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How to Classify the Projectile Points from Monitor Valley, Nevada

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ACCORDING to Willey and Sabloff (1980), American archaeology's *Classificatory-Historical Period* ended in 1960; we are now in the *Explanatory Period*, concerned with the nature of ecological systems, the use of hypothetico-deductive reasoning, and above all, the search for timeless-spaceless processes. Archaeology certainly has come a long way in the past two decades.

In fact, we may have come too quickly. As I have argued elsewhere (Thomas 1979:137-146), contemporary American archaeology has not one but three primary and sequentially ordered objectives: archaeology's initial goal is to define cultural chronologies; the intermediate objective is to reconstruct prehistoric lifeways; the ultimate objective is to explain cultural processes. But in the rush to explain the processes, many archaeologists jump the gun, failing to take the time and effort to establish the proper archaeological foundation. Simply stated, archaeologists must spend the time to flesh out the nuances of chronology and lifeway before tackling the processes which allegedly explain such prehistoric behavior. There are no shortcuts.

Living in the *Explanatory Period* has jaded many contemporary archaeologists. Too often, we require our colleagues to apologize when they do traditional studies such as refining chronologies and typologies: in truth, archaeologists conducting such research are in danger of being branded "old fashioned," or even worse, "normative."

This paper is concerned strictly with typology, offered without apology. My ultimate interests in Great Basin archaeology far exceed "mere chronology," but I realized some time ago that without proper attention to absolute chronology, archaeologists can literally forget the more anthropological goals—both in the Great Basin and elsewhere.

My aim is to review and revise the post-Mazama (i.e., post-5000 B.C.) projectile point chronology for a portion of the Great Basin. The evolution of this chronology is considered briefly, and the current problems in its application are highlighted. Two kinds of new data are then brought to bear on the problems.

Recent research in Monitor Valley, Nevada, has produced a large series of projectile points, from both stratified and surface sites. Nearly half of these points come from the radiocarbon-dated deposits of Gatecliff Shelter, providing the basis of the newly proposed *Monitor Valley typology*, which roughly spans the past six thousand years.[1]

The Monitor Valley typology is then examined against a Great Basin Database, a battery of standardized, operational measure-

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ments for roughly 6000 Great Basin projectile points. These points were reanalyzed to provide a significantly large body of comparative, systematic data. The objective is specifically to determine how far the Monitor Valley typology can be generalized.

While hardly a cure-all for the typological woes of Great Basin archaeology, the Monitor Valley typology does provide a standardized method of approaching an important class of material culture; but there are important spatial and temporal limitations on the typology. Please pay especial attention to these limitations.

EVOLUTION OF GREAT BASIN PROJECTILE POINT TYPOLOGY

Before introducing the empirical data, it is necessary to consider briefly the underpinnings of the typology being proposed here: how it evolved, what it assumes, and what are its pitfalls.

The nature of typology was of little practical concern to most Great Basin archaeologists prior to about 1950. While working at Lovelock Cave in 1912, for example, L. L. Loud's concern was not with typology and classification at all, but rather with recovering as many exhibit quality artifacts as possible. Although Loud roughly grouped the artifacts into conventional categories–such as twined and coiled basketry types–these classes were wholly intuitive and undefined (see notes in Heizer and Napton 1970). When M. R. Harrington reexcavated the site and reclassified the material culture, he did not care about the nature of classification either. Harrington (in Loud and Harrington 1929:110) used the term "artifact type," but not in a consistent fashion. Similarly, Julian Steward's (1937) report on the Promontory Cave excavations focussed on the individual specimens, rarely grouping objects into "types" at all. Steward (1937:13), for instance, discussed the "usual form of the arrow point," generally without elaboration.

Although Great Basin archaeologists in the 1930's and 1940's generally showed little interest in classification beyond bald description, the work of Luthur Cressman stands as a notable exception. Cressman often prefaced material culture discussions with a consideration of "Basis of Classification" or "Principles of Classification" (e.g., Cressman 1942:33, 53, 63). Also significant is Cressman's use of the technological attributes ("structural features") to classify basketry, mats, and sandals. A similar attempt was made in the classification of projectile points from the Roaring Springs site (Cressman, Williams, and Krieger 1940:41-47). Largely the work of Alex Krieger, the Roaring Springs classification began with 28 morphological types, which were subsequently grouped into nine major temporal types using stratigraphic criteria. Although this system was not adopted by later investigators, the criteria were metrically defined and the results tallied quantitatively. The Cressman-Krieger discussions of typology strike a remarkably contemporary tone.

The next major typological step appeared in the Danger Cave monograph (Jennings 1957) which is indicative of changes in archaeological thinking during the early 1950's. Like Cressman and Krieger, Jennings specifically emphasized his assumptions and biases:

> Although I hesitate to use the word type, its use seems permissible if we consider it to be a relatively small collection of materials which because of form and material seems to constitute a little unit not specifically identical with any other comparable small unit [Jennings 1957:99].

Jennings employed a series of 87 "noncommittal laboratory number designators," noting that such numbers "are easily forgotten, have no traditional aura, and readily permit–even encourage–local type and sub-

type lumping into broader *named* types when regional information is adequate for the establishment of those types which may actually be cultural realities" (Jennings 1957:100). Jennings candidly cautioned that "certainly the work should be reexamined" and the Danger Cave collection has indeed been reclassified a number of times (e.g., Riddell 1960:25-28; Aikens 1970:44-55; Thomas n.d.*a*.). In hindsight, the Jennings typology seems unduly cumbersome, but by the standards of the day, the Danger Cave system was rather progressive.

The Berkeley Typological System

Robert F. Heizer and a rich succession of graduate students at the University of California, Berkeley, made a breakthrough in the classification of Great Basin material culture in the mid-1950's. Heizer had been pursuing an intermittent program of excavation and analysis of Great Basin archaeological materials since the 1930's; particularly noteworthy was his ambitious Basinwide site survey in 1937 (Thomas n.d.*b*.), and also the 1958-1959 interval when several key sites were excavated and analyzed, especially Wagon Jack Shelter (Heizer and Baumhoff 1961), South Fork Shelter (Heizer, Baumhoff, and Clewlow 1968) and Ruby Cave (unpublished). Material culture from Lovelock Cave was reanalyzed at this time, both the collections at the Lowie Museum of Anthropology and the Heye Foundation in New York City (Grosscup 1960). Previously undescribed materials from the Rose Spring site were also brought to Berkeley for analysis and publication (Lanning 1963).

By 1960, Heizer and his co-workers had devised the typological framework which today still provides the backbone of Great Basin chronology. Unlike Jennings and others, Heizer and his students focussed almost exclusively on projectile point chronology to impose temporal order (e.g., Heizer and Baumhoff 1961:123; Heizer and Hester 1978:153).

Beginning with the important Baumhoff (1957) and Baumhoff and Byrne (1959) articles, a flurry of papers appeared defining the Great Basin projectile point sequence (e.g., Heizer and Baumhoff 1961; Clewlow 1967; O'Connell 1967; Lanning 1963; Heizer, Baumhoff, and Clewlow 1968; Hester 1973; Heizer and Hester 1978; Heizer and Berger 1970). The *temporal* ranges of these types were rather well established in the late 1960's, but much discussion was stimulated regarding the *spatial* limits to which these types could be extended (Aikens 1970; Adovasio and Fry 1972; Holmer 1978).

Almost from the beginning, Heizer and his colleagues anticipated the need for further revision of the typological system: Heizer's typology was at best a working approximation, never presented or viewed as a final product:

> The determination of types was performed on a strictly intuitive basis—we simply laid out all the points, gathering similar specimens into groups. In such typological analysis one often misses distinctions which later turn out to be significant. In order to permit correction of such errors of omission and commission by later students, we include a line drawing of each specimen [1961:123].

The Berkeley group established high standards for reporting their data, illustrating all of the typable point fragments recovered in their excavations, and including detailed tables of attributes. As I have stressed elsewhere (Thomas 1975), these unlovely line drawings are vastly preferable to the too-common practice of publishing only selected "key" or "representative" specimens.

The Reese River Key I

Such was the status of Great Basin point chronology in the late 1960's, when we began working in the Reese River Valley, Nevada. Because I was interested in regional patterning

of surface artifacts, the results could be only as accurate as the prevailing chronology. In three years of fieldwork at Reese River, we failed to find an adequately stratified site, and the analysis was expressed in terms of the conventional Berkeley types. From the outset, the Heizer chronology was simply stipulated (Thomas 1969).

But accepting a temporal sequence is one thing; actually classifying individual artifacts is something else. In an attempt to make these types more repeatable and more operational, a sample of 675 projectile points was reanalyzed using a series of standardized metric attributes. *Reese River Key I* was devised so that unknown specimens could be assigned to the conventional categories, minimizing the obviously intuitive, idiosyncratic factors involved in the existing typology (Thomas 1970, 1971; Thomas and Bettinger 1976; see also Tucker 1980). The objective was not to redefine types, but rather to standardize the types already in use.

CURRENT TYPOLOGICAL ISSUES

By the mid-1970's, it became clear that all was not well with Great Basin projectile point typology. The Berkeley typology (and, of course, the Reese River Key I which attempts to mimic it) mixed typological modes. In some cases, the Berkeley types operated strictly at the level of cultural chronology, documenting "the temporal and spatial changes of shared aspects of culture" (Thomas 1979:164). But the Berkeley typology also included a number of undifferentiated morphological or descriptive types, which might (or might not) have significance in other dimensions: time, space, function, technology, perhaps even ethnicity (Steward 1954). Such mixed-mode typology is not necessarily incorrect, but it does tend to make archaeologists forget the function for which types are actually defined.

A more critical problem arose when the Berkeley typology—defined as it was on the basis of sites in the western and central Great Basin—was applied to sites within the eastern Great Basin. The first such major application was the Hogup Cave report (Aikens 1970) in which the primary data were presented in terms of the Berkeley projectile point types; the Danger Cave points were also reanalyzed on that basis. Although Aikens used the "named type" definitions, they were, unfortunately, employed rather differently from the original published descriptions. Northern Side-notched points from Hogup Cave, for example, were simply not equivalent to the Northern Side-notched points defined in the western Great Basin; the Elko series meant one thing in Utah, something else in western Nevada, and so on (for specific examples, see Thomas n.d.*a*.). Much confusion arose in the early 1970's regarding this east/west typological split; part of the difficulty was typological, since identical names were being used in different fashion by different investigators (Thomas 1975). But typology aside, the key issue became whether there was one sequence or two: a "long" chronology in the east and a "short" chronology for the west (Aikens 1970; Adovasio and Fry 1972; Thomas 1975; Holmer 1978; O'Connell, Jones, and Simms n.d.).

Another typological difficulty was the so-called "Pinto problem" (Warren 1980, n.d.; Green 1975; Thomas 1971; Layton 1970): Are the bifurcate stemmed points in the central and western Great Basin the temporal equivalents of the points found by Amsden (1935) at Pinto Basin and by Rogers (1939) in the California deserts? Although there had been a growing dissatisfaction about lumping all such points into a single typological category, Great Basin archaeologists were reluctant to discard the term "Pinto," preferring to wait for new information (Thomas 1971:89; Heizer and Hester 1978:158).

But the greatest problem with the mid-

1970's Great Basin projectile point typology was that it was simply out of date. The archaeology of the 1970's had become increasingly ecologically oriented and came to rely heavily upon the surface site; the skyrocketing importance of cultural resource management also fostered a new legalistic awareness of surface archaeology. Of course, the more one relies on surface sites, the greater the burden placed on time-markers.

Taken together, these factors suggest that a reworking of Great Basin projectile point typology is in order. While such an explicit emphasis on typology and classification may strike some as old fashioned, I hasten to point out that there is nothing old fashioned about an archaeologist attempting to understand and monitor temporal change. A sound cultural chronology is the necessary first step to further archaeological investigation of any sort and, as archaeological goals become increasingly sophisticated, our temporal controls will require periodic reworking. In contemporary archaeology, research on chronology, on lifeways, and even on cultural process, must often proceed hand-in-hand.

NEW SOURCES OF DATA

The problems enumerated above led to an intensive search for sites in the central Great Basin which would allow refinement and expansion of regional chronology. This search ultimately led us to Monitor Valley, Nevada (Fig. 1), where we excavated nearly a dozen sites, conducted a probabilistic regional survey, and mapped a number of satellite and outlier sites (reported in Thomas n.d.*a*.).

The most significant typological data came from Gatecliff Shelter (26Ny301), an extremely well-stratified site with deposits nearly 11 meters deep.[2] A large collection of artifacts was recovered at Gatecliff and over 40 radiocarbon determinations are available to date the Gatecliff deposits. The Gatecliff sequence begins with the Mazama tephra near the bottom and continues into historic times.

Over 400 typable projectile points were recovered from Gatecliff Shelter, and Fig. 2 presents their distribution, classified according to criteria proposed in this paper.

The Gatecliff sequence has been supplemented by materials from other excavated and surface sites in Monitor Valley, producing a point sample of roughly one thousand artifacts, supported by nearly 60 radiocarbon determinations.

