

CLICK ANYWHERE on THIS PAGE to RETURN to HORSESHOE & HORSESHOE-NAIL AGE & HISTORY at InspectApedia.com



Bridgewater State University
Virtual Commons - Bridgewater State University

Bulletin of the Massachusetts Archaeological Society

Journals and Campus Publications

Fall 1999

Bulletin of the Massachusetts Archaeological Society, Vol. 60, No. 2

Massachusetts Archaeological Society

Follow this and additional works at: <http://vc.bridgew.edu/bmas>

 Part of the [Archaeological Anthropology Commons](#)

Copyright

© 1999 Massachusetts Archaeological Society

This item is available as part of Virtual Commons, the open-access institutional repository of Bridgewater State University, Bridgewater, Massachusetts.

BULLETIN OF THE MASSACHUSETTS ARCHAEOLOGICAL SOCIETY



VOLUME 60 (2)

FALL 1999

CONTENTS:

For Want of a Nail: An Analysis of the Function of Some Horseshoe or "U"-shaped Stone Structures	Edwin C. Ballard	38
Some Thoughts on the Nature of Archaeological Sites, and the Trend Towards a Holistic Approach as We Enter a New Millennium	Alan Leveillee	55
The Indians of the Merrimack Valley: An Introduction	David Stewart-Smith	57
Wheeler's Surprise, New Braintree, Massachusetts <i>excerpt from</i> King Philip's War: The History and Legacy of America's Forgotten Conflict	Eric B. Schultz and Michael Tougas	64
An Unusual Patinated Flint Blade from North Plymouth, Massachusetts	Bernard A. Otto	72
<i>Contributors</i>		37
<i>Editor's Note</i>		37

THE MASSACHUSETTS ARCHAEOLOGICAL SOCIETY, Inc.
P.O.Box 700, Middleborough, Massachusetts 02346

MASSACHUSETTS ARCHAEOLOGICAL SOCIETY

Officers:

Darrell C. Pinckney, P.O. Box 573, Bridgewater, MA 02324 President
Donald Gammons, 7 Virginia Drv., Lakeville, MA 02347 Vice President
Wilford H. Coutts Jr., 127 Washburn Street, Northboro, MA 01532 Clerk
George Gaby, 6 Hazel Rd., Hopkinton, MA 01748 Treasurer
Eugene Winter, 54 Trull Ln., Lowell, MA 01852. Museum Coordinator, past President
Dr. Shirley Blancke, 579 Annursnac Hill Rd., Concord, MA 01742 *Bulletin* Editor
Elizabeth Duffek, 280 Village St. J-1, Medway, MA 02053 Corresponding Secretary

Trustees: Term expires 2001 [^]; 2000 [*]; 1999 [+]:

Edwin C. Ballard, 26 Heritage Rd., Rehoboth, MA 02769^
Irma Blinderman, 31 Buckley Rd., Worcester, MA 01602+
Elizabeth Chilton, Dept. of Anthropology, Harvard University, 11 Divinity Ave., Cambridge, MA 02138^
Marilyn Crary, P.O. Box 427, Eastham, MA 02642+
Robert Hasenstab, P.O. Box 1867, Boston, MA 02205*
Marjorie Judd, 319 Derry Park Drv. #19, Middleboro, MA 02346^
Lorraine Kerrigan, 96 Old Colony Ave. U554, East Taunton, MA 02718+
Jane C. Lopes, P.O. Box 1273, Middleboro, MA 02346+
Tom Lux, 38 Somerset Ave., Riverside, RI 02915+
Jane McGahan, 239 Briar Way, Greenfield, MA 01301*
Elizabeth McGrath, 89 Standish Ave., Plymouth, MA 02360^
Nathaniel Packard, 60 Lowell Ave., Providence, RI 02909+
John Rempelakis, 7 Fairview Farm Rd., Haverhill, MA 01832^
Jean-Jacques Rivard, 6 Robert Drv. #93, Middleboro, MA 02346+
Alan F. Smith, 156 Ararat St., Worcester, MA 01606+
Edward Syrjala, P.O. Box 149, Centerville, MA 02632*
Sally Syrjala, P.O. Box 149, Centerville, MA 02632*
John Thompson, 406 Main St., Medfield, MA 02052^
Janice Weeks, 12 Long Ave., Greenfield, MA 01301*

Barbara Luedtke, Anthropology Dept., UMass, Boston, MA 02125. MHC Representative
Tom Lux, 38 Somerset Ave., Riverside, RI 02915 Newsletter Editor, Office Manager
Kathryn M. Fairbanks, 145 Aldrich St., Roslindale, MA 02131 Assistant Librarian

The BULLETIN OF THE MASSACHUSETTS ARCHAEOLOGICAL SOCIETY is published semi-annually, with a spring Volume 1 and a fall Volume 2. Institutional subscriptions are \$30; individual memberships in the Society are \$18 and include the *Bulletin*. Information on special rates for family members, seniors, students, etc., and requests for back issues of the *Bulletin* should be addressed to the Museum Office Director, Thomas Lux, Massachusetts Archaeological Society, P.O. Box 700, Middleborough, MA 02346 (508-947-9005). Manuscripts and communications for the *Bulletin* may be sent to the editor, Shirley Blancke, 579 Annursnac Hill Rd., Concord, MA 01742.

EDITOR'S NOTE

Edwin (Ted) Ballard's paper that argues for a Native American origin for one category of stone structure, "U"-shaped structures, has the kind of narrow focus on type of object, cultural context, and date, that makes for a strong case. It is also the kind of focus that has too often been missing from other discussions of this general topic. Alan Leveillee provides an equation to summarize the complexities of interpreting an archaeological site, complexities that also extend to human interrelationships in our present society, and David Stewart-Smith's introduction to tribes of the Merrimack marshals long-hidden data on that subject. The chapter by Schultz and Tougias from their new book on King Philip's War discusses historians' problems in locating the site of an ambush, a situation that seems to beg for an archaeological survey. Bernard Otto's flint blade looks as if it may be a variant of Ritchie's New York Fulton Turkey Tail type that also frequently patinated to a tan color, but it has a straight instead of a pointed base.

I would particularly like to thank all those who took my plea in the last issue about not having enough material for a Fall issue to heart, and generously sent in papers.

CONTRIBUTORS

EDWIN C. BALLARD is a long-time member of the Massachusetts Archaeological Society (Cohannet Chapter), and is on the Board of Trustees. He is an engineering graduate of Brown University, and a retired senior member of the technical staff of Texas Instruments, Inc.

