

# Vermont's Stone Chambers

*An Inquiry Into Their Past*



By Giovanna Neudorfer

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**1980**

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A little consciousness is the most dangerous thing.  
And so we had better strive to become clearly and  
fully conscious, of who we are, where we are, and  
how we got this way.

In general, the uniformities and continuities of  
human experience are what make significant thought  
possible; the manifold possibilities of experience  
are what make critical thought necessary.

....only a fool will say that any opinion is as good as  
any other opinion — and even a fool is apt to seek  
expert opinion when he gets sick.

from Herbert J. Muller,  
*The Uses of the Past*  
(N.Y.: Oxford University  
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New American Library, 1952).

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GIOVANNA NEUDORFER  
*Montpelier, Vermont*  
*February, 1980*

## Foreword

The publication of Giovanna Neudorfer's study of the Vermont stone chambers is a time to reflect on the conditions that brought this project into being as well as to applaud the conclusion of an important piece of scholarship. Fifteen years ago these chambers rested peacefully in the Vermont uplands, and most who knew of their existence did not consider them at all unusual. Today, the chambers are notorious, having been touted as the remains of European Neolithic or Bronze Age settlers. Based on vague architectural similarities with megalithic monuments in Western Europe and on the occasional presence of markings, thought to be inscriptions written in various early writing systems, these claims have been advanced by individuals who generally lacked professional training in archeology, history, or linguistics. Nevertheless, the theories took root and received a large public exposure in non-academic publications and popular media. Conferences were held and pitched battles ensued as opposition arose from professional scholars. Unfortunately, most of the professional criticism was directed at procedural or methodological fallacies in these studies. Little new evidence was advanced to support alternative explanations. The discussion, in fact, showed that little was known about the origin or function of these structures. One wonders then, how the controversy could have developed. In fact, the stone chamber debate shows clearly how such ideas are born and flourish in American society.

This topic is as interesting as the origins of the structures themselves. To deal with the general milieu first, the reasons seem to lie in part in the nature of American education and society and a lack of understanding of historical and archeological interpretation. The exotic is of particular attraction and our popular publications emphasize dramatic events and discoveries. We seem to learn by contrasting differences rather than by gradual accretion of new information. Public understanding of science is frequently beset with this problem. While there are many positive aspects in the emphasis on novelty, the negative effects include a belief in simple solutions and explanations. Very little evaluation of evidence seems to occur, and reliance is placed on the media editors to protect credibility. In the area of social science, ideas tend to become accepted when they reinforce deeply rooted social values or prejudices whether or not they have strong scientific support.

In part the receptivity for "Ancient Europe" theories may lie in the conception held by many that Indian cultures were not capable of creating complex sites or structures. In this case the present controversy is quite similar to the situation which existed in the 18-19th centuries as settlers pushed the frontiers west and encountered large mounds and ceremonial

sites which were not integrated into the politically unorganized cultures of contemporary Indians inhabiting these regions. Not realizing the extent to which white settlement had disrupted earlier native cultures, it was proposed and maintained that a race of European-derived "Mound Builders" had created these sites. This view lasted until the 1890's when the Smithsonian's mound surveys by Cyrus Thomas proved their Indian origin. The subject of Pre-Columbian European contacts in the New World has always been a persistent popular touchstone. The ready acceptance of the Kensington Stone forgery, the Phoenecian claims for the Bat Creek Stone, and the many other instances in which inscriptions have been used to authenticate claims of early European migrations are similar examples. Reliance on inscriptions and the written word rather than archeological complexes as the primary source of evidence is a typical feature of the Ancient Europe theories.

