

# Examination of Precolonial Seasonal Habitation at the Coastal Studies Center Through a Study of the Soft-Shell Clam (*Mya arenaria*) Growth Patterns

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## INTRODUCTION

Professor Anne Henshaw, Joy Giguere ('03) and I conducted an archaeological excavation of a shell midden, an ancient collection of refuse consisting mostly of discarded clamshells, from June 8<sup>th</sup> to August 2<sup>nd</sup>, 2002. Henshaw and Christie Toth ('04) identified this midden during the 2001 Coastal Studies Center (CSC) Archaeology Mapping Project. The midden, roughly 50 meters by 13 meters in size, is located on a rock outcropping and continues into the interior of the forest at Brewer Cove on the CSC property (fig 1).



Figure 1. Brewer Cove at the Coastal Studies Center

## PURPOSE

The purpose of this project was to analyze the ancient use of the Brewer Cove site through limited excavation and the study of the faunal remains, and more specifically, to examine how the activity of the precolonial peoples varied seasonally. Midden formation is associated with various types of settlements, including long term or mealtime only sites (Ceci 1984). Also, ancient sites occupied year-round and spring-

summer only have been identified along the Gulf of Maine. The activity at the Brewer Cove site, through the analysis of the soil stratigraphy, cultural features and faunal remains, can be related to these known regional patterns of precolonial and historical land use. Also, the project contributes to the ongoing investigation of ancient and colonial inhabitants of the CSC.

## EXCAVATION

The site was first cleared of overlying brush and then thoroughly photographed. We mapped the site and divided it into 2-m by 2-m quadrants using a transit and sighting compass. Eleven, 50-cm by 50-cm test pits were excavated; their specific locations were chosen to represent the various surface and topographical features found on the site. Excavation continued until sterile soil was reached, roughly 8 to 30 cm in depth. Shell fragments, soil samples, charcoal, bone and artifacts were bagged by level; levels were determined by changes in the natural soil stratigraphy, or at 10 cm in thickness if the strata did not change within that depth. All soil recovered was sifted to separate shell and other evidence of cultural activity from organic material and rock (fig 2). The shellfish species recovered in the greatest abundance was *Mya arenaria* or soft shell clam. The growth patterns of *Mya arenaria* can be analyzed to determine site seasonality. Other shellfish remains that were recovered included quahog (*Mercenaria mercenaria*), oyster and periwinkle.



Figure 2. Sifting at the site

## MYA CHARACTERISTICS AND IMPORTANCE

The growth rates of *Mya arenaria* (soft-shell clams) vary directly with temperature and therefore correspond to the seasonal conditions of their environment (Cerrato 2000). Fall and winter growth will be opaque and spring and summer will be translucent. This pattern is best preserved in the chondrophore, a spoon-like projection near the hinge of the left valve (fig 3). The most recent growth increment is found at the tip of the chondrophore. The relative transparency of the tip sectioned to about 100 microns thickness will reveal what season the clam was harvested and consequently when the site was occupied.



Figure 3. Recovered chondrophores in the field

## SECTIONING METHOD

- Chondrophores from each test pit and level were washed, photographed and measured (length and width)
- The chondrophores were sectioned from umbo to tip on a low speed saw
- The two halves of the sectioned chondrophore were affixed to petrographic slides with epoxy
- The slides were sectioned on a low speed saw until about a 400 micron section of chondrophore remained on the slide

- The slides were ground on a grinder-polisher until the chondrophore section was about 100 microns in thickness (fig 4)
- The slides were viewed under low magnification (10x)