ALAN LEVEILLEE is a Senior Archaeologist at the Public Archaeology Laboratory, Inc., Pawtucket, RI, and is on the advisory board of the Robbins Museum, Middleborough, MA.

BERNARD A. OTTO, long-standing chairman of the Massasoit Chapter of the Massachusetts Archaeological Society, continues to pursue a study of the coastal Late Archaic culture in adaptation and movement preferences for occupation.

ERIC B. SCHULTZ has been researching and reconstructing the events of King Philip's War since 1990 culminating in King Philip's War: The History and Legacy of America's Forgotten Conflict, just published by The Countryman Press. Educated at Brown and Harvard Universities, he is chairman of an information software company, and lives in Massachusetts.

DAVID STEWART-SMITH teaches history and cultural studies at Vermont College of Norwich University. He is staff ethnohistorian for the Sargent Museum of Archaeology, Concord, NH, and serves on the Abenaki Delegation for Native American Repatriation as a member of the New Hampshire Intertribal Council.

MICHAEL TOUGIAS is co-author with Eric B. Schultz of King Philip's War (The Countryman Press). He is also author of eleven books about New England, including Until I Have No Country, an historical novel set during King Philip's War. He lives in Massachusetts.

FOR WANT OF A NAIL: AN ANALYSIS OF THE FUNCTION OF SOME HORSESHOE OR "U"-SHAPED STONE STRUCTURES

Edwin C. Ballard

Introduction

For many reasons there has been a paucity of in-depth analysis of the myriad of stonework remnants that exist upon the rough terrain of the backlands of New England. Much of it is the work of 18th and 19th century Euro-american farmers, such as walled field boundaries (Allport 1990), walled building foundations, and stone storage structures (Neudorfer 1980). Glacial debris abounds.

There are, however, other enigmatic structures that remain unexplained. This discussion makes a case for Native American construction and use for one class of these, a "U"-shaped construct. The lack of analysis to date has deep roots. It originates in the Contact period Puritan colonists' struggle to survive. It derives from their religious mindset (Fischer 1989) that resulted in laws banning the practice of Native American religion, and attitudes that strongly influenced historical scholarship into the 20th century (Jennings 1976). Added factors include the early disruption of Native American social structure due to the effects of imported diseases (Salisbury 1982), middle 17th century warfare (Jennings 1976), and academic paradigms such as "Indians of the Northeast did not use stone architecture" (Hall and Woodman 1972). The latter paradigm has served as a serious impediment to extensive professional involvement in an in-depth evaluation of residual lithic structures in New England. It has contributed to minimizing meaningful dialogue between

professional and amateur that was encouraged by Fitzhough in his preface to Neudorfer (1980), and to a lack of application of basic archaeological excavation technique that might supply chronological and cultural context for such structures. This state of entropic unease has served to temper public support for our efforts to enhance our understanding of the blank spots in New England's past.

In the late 1980s, I began investigating the possible uses for a specific type of horseshoe or "U"-shaped, laid-up (unmortared) stone construct found at two locations near my home in southeastern Massachusetts (Figures 1,2). Initial contact with professionals was to say the least cool. That with amateurs ranged from mild interest to rampant speculation. As the data accumulated, similarities in location and orientation became apparent. With some encouragement from a few open-minded professionals, I was able to float a sun-cycle orientation hypothesis based on similarities in location and construction for 17 of these "U" structures at the spring 1992 meeting in Bridgewater of the New England Archaeological Association and Massachusetts Archaeological Society. The presentation evoked some careful reaction from a few members of the professional community, but for the most part the response was muted and I went back to tramping in the woods. In the interim, a review of published data showed four references for similar constructs that had proposed use hypotheses:

- Goodwin (1946) identified three structures in Acworth, New Hampshire, two of which were enclosed, and reported hearsay evidence for



Figure 1. Equinox Sunset viewing structure: Site 1b (Figure 5, location 11). Sunset observed 3/21/91. This structure is sited 20 meters back from the edge of a sharp drop-off. The true horizon is obscured by distant tree tops. (Scale in 25 cm segments.)



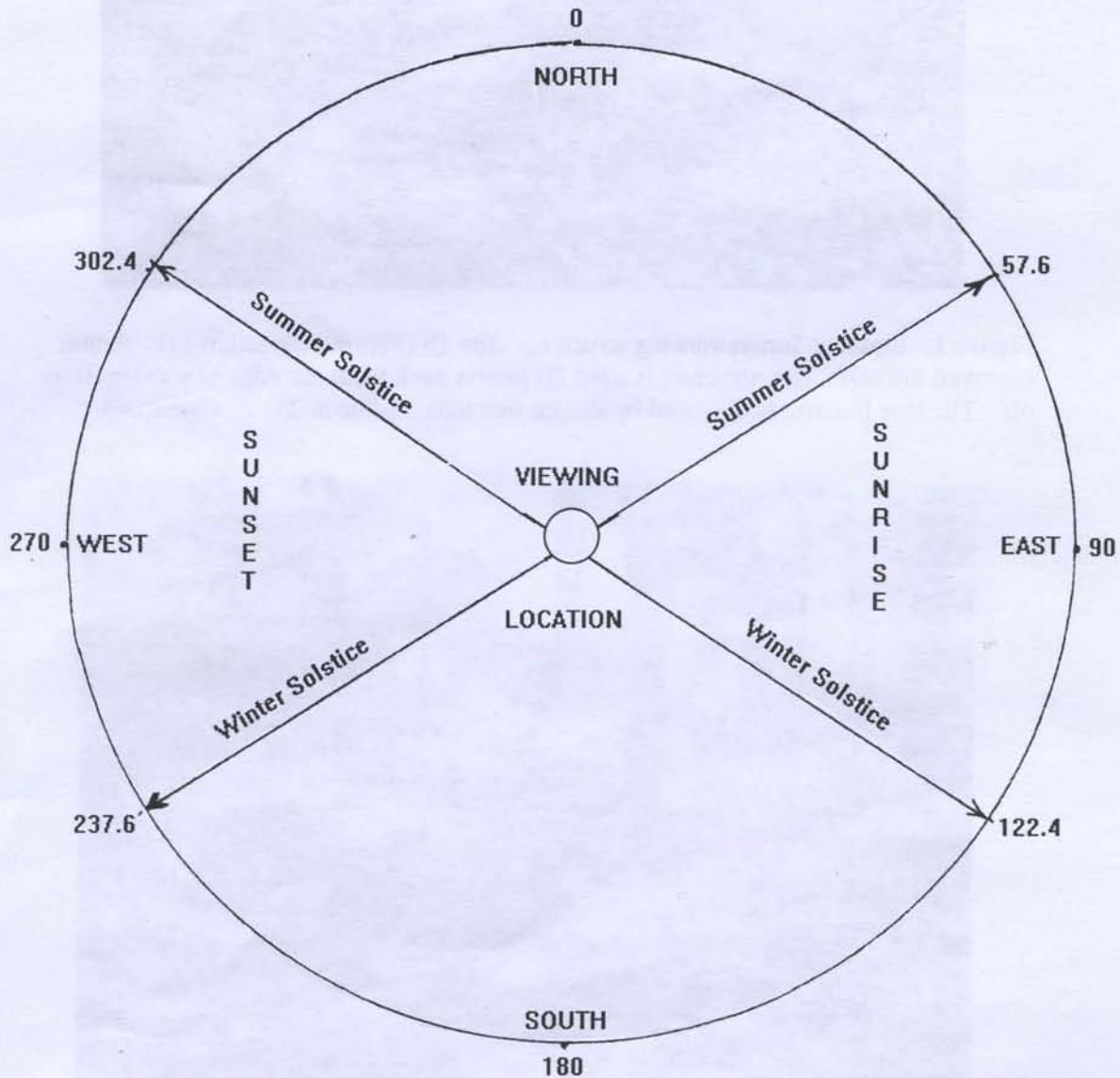
Figure 2. Viewing structure: Site 1a (Figure 5, location 8). "U" faces slight uphill grade at about 240 degrees True azimuth. Winter Solstice sunset observed from this structure on 12/21/89, at 3:59 p.m., 19 minutes before listed sunset. Actual setting obscured by vegetation. (Scale in 25 cm segments.)