The other basic historical ingredient is that most people consider American cultural history to be fairly well known. Along with the sanctity of the written work, be it enscribed on rock or in a book, there is a common feeling that history would indicate whether stone chambers were used for root cellars or not. The fact that most kinds of historical documents do not mention these structures greatly reinforced the arguments of the ancient theory proponents. Actually, most historians have concentrated on individual histories and political events rather than regional and ethnic studies, American material culture, and architectural history. Anthropologists who might have brought the proper perspective to such studies were strongly influenced by their disciplines and by moral obligations to gather data on vanishing Indian cultures, while geographers had virtually no academic basis in most American universities. Consequently, local history and American studies remained the purview of amateur specialists operating within the context of local historical societies and museums. Primary interest in historical archeology centered on identification of battlefields and forts, or early colonial settlements, or the homes of prominent individuals. Without a cultural perspective or a tradition of professional field studies, many aspects of early American life remained unexplored, and in the absence of historical documentation or oral tradition other subjects quickly passed into obscurity. Added to this was the very large void created by the failure of the American academic and government communities to undertake a program of American cultural history, folk, and historical archeology studies, especially in rural regions. This problem continues to the present day and is a glaring deficiency.

When Neudorfer arrived in 1976 to take the post of State Archeologist, the controversy of the stone chambers was just reaching its peak. At that time, the only detailed arguments presented were those of the proponents

of "Ancient Europe." While scholars fired stinging salvos to academic journals, and occasionally to newspapers and radio audiences, none had committed his or her time to a scholarly review of the entire problem. I do not claim immunity to this criticism, and frequently referred many letters of inquiry sent to the Smithsonian to my colleagues in New England institutions. Some, such as Dr. Dena Dincauze, responded to the problem and investigated some of the claims. But the response was miniscule and the results did little to counter the pervasive appetite of the times, which included incredible sales of von Dannikan tracts, and a number of sensational claims made by self-styled archeologists and even some professional scholars operating outside their fields of competence. The results were a garbled mess of claims and hypotheses, such as translations of inscriptions purportedly written in one language on architectural remains attributed to a different culture and age. The absence of other artifactual or skeletal evidence of ancient Europeans necessitated a leap of faith about the habits of the immaculate builders. Still, the fact that this hypothesis was based on a large number of sites and not on single isolated finds or possibly faked remains raised considerable interest.

The challenge has now been met, in part, by the detailed and highly scholarly treatment presented in this volume. The purpose of the study was to conduct a baseline inventory of the known stone chambers and to record their location and associations, basic variability, and probable functions. In addition to field studies, extensive archival research traced deeds and property descriptions, while oral history was collected from local residents. Historical literature was researched for comparable structures from other regions. This research has shown, with a high degree of scholarship, that the claim for ancient origins cannot be considered. Undoubtedly, continued historical research would augment the conclusions in this book and provide a better understanding of the role of this technological complex in the early settlement of the region. Neudorfer does not claim to have made an exhaustive study of all aspects of the problems. Nevertheless, her approach along various lines of evidence should leave little doubt as to the appropriate methods of investigating cultural phenomena. One of the surprising results of the study is that claims of ancient origins could have been seriously advanced for structures which were such an integral part of the recent history of the area, and that records of their existence have been so generally lacking.

Neudorfer's conjunctive study, using a variety of methods to document and explore the Vermont stone chambers, should be followed in other areas, such as Pennsylvania and New York, where similar structures exist in order to determine the relationships between their separate distributions.

In addition, one hopes that future studies will be directed at archeological excavations to test the hypothesis that has been developed from the archival and historical evidence using material culture remains, plant evidence, and structural features. Considerable work will have to be done to understand the role of these structures within specific farm and local settlement patterns and ethnic traditions. This study, therefore, should be viewed as a preliminary analysis of part of the stone chamber problem which should pave the way for continued research in rural American culture history in the Northeast. Hopefully, the efforts expended by Neudorfer, and her demonstration of the need for an enlarged consciousness about gaps in our knowledge of the past, will continue to enlighten the search. Perhaps, we will be less inclined to dramatize the unknown with "mysteries" and extravagant claims before exhausting more probable homegrown explanations. Certainly, we now are more aware of inadequacies in our understanding of even the recent past in rural New England. We should encourage the sometimes prosaic but frequently fascinating study of undocumented colonial and post-colonial society in the areas most neglected by scholars beyond the urban centers and outside the range of historical documentation. The Great Stone Chamber Debate of the 1970's also reminds us to tend house in neglected areas of scholarship and to communicate widely the results of this work. Professional scholars must also do a better job at working together with local societies and amateur groups in identifying, clarifying and preserving the remarkable traditions of our pioneer and native predecessors.