Figure 4. Operating the grinder/polisher

#### SEASONALITY DATA AND GRAPHICS

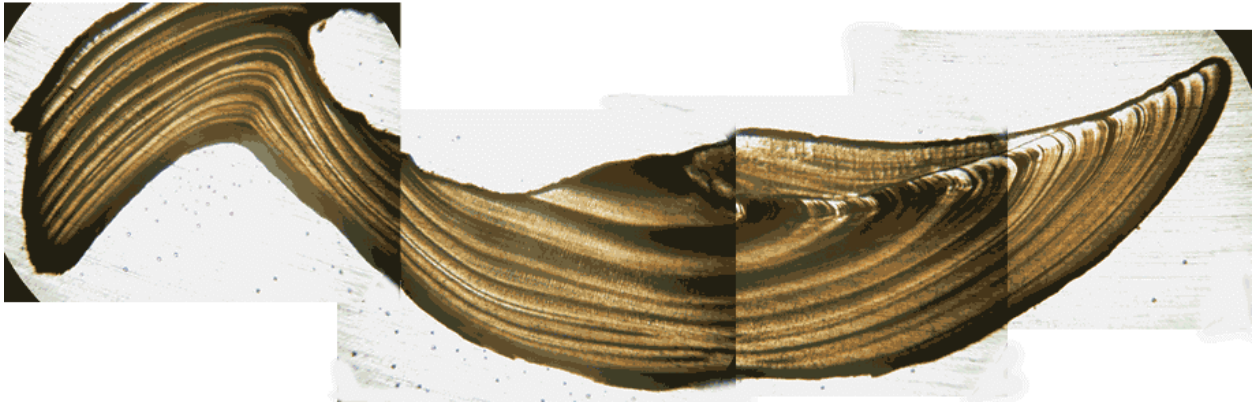


Figure 5. A composite photo of a thin-sectioned chondrophore (sample # 13). The boundaries between the opaque and translucent bands illustrate a shift from early spring to late spring/early summer growth.

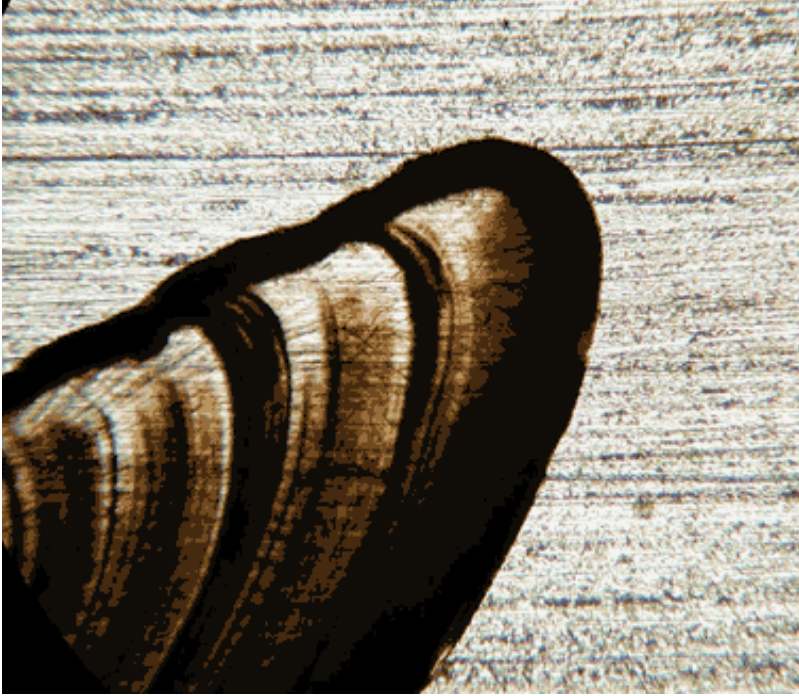


Figure 6. Chondrophore #13. A faint translucent rim is found along the tip, which denotes a spring harvest.