prior use as 19th century trapping structures.

• Hall and Woodman (1972) reported on the same three structures and proposed a similar use hypothesis. As part of their data they listed horizon azimuths (see Glossary, Figure 3) from the

open ends of the two covered structures. Based on personal measurement one of their reported azimuths is in error by 15 degrees. Since this was the magnetic deviation for the area, their error is probably due to a mistake in transcribing field

Figure 3. True horizon azimuths for solstices at 42 degrees north latitude.



- To obtain true compass reading subtract local magnetic deviation from observed magnetic compass value (15 degrees for east central Massachusetts).
- For an elevated horizon the sun will rise to the right (+) and set to the left (-) of the horizon value.

notes. I believe that this error limited the scope of their conclusions since one structure faced Summer Solstice sunrise, the other Winter Solstice sunrise. In addition they quoted as supporting evidence for their proposed hypothesis - trapping enclosures - the paradigm, "Native Americans in the Northeast did not use stone architecture."

Neither of the above two reports mentioned other non-covered "U" structures on the hill at the Acworth site. Based on Rothovious (1966), and confirmed by personal communication (November 1998), they were present at the time of Hall & Woodman's survey. These open structures have significant horizon azimuths. They are recorded in the summary in Table 1.

- Snow (1980), cited the Hall and Woodman use hypothesis to support a discourse on "Myths of New England's Past" dismissing any other use hypothesis.

- Mavor & Dix (1989) compared several laid up stone "U" constructs in New England to the "prayer seats" used by Native Americans in the western United States. They suggested a similar local use context.

Since my 1992 presentation I have compiled data on an additional 54 laid-up stone "U" structures. Sixty-seven of the 71 total are grouped in multiple combinations at 10 sites from southeastern New England to southwestern New Hampshire. Table 1 is a compilation of the common azimuths including site location. The azimuths were measured from the centerline of the open arms of the "U" facing outward toward the horizon.

I propose that the use of 40 of these 71 structures was to monitor the annual cycle of the sun, at sunrise or sunset, at specific horizon positions during the Sun's annual journey from solstice to solstice and return. A second subset of 20 structures are located to provide a view of the northern constellations, the stars that never set,

particularly the Big Dipper in its late summer to early winter evening positions as it rotates about the "hole in the sky." This locus is presently denoted by the North Star, Polaris. Of the rest, 8 are focused on other horizon positions within the sun-cycle, 2 open south-southeast, and 1 opens south.

This data assemblage leads me to conclude that a widespread social grouping was using the motions of the sun and stars in a ritualistic way. The question is who was using them and why? I propose the following hypothesis:

- It is widely accepted that Native Americans used the celestial dome to determine the timing of socio-cultural events (Carlson 1990, Miller 1997).

- Features in the landscape are tied to that use in parts of the Americas other than New England (Stevenson 1901/1902, Williamson 1984).

- Features in the landscape in New England are also associated with celestial events (Mavor & Dix 1989, Ballard 1992).

- Data on the orientation of a class of "U"-shaped structures in New England indicate they are related to specific celestial phenomena: aspects of the sun-cycle and the northern constellations, in particular the Big Dipper, or Bear, which was important to Native Americans of the northeast (Volmar 1996). These structures may be Late Woodland through Contact period in date.

Location and Configuration of "U"-shaped Structures

All of the structures I have observed are located on high ground, primarily on the sides or upper levels of rock outcrops or ledges, i.e. areas of little potential economic use until the development boom of the last ten years. Five of the sites are located around the periphery of the Taunton River basin, and one is on the northeastern

Table 1. Horizon vectors from "U"-shaped stone structures by numbered site location.

NORTH			EAST			SOUTH		
	10			8				
	10			8				
	(9)			8+				
	6			6				
	6	(9)		2		3		(9)
2	5	8		2		2		(9)
2,8	2,(3)	8		{1b}		1a	5	6
1a,8	{1b}	(9)4		{1a),(3)}		1a,(3)	4	1a+,1a
								7
								5
								8
0		30		57.6		90		122.4
				^				^
←————→				Summer				Winter
Swing of the				Solstice				Solstice
Big Dipper				sunrise				sunrise