WILLIAM W. FITZHUGH  
*Smithsonian Institution*  
11 February 1980

## Introduction

Since at least the 1940's distinctive stone structures in the Northeast, variously called "chambers," "huts," "caves," "beehives," and "root cellars," have provoked questions about their age and cultural origin.<sup>1</sup> Recently, the hypothesis that the chambers are remnants of an ancient civilization has gained popular support. Widespread publicity has contributed to the uncertainty and added a degree of sensationalism to the discussion.<sup>2</sup> It became evident that the structures needed to be studied and evaluated to determine their origin and to provide a basis for deciding the desired level of protection and preservation. Although the relative significance of the chambers would increase with a demonstrated antiquity, the structures deserve study regardless of who built them. Along with being architecturally distinctive, the stone chambers are significant archeological sites because of their potential for yielding data on the behavior, cultural patterns, and traditions of past peoples either in the recent past or in antiquity.

In the summer of 1977 the Vermont Division for Historic Preservation undertook a study of these stone chambers found in many areas of Vermont. While the study was limited to Vermont, structures of this type have a widespread distribution, having been identified in all of the New England States, New York, Pennsylvania, New Jersey, Ohio, Virginia, West Virginia, and Kentucky.<sup>3</sup> The structures exhibit a number of common features, although construction details of individual chambers vary widely. In context and in construction these stone structures differ from typical New England stone burial vaults, usually associated with cemeteries, as well as from better documented stone facilities such as charcoal and lime kilns, potash burners, and iron furnaces.<sup>4</sup>

Intense public interest in Vermont's stone structures began in 1975 when, at the request of several individuals, Professor Barry Fell, retired marine biologist from Harvard University, undertook an examination of several areas in Vermont. At that time Fell first stated that he had identified inscriptions in an early form of Ogam script dating from 1000 B.C. to 300 B.C. carved in stone by "Celts from the Iberian Peninsula."<sup>5</sup> Fell wrote that "both on-site investigations and historical research" demonstrated "that Celts from the Iberian Peninsula were responsible for the Ogam inscriptions we find on ancient stone buildings in New England. In all probability," he continued, "the same Celts were the actual builders of the structures on which their inscriptions occur" and "that Celts in considerable numbers did in fact settle here, particularly in New England."<sup>6</sup>

To Professor Fell "it became clear that ancient Celts had built the New

England megalithic chambers and that Phoenician mariners were welcome visitors, permitted to worship at the Celtic sanctuaries and allowed to make dedications in their own language.”<sup>7</sup> Fell explained the upland location of the Celtic settlements as the result of migration from their first settlements near the mouths of New England rivers.

At some time they ascended the Connecticut River, sailing as far north as Quechee, Vermont, where a western branch of the river joins the main stream through a precipitous gorge. Attracted doubtless by the seclusion of the uplands beyond the gorge, the Celts turned westward and colonized the hanging valleys of the Green Mountains . . . In the secluded valleys and on the hilltops, the priests (or Druids) erected the temples and circles of standing stones required by their religious beliefs, using, like their European cousins, the great stone boulders left upon the land by the retreating glaciers at the end of the ice age.<sup>8</sup>

In addition to inscriptions and stone chambers, Fell and others cite further evidence in support of the ancient European settlement thesis including rocks carved into the shape of male and female genitals and deity and animal figures;<sup>9</sup> stone piles, perched and standing stones, some with symbolic markings;<sup>10</sup> Celtic place names;<sup>11</sup> various kinds of artifacts;<sup>12</sup> and archaeoastronomical data suggesting that some of the stone chambers “had been carefully selected for prominent horizon features that would align with the sunset and sunrise during the [solar] solstices and equinoxes.”<sup>13</sup> The stone structures, therefore, are simply one of many kinds of evidence which allegedly reflect an ancient European culture in Vermont and elsewhere in New England. Even Fell’s supporters agree that some of the evidence of ancient settlement is equivocal: “sometimes because of the extensive weathering, it is indeed impossible to tell whether stone markings are truly man-made, although they may seem suggestively so.”<sup>14</sup> The stone chambers, on the other hand, are without any doubt man-made. Of all the components of the hypothesized ancient European culture, the stone chambers are the most readily studied.

