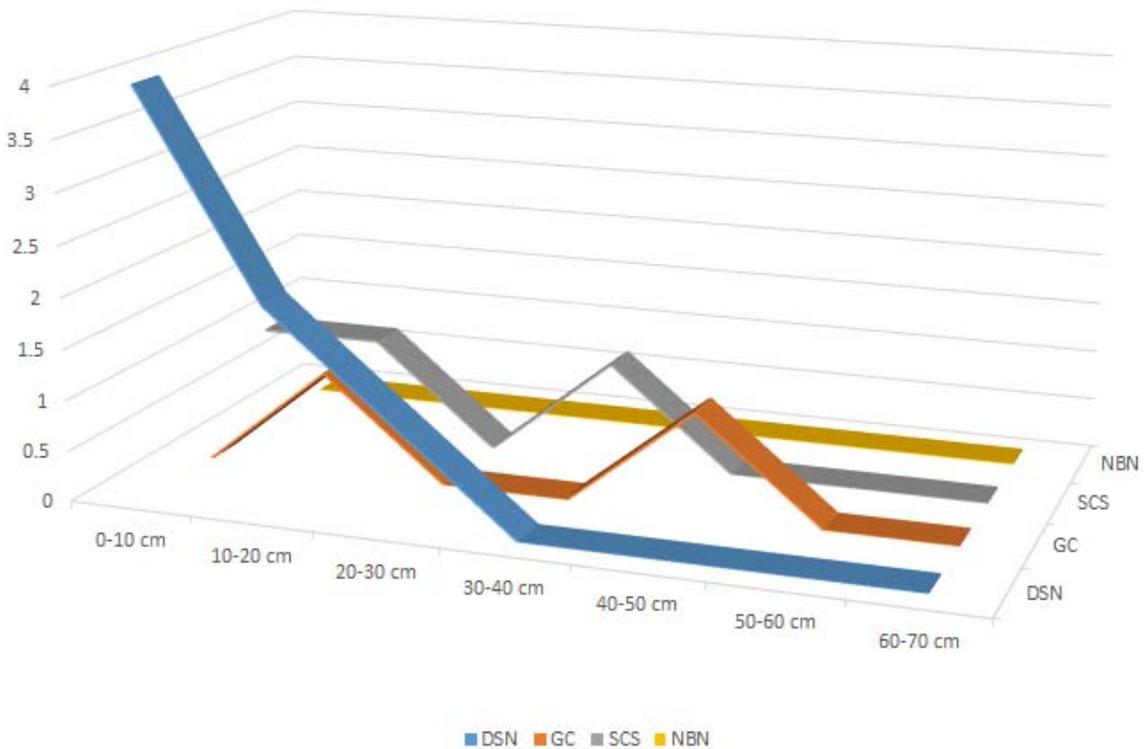


Figure 7. Site FS 05175300788 point stratigraphic occurrence in 10 cm levels for Desert Side Notched (DSN), Gunther Cluster (GC), Sierra Contracting Stem (SCS) and Norden Basal Notched (NBN).