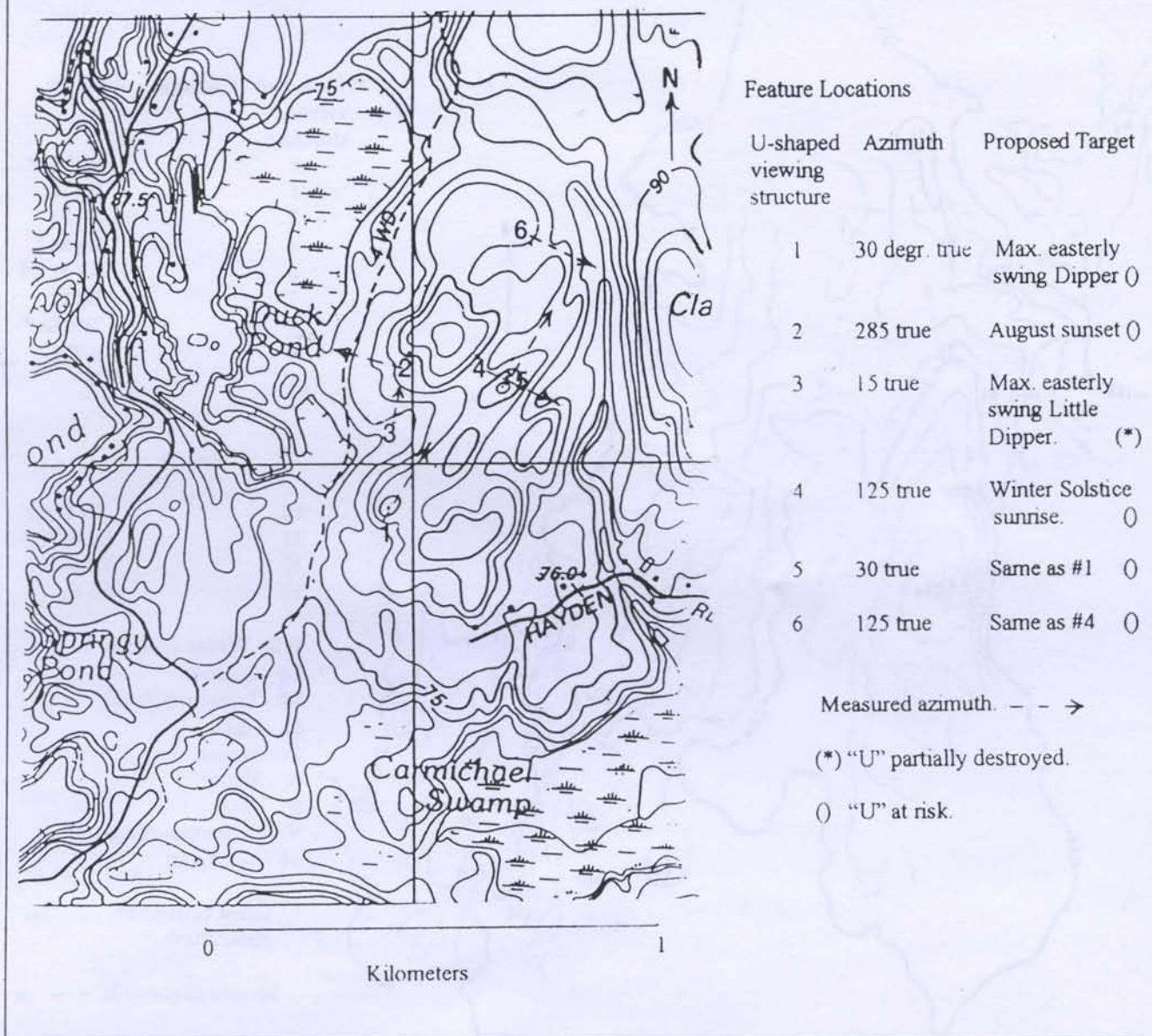
NORTH			WEST			SOUTH		
				10			10	
				5			4	
				4			3	
				3	(9)		1c	
				{1b}	6		{1c}	
				2, 1a, 8	3,4		(1b)	8 {7}
	{8}							2,1a+
360	345			302.4		270		237.6
				^				^
←————→				Summer				Winter
Swing of the				Solstice				Solstice
Big Dipper				sunset				sunset

^ Actual Sun horizon azimuth for 42 degrees north latitude. (True North is 0 azimuth, 90 is East, 180 is South, 270 is West)
 + Denotes confirming observations.
 { } Destroyed by development as of 3/15/99.
 () At risk by development as of 5/1/99.

Site Locations:

- | | |
|-----------------------------------|--------------------|
| 1a. West edge Taunton River Basin | 5. Barrington R.I. |
| 1b. East edge Palmer River Basin | 6. Acworth N.H. |
| 1c. Rehoboth Ma. | 7. Dighton Ma. |
| 2. Foxboro Ma. | 8. Wrentham Ma. |
| 3. Easton / Sharon Ma. | 9. Groton Ma. |
| 4. Middleboro Ma. | 10. Swanzey N.H. |

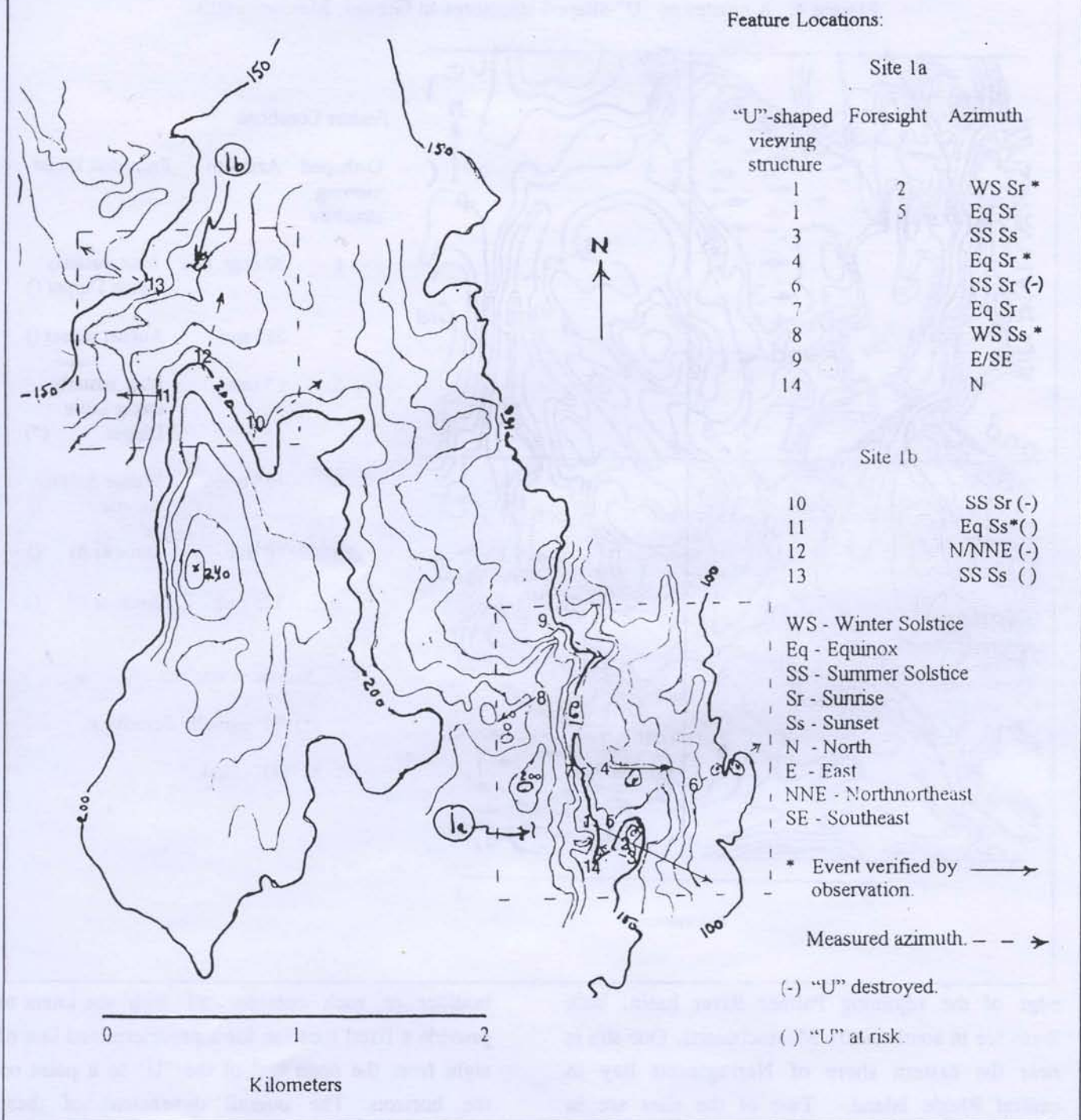
Figure 4. A cluster of "U"-shaped structures in Groton, Massachusetts.