The Monitor Valley points were then measured on a series of standardized attributes (Fig. 3), first proposed by Thomas (1970; see also Thomas and Bettinger 1976):

> *Distal Shoulder Angle–DSA*. The Distal Shoulder Angle is that angle formed between the line (A) defined by the shoulder at the distal point of juncture and line (B) drawn perpendicular to the longitudinal axis (C) at the intersection of A and C. *DSA* ranges between 90 degrees and 270 degrees. If points are asymmetrical, the smaller value of *DSA* is measured. *DSA* is recorded to the nearest 5 degrees.
>
> *Proximal Shoulder Angle–PSA*. The Proximal Shoulder Angle is that angle formed between the line (D) defined by the proximal point of juncture and line (B) plotted perpendicular to the longitudinal axis at the intersection of C and D. *PSA* ranges between 0 degrees and 270 degrees. If points are asymmetrical, the smaller value of *PSA* is measured. *PSA* is recorded to the nearest 5 degrees.
>
> *Shouldered*. A point is termed shouldered if *DSA* and *PSA* can be measured. If these two angles do not apply, the point is termed unshouldered.
>
> *Basal Indention Ratio–BIR*. Basal Indention Ratio is the ratio of the length of the longitudinal axis (L_A) to the total length (L_T) parallel to C, i.e., $BIR = L_A/L_T$. Basal Indention Ratio ranges between .0 and about 0.90.
>
> *Length-Width Ratio–L/W*. The Length-Width Ratio is the ratio of the total length (L_T) parallel to the longitudinal axis to the

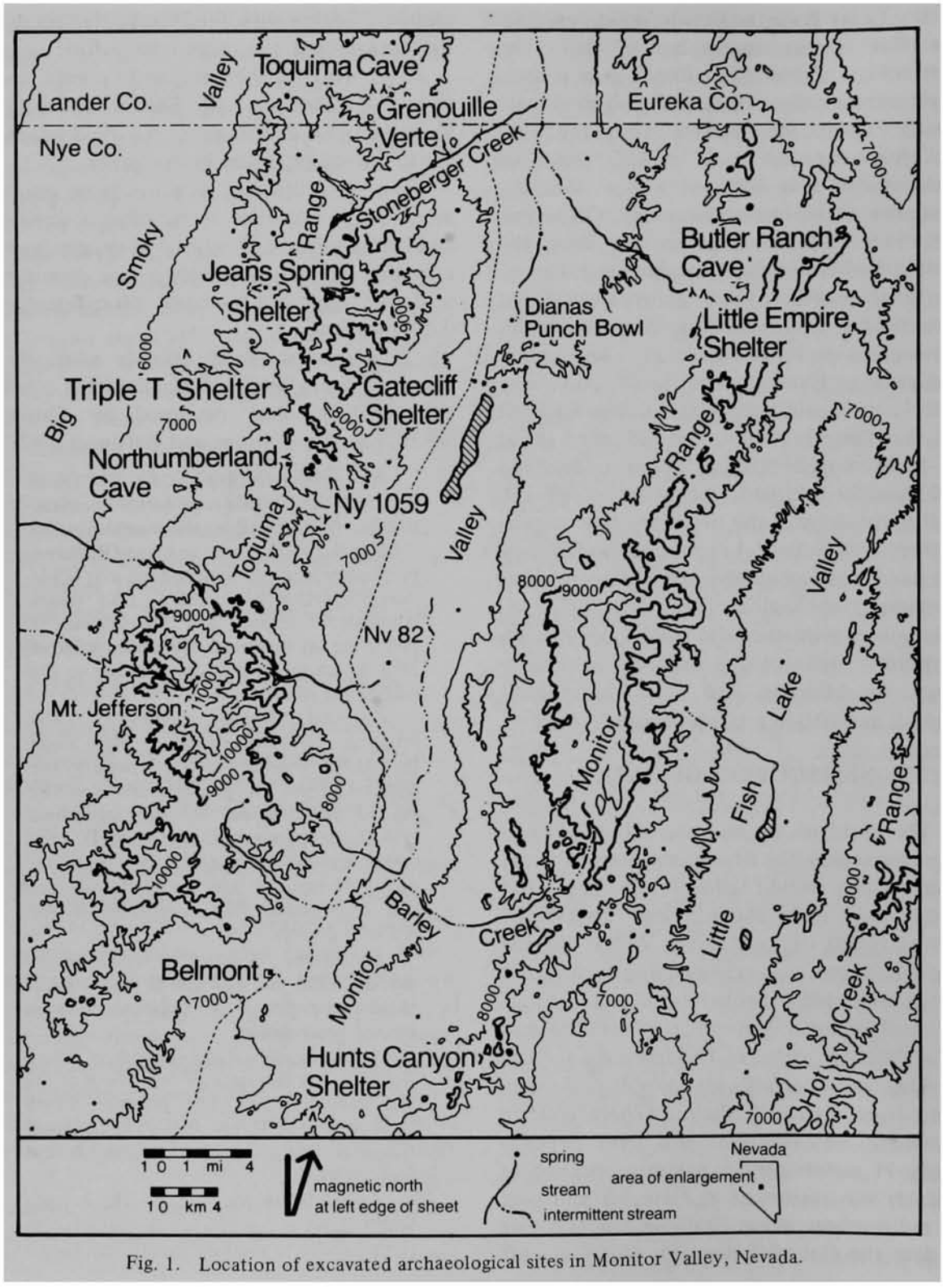

Fig. 1. Location of excavated archaeological sites in Monitor Valley, Nevada.

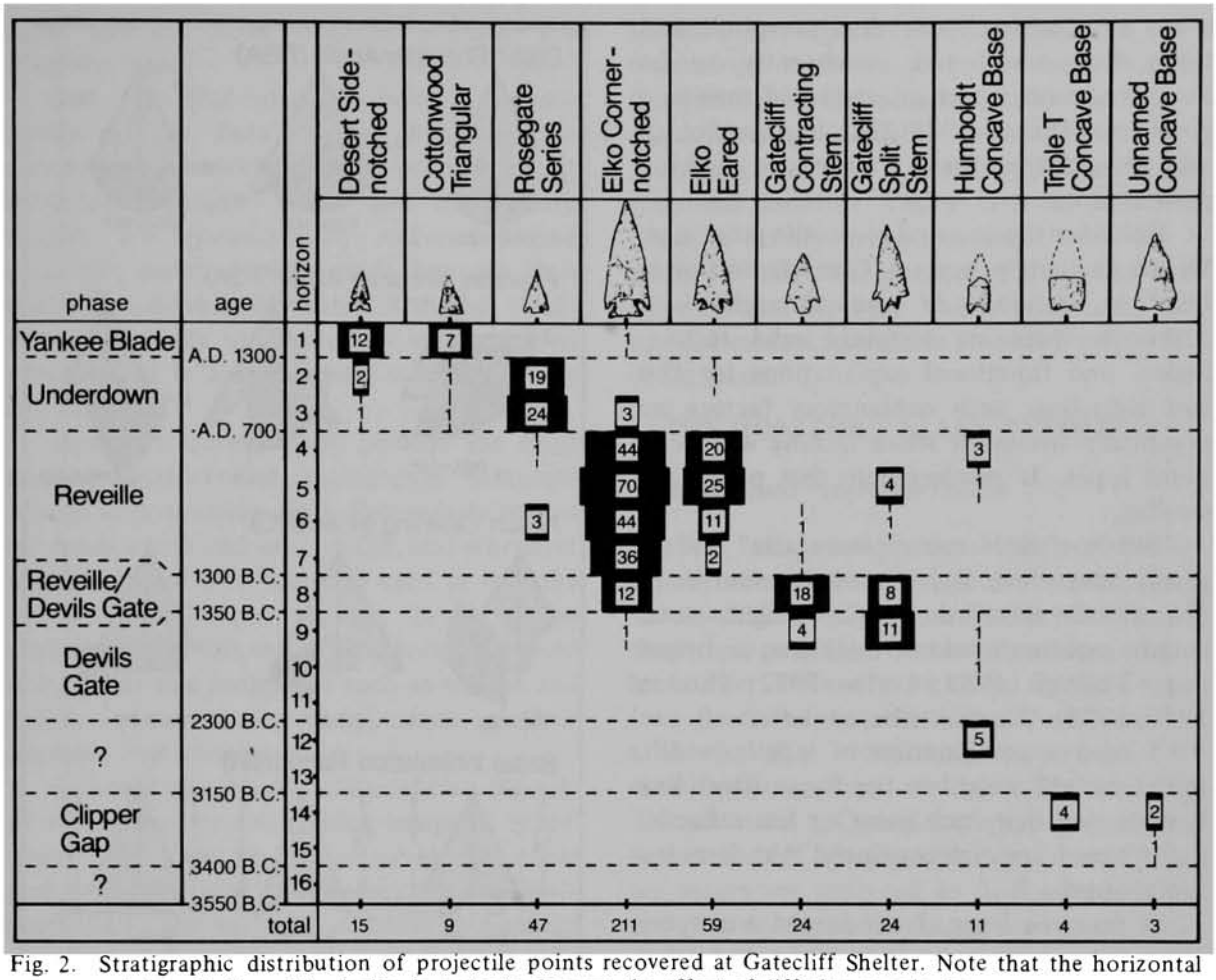

Fig. 2. Stratigraphic distribution of projectile points recovered at Gatecliff Shelter. Note that the horizontal axis is scaled logarithmically, in order to dampen the effect of differing sample sizes.

maximum width (W_M) perpendicular to E, i.e., Length-Width Ratio = L_T/W_M.

The *Maximum Width position* is the percentage of the total length between the proximal end and the position of maximum width (100 L_M/L_T). Range is generally between 0 and about 90%.

Basal Width-Maximum Width–W_B/W_M. The Basal Width-Maximum Width Ratio is the ratio of the width at the widest portion of the base (W_B) to the maximum width (W_M). Range is from 0 to about 0.90.

These attributes are neither exhaustive nor universal. They simply describe some salient features. What is important is that these attributes have been defined in operational fashion. Most individuals, after a suitable training period, should be able to reproduce our observations.

Over the past decade or so, it has become clear that some variables are less influenced by extraneous (in this case, non-temporal) variability than others. The criteria proposed in this paper differ from those published earlier (Thomas 1970; Thomas and Bettinger 1976) primarily because attributes have been deliberately selected for their temporal sensitivity.

Let me reemphasize that I am currently concerned only with *temporal types* (Thomas 1979: Chapter 7). Simply stated, temporal

types are nothing more than morphological types that are found consistently to be associated with a particular span of time in a given area (Thomas 1979:222). Explanation of *why these artifact forms change* is beyond the present scope.

Consider the issue of projectile point size. We know that in general, Great Basin points tend to decrease in size through time. Although there are certainly valid technological and functional explanations for this size reduction, such explanatory factors are practically irrelevant when dealing with temporal types. It matters only that points get smaller.

But how does one measure size? Investigators have previously proposed a number of operational measures: total weight, total length, maximum width, thickness, and mass (e.g., Fenenga 1953; Corliss 1972; Thomas 1970, 1978). Which attribute is best?

I used a combination of length, width, thickness and weight in the Reese River Key I, reasoning that each more or less reflected point size. I am now convinced that there is a better approach.

A few years ago, I conducted an experiment on a large series of arrows and atlatl darts (Thomas 1978). Among other things, I was curious about size variability. A number of different size attributes varied between arrows and darts, and these same variables can probably also reflect systematic change through time.

The reason for this is relatively straightforward. Once a projectile point—whether spear point, arrowhead, or dart point—is manufactured, it is hafted and then used for the intended function. The point can suffer a number of fates during its use-life: simple breakage from impact, resharpening, edge attrition from use, burination, or conversion into an entirely different kind of tool, such as a drill or scraper. Each modification changes the morphology of the projectile point, and

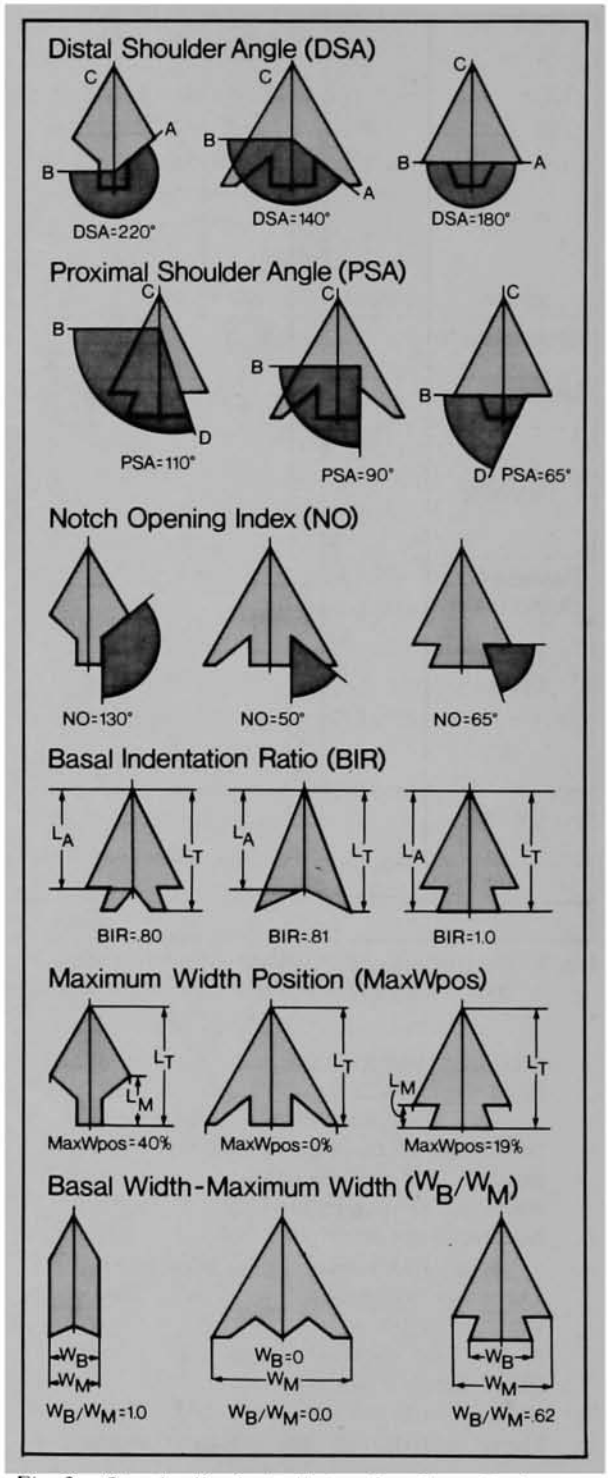

Fig. 3. Standardized attributes for Great Basin projectile points (after Thomas 1970: Figs. 2 and 3).

these changes serve only to confuse the temporal issue.

But note that such attrition occurs primarily on the distal end of the projectile point. Use-life modification, in other words, is systematic: length, width and particularly weight, are systematically *reduced* during projectile point use-life, and they are thus relatively unstable attributes. Although thickness is generally unaffected by such attrition processes, it is also the least sensitive of the size variables.

Basal attributes clearly provide the most stable variables for monitoring temporal change in projectile points. Particularly robust are *basal width* and *neck width*, and whenever possible, basal attributes are used to sort the various point types through time; in the analysis that follows, I deliberately avoid using gross size indicators such as weight and length (whenever possible) because of their unstable characteristics.

I should also briefly comment on the role of technology in establishing temporal types. There seems to be a feeling among some archaeologists that technological variables—particularly the variables of lithic technology—are somehow more conservative, more indicative of cultural continuities and discontinuities, more sensitive to "cognitive" and "ethnic" variability than are, say, stylistic variables.

This assumption has never been established and it is quite likely wrong. As I have argued elsewhere, archaeologists involved in construction of cultural chronologies can make certain necessary (if not always explicit) assumptions: the temporal type is a deliberately simplified creation of the analytical archaeologist (Thomas 1979:157-165). When defining a temporal type, the wise archaeologist employs the simplest, most repeatable criteria available. Technological variables may sometimes be the most suitable, often not. But technological factors cannot be assumed to be *a priori* superior to other attributes until technology is shown to be the best variable for predicting radiocarbon dates. Such evidence is not yet available.