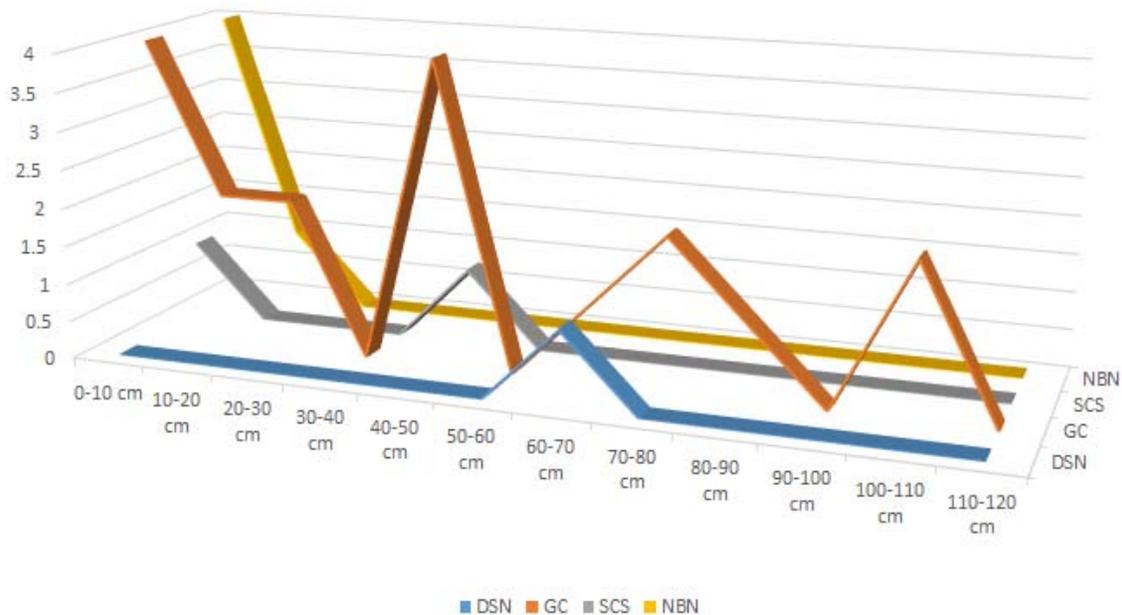


Figure 8. Site FS 05175300493 point stratigraphic occurrence in 10 cm levels for Desert Side Notched (DSN), Gunther Cluster (GC), Sierra Contracting Stem (SCS) and Norden Basal Notched (NBN). This is a disturbed site, but general data of these point types' occurrence from excavations still conforms with that seen in Bullard's Bar and other Pendola excavations.

Within the small sample from Pendola, data suggests that the warfare points are potentially observable as evolving. Common serration appears soon after the earliest appearance of Gunther, coupled with an overall increase in size, narrowing of form, proportional decrease in stem size and shortening of barbs of some points, concomitant with the introduction of Desert Side Notched points. Gunther points continue in use along with the proposed anti-armor Sierra Contracting Stem. Not to suggest that all points within Sierra Contracting Stem collectively represent anti-armor arrow points, but late prehistoric occurrences in the Western Slope appear to potentially fit the suggestion.

Although Norden Basal Notched is defined as a Late Archaic Western Slope manifestation, points consistent with the description in Pendola indicate that they appear in use well after the first warfare-type points, Gunther Series and Sierra Contracting Stem, and increase in frequency in very late prehistoric assemblages (Justice 2002:289-290). Norden Basal Notched is primarily diagnosed by very large size for an arrow point, regular, coarse serration and barb thickening or buttressing, potentially to maintain the barbs upon impact and therefore increase likelihood of inflicting a scratch upon an armored target.

Although variation within the Desert Side Notched Series is outside the scope of this research, the sample suggests overlap in subtype use. Of 22 complete enough to suggest morphological subtype, eight (36%) would classify as Delta, seven (32%) Sierra, six (27%) Redding and one (5%) General. Although the subtypes appear to co-occur stratigraphically, in general terms, it is possible that the Sierran subtype range is earlier, followed by Delta, with Redding possibly the latest. A couple of points appear to be possibly transitional between Sierran and Delta, bearing a basal notch within a deep basal concavity.

Often considered temporally earlier (400-1400 CE), Rosegate Cluster points are noted as western Great Basin ethnographic examples, often alongside Desert Side Notched Points (Justice 2002:321-328). Although not included in graphic breakdowns here since they are suggested to be uncommon, curated, foreign, Washoe points (See Loendorf 2012:55-56,101), Rosegate Series arrow points occur infrequently at levels from up to 50 cm below the deepest appearance of Gunther series points all the way through the stratigraphic sequence.