edge of the adjoining Palmer River basin, both areas are in southeastern Massachusetts. One site is near the eastern shore of Narragansett Bay in central Rhode Island. Two of the sites are in southwest New Hampshire near Keene on elevated heights. The other is on a knob in Groton in northern Massachusetts. Most of these structures are freestanding on a level surface. Several are built on raised pads, others are set against a

boulder or rock outcrop, all with the intent to provide a fixed location for a predetermined line of sight from the open end of the "U" to a point on the horizon. The overall dimensions of these constructs range from a width of 1.5 to 2 meters, a length of 1.5 to 2.5 meters, and a rear height from 0.7 to 2 meters. In most cases the side arms are lower than the rear height, similar to the arms of a chair.

Figure 5. Two clusters of "U"-shaped structures (Sites 1a,1b) in Bristol County, Massachusetts.



Of the 71 structures I have recorded, 67 are located at these 10 sites in groupings of 4 or more. Only four were of covered, or beehive construction. At least six have been destroyed by subsequent development projects and several others

are at significant risk. One site in Groton, Massachusetts, (Figure 4) has been invaded by an upscale residential development and will be obliterated within three years. The northern part of the site in Figure 5 is in its second phase of resi-

dential development. At five of the sites there are remnants that suggest the previous existence of additional elements. My surveys of the sites were extensive, but due to the nature of the terrain do not preclude the existence of other similar structures.

Clustering of Celestial Orientation Data

As the observed and recorded data began to accumulate the two previously noted subsets of data became more apparent, one sun-cycle related, the other with a north by north-northwest to north-northeast orientation. The obvious sky-based objects that fit the second subset are the northern constellations, "the stars that never set." The 20 observed azimuths range from 345 degrees true to 30 degrees true, i.e. from a mid-summer to early winter (maximum easterly swing) evening position of the Big Dipper. At our local latitude, 42 degrees north, the Dipper bowl and tail, in its present lowest position, never touches the horizon. It is interesting to note that most of the northerly facing "U"s have a slight uphill orientation to an artificial horizon. This suggests that they were located to face the Dipper bowl, or tail, when it touches that horizon making the connection between the sky and the earth.

A probability of occurrence test for sun-cycle relevance for the remaining 51 structures is 99.9999%; 40 of the 51 are focused on solstice/equinox azimuths. This, coupled with the previously noted direct observations and the multiple site locations, makes the case for a widespread regional cultural context in which sky observations were used as a component of socio-

ritual structure. The question is who used them and when?

Determination of Celestial Orientation of "U"-shaped Structures

Azimuths from the open end of the "U" for 40 of these structures point to significant sun-cycle events. Five point to the horizon position of the sun at Winter Solstice sunrise, 7 towards Winter Solstice sunset, 5 towards Equinox sunrise, 6 towards Equinox sunset, 9 towards Summer Solstice sunrise, and 8 towards Summer Solstice sunset (Table 1). Some of the structures have constructed or placed foresights. One of these is shown in Figure 6. This 4-ton monolith rests on an opposing ridge from the "U" shown in Figure 7 (locations 2 and 1 on Figure 5). These two elements were used to determine the day of Winter Solstice sunrise. The initial observation that suggested my sun-cycle hypothesis occurred at sunrise on December 22, 1989, Winter Solstice, when I observed the first flash of the Sun at the juncture of the chocked-in-place monolith in Figure 6 with its bedrock base, while standing between the arms of the "U" shown in Figure 7. The flash of the sun occurred two minutes after the listed sunrise time. This observation verified an assumption made in the summer of 1989 that there was a connection between these two constructs, sited on the shoulders of opposing ridges, separated by 130 meters of trees, brush, brook, swamp and scree. Other Winter Solstice viewing locations, such as at Acworth, New Hampshire, and Groton, Massachusetts, have topographical features as foresights. (See Glossary for terms used in this section.)



Figure 6. Winter Solstice Sunrise foresight: Site 1a (Figure 5, location 2). Sunrise observed 12/22/89, at notch formed by junction of this chocked-in-place 4-ton lith with its bedrock base, at 7:12 a.m., two minutes after listed horizon sunrise. (Scale in 25 cm segments.)



Figure 7. Winter Solstice Sunrise viewing structure: Site 1a (Figure 5, location 1). This "U"-shaped structure is located on the shoulder of an opposing ridge 150 meters northwest of the foresight in Figure 6. (Scale in 25 cm segments.)

Other direct observations include:

- Summer Solstice sunrise on June 21, 1996, from a "U" at the Wrentham site, to the location of a laid-up stone structure on the high point of the Foxborough site, both in Massachusetts.
- Equinox sunset on March 21, 1993, from the "U" (Figure 1) at location 11 on Figure 5.
- Winter Solstice sunset on December 21 and 22, 1989, from the "U" (Figure 2) at location 8 on Figure 5.
- Equinox sunrise on March 21, 1992, from the "U" at location 4 on Figure 5.