What follows is a summary of the newly proposed Monitor Valley criteria. The evidence is briefly presented, and then a key is defined.[3] The final portion of this paper will examine the Monitor Valley criteria on the basis of evidence available from the rest of the Great Basin.

THE MONITOR VALLEY TYPOLOGY

Unshouldered Projectile Points

The class of unshouldered projectile points includes the relatively well-known Cottonwood Triangular and Cottonwood Leaf-shaped types, the Humboldt series, and a tentatively defined type called Triple-T Concave Base. Before proceeding, I must emphasize briefly the importance of the manufacturing-stage concept (Muto 1971; Thomas n.d.*a*.). Considerable typological confusion results when preliminary manufacturing stages are analyzed as finished products, and this tendency is exaggerated in unshouldered points. This discussion considers only finished projectile points, based on criteria in Thomas (n.d.*a*.).

Cottonwood Triangular (post-A.D. 1300). The type site for the Cottonwood Triangular type is Iny-2, an open village site located on the western margin of Owens Valley (Riddell 1951). Over 58 projectile points, mostly surface finds, were recovered from Iny-2, but Riddell's short report contains only field illustrations and little description. Lanning (1963:265-266) reanalyzed the Cottonwood Creek collection in conjunction with his own analysis of the Rose Spring materials, and it was Lanning who initially defined the Cottonwood Triangular and Cottonwood Leaf-shaped types (1963:252-253). Heizer and Clewlow (1968) added a third type, Cotton-

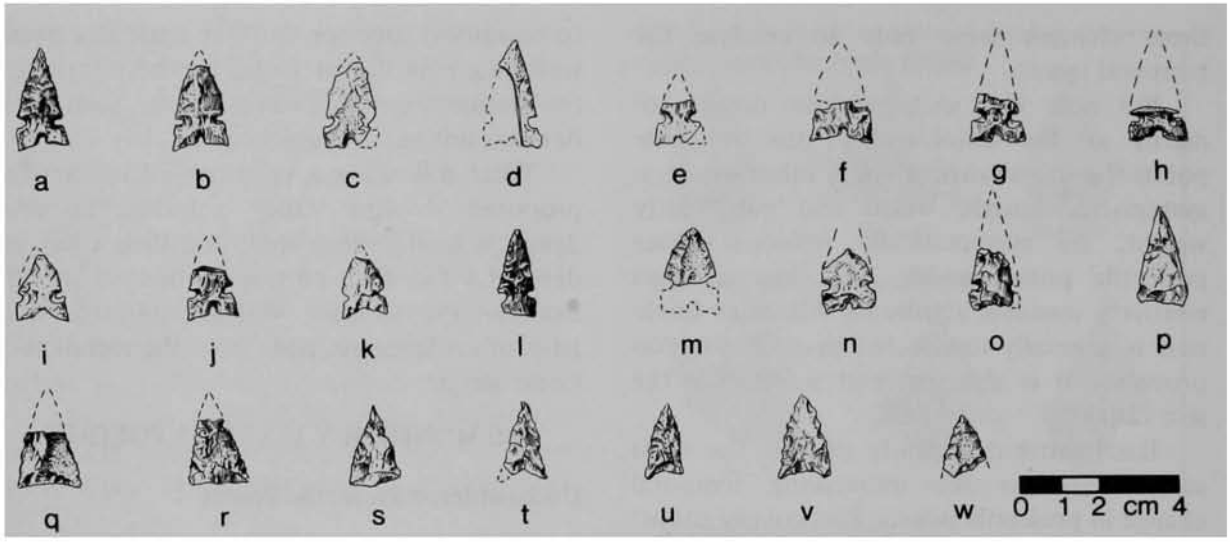

Fig. 4. Desert series projectile points from Gatecliff Shelter; a-o are Desert Side-notched points, p-w are Cottonwood Triangular points.

wood Bipointed, on the basis of surface materials from Ch15.

Thirty Cottonwood Triangular points were recovered in the Monitor Valley research (Fig. 4). *The Cottonwood Triangular type consists of small, unnotched, thin, triangular projectile points*, operationally defined as follows:

Small: Weight less than or equal to 1.5 g. Length less than 30 mm.
Thin: Thickness less than 4.0 mm.
Triangular: Basal width/maximum width ratio greater than 0.90.

Note that this definition differs from that in the Reese River Key I (Thomas 1970; Thomas and Bettinger 1976).

Lanning (1963:281) suggested that the Cottonwood Triangular type was diagnostic of the post-A.D. 1300 era in the Great Basin, and several investigators agree with this estimate (e.g., Clewlow 1967; Bettinger and Taylor 1974:20). Eighty percent (12 of 15) of the Cottonwood Triangular points excavated at Gatecliff Shelter occurred in Horizon I, which postdates A.D. 1300. The additional Cottonwood Triangular points recovered in the Monitor Valley survey also seem to occur in relatively late context. In sum, the Monitor Valley data clearly support Lanning's initial post-A.D. 1300 estimate for the age of this type. Cottonwood Bipoints were absent in Monitor Valley, and I rather doubt their validity as a type.

Cottonwood Leaf-shaped (post-A.D. 1300). A round-based morphological variant of the Cottonwood Triangular point is occasionally found in Monitor Valley. The triangular and leaf-shaped varieties can be easily distinguished on the basis of maximum width position (Thomas and Bettinger 1976:284-285). *The Cottonwood Leaf-shaped type consists of small, unnotched, thin, and basally rounded projectile points*, and these three criteria are operationally defined as follows:

Small: Weight less than or equal to 1.5 g. Length less than 30 mm.
Thin: Thickness less than 4.0 mm.
Basally rounded: Maximum width position greater than 15%.

Although Cottonwood Leaf-shaped points are rare in Monitor Valley, we think that this type dates the same as Cottonwood Triangular.

Humboldt Series (ca. 3000 B.C. – A.D. 700). Humboldt points were defined on the basis of surface artifacts recovered from Ch15, the Humboldt Lakebed site (Heizer and Clewlow 1968). Although surface sites are becoming increasingly important in contemporary archaeology, it remains an extremely risky business to define allegedly time-sensitive artifact types from surface specimens. The confusion associated with the Humboldt series can be traced directly to the original type definition, based as it was on surface artifacts from a multi-component site. There is also a high degree of functional variability in this type, and well-dated specimens are rare (Heizer and Hester 1978:155-157; Layton 1970:249; Thomas 1971:91; Bettinger 1976).

Humboldt points are also relatively scarce in the stratified deposits of Monitor Valley (Fig. 5), but it is still possible to define the Humboldt series with some degree of operational repeatability. *The Humboldt series is defined as unnotched, lanceolate, concave-base projectile points of variable size*:

> *Lanceolate:* Basal width/maximum width ratio less than or equal to 0.90.
> *Concave-base:* Basal indention ratio less than 0.98.
> *Variable size:* Weight tends to be greater than or equal to 1.5 g. Length tends to be greater than or equal to 40 mm. Thickness tends to be greater than or equal to 4.0 mm.

The Humboldt series is a "residual" category, with size limits expressed only as tendencies rather than as absolute boundaries. This definition operates strictly at the series level, leaving individual types such as Humboldt Concave Base A, Humboldt Concave Base B, and Humboldt Basal-notched undefined. Perhaps subsequent work will provide data necessary for discrimination at the level of temporal type, but such data are presently lacking.

The Humboldt series is a relatively poor time marker: These points were manufactured during much of the post-Mazama period, but we cannot be more specific than that. The limited evidence from Gatecliff Shelter indicates a time-span from 3000 B.C. to A.D. 700 (Horizons 4-12), and there is not a straightforward relationship between time and size (see Fig. 5). Several rather small Humboldt

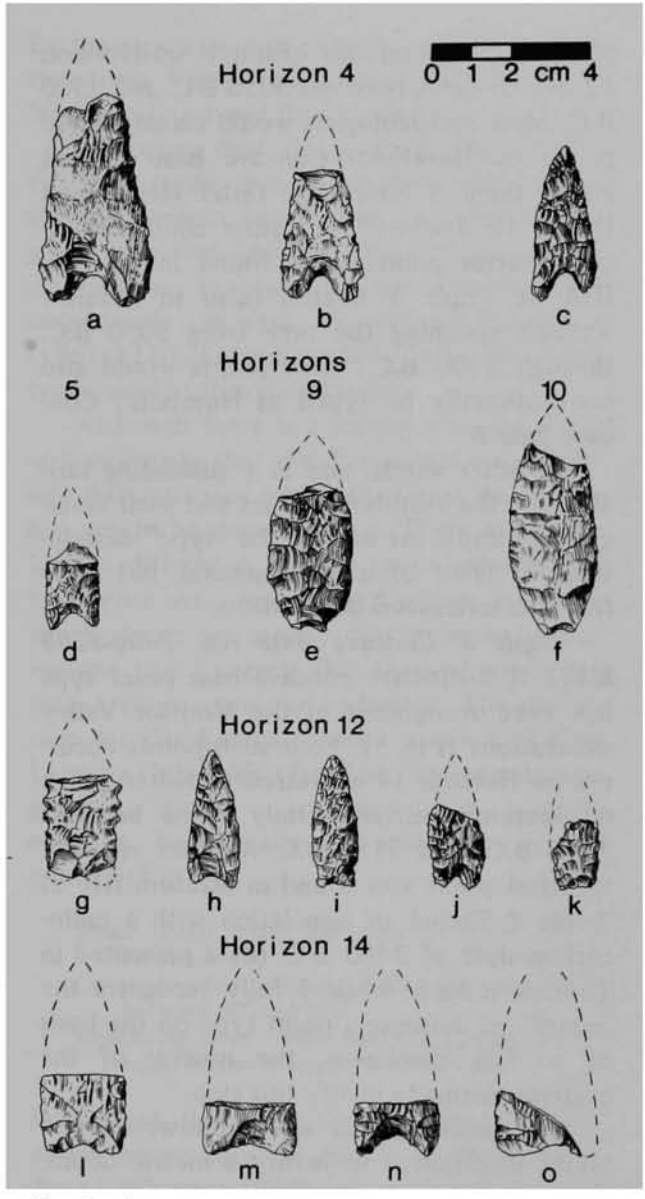

Fig. 5. Concave base points from Gatecliff Shelter; a-k are Humboldt series points, l-o are Triple T Concave Base points.

points were found, for example, on Horizon 12, which dates between 3050 B.C. and 2300 B.C. Most archaeologists would classify these points as Humboldt Concave Base B, and assign them a later date (after Heizer and Hester 1978:155-157). Rather similar Humboldt series points were found in Stratum IIIA at Triple T Shelter (also in Monitor Valley), spanning the time from 3050 B.C. through 2300 B.C.; these points would also conventionally be typed as Humboldt Concave Base B.

In other words, size is a misleading variable for the Humboldt series and such ambiguity prompts me to drop the "type" descriptions in favor of a more general, but more realistic, series-level designation.

Triple T Concave Base (ca. 3400-3200 B.C.). A distinctive concave base point type has been recognized in the Monitor Valley excavations (Fig. 5). Four such points occurred on Horizon 14 at Gatecliff Shelter, on an occupational surface firmly dated between 3300 B.C. and 3150 B.C. Another virtually identical point was found in Stratum IIIF at Triple T Shelter in association with a radiocarbon date of 3400 B.C. (data presented in Thomas n.d.*a.*). While I fully recognize the hazards of defining a point type on the basis of so few specimens, the quality of the evidence seems to justify this step.

The small sample size is, however, certainly insufficient to justify a metric definition, so let me simply state that *by Triple T Concave-base, I mean an unshouldered point with slightly to moderately concave base, characterized by distinctively rounded basal projections* (see Fig. 5). These points are distinguished from Humboldt series points by the rounded basal profile, and gently curving sides. A number of somewhat similar concave base points are known to occur in pre-Mazama context, and a more formal definition must await consideration of these Paleo-Indian specimens (as discussed by Pendleton 1979, n.d.).

At present, we can assign only a preliminary point estimate for the age of Triple T points, *ca.* 3400-3200 B.C. The actual span is probably much longer.

Side-notched Projectile Points

Side-notched projectile points are defined in two ways. For small points (weight less than 1.5 g.), the Proximal Shoulder Angle is greater than 130°. For the larger points (weight greater than or equal to 1.5 g.), the Proximal Shoulder Angle must be greater than 150°. Nearly 80 side-notched projectile points were recovered in the Monitor Valley research, and these are grouped into two types, the familiar Desert Side-notched category, and a residual class called Large Side-notched.

Desert Side-notched (post-A.D. 1300). This type was originally defined by Baumhoff (1957; Baumhoff and Byrne 1959). The present definition follows Lanning (1963:253): "*small triangular points with notches high on the sides* [italics mine]" (Fig. 4).

> *Small:* Weight less than or equal to 1.5 g.
> *Triangular:* Basal width/maximum width ratio greater than 0.90.

Note that these criteria differ somewhat from those of the Reese River Key I (Thomas 1970; Thomas and Bettinger 1976).

Heizer and Hester (1978:163-165) have recently evaluated the radiocarbon evidence relative to Desert Side-notched chronology, concluding that the type dates from A.D. 1100-1200 into the historic era. Citing somewhat different evidence, Bettinger and Taylor (1974) suggest a time span from A.D. 1300 to historic times. The Monitor Valley evidence supports this post A.D. 1300 estimate, although the slightly earlier Heizer-Hester date is also consistent with the Monitor Valley data.

Large Side-notched (pre-A.D. 1300). This

broad category includes all of the remaining side-notched points recovered in the Monitor Valley (Fig. 6).

Large: Weight greater than 1.5 g.
Side-notched: Proximal Shoulder Angle greater than 150°.

This class lumps a number of previously defined Great Basin projectile point types, including Northern Side-notched, Bitterroot Side-notched, Madeline Dunes Side-notched, Elko Side-notched, and Rose Spring Side-notched.

The Monitor Valley Research recovered only 15 such Large Side-notched points, and we have little to offer in terms of temporal information; but they are certainly older than Desert Side-notched points.

Corner-notched Projectile Points

Small points (weight less than 1.5 g.) are considered corner-notched if the Proximal Shoulder Angle is 130° or less. Large points are corner-notched if the Proximal Shoulder Angle is 150° or less. Points are considered to be side-notched if the Proximal Shoulder Angle measurements exceed these limits.

The Monitor Valley corner-notched points are further divided into the Rosegate, Elko, and Gatecliff Series.

Rosegate Series (A.D. 700 - A.D. 1300). The Rosegate series is a composite of the previously defined Rose Spring and Eastgate point types.[4] Rose Spring points were defined by Lanning (1963:252), on the basis of examples found at the type site, Iny-372. Eastgate points were recognized in the collection from Wagon Jack Shelter, near Eastgate, Nevada (Heizer and Baumhoff 1961).