The controversy over these structures focuses on two primary theories about their age and origins: the historic origin theory and the ancient origin theory. Some have also suggested that native Indian cultures built the stone chambers. Although there is abundant evidence that prehistoric Indian groups in the Northeast had traditions of stone utilization,<sup>15</sup> absolutely no archeological or ethnological evidence exists at present which suggests that prehistoric or historically known Indian groups undertook the level of stone construction represented by the stone chambers. Furthermore, the concentration and distribution of stone chambers precludes construction by Indian populations, either in the remote or recent past. Native American subsistence and settlement patterns, both documented historically and known archeologically, indicate that native groups limited their use of upland areas, where the vast majority of the chambers

are located, to hunting and other short-term activities. Intensive and long-term occupation, as implied by the concentration and stone construction of the chambers, was invariably associated with river or lake-side environments.

The historic origin theory attributes the structures to colonial or post-colonial farmers of the eighteenth and nineteenth century and considers numerous original functions with varying adaptive uses including temporary settlers' quarters, smoke houses, sheperds' shelters, animal pens, whiskey storage facilities, slave quarters<sup>16</sup> and hunting or trapping enclosures.<sup>17</sup> Most observers, supported by strong local oral tradition, call them root cellars. The general absence of reference to the stone structures in records and accounts of the early settlement period and town histories<sup>18</sup> lends support to their construction within the recent historic period, since the absence of references to these structures implies that they were routine, not worthy of discussion. Failure to find primary documentation on various kinds of buildings is, in fact, quite common.<sup>19</sup>

Anthropologists and historians concerned with the stone chambers have for the most part attributed them to the historic period. They base their opinion less on what they know or do not know about the chambers but rather on intimate acquaintance with New England's archeological record and regional ethnology and on their knowledge of cross-cultural studies and general anthropological theory.<sup>20</sup> The primary anthropological concern relating to the possibilities of long-term ancient European settlement in the Northeast centers around the nature of the ancient settlements as implied by Professor Fell and others. The theory of pre-Columbian European settlement in the Northeast is based on a broad and widely scattered range of purported evidence which describes *not* a single, accidental landing or contact episode by a group of explorers or lost seafarers, but rather major, deliberate, repeated and on-going voyages and settlements by groups of Celtiberians and Phoenician traders.<sup>21</sup> These two kinds of contact differ not only in the amount and character of residual material which is found archeologically, but also in the cultural consequences of the contact with native groups. While one or several isolated landings would leave behind little physical evidence and make a negligible impact on the native populations, on-going and long-term contact, as hypothesized by Fell, would result in a significant transmittal of ideas, material objects, technologies, customs, language, genetic traits, and diseases from the newcomers to the native inhabitants.<sup>22</sup> While the possibility of transatlantic travel to eastern North America prior to 1492 is generally accepted (at least one landing episode has been documented archeologically),<sup>23</sup> Fell's concept of long-term and repeated settlement significant enough to leave in its wake a widely distributed and broad range of evidence is open to question or has been dismissed on anthropologi-

cal grounds. First, there is the problem of missing archeological and physical anthropological evidence. "Why did ancient voyagers leave behind nothing but inscriptions and religious structures? Where are the habitation sites and tools and pottery one would expect from the many centuries of claimed Old World colonization?"<sup>24</sup> Scholars such as John R. Cole contend that "significant colonization should yield . . . domesticated animal bones [such as horses, sheep, cows or pigs] in pre-Columbian times . . . , but they do not appear. Artifacts of subsistence and not just ideology should have been left behind."<sup>25</sup> According to what is known "about cultural and biological processes, any significant pre-Columbian contact (that is, not just a possible stray boat or very temporary settlement such as the Vikings') would simply have had to leave evidence other than religious artifacts."<sup>26</sup> Peter Reynolds, a British Celtic scholar, commented that the question of ancient European settlement should include discussion of "postholes, potsherds, house foundations, field systems and trackways that would belong to a Celtic culture B.C."<sup>27</sup> Many decades of archeological work provide no evidence that prehistoric Northeastern Native American populations were affected by anything but contacts with other Native American groups.<sup>28</sup> Similarly, there is no evidence of linguistic borrowings.<sup>29</sup>