The exact horizon azimuths for the latter two observations were obstructed by intervening vegetation. By plotting the setting and rising trajectories of the sun, the foresight features were identified: a boulder at location 8, and a notch formed by the juncture of two landform slopes for location 4.

One of the major problems in verifying horizon azimuths for these "U"-shaped cairns is the presence of intervening vegetation. I have used several additional methodologies to overcome the constraints: measuring azimuths from the center line of the open arms of the "U" and then forward-searching for foresights; surface triangulation from adjacent locations with a clear horizon view; or the use of topographical maps to identify horizon features at equivalent altitude on the azimuth bearing. In the past, visibility would not have been a problem on the bedrock outcrops. It requires ages for soil to accumulate in crevices to sustain vegetation. For the other areas, the record shows (Russell 1980, Cronon 1983) that Native Americans in the northeast modified the landscape to control their environment especially by burning to improve visibility.

Native American Ritual Use of the Sun-Cycle

As previously noted, there is an expanding base of documentation that Native American

cultural groupings used the celestial dome as a component of their ritual structure (Carlson 1990, Miller 1997).

More specific use documentation is provided by Stevenson (1901/1902). She reported on the ritual use of similar laid-up stone "U" structures by the Zuni who, because of their isolation, were able to maintain a cohesive tribal culture into the 20th century. The Yurok Indians of northern California, who have 15th century Algonquian roots (Mavor & Dix 1989), used similar "U"-shaped structures to control sky-based ritual (Chartkoff 1983). The symbol for the Hopi Moon Clan was a "U" with a dot between its open ends (Patterson 1992). Eddy (1977) discussed the evidence for sky-event usage by Native Americans for the laid-up stone structures of the northern plains "Medicine Wheels."

Closer to New England, the Anderson Mounds in Indiana, an Adena ditch and bank structure, had grooves dug in the outer bank to provide for the viewing of horizon events related to the sun and stars from a central mound. This site has been dated to 2100 BP (Anderson Mounds 1969). The "U"-shaped loops of the serpent at the Ohio "Serpent Mound" are solstice/equinox oriented (Fletcher & Cameron 1988). Williamson (1984) discusses the reported solar alignments of the wooden post hole circles at the 13th century "Cahokia" site in southern Illinois. The Seneca used "U" symbols in a northeast, southeast, southwest, and northwest context (Sams & Nitsch 1991).

In southern New England, Roger Williams (1643) referred to a major feasting period by local Native Americans at Winter Solstice as "their kind of Christmas."

Event-Specific Use of Structure Clusters

The location by site data, compiled in Table 1, shows that every site does not at present

have the full spectrum of possible primary sun-cycle observation locations. This suggests either an incomplete inventory or an event-specific use. An example of site-specific use was noted by Stevenson (1901/1902). She detailed the use of a "U"-shaped, laid-up stone construct by the Zuni sun priest, Pequin. Starting with the last full moon in October he made daily observations of the horizon positions of sunrise. Using a string of 48 knots, untying one knot each day, he established the starting date of the advent period Shalako festival to prepare for Winter Solstice, the primary ritual event in the Zuni year. Additional "U"-shaped stone structures located at other sites around the pueblo were used to determine the appropriate time for other significant rituals.

The location of the stone constructs at the Groton, Massachusetts, site suggests a similar sky-event usage for timing a social ritual. This set of "U"s is located west of the Forge Pond area of Westford, Massachusetts, in an area of documented Native American activity (Jennings 1976, Mavor & Dix 1989). It is northwest of the presumed site of the Nashoba praying-Indian village. The viewing stations are located around the sides of the high point of a low north-northeast/south-southwest ridge (Figure 4). The viewing locations cover an area 400 x 800 meters. This site was relatively remote until recent years when a high-end housing development began encroaching on it. Table 2 shows the recorded data for 6 viewing stations, 4 complete, and 2 damaged. We were unable to locate 2 others apparently destroyed during land clearing. Figure 8 shows two views of "U" # 2 at this site. Field surveys were made in November 1996 and April 1997 in the company of D. Palmisano who had made the original observations several years previously and had been unable to interest anyone in determining a possible use for the structures. At the time of the survey several homes were in various stages of construction,

intruding into the center of the primary viewing area. The layout of the viewing structure locations and azimuth directions noted in Table 2 is shown on Figure 4. The cumulative data suggests an August to December viewing period, using the sun and Dipper as timing devices, culminating with Winter Solstice sunrise.

In contrast, the data recorded for the site shown on Figure 5, which is substantially larger (2800 meters for its major axis), suggests a year-round use. Figure 5 shows the recorded survey data for 14 constructs, 12 "U"s and 2 foresights. Two "U"s have been destroyed by residential construction, another has part of the above surface structure removed. All the azimuths are included in the Table 1 compilation.

Dating of Structures

A literature search provided two Contact Period references for Native American presence in the area shown in Figure 5. These were the use of an adjacent swamp as a winter hunting campsite by the Wampanoags (Russell 1980, Bourne 1990), and the description of the capture site of Annawan that ended King Philip's War (Church 1989). That site 1a (Figure 5) existed already in the 17th century (and was probably not built by the English) is suggested by a 1713 deed that referred to a point on the 1661 Taunton South Purchase boundary adjacent to the site as "a tree commonly called the horseshoe," an apparent reference to a "U" structure (Emery 1893).

The site in Barrington, Rhode Island, contained 4 "U"-shaped constructs. They were found 30-50 cm below ground surface, and all of the structures were below juncture. They were constructed with hand size rounded cobbles, and there was a 40 cm pile of similar cobbles located in front of the open end of each "U", suggesting the "U" and dot, or sod and skull, motifs (see below). The horizon azimuths of these constructs fit the sky

Table 2. Recorded viewing data for "U" structure cluster at Groton, Massachusetts (Figure 4).