I propose that the Rose Spring and the Eastgate types should be combined into a single Rosegate series. The types obviously grade into one another, and it is extremely difficult in practice to separate the two consistently; in fact, Heizer and Baumhoff (1961:127-128) anticipated that these two types would ultimately merge.

Although there is a feeling amongst some archaeologists that the two types are regionally differentiated within the Great Basin, this has yet to be demonstrated. There is also no known difference in time range between the two types. As a result, the Eastgate and Rose Spring types are merely morphological designations, and I suggest that they be combined into a single *temporal* indicator. The definition for the Rosegate series parallels that of Lanning (1963:252) for Rose Spring points in general: "*small . . . corner-notched . . . stem expands, but usually not markedly* [italics mine]" (Fig. 7).

Small: Basal width less than or equal to 10 mm.
Corner-notched: Proximal Shoulder Angle between 90° and 130°.
Expanding stem: Neck width less than or equal to [basal width plus 0.5 mm.].

Note that this definition differs from the earlier metric consideration in the Reese River Key I (Thomas 1970). As explained above, I now think that size is best indicated by

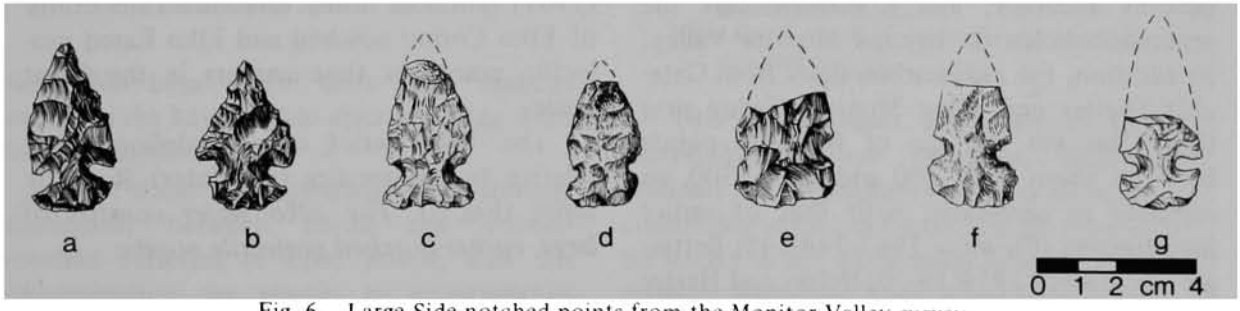

Fig. 6. Large Side-notched points from the Monitor Valley survey.

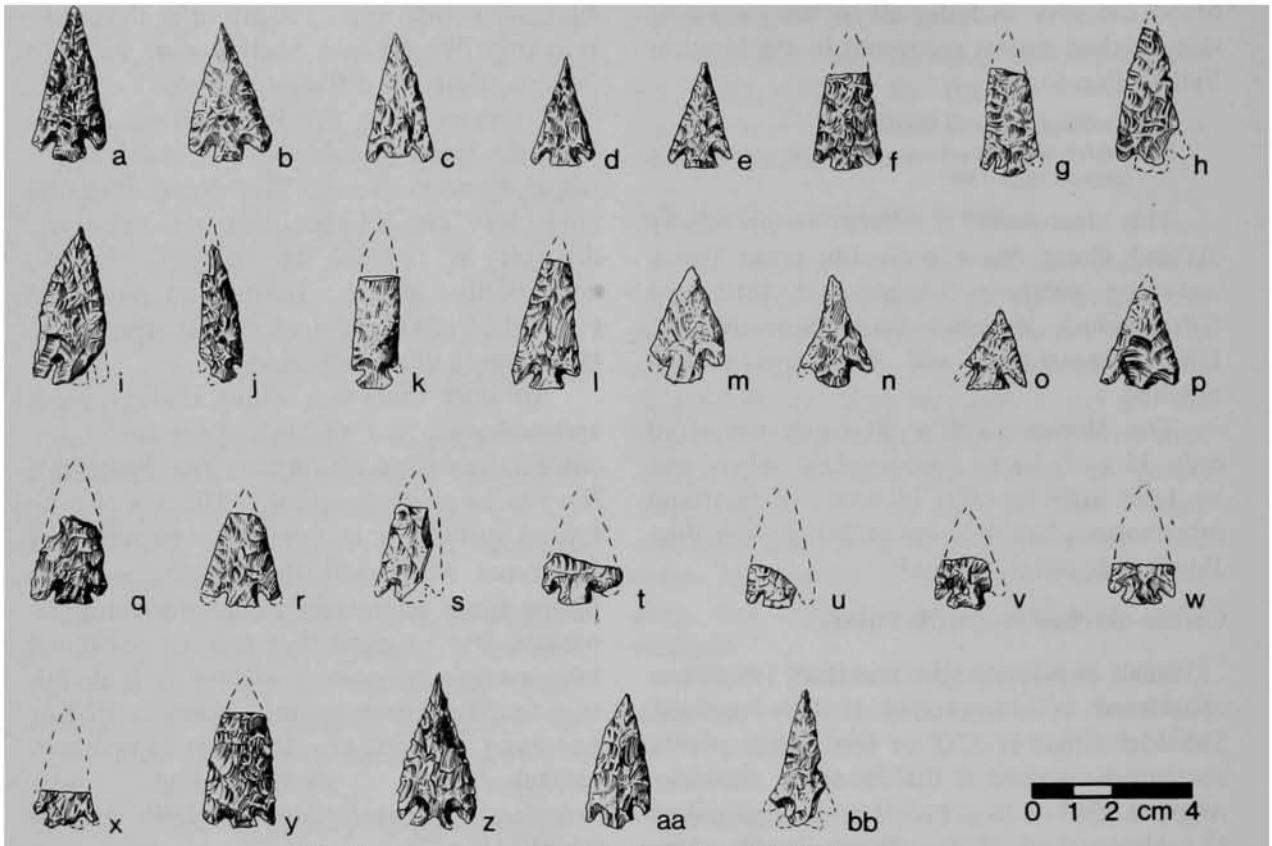

Fig. 7. Rosegate series points from Gatecliff Shelter.

absolute basal measurements rather than by weight.

This definition is based on the stratigraphic separation of corner-notched points at Gatecliff Shelter. As Fig. 2 forcefully illustrates, from a total of over 300 points, Rosegate could be separated from Elko series with fewer than 10 exceptions *based on basal measurements alone*. This is better than 95 percent accuracy, and I suspect that the separation holds far beyond Monitor Valley. In addition, the radiocarbon dates from Gatecliff Shelter and other Monitor Valley sites firmly bracket the age of Rosegate points between about A.D. 700 and A.D. 1300, an estimate in agreement with that of earlier investigators (Clewlow 1967:144-145; Bettinger and Taylor 1974:19-20; Heizer and Hester 1978:160-163).

Elko Series (1300 B.C.-A.D. 700). The Elko series was initially divided into three types: Corner-notched, Eared, and Contracting Stem (Heizer and Baumhoff 1961:128). A fourth type, Elko Side-notched, was added on the basis of the South Fork Shelter assemblage (Heizer, Baumhoff, and Clewlow 1968). Lanning (1963:251) discussed the Elko series in some detail, and O'Connell's important (1967) synthesis firmly established the utility of Elko Corner-notched and Elko Eared projectile points as time-markers in the Great Basin.

The Elko series can be defined only relative to the smaller (and later) Rosegate series (Fig. 8). *The Elko series consists of large, corner-notched projectile points:*

Large: Basal width greater than 10 mm.

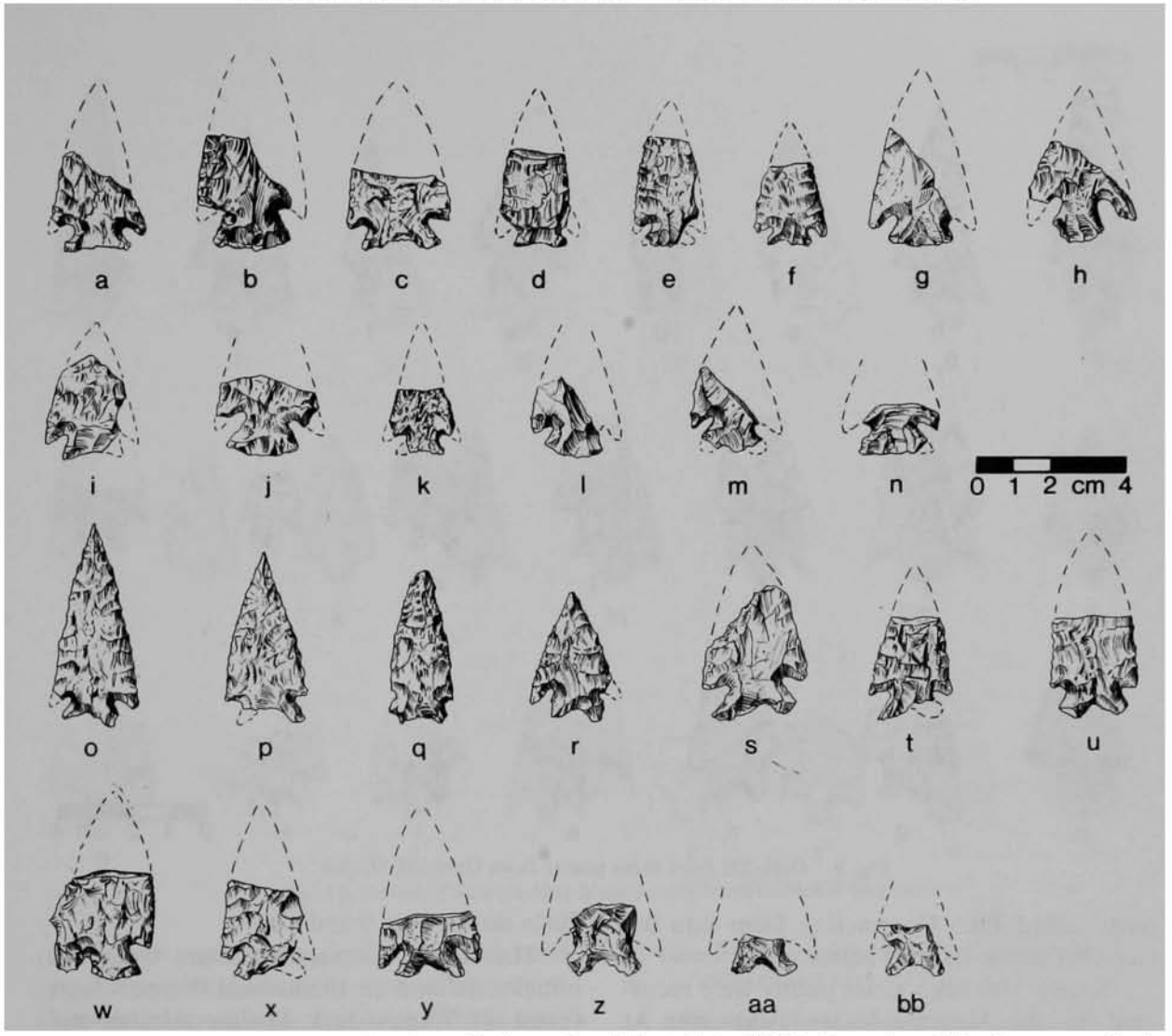

Fig. 8. Selected Elko series points from Horizons 6 and 7 at Gatecliff Shelter; a-i are Elko Corner-notched points, o-bb are Elko Eared points.

Corner-notched: Proximal Shoulder Angle between 110° and 150°.

Note that basal width once again replaces weight as the key variable discriminating Elko from Rosegate series.

Great Basin archaeologists conventionally distinguish between Eared and Corner-notched varieties of Elko points, and this discrimination can readily be accomplished with operational variables:

Elko Corner-notched: Basal indention ratio greater than 0.93.
Elko Eared: Basal indention ratio less than or equal to 0.93.

This conventional distinction is strictly *morphological, not temporal,* reluctantly retained to emphasize that two point types commonly associated with the Elko series are no longer in the Elko series as defined here. I propose dropping Elko Side-notched, and I further propose grouping the points previ-

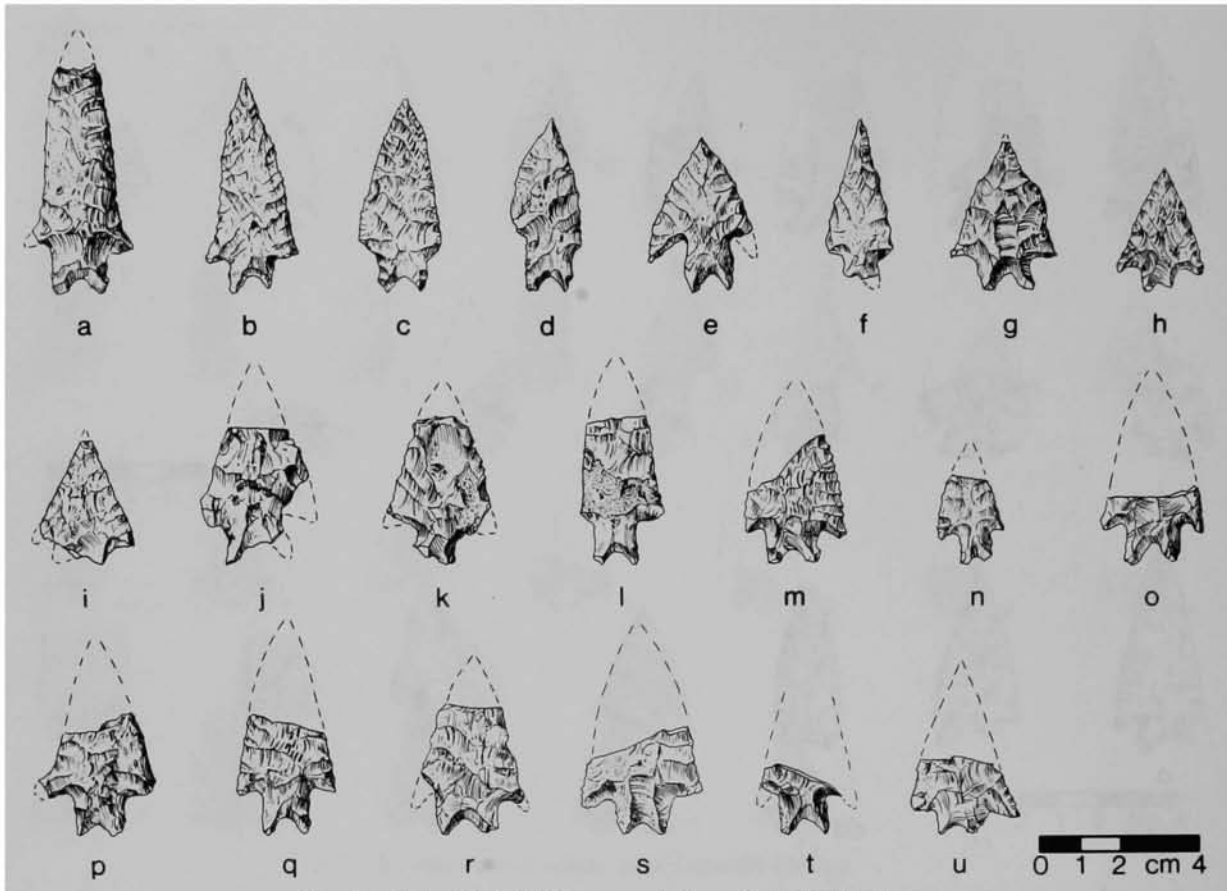

Fig. 9. Gatecliff Split Stem points from Gatecliff Shelter.

ously called Elko Contracting Stem into the Gatecliff series, defined below.