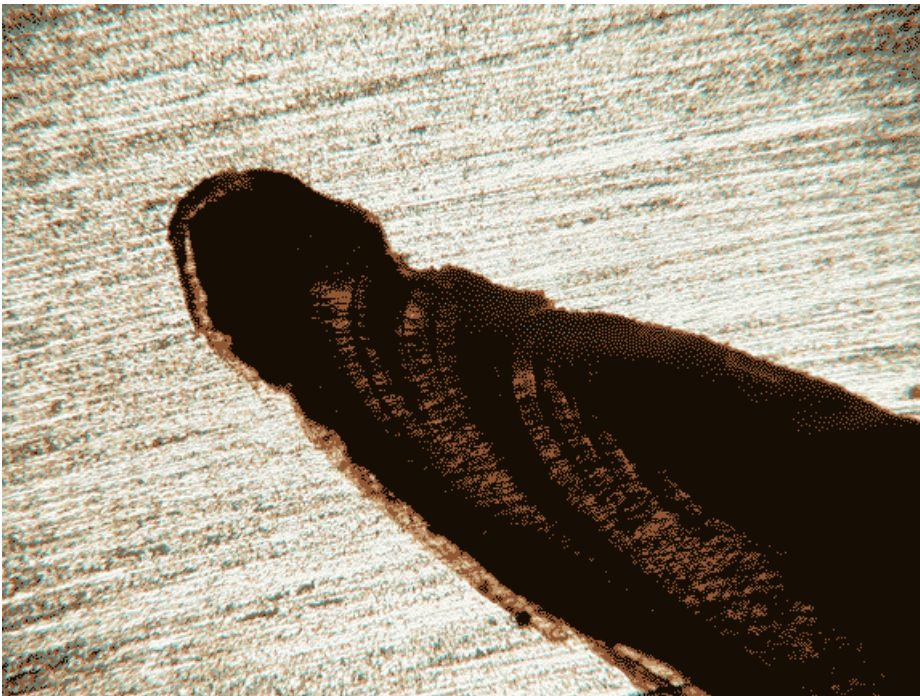


Figure 7. Chondrophore #8. The translucent band along the edge is substantial; a summer harvest is implied.

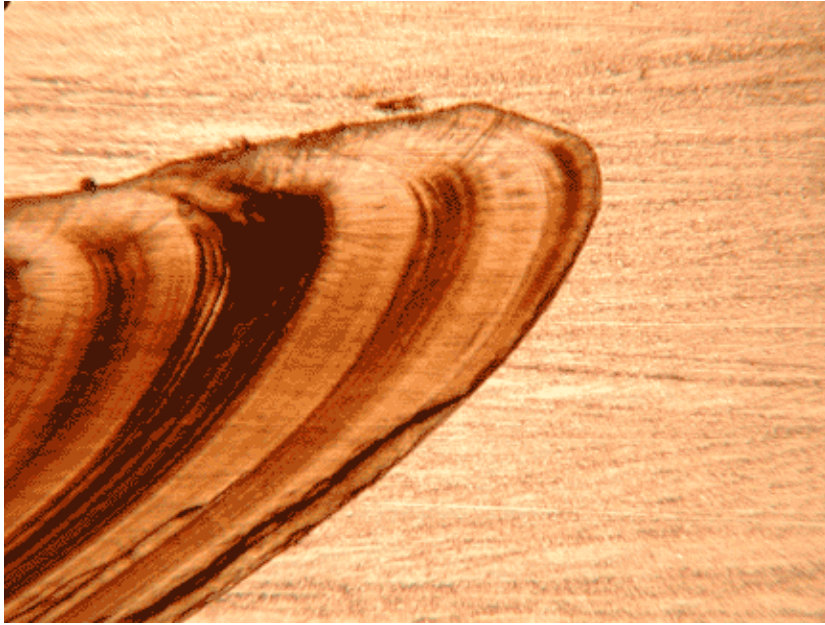


Figure 8. Modern Chondrophore #2. Ancient seasonal patterns were confirmed with patterns from modern samples harvested on known dates. This sample was collected from Dog's Head at the CSC on June 21<sup>st</sup> 2002.