Structure #	Horizon Azimuth Deg.	Comments / Construction	Location
1	25/30 T Max easterly swing of Big Dipper (Dec.)	Built against a vertical boulder face. Backwall 1.5 m high, 1.5 m wide. "U" arms 1m to .7m high sloped to front. Lintel like stone row along front of boulder edge above arms.	South side of hill facing a 5 deg. uphill slope.
2	285 T Early August sunset.	Against vertical boulder face. Backwall 1.5 m high. Parallel arms separated by .7m. Stone row lintel. (see figure # 8).	West shoulder of high point, facing low ridge.
3	15 T Max easterly swing Little Dipper or early Nov. Big Dipper.	Freestanding structure partially destroyed by construction activity. Backwall .7m high. Arms .4m high.	Southwest edge of high point facing uphill
4	125 T Winter Solstice sunrise.	Built against vertical ledge outcrop. Backwall 1.3m high. Arms .9m high. Stone row lintel gives structure the appearance of a cave entrance.	Southeast edge of hill. Faces #5 across a small defile.
5	30 T Max. easterly Swing Big Dipper Dec.	Structure severely damaged by tree intrusion. 5 year old stump has over 75 growth rings. Two of stones on left shoulder show 1.3cm. non concentric drill marks. Stone row lintel intact. Foresight for horseshoe #4.	North side of small ridge parallel to main ridge.
6	125 T Winter Solstice Sunrise.	Wide V shaped segment of ledge outcrop. Stone row lintel center stone has a vertical quartz pipe in line with with the center of the V. No constructed side arms.	Northern extremity of the site.

cycle template and are included in the Table 1 (location 5) data. A literature search shows that the "U" and dot motif was used as the glyph symbol for the Hopi Moon Clan (Patterson 1992). It is also the facial painting symbol of Spring Boy in the Siouxian Sun Dance adoption/mourning ritual and the shape used in the placement of the sods and buffalo skull on the Cheyenne (who were Algonquian speakers) Sun Dance altar (Hall 1997). Radiocarbon ages of 800 ± 50 BP (Beta 54901,

1992) and 860 ± 50 BP (Beta 62401, 1993) (both uncorrected $\delta^{13}\text{C}$) indicating the Late Woodland period, were obtained on charcoal from two of the structures (personal communication, D. Andreozzi 1996). The structures were however in the same location as lithic assemblages of at least two other periods, the Transitional Archaic and Middle Woodland. These earlier lithics were found at various levels, some above the levels of the constructs, suggesting disturbed strata possibly due



Figure 8. Front and side views of "U" #2 at the Groton, Massachusetts, site. The azimuth, 285 True, is halfway between Equinox and Summer Solstice azimuths. These views show the use of the stone row to frame the space between the arms of the structure. (Scale in 10 cm segments.)

to the building of the structures at a later date. Native American burials were found in the early 1900s during construction of a golf course adjacent to the site.

Native American Ritual Use of the Big Dipper, Polaris, and The Pleiades Constellations

The Big Dipper was used as an event-timing device by many cultural groups in the Americas.

For the Maya of Central America, the Big Dipper was their God, Itzam Yeh (7 Macaw), who was knocked out of the Milky Way tree in the evening of the day of the return zenith passage of the sun, signaling the rebirth of the Maize God from the crack (defined by the three stars of Orion's belt) in the shell of the turtle (Freidel 1993). Also, the Aztec god Tezcatlipoca, who was associated with death and darkness, was the Big Dipper, and he was pictured with the lower portion of a leg torn off (Krupp 1983). Today, the end stars of the handle of the Dipper drop below the horizon at latitudes below about 40 degrees. The Aztecs migrated south to Mexico City, latitude 20 degrees, where the whole Dipper is below the horizon on winter evenings.

In North America, the bowl of the Dipper was the canoe that transported the Corn Mother of the Alabama to earth signaling the start of the mid-summer green corn (Busk) ceremony (Swanton 1929). For the California Chumash, the Hutash ceremony (burning the blankets of the dead) was associated with the Dipper standing on end (Hudson & Underhay 1978). At this time in the Dipper cycle (late fall, early winter) the bifurcated split in the Milky Way (highlighted by the stars Altair and Deneb) plunges to the southwestern horizon providing a pathway for the "spirits of the dead" (Brinton 1868) to travel to the place of the dead from their temporary abode among the stars of the Milky Way. Men traveled along one branch,

women along the other. Krupp (1983) noted that the Chumash also referred to the North Star, Polaris, as the "Sky Coyote" who controlled the order of the heavens, and he discussed the use of Polaris as the target for the Omaha's Sky Pole that was framed by a "U"-shaped structure of mats.

In the northeast, there is reputedly an Abenaki tradition associating the spirits of the dead with Altair (personal communication, 1997). Simmons (1970) refers to Roger Williams' comments on Native beliefs in the "Key" (1643), where "the souls of their great men and Women" take the journey to join Cautantowwit in his dominion in the southwest. Roger Williams, in another section of the "Key" (1643), notes the use of the Bear constellation (identified as the English Charles Wain [Wagon], our Big Dipper,) by the Narragansetts. Among the Iroquois, the three stars of the Dipper handle represent three Mohawk hunters who chased the Bear (Dipper bowl) into the sky in winter (Tehanetorens 1976, Volmar 1996).

Additional sky object usage by northeastern Native Americans was reported during the Contact Period. Verrazzano cited the use of the Pleiades as a planting cycle controller in the Narragansett Bay area (Ceci 1978). Mavor & Dix (1989) suggest the use of a corbelled stone structure in Upton, Massachusetts, with stone mound foresights, as a mechanism for precise viewing of the set of the Pleiades in the 8th century AD. The Iroquois used the zenith passage of the Pleiades to time their mid-winter festival (Snow 1993).

Scarcity of Sky Event Usage Data for Local Native Americans

It is unlikely that any of these structures were built by or used for celestial observation by the English since no documentation exists for formal sky event usage by Contact period Calvinist English immigrants. Rather the opposite is true. Because of Elliot's early failures at proselytizing

Native Americans in the Massachusetts Bay area, the General Court, in November 1646, enacted laws prohibiting the practice of Native American religion under pain of fines or death (Jennings 1976). As previously noted the residual cultural memory of local Native Americans was dealt a devastating blow by lack of immunity to imported diseases and 17th century warfare with Europeans. The primary source for written knowledge of their social structure and ritual has been a few Contact period writings, by Europeans, that met the censorship criteria of the Puritan theocracy. Some inferences have been made from analysis of grave goods, a resource that has been severely constrained. An oral trace survives in family lore of the few surviving descendents. An example is the recitation of the Christian Wampanoag version of The Lord's Prayer which starts with the phrase "Our Father the Sun" (personal communication, Russell Gardner, Wampanoag Tribal Historian, 1996).

Other than the Barrington, Rhode Island, site there is no direct linkage showing Native American involvement with the sites discussed here. I have done no excavation. In addition to the location inferences for the Groton site (Figure 4) and the area shown in Figure 5, hearsay indicates a late 19th -early 20th century Native American pre-

sence on the northern portion of the Wrentham site. The Middleborough site is adjacent to Wapanucket with its documented prehistory from the Archaic into the Contact Period.