Nearly 500 Elko series points were recovered in the Monitor Valley fieldwork. At Gatecliff Shelter, 274 Elko projectile points were excavated; all but six of these occurred between Horizons 4 and 8 (Fig. 2). Numerous radiocarbon dates are available to bracket this time range between about 1350 B.C. and about A.D. 700. These dates receive further support from other Monitor Valley sites, particularly Triple T Shelter, and Toquima Cave.

Gatecliff Series (3000 B.C. - 1300 B.C.). The Gatecliff series, defined here for the first time, contains two traditional artifact categories previously considered to be independent: Elko Contracting Stem points and the Pinto series (Figs. 9 and 10).

The Elko Contracting Stem type was initially defined on the basis of three artifacts found at Wagon Jack Shelter (Heizer and Baumhoff 1961:128). Similar points are often called "Gypsum Cave" (Harrington 1933; Fowler, Madsen, and Hattori 1973:20-21; Heizer and Berger 1970).

The Gatecliff series also includes split stem points commonly referred to as the Pinto series (Clewlow 1967; Thomas 1971:89; Heizer and Hester 1978:157-158), the Little Lake series (Bettinger and Taylor 1974:13), the Silent Snake series (Layton 1970) and Bare Creek Eared (O'Connell 1971). The "Pinto" problem, discussed above, has long been recognized by Great Basin archaeologists (e.g., Warren 1980, n.d.). Previously, I sugges-

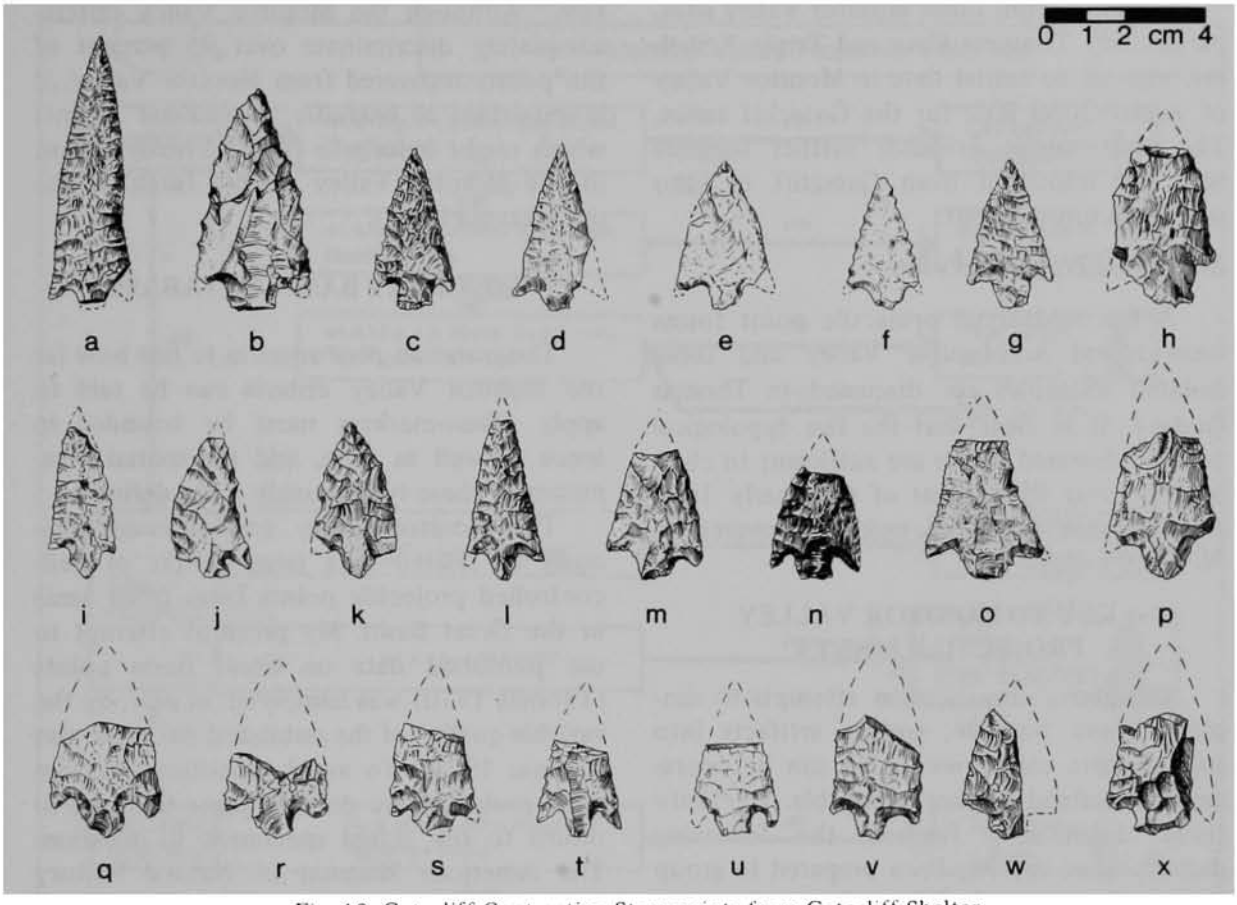

Fig. 10. Gatecliff Contracting Stem points from Gatecliff Shelter.

ted "with some reluctance" that the term "Pinto" be retained until new data became available to resolve the typological difficulties (Thomas 1971:89-90). I now think that sufficient data are at hand to clarify the situation.

The Gatecliff series is comprised of medium to large contracting stem projectile points:

Size: Weight greater than 1 g.
Contracting stem: Proximal Shoulder Angle less than or equal to 100° or notch opening index greater than 60°.

It is possible to subdivide the Gatecliff series further into morphological types.

Gatecliff Split Stem: Basal indention ratio less than or equal to 0.97.

Gatecliff Contracting Stem: Basal indention ratio greater than 0.97.

Although these morphological types add nothing to our knowledge of Great Basin time-markers, I reluctantly retain them to emphasize the restructuring of the Elko series and to point out that the Gatecliff series is a mixture of contracting and split stem forms. Gatecliff Split Stem points generally correspond to the previous "Pinto" series, and Gatecliff Contracting Stem points roughly correspond to "Elko Contracting Stem" or "Gypsum Cave" points.

Gatecliff Shelter contained 48 Gatecliff series points. A number of radiocarbon dates at Gatecliff Shelter suggest that the Gatecliff series terminates at about 1300 B.C.

Evidence from other Monitor Valley sites, particularly Toquima Cave and Triple T Shelter, suggest an initial date in Monitor Valley of about 3000 B.C. for the Gatecliff series. The stratigraphic evidence further suggests that the transition from Gatecliff to Elko series was quite abrupt.

Additional Projectile Points

A few additional projectile point forms were found in Monitor Valley and these isolated examples are discussed in Thomas (n.d.*a*.). It is clear that the five typological series elaborated above are sufficient to characterize over 95 percent of the nearly 1000 post-Mazama projectile points recovered in Monitor Valley.

A KEY TO MONITOR VALLEY PROJECTILE POINTS

The above classification attempts to simplify where possible, sorting artifacts into time-specific categories which can be operationally defined and are repeatable. To clarify these distinctions further, the following dichotomous key has been prepared to group the various typological criteria into an ordered sequence (Fig. 11).[5]

The Monitor Valley Key differs from and supercedes the earlier Reese River Key (Thomas 1970; Thomas and Bettinger 1976). Reese River Key I was based on published descriptions of 675 projectile points from various sites throughout the central and western Great Basin; the Monitor Valley Key uses strictly first-hand measurements. The criteria and cut-off points for the Monitor Valley Key are more consistent and should be more accurate.

In addition, Key I was a closed system: once the key was applied to a given projectile point, that point (by definition) would be typed into one of the 21 categories, no matter what. In the Monitor Valley Key, by contrast, anomalous specimens are judged to be "out of key." Although the Monitor Valley criteria adequately discriminate over 95 percent of the points recovered from Monitor Valley, it is important to exclude "anomalous" points which might belong to types virtually absent in the Monitor Valley sample (such as the pre-Mazama types).

THE GREAT BASIN DATABASE

The question now arises as to just how far the Monitor Valley criteria can be said to apply. Time-markers must be bounded in space as well as time, and the spatial parameters of these types remain to be defined.

The Monitor Valley criteria must obviously be related to a large sample of well-controlled projectile points from other areas in the Great Basin. My previous attempt to use published data on Great Basin points (Thomas 1970) was hampered, in part, by the variable quality of the published data (see also Thomas 1975). To avoid repetition of these same problems, we decided some time ago to return to the actual specimens in question. The American Museum of Natural History began in 1973 to build a systematic file of metric data from key Great Basin sites. Since that time, over three dozen museum collections have been analyzed first-hand, gathering data from well over 200 Great Basin sites.[6] Standard attributes were noted on a variety of material culture items; for present purposes, we focus strictly on the projectile point data.

Roughly 7000 individual points were measured using the standard attributes presented above. Each specimen was sketched and/or xeroxed, and the available unpublished provenience and typological information also recorded. The better controlled sites (containing roughly 5900 of these points) were selected for comparison with the Monitor Valley typology. Figure 12 shows the distribution of these sites, and Table 1 provides information as to the sample sizes.

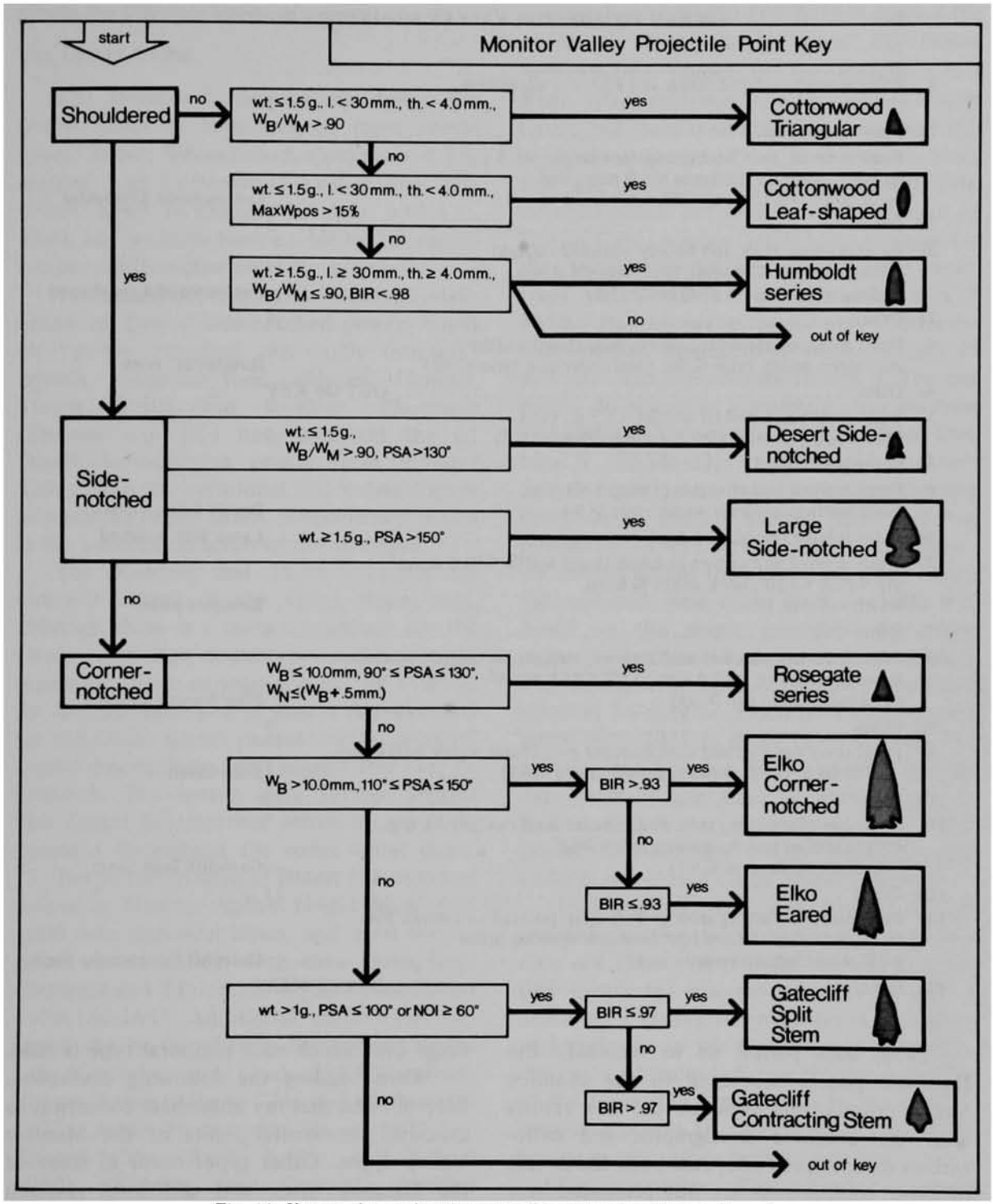

Fig. 11. Key to the projectile points from Monitor Valley, Nevada.