The frequently repeated idea that physical similarities between New England and ancient Old World structures imply direct cultural and temporal connections also runs into vehement criticism on anthropological grounds. Physical similarities in methods of building construction do not prove a direct relationship between the builders: "people living in similar kinds of environments, having similar needs for protection from the elements and possessing comparable degrees of technological skill and comparable availability of raw material, are likely to stumble upon similar methods of solving problems of survival."<sup>30</sup> That is, based on the precept of "limitations of possibilities," "ways of doing things are limited or channeled by biological, psychological, sociocultural, and physical environmental possibilities (or demands) and by limitations or efficiencies intrinsic in the materials used or in the functions of the objects or practices, and that a trait may therefore have a fairly high probability of arising more than once."<sup>31</sup> For example, similar stone structures of widely varying age and function have been documented from Britain, Scotland, France,<sup>32</sup> northern Canada,<sup>33</sup> and southeastern Italy<sup>34</sup> without claim of common ancestry.

The proponents of the ancient theory perceive physical similarities between New England stone chambers and Bronze Age "megalithic," or large stone, structures in Europe as direct evidence of cultural and chronological connections.<sup>35</sup> The proponents of this theory also perceive the stone chambers as but one aspect of a vast complex. Claims for their antiquity

thus rely on many kinds of corroborative data relating to the ancient complex as well as on attributes of the chambers themselves. Labeling the apparent variety of data as “serious cracks in the reigning paradigm, the ‘root cellar’ mind set,” Professor Warren Cook of Castleton State College cites such factors as “solar and lunar orientations, associated inscriptions, adjacent huge stones with inscriptions allegedly translatable as relating to fertility practices, and repetitive patterns of field walls in seemingly unfunctional shapes near stone chambers.”<sup>36</sup>

Although Fell’s thesis pertains generally to New England slab-roofed chambers, most of his detailed examples focus upon several Vermont chambers. Largely on the basis of inscriptions found on or near some of the structures and on the basis of their astronomical orientations, Fell attributes the chambers to Celts in the first millennium B.C.: “it is obvious that most slab-roofed chambers are temples” used, among other purposes, as lunar and solar observatories.<sup>37</sup> To Fell, the “absurdity” of the root cellar interpretation is demonstrated by several generalizations which, he claims, characterize the slab-roofed chambers: 1) they nearly always face east; 2) their long axis almost invariably lies due east, or along “some other well-defined astronomical axis such as due south;” and 3) “inscriptions” are frequently found on lintel stones inside of the chambers or on the ceiling slabs. “To assert that these megalithic buildings are merely ‘root cellars’ built by the colonists,” Fell reasons, “is unjustified. Even supposing that by some unexplained means the colonial farmers were able to inscribe Ogam and Phoenician dedications on their ‘cellars,’ this would by no means explain the systematic orientation of the cellars with respect to the ancient rites of the Celtic solar year.”<sup>38</sup>

In another attempt to refute their use as root cellars, Salvatore Michael Trento computed that the chambers were far too large for use for food storage. According to his calculations, 10 New York chambers identified on a one and one-half mile stretch of roadway could have fed 1,755 people, a number greater than the total population of the entire region.<sup>39</sup> Another observer commented that “Vermonters traditionally built root cellars near the south inner sides of cellars underneath their houses, rather than outdoors in a hillside.”<sup>40</sup>