Conclusion

The data accumulated to date and discussed here suggest that these "U"-shaped constructs are artifacts that are remnants of a sky-based socio-ritual structure applicable to at least Late Woodland and Contact Period New England Native American society. The evidence for ritual usage of similar structures by Algonquian peoples in the west and far west strongly suggests a deep-rooted cultural base. The commonality of usage of these similarly constructed viewing structures by other Native American culture groups suggests a widespread ritual practice that is embedded in prehistory. These data from other areas of the United States and Central America lend support to a sky-based ritual interpretation for "U" structures in New England. Radiocarbon ages from a single site in Rhode Island imply a Late Woodland context.

While these structures still exist they provide a window of opportunity for expanding our database of anthropological knowledge about a relatively unknown period of New England prehistory.

GLOSSARY

Azimuth	A vector angle as measured from a reference point. Compass readings use North as the reference point. The azimuth of North is 0. For East the azimuth is 90 degrees, for West it is 270 degrees.
Equinox	Two dates each year when day and night are of equal length, March 21 and September 21 (half way between the Solstices). At equinox the sun rises directly East at an azimuth of 90 degrees.
Flash of the sun	The moment the Sun's edge breaks the horizon at sunrise.
Foresight	The front sight of a weapon that is pointed at a target. When the target is the Sun along the horizon at sunrise, the foresight can be a hilltop or notch or a man-made object such as the placed stone (lith) shown in Figure 4.
Solstice	The day when the Sun is at its maximum (June 21) position above the equator or minimum (December 21) position below the equator. (The longest or shortest days of the year).
Vector	The direction or line of sight towards a target.

U6L60(2)

REFERENCES CITED

- Allport, Susan
1990 *Sermons in Stone*. W.W. Norton, NY.
- Anderson Mounds
1969 *The History of the (Anderson) Mounds*. Division of State Parks, Indiana Dept of Natural Resources.
- Ballard, Edwin C.
1992 Lithic Ritual Structures in the Taunton and Palmer River Basins. Presentation N.E.A.A./ M.A.S. Conference, Bridgewater, March 13, 1992.
- Bourne, Russell
1990 *The Red King's Rebellion (Racial Politics in New England 1676-1678)*. Atheneum, N Y.
- Brinton, Daniel G.
1868 *Myths of the Americas*. Multimedia Publishing Co., Batavia, NY. (1976)
- Carlson, John B.
1990 America's Ancient Skywatchers. *National Geographic Society*, Washington, DC, January 1990.
- Ceci, Lynn
1978 Watchers of the Pleiades: Ethnohistory among Native Cultivators in Northeastern North America. *Ethnohistory* 25(4): 301-317.
- Chartkoff, J. L.
1983 A Rock Feature Complex from Northwestern California. *American Antiquity* 46(4): 745-760.
- Church, Thomas Esq.
1989 [1716] *The History of Philip's War*. Heritage Books, Bowie, MD, (Reprint).
- Cronon, William.
1983 *Changes in the Land*. Hill and Wang, New York.
- Eddy, John A.
1977 Probing the Mystery of the Medicine Wheels. *National Geographic Society*, Washington, DC, January 1977.
- Emery, S.H.
1893 *History of Taunton, Massachusetts*. D. Mason & Co., Syracuse, NY.
- Fischer, David H.
1989 *Albions Seed*. Oxford University Press.
- Fletcher, Robert, and Terry Cameron
1988 *Serpent Mound*. Publication of the Ohio Historical Society.
- Freidel, David, Linda Schele, and Joy Parker
1993 *Maya Cosmos*. William Morrow & Co. Inc., New York, NY.
- Goodwin, William P.
1946 *The Ruins of Greater Ireland in New England*. Meador Press, Boston, MA.
- Hall, Robert L.
1997 *An Archaeology of the Soul*. The University of Illinois Press, Urbana & Chicago.
- Hall, Jonathan, and Eric Woodman
1972 Beehive Shaped Stone Structures: Ancient or Recent Origin. *Man in the Northeast* 5, 1973.
- Hudson, Travis, and Ernest Underhay
1978 *Crystals in the Sky*. Balena Press, Menlo Park, CA.
- Jennings, Francis
1976 *The Invasion of America*. W.W. Norton, New York, NY.
- Krupp, Edwin C.
1983 *Echoes of the Ancient Skies*. Oxford University Press, New York, NY.
- Mavor, James, and Byron Dix
1989 *Manitou*. Inner Traditions Intemationa, Rochester, VT.
- Miller, Dorcas S.
1997 *Stars of the First People*. Pruett Publishing Co., Boulder, CO.

Neudorfer, Giovanna

1980 *Vermont Stone Chambers*. Vermont Historical Society, Montpelier, VT.

Patterson, Alex

1992 *Rock Art Symbols of the Greater Southwest*. Johnson Printing, Boulder, CO.

Rothovious, Andrew E.

1966 Site Report File. New England Antiquities Research Association.

Russell, Howard S.

1980 *Indian New England Before the Mayflower*. University Press of New England, Hanover, NH.

Salisbury, Neal

1982 *Manitou and Providence*. Oxford University Press, New York, NY.

Sams, Jamie, and Twylah Nitsch

1991 *Other Council Fires Were Here Before Us*. Harper Collins, New York, NY.

Simmons, William S.

1970 *Cautantowwit's House*. Brown University Press, Providence, RI.

Snow, Dean R.

1980 *The Archaeology of New England*. Academic Press, San Diego, CA.

1993 *Iroquois*. Blackwell, Cambridge, MA.

Stevenson, Matilda Cox

1901/1902 *The Zuni Indians*. 23rd Annual Report of the Bureau of American Ethnology, Washington, DC.

Swanton, John R.

1929 Myths and Tales of the Southeastern Indians. Bureau of American Ethnology Bulletin 88.

Tehanetorens

1976 *Tales of the Iroquois*. Akwesasne Notes, Mohawk Nation, Rooseveltown, NY.

Volmar, Michael A.

1996 Mangua the Bear in Northeastern Indian Mythology and Archaeology. *Bulletin of the Massachusetts Archaeological Society* 57(2).

Williams, Roger

1643 *A Key Into the Language of America*. Editors, John J. Teunisson and Evelyn J. Hinz. Wayne State University Press, Detroit, 1973.

Williamson, Ray A.

1984 *Living the Sky*. University of Oklahoma Press, OK.