A KEY TO MONITOR VALLEY PROJECTILE POINTS

1. Point is unshouldered (DSA and PSA not applicable to both sides) 2
1*a*. Point is shouldered 5
2. Point is small, thin, and triangular (weight ≤1.5 g., length <30 mm., thickness <4.0 mm., and basal width/maximum width ratio >.90 ..... **Cottonwood Triangular**
2*a*. Other 3
3. Point is small, thin, and basally rounded (weight ≤1.5 g., length <30 mm., thickness <4.0 mm., and maximum width position >15%) ..... **Cottonwood Leaf-shaped**
3*a*. Other 4
4. Point is lanceolate with concave base (basal width/maximum width ratio ≤.90, basal indention ratio <.98) ..... **Humboldt series**
4*a*. Other ..... OUT OF KEY
5. Point is side-notched (if weight <1.5 g., then PSA >130°; if weight ≥1.5 g., then PSA >150°) 6
5*a*. Point is stemmed 7
6. Point is small and triangular (weight ≤1.5 g., basal width/maximum width ratio >.90 ..... **Desert Side-notched**
6*a*. Point is large (weight ≥1.5 g.) ..... **Large Side-notched**
7. Point is small and corner-notched (basal width ≤10.0 mm., 90° ≤PSA ≤130°; neck width ≤ basal width +.5 mm.) ..... **Rosegate series**
7*a*. Other 8
8. Point is corner-notched with convex, straight, or slightly concave base (basal width >10.0 mm., 110° ≤PSA ≤150°, basal indention ratio >.93) ..... **Elko Corner-notched**
8*a*. Other 9
9. Point is corner-notched with concave base (basal width >10.0 mm., 110° ≤ PSA ≤150°, basal indention ratio ≤.93) ..... **Elko Eared**
9*a*. Other 10
10. Point has contracting stem and concave base (weight >1.0 g., PSA ≤100° or notch opening index ≥60°, basal indention ratio ≤.97) ..... **Gatecliff Split Stem**
10*a*. Other 11
11. Point has contracting stem and straight, pointed or convex base (weight >1.0 g., PSA ≤100° or notch opening index ≥60°, basal indention ratio >.97) ..... **Gatecliff Contracting Stem**
11*a*. Other ..... OUT OF KEY

These data permit us to reclassify the Database points according to the Monitor Valley criteria, and compare the new results with the available stratigraphic and radiocarbon data at each site. Although the details of these comparisons are not presented here (see Thomas n.d.*a*.), it is necessary to proceed type by type to determine the geographical range over which each temporal type is valid.

When reading the following discussion, keep in mind that my immediate concern is to examine the spatial limits of the Monitor Valley types. Other types occur in some of the Database sites, and additional research will be necessary to define these additional types with clarity; their presence does not

vitiate the Monitor Valley typology.

The Desert Series

The Monitor Valley criteria define the Desert series as consisting of three coeval types: Desert Side-notched, Cottonwood Triangular, and Cottonwood Leaf-shaped. The Desert series is thought to date post-A.D. 1300, and we have been unable to distinguish temporal differentiation at the type level.

The Baumhoff and Byrne (1959:37) definition of Desert Side-notched points, based on "partly statistical and partly intuitive" criteria, proposed four subtypes: General, Sierra, Delta, and Redding. Elsewhere (Thomas n.d.*a.*), I have analyzed the 62 Desert Side-notched points from Monitor Valley, plus the additional 330 archaeological and ethnographic Desert Side-notched points in the Database in terms of the subtypes.

The Redding and Delta subtypes are virtually absent in the Great Basin, and, although there is a certain tendency for the General and Sierran subtypes to be grouped regionally, these correlations are not striking. So far, the subtypes of Desert Side-notched (in the Great Basin) remain merely morphological descriptions, and I suggest that they be dropped. The metric data further suggest that Desert Side-notched attributes are fairly constant throughout the entire Great Basin.

The temporal span of Desert Side-notched points in Monitor Valley ranges from A.D. 1300 into historical times, and most investigators would concur with these dates (e.g., Bettinger and Taylor 1974; Heizer and Hester 1978:163-164). Additional radiocarbon evidence can be found from the Sherwin Grade site (Garfinkel and Cook 1979:75), Dirty Shame Shelter (Aikens, Cole, and Stuckenrath 1977: Table 1; see also Hanes 1977:14), Painted Cave (Bard, Busby, and Kobori 1980), O'Malley and Conaway Shelters (Fowler, Madsen, and Hattori 1973: Tables 1 and 19).

Heizer and Hester (1978:165) suggest the possibility of an "early origin" for Desert Side-notched points in the eastern Great Basin, citing evidence from Danger and Hogup Caves, but there is no evidence to support this suggestion. Danger Cave is irrelevant, since this site produced only three Desert Side-notched points out of 450 typable points. At Hogup Cave, Aikens (1970:56) has suggested that Desert Side-notched points span a period from "*ca.* 1000 B.C. to perhaps as late as A.D. 1850." But Aikens recovered only five Desert Side-notched points, three from Stratum 14 and one each from Strata 16 and 9. The late points do not pose a problem, and we have personally examined the specimen from Stratum 9 (FS346-23); it is indeed a Desert Side-notched point, but considering the relatively large overall sample size, and the possibility of mixing of isolated specimens, we cannot accept the extension of the Desert Side-notched time range back to 1000 B.C. *based on this single specimen*. The other points in Stratum 14 are no earlier than A.D. 740, and more recent assessments suggest that Stratum 14 may be much later (Madsen and Berry 1975:397). In short, there is no conflict between the Monitor Valley criteria and the data from Hogup Cave; a reassessment by Holmer and Weder similarly concludes that Desert Side-notched points post-date A.D. 1150 in the eastern Great Basin (1980:67).

Unfortunately, little comparative data are available for the two Cottonwood types. Not only are these points relatively rare in stratified contexts, but investigators persist in including a variety of production-stage blanks and preforms in the Cottonwood categories, thereby artificially inflating the temporal span of the types. The limited data in the Database suggest a post-A.D. 1300 age for both types, but more research is definitely needed.

To summarize: The available evidence indicates that the Desert series, as defined by the Monitor Valley criteria, is an acceptable

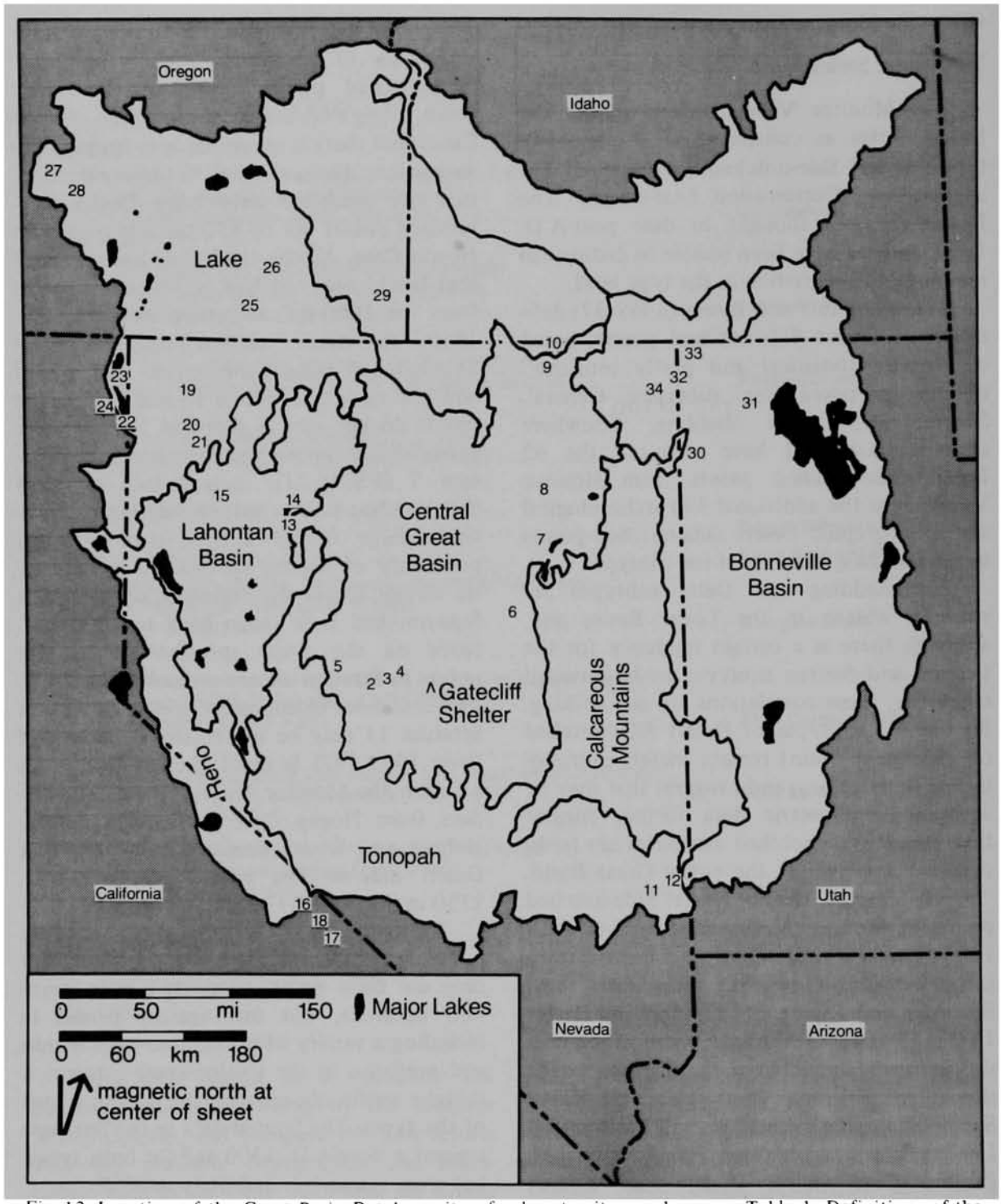

Fig. 12. Location of the Great Basin Database sites; for key to site numbers, see Table 1. Definitions of the hydrographic Great Basin and various floristic subdivisions follow Cronquist *et al.* (1972).

Table 1
PROJECTILE POINTS INCLUDED IN THE GREAT BASIN DATABASE SAMPLE
(see Fig. 12 for Site Locations)

Site or Area	No.	Location of Collection[a]	Sample Size	Reference
Central Great Basin Section				
1. Monitor Valley		AMNH	925	Thomas n.d.*a*
2. Reese River I survey		AMNH	641	Thomas 1971, 1973
3. Reese River II survey		AMNH	211	Thomas and Bettinger 1976
4. Mateo's Ridge	26Ny307	AMNH	230	Hatoff and Thomas 1976
5. Wagon Jack Shelter	26Ch145(Ch-119)	RHLMA	77	Heizer and Baumhoff 1961
6. Newark Cave	26WP107	DRI	36	Fowler 1968
7. Ruby Cave	26Ek18(805)	UCD	76	unpublished
8. South Fork Shelter	26Ek13(El-11)	RHLMA	78	Heizer, Baumhoff, and Clewlow 1968
9. Deer Creek Cave	26Ek25	NSM	180	Shutler and Shutler 1963
10. Freightor's Defeat	26Ek20	UCD	152	unpublished
Tonopah Section				
11. Conaway Shelter	26Ln126	DRI	51	Fowler, Madsen, and Hattori 1973
12. O'Malley Shelter	26Ln418	DRI	373	Fowler, Madsen, and Hattori 1973
Lahontan Basin Section				
13. Humboldt Lakebed	---	RHLMA	145	Heizer and Clewlow 1968
14. Hesterlee site	---	RHLMA	25	Cowan and Clewlow 1968
15. Black Rock Desert survey	---	RHLMA	100	Clewlow 1968
Reno Section				
16. Owens Valley survey	---	NYU	142	Bettinger 1975
17. Rose Spring site	4-Iny-372	RHLMA	110	Lanning 1963
18. Stahl site	4-Iny-182	SWM	187	Harrington 1957
Lakes Section				
19. Hanging Rock Shelter	26Wa1502	NSM	108	Layton 1970
20. Smokey Creek Cave	26Hu46	UCD	120	Layton 1966
21. Silent Snake Springs	26Hu201	NSM	73	Layton and Thomas 1979
22. Rodriguez site	4-Las-194	RHLMA	119	O'Connell and Ambro 1968; O'Connell 1971, 1975
23. Menlo Baths	4-Mod-197	RHLMA	82	O'Connell 1971, 1975
24. Bare Creek Cave	---	UCD	19	Brown 1964
25. Catlow Cave No. 1	---	UOMNH	205	Cressman, Williams, and Krieger 1940
26. Roaring Springs Cave	---	UOMNH	348	Cressman, Williams, and Krieger 1940; Cressman 1942
27. Fort Rock Cave	35 LK 1	UOMNH	48	Cressman, Williams, and Krieger 1940; Bedwell 1973
28. Connley Caves	35 LK 50	UOMNH	43	Bedwell 1973
29. Dirty Shame Rockshelter	35 ML 65	UOMNH	67	Aikens, Cole, and Stuckenrath 1977; Hanes 1977
Bonneville Basin Section				
30. Danger Cave	42To13	UU	335	Jennings 1957; Aikens 1970
31. Hogup Cave	---	UU	240	Aikens 1970
32. Swallow Shelter	42Bo268	UU	239	Dalley 1976
33. Beatty Springs	---	UU	81	Dalley 1976
34. No Name Valley	26El910	UU	45	Berry 1976
		Total	5911	

[a]The following abbreviations are used on this table:

AMNH	American Museum of Natural History, New York City
RHLMA	Lowie Museum of Anthropology, Berkeley, California
DRI	Desert Research Institute, Reno, Nevada
UCD	Department of Anthropology, University of California, Davis
NSM	Nevada State Museum, Carson City, Nevada
NYU	New York University, New York City
SWM	Southwest Museum, Los Angeles, California
UOMNH	Museum of Natural History, University of Oregon, Eugene
UU	Department of Anthropology, University of Utah, Salt Lake City

time-marker in the western and central Great Basin, and probably in the eastern Great Basin as well.

Large Side-notched

The Monitor Valley Key groups the residual side-notched points (those weighing more than 1.5 g.) into a single category, lumping previous types such as Northern Side-notched, Elko Side-notched, and Rose Spring Side-notched.

Large side-notched points are unfortunately quite rare in Monitor Valley; in fact, very few occur in the central Great Basin at all. We have little new data on large side-notched points and can point out only that many of the so-called typological distinctions so far recognized are weak and confusing. Both Elko and Rose Spring Side-notched categories should be dropped as there is no stratigraphic or morphological evidence to support their existence. Most of the Rose Spring Side-notched points defined by Lanning (1963:252, Plate 7*a*) are indistinguishable from the conventional Rose Spring Corner-notched points recovered at that site.[7] Similarly, Elko Side-notched points were defined on the basis of surface materials at the Humboldt Lakebed site (Heizer and Clewlow 1968); in both cases, these so-called side-notched points are morphologically indistinct from the corner-notched varieties.

Similar problems arise with the side-notched points in the eastern Great Basin. When Aikens classified the Hogup Cave projectile points, he used the standard "main type" definitions, but in a manner rather different from the original published description. The points in question have since been measured and described in the Database, and can be compared to the Monitor Valley criteria (Thomas n.d.*a*.).