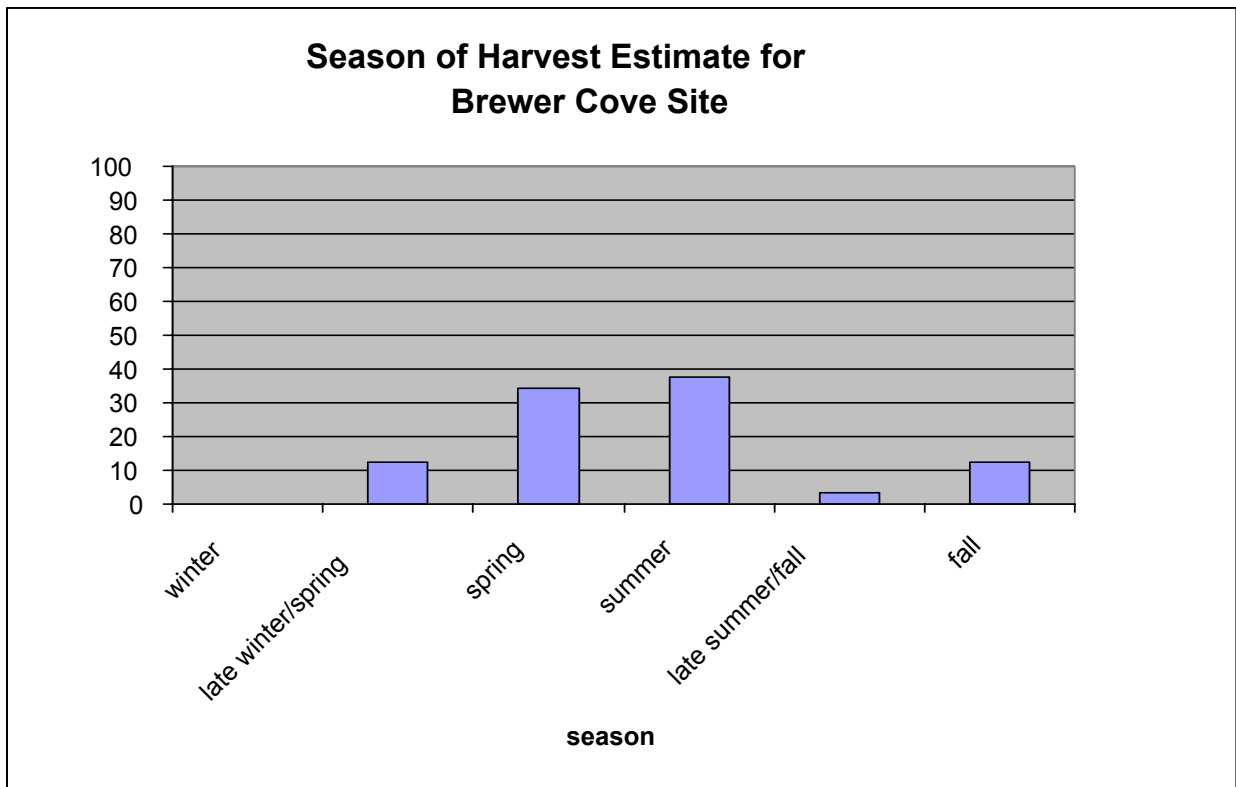


Figure 9. Seasonality of harvest percentages from chondrophore samples

Table 1. Chondrophore sample and seasonality of harvest

Sample Number	Test Pit	Level	Age(years)	Harvest Season
	3A		2	4late summer/fall
	6A		3	3spring
	8A		3	3summer
	9A		3	3summer
	13B		1	9spring
	17B		2	11late winter/spring
	18B		211+	summer
	22B		2	4late winter/spring
	23C		1	4late winter/spring
	32D		2	7spring
	34D		2	12summer
	35D		2	4fall
	38D		2	12summer
	39D		2	7spring
	40D		2	4spring
	43F		113+	summer
	49F		2	7summer
	53D		3	8summer
	54D		3	6spring
	55D		3	10spring
	56D		3	14fall
	57D		3	9spring
	58D		4	10summer
	59D		4	6spring
	60D		4	11spring
	62D		4	8spring
	70H		1	2fall
	72H		1	3fall
	74H		2	10late winter/spring
	75H		2	5tip gone
	78I		2	8summer
	79I		2	tip gone
	80I		2	3summer
	84I		2	8tip gone
	86I		2	8summer

### SAME SIZE, SAME MESS

It can be assumed that differing chondrophore size and distribution patterns indicate a different mess or population of the organism (Spiess and Hedden 1983). Statistically, only the length and width averages of Test Pit C differ significantly from the averages of all the other test pits. This may be in part to Test Pit C's small sample size. Also, a distinct mess from Test Pit C was not supported by the soil-shell ratios and other analysis performed by Joy Giguere (2002).