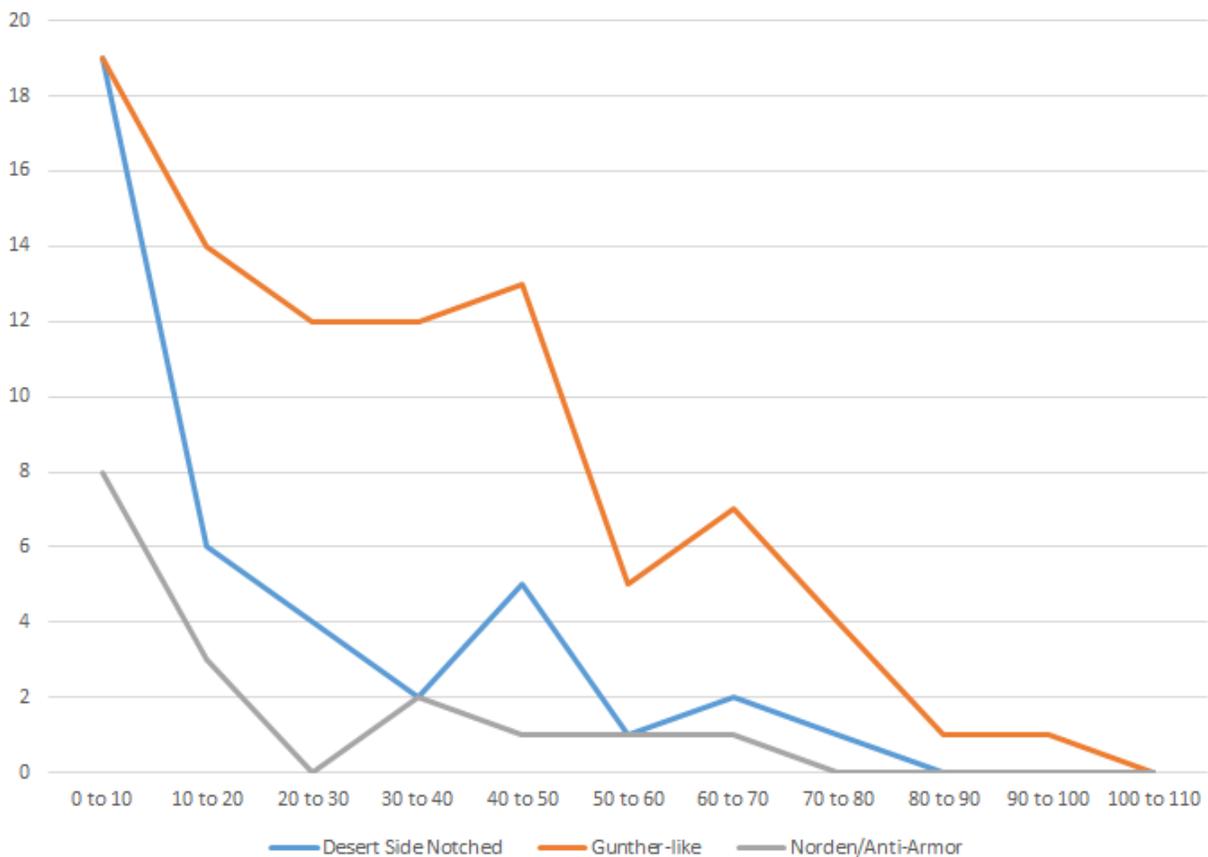


Figure 9. The combination of Bullard's Bar data and Pendola point stratigraphic occurrence in 10 cm levels for Desert Side Notched, Gunther Cluster and Anti-armor points (Sierra Contracting Stem and Norden Basal Notched) combined. Sierra Contracting Stem and Norden Basal Notched are not differentiated due to lumping within the Bullard's Bar Type 9 (Bullard's Bar data in Humphreys 1969:Tables 1, 9 and 12).

Based upon comparison of snowfall and vegetation data, the Yuba River Valley appears a possible movement corridor and potential focal point for hostility between the Nisenan, Konkow, Maidu, Northern Paiute and Washoe. As such, higher numbers of warfare points might be expected within the Yuba drainage. Perhaps reflecting this, a review of point types in the northern Sierra Nevada by Deis (2004) found that 34% of the contracting stem (here argued warfare type) arrow points occur within the Yuba River drainage, followed next in occurrence by 21% in the American River drainage, followed by the Feather River drainage and last, the Cosumnes River drainage with the lowest occurrence.

## CONCLUSIONS

Empirical evidence indicates that suggested age assignments of point types based upon surface material is a major contribution in the Western Slope's archaeological stalemate. The standstill is, then, self-imposed. Due to the suggested diagnosis of "Martis" and its distinction from the succeeding occupation based upon survey material, Heizer and Elsasser (1953:14, 20, 23) proposed that older occupations in Central California used almost exclusively basalt, and furthermore, that more recent, late prehistoric occupations produced small arrow points manufactured almost exclusively from chert or obsidian. Those observations were later taken unquestionably in data interpretation. Humphreys, for instance, was looking to find what Heizer and Elsasser previously stated, although it required selective use of his own excavation

data at Bullard's Bar to support it. As reflected in Humphreys' (1969) data almost fifty years ago, however, the largely chert Desert Side Notched and FGV warfare points co-occur stratigraphically (Figures 1 and 9).

Based upon excavation data available near the North Fork of the Yuba River, it appears that prehistoric Hill Nisenan produced two general types of stone-tipped arrows with distinct intended uses: One, bearing notched, hafted points on simple shafts for hunting, and a second, bearing often-poisoned, stemmed, unhafted points on composite arrows including a foreshaft, for war. The relayed ethnographic information correlates well with the regular co-occurrence of "figure eight hafted" Desert Side Notched and loosely adhered warfare points, Gunther-like in general form, at late prehistoric Hill Nisenan archaeological sites in the Pendola area.

Within the point grouping consistent with warfare type characters, at least two distinct divisions are apparent that have contributed to the confusion: smaller, general purpose, Gunther Cluster points, as well as a similar group of larger points consistent with the Sierra Contracting Stem Cluster. This large variety is divisible further into two point subtypes often diagnosed as dart points: Sierra Contracting Stem and Norden Basal Notched.

The varieties might reflect an original, more common-use, Gunther Cluster warfare points, along with those developed and reserved for specialized use as high kinetic energy "slugs" capable of armor penetration in formal battles, Sierra Contracting Stem and Norden Basal Notched. These larger, heavier, most often serrated points are suggested to represent evolution of the general form into armor piercing morphotypes. Intended only for use in short-range, dueling conditions, the anti-armor types have defied typology due to size and material construction, which was intentional. Such a case would explain the widespread regional disagreement in separating regional point types as dart or arrow.