Aikens recognized four kinds of side-notched points in the Hogup Cave and Danger Cave collections: Bitterroot, Elko, Rose Spring, and Desert. The major distinction between Bitterroot and Elko Side-notched points is apparently that on Elko Side-notched points "bases are uniformly straight," while on the Bitterroot Side-notched points "bottoms of bases [are] markedly convex" (Aikens 1970:36). Aikens refers to comparable specimens of Elko side-notched points at South Fork Shelter, noting that Bitterroot Side-notched points are illustrated from the Birch Creek Valley of eastern Idaho.

There is a problem here. The authors of the South Fork monograph (Heizer, Baumhoff, and Clewlow 1968:6) state explicitly that their Elko Side-notched points have *round* (not "uniformly straight") bases, and only one of the illustrated specimens from South Fork has a straight base. Moreover, half of the Bitterroot Side-notched points illustrated in the Birch Creek report have straight bases (Swanson, Butler, and Bonnichsen 1964).

In other words, the key attributes of the "type" descriptions were confused in the Hogup Cave report, and similar typological confusion occurs in a number of Great Basin sites reported with regard to the larger side-notched points. The recent analysis by Holmer and Weder (1980) shows the variability in post-Archaic side-notched points for the eastern Great Basin, but the earlier types remain to be unravelled.

To summarize: It seems likely that the various larger side-notched points can eventually be established as valid time-markers, but more work is required.

Rosegate Series

Over 150 Rosegate points were recovered in the Monitor Valley, and measurements for an additional 700 Rosegate points are available in the Database. The Monitor Valley evidence indicates that the Rosegate series spans the period from about A.D. 700

through A.D. 1300, and this estimate is consistent with other estimates (Clewlow 1967; Bettinger and Taylor 1974; Heizer and Hester 1978). Nevertheless, there remain a few chronological problems.

Heizer and Hester (1978:162) accept a "*floruit* between A.D. 600-700 and A.D. 1000" for Rose Spring and Eastgate points, but they recognize an introduction of such points much earlier. Heizer and Hester (1978:162) apparently accept Aikens' suggestion that Rose Spring and Eastgate points may date as early at 2500 B.C. in the eastern Great Basin.

My own reanalysis of Hogup Cave material is presented elsewhere (Thomas n.d.*a*.). Briefly summarized, Aikens (1970:34) identified 62 Rose Spring and Eastgate points from Strata 7 through 16 at Hogup Cave. According to Monitor Valley criteria, only 39 of these are Rosegate points. Although isolated Rosegate points are indeed found in the deeper strata of Hogup Cave, over 85 percent of the Rosegate points occurred in Strata 9 through 14. According to the Madsen and Berry (1975) chronology, Strata 9 through 14 at Hogup Cave date between A.D. 650 and A.D. 1350, estimates which are almost identical to those obtained from Gatecliff Shelter. The revised Hogup Cave data simply do not support an early introduction of Rosegate series points in the eastern Great Basin.

I also take exception to the Heizer-Hester statement that, as a type, Rose Spring points persisted into historic times. They cite a date from Conaway Shelter in support of this statement. The date in question, A.D. 1720 ± 100 (RL-36) comes from Stratum 1 at Conaway, presumably associated with "Shoshonean ceramics, Rose Springs points" (Fowler, Madsen, and Hattori 1973: Table 19). But only a single "Eastgate series, Expanding Stem point" was found in Stratum 1 (Fowler, Madsen, and Hattori, 1973: Table 21). This single Stratum 1 point was unfortunately unavailable for study when we examined the Conaway materials; nevertheless, date RL-36 is irrelevant to Rose Spring/Eastgate chronology.

Heizer and Hester have also marshalled evidence to support the notion that Rose Spring and Eastgate are distinct yet contemporary types (1978:162), citing data from Wal97, located on the south shore of Lake Winnemucca (Hester 1974). Heizer and Hester suggest that with a single exception, the finished points are Eastgate Expanding Stem types; they further conjecture that "these data support the hypothesis that the Eastgate type is a discrete entity, and that the series represents a typological development concentrated in western and central Nevada" (Heizer and Hester 1978:162).

While agreeing that this cache is indeed interesting, I draw precisely the opposite conclusion from the data. First of all, why are these points Eastgate rather than Rose Spring? Heizer and Hester (1978:162) tell us that the typology is "based on comparisons with illustrated specimens from both series" citing evidence from Wagon Jack Shelter, Ch15, and the Rose Spring site. All three sites are included in the Database, and one simply cannot justify the Heizer-Hester typological assignment. The mean weight for points from Wal97 is 2.98 g. (Hester 1974: Table 2).[8] The Wal97 points are significantly larger than those from the other three sites, and, based on the published descriptions, I would guess that they are probably Elko Corner-notched.

Not only does this indicate the subjectivity with which projectile points have been typed in the Great Basin, but it also points up a problem of the typological concept in general. Heizer and Hester entertain "the hypothesis that the Eastgate type is a discrete entity" (1978:162). What does this mean? What is *Eastgate* supposed to be? If it is a temporal type, then does it differ significantly in time or space from Rose Spring? Is

Eastgate a morphological type, or a functional type? Or maybe a technological type? The Eastgate point type may include all of these, but treating types as "discrete entities" with undefined objectives is misleading. There are no absolute types; there are only types which serve the purposes we designate for them.

To summarize: The Rosegate series, as defined by the Monitor Valley criteria, can probably serve as an adequate time-marker throughout most of the Great Basin.

Elko Series

Over 450 Elko series points were discovered in the Monitor Valley research, and these points can be compared metrically to the nearly 1500 Elko points in the Database sample. The Elko series in Monitor Valley ranges in age from 1300 B.C. through A.D. 700, and this estimate generally agrees with the conclusions of O'Connell (1967), Bettinger and Taylor (1974:14, 18-19), and Heizer and Hester (1978). Literally dozens of radiocarbon dates are now available from the central and western Great Basin to support this chronology *in this area.*

As noted earlier, a major issue in Great Basin projectile point typology has been whether or not the temporal ranges differ significantly between the east and west. Previously, I had expressed skepticism about this difference (Thomas 1975), but after examining the metric data in the Database, I am now convinced that the morphological Elko Corner-notched and Elko Eared types are indeed much earlier in the eastern Basin.

C. Melvin Aikens (1970, 1972) was absolutely correct about this. Once typological variability is factored out of the Hogup Cave and Danger Cave data, it became clear that the Elko series is quite ancient at both sites. The Elko series at Danger Cave (as defined by Monitor Valley criteria) appears in abundance in level DII, which dates as old as 8000 B.C. Elko points are also common in level DV, which probably post-dates A.D. 20. Elko Corner-notched and Elko Eared points become relatively common in Stratum 3 at Hogup Cave. On the basis of these data, I am willing to accept an introduction of the Elko series in the eastern Great Basin by at least 5000 B.C.

Additional supporting data are also available from stratified sites on the Colorado Plateau, particularly Cowboy Cave and Sudden Shelter. At both sites, Elko series points seem to have been introduced at least as early as 5500 B.C. (Jennings 1975; Schroedl 1976; Holmer 1978, 1980).

I am less enthusiastic about extending the Elko series much later than about A.D. 500-700, even in the eastern Basin. Heizer and Hester (1978:159, Table 6.3) suggest that the Elko series persists as late as A.D. 1080 at O'Malley Shelter. Stratum V at O'Malley contains a large and mixed assemblage including Fremont and brownware ceramics and a number of Rosegate and Desert series points. A terminal date for Elko of A.D. 500 or so at O'Malley Shelter is consistent with the stratigraphic data and squares much better with the remaining data from the central and western Great Basin. Unfortunately, the data from Danger Cave, Hogup Cave, Swallow Shelter, Cowboy Cave, and Sudden Shelter are ambiguous about the terminal date for Elko series in the eastern Great Basin.

I do not suggest that isolated Elko series points were not used after A.D. 500; in fact, I have previously discussed how an Elko Eared point was curated for use by an ethnographic Diegueño shaman (Thomas 1976). One of the arrows collected by J. W. Powell from the Kaibab Southern Paiute in 1873 was also tipped with an Elko series point (see Fowler and Matley 1979), and there is also an Elko series point hafted for use as a knife in the ethnographic Powell collection. But isolated artifacts are not our concern. Let us not forget that over 90 percent of the points in

the Powell collection were indeed of the Desert series, just as one would expect (see Thomas n.d.*a*.).

To summarize: The Monitor Valley criteria for the Elko series can be applied only to sites in the central and western Great Basin; morphologically identical forms are much earlier in the eastern Great Basin.

Gatecliff Series

The Gatecliff series is proposed for the first time in this paper, and the temporal range requires closer examination. The Gatecliff series seems to date from about 3000 B.C. to 1300 B.C. in Monitor Valley, and in this section we will evaluate the relevant evidence from other Great Basin sites.

Consider first the Gatecliff Split Stem point, previously called a kind of Pinto point. Thirty years ago, Robert Lister was struck by the similarities among stemmed, indented base points at a number of sites: "Has the time arrived when we can set up another horizon marker in the archaeology of western United States?" (Lister 1953:265). Lister presented data from 17 sites, suggesting that these artifacts did indeed occur at approximately the same time period throughout a wide area. The major exception to his chronology occurred in the Great Basin with Pinto points from Pinto Basin (Amsden 1935) and the Stahl site (Hamilton 1951; Harrington 1957). Pinto points seemed to be considerably older than stemmed, indented base points at other sites (Lister 1953: Fig. 90, see also Wormington 1957:168-169).

Since that time, a number of investigators have examined the "Pinto problem" in the Great Basin (Clewlow 1967; Layton 1970; O'Connell 1970; Thomas 1971; Bettinger and Taylor 1974; Heizer and Hester 1978; Warren 1980, n.d.). All agree that Pinto Basin points are "different" from Basin Pinto points: larger, cruder, earlier. The further consensus (if there is one) is that the "Great Basin Pinto-like points" tend to pre-date the Elko series, although specific temporal estimates vary. Other investigators suggest considerably earlier introduction of Pinto points in the eastern Great Basin (Aikens 1970:56; Holmer 1978:66).

Consider first the evidence from the central and western Great Basin. A number of investigators relied on data from Hidden Cave as relevant to the dating of split stem points in the Great Basin (Clewlow 1967; Roust and Clewlow 1968; Aikens 1970:56). We now think that the previously available data from Hidden Cave may be misleading, and refrain from using the Hidden Cave data until materials are analyzed from the 1979-1980 American Museum of Natural History excavations at that important site.

A hafted split stem point was recovered from Kramer Cave, on the western shore of Winnemucca Lake, and a radiocarbon date of 1880 B.C. ± 100 (GaK-2387) was obtained from the foreshaft. Through the courtesy of Eugene Hattori, we were able to examine the point (No. 2269) which had been hafted to the dated foreshaft. There is no question that this is a Gatecliff Split Stem point, and a number of other Gatecliff Split Stem and Contracting Stem points occurred in the Kramer Cave collection (Hattori 1980).

Three radiocarbon dates are available for the lower part of the deposit at South Fork Shelter in which a single Pinto and two Humboldt points were recovered (Heizer, Baumhoff, and Clewlow 1968): 2410 B.C. ± 300 (UCLA-295), 2360 B.C. ± 400 (UCLA-296), and 1370 B.C. ± 200 (LJ-212). These dates are also consistent with the Monitor Valley estimates.

A series of five radiocarbon dates is also available from the Rose Spring site (Clewlow, Heizer, and Berger 1970), but it is extremely difficult to correlate these dates, taken at arbitrary depths, with actual projectile point types at Rose Spring.

O'Connell (1971: Table 35) reports a radiocarbon date of 670 B.C. ± 80 (UCLA-1222) from the Rodriguez site. The date is clearly associated with Gatecliff Split Stem points, though somewhat later than one would expect (O'Connell and Ambro 1968:151).

A large sample of split stem points was found at Silent Snake Springs, in northern Humboldt County, associated with several later types (Layton and Thomas 1979). A single radiocarbon date of 3300 B.C. ± 380 (WSU-994) is available for the site; although this does not directly date Gatecliff Split Stem points, the occupational duration of the site appears to be relatively brief, and this date is consistent with the Monitor Valley estimates.

The reclassified sequence from Hogup Cave is also of interest (Thomas n.d.*a*.). Gatecliff Split Stem points occur frequently only in Strata 7-9. There is no need to posit an early introduction of split stem points in the eastern Great Basin to explain this distribution, although it might be that split stem points last somewhat later than in the central Great Basin (depending on the actual age of Strata 9-11 at Hogup Cave).

Split stem points are also common in Strata 2-4 at Swallow Shelter (Dalley 1976: Table 5). A radiocarbon date from the bottom of Stratum 3 is 1550 B.C. ± 120 (RL-110), which falls within the acceptable range for the Gatecliff series in Monitor Valley. A date of 900 B.C. ± 100 (RL-87), however, also occurs near the bottom of Stratum 4. While this date seems to be slightly too late for the Gatecliff series, several Elko points occurring in this level suggest that Stratum 4 may be a mixed Gatecliff/Elko component (similar to Horizon 8 at Gatecliff Shelter). If so, then the 900 B.C. date does not necessarily relate to the Gatecliff series at all.

Heizer and Hester (1978: Table 6.2) cite a date of 680 B.C. ± 110 (RL-109) from Stratum 5 at Swallow Shelter as somehow germane to the dating of split stem points. But since all but two specimens lie in Stratum 4 or below (Dalley 1976: Table 5), this date is irrelevant to the issue.

Few Gatecliff Split Stem points were recovered at O'Malley Shelter, but their distribution in Strata II-IV is certainly consistent with the Monitor Valley dates.

In short, much information supports the Monitor Valley sequence for Gatecliff Split Stem points. Hanes (1977:14), however, reports the occurrence of six Pinto points in Zone I at Dirty Shame Shelter, which apparently dates after A.D. 500 (see Aikens, Cole, and Stuckenrath 1977: Table 1). This association would appear to be too late.

Although few split stem points were present in the Danger Cave collection, their distribution also suggests an extremely early introduction for Gatecliff series in that area (despite the conflicting evidence from Hogup Cave, Swallow Shelter and O'Malley Shelter).