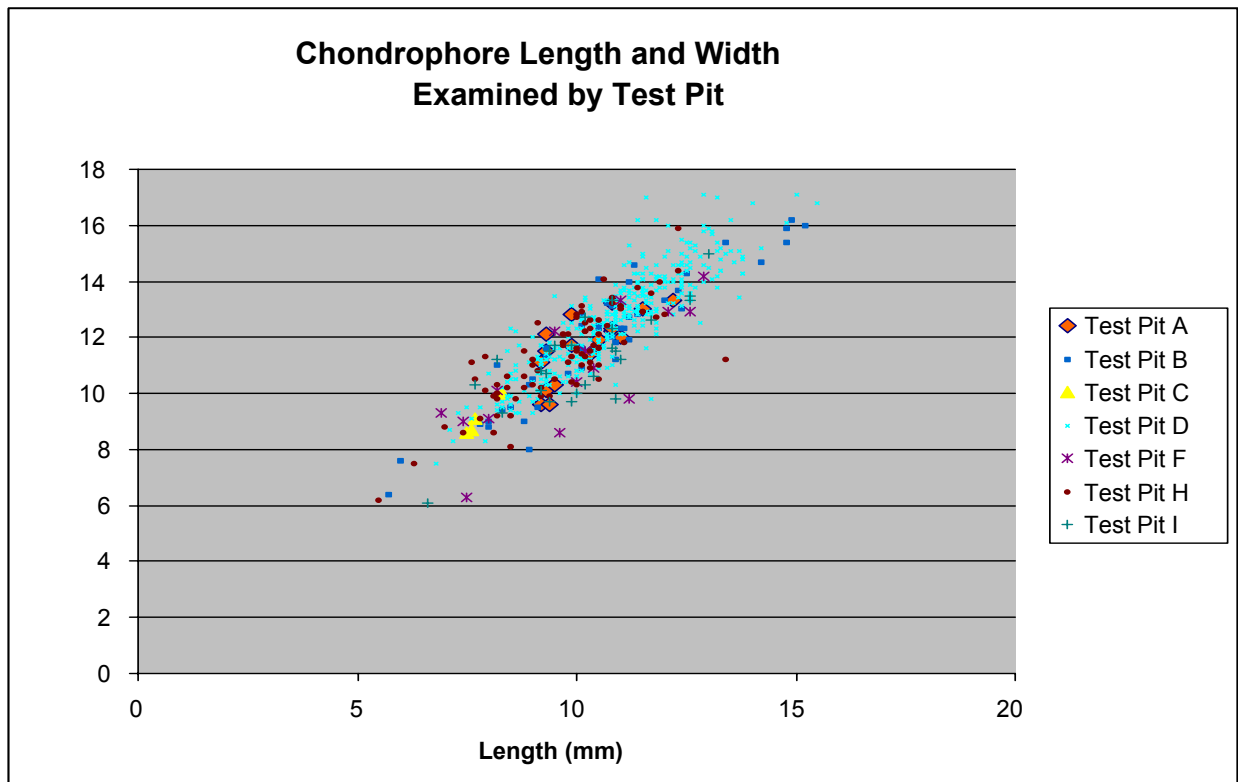


Figure 9. Length and width of chondrophore samples by test pit.

### CONCLUSIONS

The ancient recovered chondrophores averaged over 6 years in age. This implies that there was probably not substantial pressure on local *Mya* populations from the harvesting of precolonial peoples (Claasen 1998.) The older age of the clams made seasonality harder to determine, as growth rates in *Mya arenaria* decline linearly with age. The translucent/opaque patterns are compressed, especially towards the tip, and are consequently less apparent in the older specimens. The seasonality of many *Mya* specimens was still evident. The soft shell clam record reveals that the site was largely occupied in the spring and summer months, and that activity continues into the fall and may have begun in late winter. The absence of a winter harvest corroborates with Giguere’s proposal that the Brewer Cove site was used largely for processing, and was not a permanent, year-round settlement. A relationship between season of harvest and within the site (specific test pit) was not demonstrated by the data.

The work this summer will contribute to many future studies of the land use and ancient activity at Brewer Cove and also the rest of the CSC property. Further excavation will refine and hopefully strengthen the analysis presented here. More *Mya* specimens should be examined, perhaps with a quantitative study applied to the decline in growth rate with age; consequently, seasonality estimates could be much more accurate. Also, the analysis of other faunal remains and a fine grain measurement study could both strengthen the seasonality estimate.

## ACKNOWLEDGEMENTS

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