Due to the appearance of anti-armor point forms, warfare points as a group appear to have been getting larger on average over time, in contrast to Humphreys key qualifications for his chronology. While increasing in size, proportional stem lengths were decreasing on average. These factors suggest concern with higher kinetic energy, therefore penetration capability, and decreased possibility of retracting the embedded point, and refinement of qualities desired in formal warfare. Serration data also supports the increased concern with penetration capacity.

The large, anti-armor warfare points seem to reflect a parallel anachronism. The arrival of arrow point technology into the Western Slope did not require tiny points to be made of increasingly knappable materials. Given the situation, the practice of formal warfare, with armored enemy targets, promoted the use of larger, heavier points manufactured from "obsolete" material. Relatively standardized criteria, such as limited necessary range between formal battle lines in open, dueling conditions would have altered typical ballistic requirements in keeping points small and light. As a result, the added benefit of heavier, serrated projectiles to penetrate armor may have resulted in a unique situation in which projectiles considered too large for average practical purposes evolved for those specific circumstances. Anti-armor "slugs" works as an analogy. Hence the suggestion that use of that larger than expected, poisoned points against the most desired targets, armored enemies.

Sparring with seasonally intruding, unarmored Washoe hunters, general feuding, and the hunting of potentially dangerous game could account for the continued use of general Gunther series points. This practice would also simplify which points needed high protective caution in domestic contexts due to added poison. However, in a border area debatable concerning by which tribe it was inhabited prehistorically, the late prehistoric increase in anti-armor point types suggests that warfare in the North Yuba River Valley included notable formal warfare between Maiduan villages.

As observed, Desert Side Notched points in the Pendola area were produced from chert, primarily chalcedony and opalized wood, but also possibly heat treated Shoo Fly and Palmetto chert, which are the best quality lithic materials locally available in terms of knappability, general performance and suitability for reworking. On the other hand, warfare points, including Gunther, Sierra Contracting Stem and Norden Basal Notched, are almost always produced from FGV, which is often scarcely workable and unlikely to allow reworking if broken in use. Selected use of the structurally inferior (primarily in its lack of

homogeneity) FGV contributes to a substantial amount of variation within the warfare points and almost completed aborts, and has also resulted in disagreement, or fractious agreement at best, regarding point definitions even, much less sorting out cultural implications.

Selection for raw materials was intentional given distinct functions for each point type, to make best use of the physical properties of each type of stone given their functions and to maximize use of available lithic materials. Desert Side Notched points, as hunting points were expected to have been retrieved and reworked, to use as many times as possible. Warfare type points were not expected to be retrieved, so reworking potential was not a factor in intended use life. Warfare points only had to fulfill their purpose one time each, and had one shot to do so. FGV was selected for warfare points not only because it allowed the “good stuff” to be used on hunting points, and indeed not only adequate to fill the duty, but given the circumstance of encountering an armored enemy, fulfilled the duty better than other materials available.

Properties that make FGV superior for that task are the same qualities that make it inferior for knapping and manufacturing small formal tools like arrow points: dense, heavy, very hard, and hard to break. The density and weight provided warfare points with additional kinetic energy for penetration that no other resource allowed, and the hardness made points less likely to fracture upon hitting an armored enemy, thus more likely allowed the elevated kinetic energy to do as intended. Loendorf (2012:11-12, 47, 101) found that use of basalt for projectile points declined over time to a low of 11% in the Hohokam Classic period, yet the succeeding historic assemblage, which are all warfare type increased to 24% basalt; He attributes that increase to shield use in warfare. Perhaps reflecting similar materiofunctional needs, Shasta dam investigations revealed Gunther Cluster points’ persistence in use into the historic period produced in metal, associated with Desert Side Notched points made from glass (Justice 2002:416).

Although there is a tendency to produce smaller projectile points for arrows, experiments with bows and atlatls suggest that both large and small projectile points are adequate for either delivery system. Production of smaller points is sufficient for average tasks and conserves a precious natural resource, in general. As noted, conservation of the raw material used for the warfare points in the region is not likely a driving factor, while short range penetration of armor on selected, open, dueling-ground potentially is. Larger points can indicate use of larger arrows, and it is notable that war arrows were composite, with foreshafts (Blitz 1988).

The hypotheses presented offer potential debate that could hopefully jumpstart archaeology of the Western Slope from its fifty-year stagnancy. Suggestions herein are supported by qualities of the materials, distinctive, empirical use-life patterns from recovered points, ethnographic data indicating distinction between hunting and warfare points, motive (especially given requirements for possible use against armored enemies), poison use coupled with native beliefs concerning supernatural qualities of stone types, and stratigraphic indications.

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