An early eastern introduction is also supported by evidence from Sudden Shelter on the Colorado Plateau (Holmer 1978, 1980). Holmer's "Pinto" points appear to be roughly similar to the Gatecliff Split Stem points discussed in this report, although there is probably more divergence between the two type definitions than was the case for the contracting stem points (see Holmer 1978:41, 43; 1980). Pinto Shouldered points at Sudden Shelter are restricted to the basal seven strata, in association with four rather early radiocarbon dates: 5890 B.C. ± 333 (RL-474), 5615 B.C. ± 115 (UGa-903), 5140 B.C. ± 85 (UGa-859), 4720 B.C. ± 180 (RL-422). Holmer (1980:80) assigns Pinto to a temporal range from 6400 B.C. to 4350 B.C. at Sudden Shelter and reports similar early dates on Gatecliff-like points from Joes Alcove, also on the Colorado Plateau.

In sum, the weight of evidence from

throughout the Great Basin supports the Monitor Valley chronology for Gatecliff Split Stem points; there are, however, early sequences at Danger Cave and Sudden Shelter which remain to be explained.

More severe problems arise with the Gatecliff Contracting Stem type, variously called Gypsum Cave or Elko Contracting Stem. Harrington (1933) thought the type was Paleo-Indian because of the apparent association with extinct fauna. This contention was bolstered by a number of radiocarbon dates which were processed on sloth dung from Gypsum Cave, ranging from about 10,500 to 8500 B. P. (Wormington 1957:157-160).

More recent analysis by Heizer and Berger (1970) demonstrates that the association between extinct animal dung and Gypsum Cave points was spurious. A bundle of *Sarcobatus* sticks from Gypsum Cave was dated to 450 B.C. ± 60 (UCLA-1069), and a decorated atlatl foreshaft was dated to 950 B.C. ± 80 (UCLA-1223). These dates would seem to establish the Gypsum Cave type as considerably later than pre-Mazama time.

But one cannot determine the significance of these dates for more accurate dating of the specific type. At least some of Harrington's "Gypsum Cave dart points" now would qualify as Gatecliff Contracting Stem points by the Monitor Valley criteria (Harrington 1933: Figs. 19, 21, 51e, 51n). But while Harrington maintained that a single dart point type occurred—the familiar "lozenge-shaped" or Gypsum Cave form—the site report itself reveals the presence of at least one Elko Corner-notched point (Harrington 1933: Fig. 16b). In addition, at least two of the "arrowpoints" from Gypsum Cave also seem to belong to the Elko series, as we now define it (Harrington 1933: Fig. 56). The dates presented by Heizer and Berger could relate to either the Gatecliff or Elko series, depending on which points were associated with the foreshafts in the first place; as things now stand, the dating is equivocal.

The Gatecliff series is the most tentative of those proposed here. Unfortunately, too few Gatecliff Contracting Stem points have been found in datable contexts in the central and western Great Basin. We need to know more about the regional dating of this series, and this mistrust is confirmed by examination of the evidence from the eastern Great Basin.

Although a relatively large sample of contracting stem points was recovered at O'Malley Shelter, the excavators concluded that the Gypsum types "are clearly not useful as time markers" (Fowler, Madsen, and Hattori 1973:43). An examination of O'Malley points in the Database (Thomas n.d.*a*.) suggests that the excavators were unduly pessimistic.

Specifically, although the excavators suggested that Gypsum points at O'Malley span nearly 6000 years (1973:43), this estimate seems excessive. According to the Monitor Valley criteria, well over 90 percent of the contracting stem points at O'Malley Shelter occur in Strata II-V, which date from about 2680 B.C. to A.D. 1080 (Thomas n.d.*a*.). The early strata conform to the Monitor Valley data, but it would appear that contracting stem points last somewhat later at O'Malley than, say, at Gatecliff Shelter. Even so, there is no major problem in using the O'Malley data to establish the time range of contracting stem points.

The O'Malley data are supported, to some extent, by the Hogup Cave point distributions, reclassified by Monitor Valley criteria (Thomas n.d.*a*.). Roughly half of the contracting stem points at Hogup occurred in Strata 12-14, which may date from about A.D. 1000 to A.D. 1350. These dates, if accurate, suggest a later duration for contracting stem points in the east. It may be, in fact, that contracting stem points in the east properly belong to the Rosegate series, rather than the Gatecliff series.

This notion is further supported by the excavations at Backhoe Village, a Sevier village site west of Richfield, Utah (Madsen and Lindsay 1977). Although I have made no attempt to survey the Fremont literature, this site is of interest because five contracting stem points were recovered in well-dated contexts (see Madsen and Lindsay 1977: Fig. 22a-e). Had I found these points in Monitor Valley, they would have been assigned to the Gatecliff series, with an estimated time range from about 3000 B.C. to 1300 B.C. (as at Gatecliff Shelter). But four of the five Backhoe Village specimens came from Structure 9, which has an associated radiocarbon date of A.D. 830 ± 110 (RL-625). (Madsen and Lindsay 1977: Tables I and II). The occurrence of contracting stem points in relatively late contexts, plus supporting evidence from Hogup Cave and O'Malley Shelter, prohibits extension of the Gatecliff Contracting Stem type into the eastern Great Basin.

Comparative data are unfortunately lacking for other Bonneville Basin sites. A single contracting stem point was found in Stratum 6 at Swallow Shelter which dates sometime between 680 B.C. and A.D. 830. Gatecliff Contracting Stem points are found from DII through DV at Danger Cave, implying a lengthy time span (Thomas n.d.*a.*).

Some relevant data are also available from the Colorado Plateau. One Gatecliff Contracting Stem point was found at Pint-Size Shelter (Lindsay and Lund 1976), associated with a date of 1440 B.C. ± 170 (RL-536). At nearby Sudden Shelter, a number of contracting stem points were also found in datable contexts. Holmer has discussed this point sequence in some detail and it would seem that his "Gypsum" projectile points are equivalent to the Gatecliff Contracting Stem, as defined for Monitor Valley (e.g., Holmer 1978:49, Fig. 15; 1980: Fig. 36j-n). A total of 37 of these points were recovered in Strata 15-22 at Sudden Shelter associated with the following radiocarbon dates: 2475 B.C. ± 85 (UGa-904), 1585 B.C. ± 95 (UGa-1260), 1425 B.C. ± 200 (UGa-905a) and 1410 B.C. ± 85 (UGa-905). Holmer (1980:83) assigns this type to a range of 2600 B.C. to 1300 B.C., dates surprisingly consonant with the Monitor Valley radiocarbon dates for Gatecliff Contracting Stem points.

Twenty-six Gatecliff Contracting Stem ("Gypsum") points were recovered from Cowboy Cave, an extremely well-stratified site located on the edge of the canyonlands province of the Colorado Plateau (Jennings 1975, 1978:92-93; Schroedl 1976). The Gypsum points are, once again, tightly grouped stratigraphically, occurring from Stratum IVa through Vb, according to Holmer (1978: Table 11). The following dates are available for these strata at Cowboy Cave (after Jennings 1975, and Holmer 1978: Table 11): 1685 B.C. ± 55 (SI-2715), 1610 B.C. ± 75 (SI-2998), and A.D. 455 ± 60 (SI-2425). Five additional radiocarbon dates are available in this time range, but the precise strata of origin for these dates are unavailable (Holmer 1978:58). The basal dates once again correspond almost exactly with the Monitor Valley (and Sudden Shelter) data, but the 11 points contained in Strata Va and Vb would appear to date as late as A.D. 500.

Neither Sudden Shelter nor Cowboy Cave are located in the Great Basin, but it is worth noting that these dates for contracting stem points are in general agreement with the Hogup Cave dates.

To summarize, it is proposed that in the western and central Great Basin, Gatecliff Contracting Stem and Gatecliff Split Stem types are coeval, ranging in time from *ca.* 3000 B.C. to 1300 B.C. The available evidence suggests that somewhat different relationships exist in the eastern Great Basin.

Humboldt Series

The Humboldt series groups the previ-

ously defined Humboldt Concave Base A, Humboldt Concave Base B, and Humboldt Basal-notched points into a single typological category. The Monitor Valley data suggest three things about the Humboldt series: (1) Humboldt points are not good time markers, spanning at least the last 5000 years, (2) size is not a particularly good way to group points within the Humboldt series, since small points are known to occur fairly early in the Monitor Valley, and (3) Humboldt points are most commonly found on sites directly related to intercept hunting strategy sites, which are rarely stratified (Thomas n.d.*a*.). In other words, the Humboldt series is a function-specific residual category with a rather broad time span.

Caution is in order when generalizing about the Humboldt series in the Great Basin. Pre-Mazama occupations were lacking in the Monitor Valley, so we have not been able to distinguish the various pre-Mazama concave-base point types from those occurring after 5000 B.C. The Monitor Valley Key also does not include the Triple T Concave Base type, because so little is known about it. Considerable work is still required on the concave base point complex within the Great Basin. Certainly we know less about concave base points than we do about stemmed or side-notched points.[9]

SOME CAUTIONS ABOUT THE MONITOR VALLEY CRITERIA

I have proposed a reorganized method for classifying the projectile points from Monitor Valley. I also make some suggestions about typology for the western Great Basin, in general. I think the temporal assignments are more realistic than those proposed previously, and the types themselves are more adequately defined.

But the Monitor Valley classification is hardly infallible, and undoubtedly becomes fuzzy the further one travels from Monitor Valley. We need to know much more about the temporal ranges of certain categories, particularly the side-notched and Humboldt series; the chronology of pre-Mazama types is rudimentary at best, almost wholly lacking in stratigraphic evidence; also, we must be certain to restrict the geographic extent of this typology to the central and western Great Basin areas. Like earlier efforts, the Monitor Valley criteria can, and should, be improved by subsequent research.

Although the metric criteria proposed have a sound empirical base, difficulties remain. We cannot, for instance, expect to classify properly each isolated specimen. Criteria such as these are designed for collections rather than isolates, and we must expect a certain degree of variability as these criteria are imposed on new data. I would, however, suggest that the evidence from Monitor Valley clarifies two major typological difficulties facing Great Basin archaeologists.

First of all, we should recognize explicitly that different cultural chronologies exist in the eastern and the western Great Basin, and we should start attempting to explain those differences. Although the *morphological* types are nearly identical in the two regions, the *temporal duration* for several of the types is markedly different to the east and to the west of the Calcareous Mountains. An adequate explanation for this difference must utilize data far beyond mere projectile point typology.

In addition, I think the newly proposed Gatecliff series clarifies the "Pinto problem." There is clearly an early series of bifurcate stemmed points which occurs in the Mojave Desert and elsewhere in the Great Basin. These are the "true" Pinto points (Warren n.d.). About these early points we have had little to say, but much work could be done on this problem.

There is, however, a later series of bifurcate stemmed points, and I am proposing that

these later points be termed Gatecliff Split Stem, and assigned a temporal range from about 3000 B.C. to 1300 B.C. There is no longer a "Pinto problem" because these later bifurcate stemmed points are not considered to be "Pinto" at all. A number of interesting technological features can be pointed out about Gatecliff series points (Green 1975; and Hattori, personal communication), but it remains to be established whether these criteria are relevant for the definition of *temporal* types.

I would also hope that the publication and detailed discussion of the Monitor Valley criteria will encourage other Great Basin archaeologists to be somewhat less cavalier in their typological efforts. Both the east/west chronological split and the "Pinto problem" would have vanished years ago had all investigators used the same criteria in the same way. We were able to delay resolution of the east/west dichotomy by at least a decade because of sloppy typology. My hope is that relatively objective criteria, whether those from Monitor Valley or elsewhere, could be presented in a suitable fashion so that at least all of us are speaking the same language.

NOTES

1. This paper has been abstracted from several chapters being prepared for a volume tentatively entitled *The Archaeology of Gatecliff Shelter and Monitor Valley* (Thomas n.d.*a*.). The results are presented in this format in order to provide interested investigators with a convenient summary of the Monitor Valley typology. I do not consider these results ironclad, and I hope that improvement and refinement will result from the application of these findings. The actual data supporting the statements in this paper are to be found in Thomas (n.d.*a*.).

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Nicholas Amorosi prepared the artifact illustrations presented here, and Dennis O'Brien is responsible for all finished artwork. I also thank Jane Epstein, Margot Dembo, and Stacy Goodman for assistance in preparing the manuscript.

2. The following conventions are followed for site nomenclature: California site numbers are hyphenated to correspond with records at the Robert H. Lowie Museum of Anthropology (e.g., 4-Iny-2); Oregon site numbers are not hyphenated, but spaces are left between the state-county-site designations, to correspond with files at the Museum of Natural History, University of Oregon (e.g., 35 LK 55); Utah and Nevada site numbers are unhyphenated without spaces, to correspond with procedures at the University of Utah and the Nevada State Museum (e.g., 42Bo268, 26Ny301). State prefixes are dropped whenever possible.

3. All ages in this paper will be expressed as uncorrected radiocarbon years B.C./A.D. A slight discrepancy arises when comparing my results with those of Bettinger and Taylor (1974), since those investigators corrected their radiocarbon dates using the conventional bristlecone pine correlation.

4. I am indebted to Robert Elston for suggesting the name Rosegate.

5. Note further that the Triple T Concave Base type has been excluded from the Monitor Valley Key, due to the very small sample size involved.

6. I thank the following people for assisting in the Great Basin Database project: Susan Bierwirth, Gary Heath, Patrick Hogan, Clark Spencer Larsen, Robert Rowan, and Lisa Sherman. I also am grateful to the following individuals and institutions for assistance and cooperation in allowing us access to the Database site collections: Dave D. Herod (Robert H. Lowie Museum of Anthropology), Don D. Fowler (formerly of the Desert Research Institute), M. A. Baumhoff

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7. Very small side-notched points are known occasionally to occur at sites in the western Great Basin, as for example in the Carson Sink (Robert Kelly, personal communication) and in Owens Valley (Robert Bettinger, personal communication). Although investigators seem commonly to assume that these small points properly fall into the Rose Spring series, I am unaware of stratigraphic verification for this suggestion. Once these points are pinned down stratigraphically, it will probably be necessary either to group them with Desert series points or to provide criteria for defining a side-notched variant of Rosegate. Such a distinction cannot be made for Monitor Valley, since these points are absent from that area.

8. This comparison is clouded because we lack the appropriate linear metric variables for the Wal97 collection (see Hester 1974). But the size difference (as suggested by weight) is sufficiently striking to question the initial assignment to the Eastgate series.

9. Bettinger (1978) has proposed that Humboldt Basal-notched points/knives date to the period A.D. 700-1300. Although I hesitate to make any generalizations regarding discrete time ranges for the types within the Humboldt series, I should point out that two Humboldt Basal-notched points occur in Horizon 4 deposits at Gatecliff Shelter (Fig. 5), known to pre-date A.D. 700. While the presence of a couple of points in such a large collection should alarm nobody, the evidence (weakly) suggests a time range earlier than that anticipated by Bettinger.

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