In addition to the supportive “data” which could suggest that the chambers *were* of ancient origin, proponents of that position also argue that the chambers could *not* have been built within the recent historic period. For example, Mark Feldman declares conclusively that “there is no record of any construction of this kind occurring during the colonial period. It is inconceivable that hundreds of such structures could have been built by the farmers without any word ever having been recorded about the activity.” He finds “the existence of these structures in colonial New England . . . totally without explanation or rationale.” In a series

of rhetorical questions he further argues: "What were the structures built for? Why was it done in secret? And, most important, *how* was it done in secret? How could all of that construction occur without 'outsiders' hearing of it, seeing it, and finally reporting it for publication in the newspapers of the day? It is quite obvious that they were not built for ordinary mundane use."<sup>41</sup>

Supporters of the ancient origin theory also raise questions about the level of stone working technology required to build the chambers. For example, "why", they ask, "in an environment abounding in trees, would anyone, much less a practical-minded Vermont farmer or an exbondsmen, waste such a great amount of effort quarrying great stones and hauling them laboriously into place?"<sup>42</sup> They emphasize "the enormity of the task of emplacing stone roof slabs and the seemingly insuperable difficulty of sliding such stones onto unmortared stone walls."<sup>43</sup> (Why pre-Columbian settlers would have found the task easier goes unasked.)

Several proponents of the ancient origin theory cite documentation suggesting that, at least in some areas of New England, stone chambers already existed when the settlers first arrived. Retired Vermont farmers allegedly "recounted stories of their great-grandfathers' plows uncovering stone huts which 'looked like they'd always been there.'"<sup>44</sup> Specific reference is made to a letter written in 1654 to John Winthrop, Jr., by John Pynchon of Springfield, Massachusetts, who had heard "a report of a stone wall and strong chamber in it, made all of stone, which is newly discovered at or near Pequot; I should be glad to know the truth of this from yourself, here being many strange reports about it."<sup>45</sup>

As with any new theory, caution at the outset should ease the burden of future verdicts, and caution has not generally marked pronouncements from the ancient theory proponents. James Whittall, a notable exception, does not make the mistake of treating all of New England's chambers as a single type. He advises that each chamber merits study "on an individual basis and not all lumped together . . . suggestive of one age and origin."<sup>46</sup>

### **The Project: Philosophy and Methodology**

The conclusion that the stone chambers are ancient structures should be independently verifiable and should not ride coattail to inscriptions or other purportedly ancient evidence. That is, the chambers, on their own merits, are demonstrably ancient or they are not. Professor George Carter of Texas A & M University has objected to this line of reasoning. He criticized an earlier study<sup>47</sup> which focused exclusively on the stone chambers, noting that the "discussion of the stone beehives [was deliberately] out of context." He termed it "bad methodology to discuss anything out of context. In this case dolmens, menhirs, and passage graves form a

context, and that context is exactly like that of Bronze Age Europe."<sup>48</sup> The basic dilemma remains that more than a single context may be involved. The ancient theory proponents and their critics clearly disagree on what comprises the "proper" context of the stone chambers: the context of the Ogam inscriptions, animal and phallic figures and standing stones or the context of the eighteenth and nineteenth century rural New England milieu. To accept one context precludes the other. The debate engages two clearly conflicting "particularistic contexts," or observable environments,<sup>49</sup> surrounding the stone chambers.

In theory the on-going circular argument of "proper" context can be avoided by removing the chambers from any context and treating them as a series of artifacts which require appraisal independent of their setting. Henry Glassie, for example, advises that in order "to keep historic goals in focus, one must initially assume that the present context of an old artifact is irrelevant. Once the old thing has been analyzed in its own terms, the scholar can return to look at its modern setting for suggestions to aid in his argument."<sup>50</sup> But how does one look at a set of artifacts, particularly a set of artifacts thought to be directly related, both by culture and age, to ancient European megalithic structures?

Betty Meggers, an anthropologist with strong diffusionist tendencies, outlined three necessary criteria before direct relationships of traits (or artifacts, architectural techniques, etc.) can be considered between two disparate places: "uniqueness of the trait, absence of local antecedents, and absence of functional causality."<sup>51</sup> In terms of the stone chambers, these three criteria translate into three questions. First, what is the geographic distribution of the structures and what factors affected this distribution pattern? Second, can or did the structures develop out of local historical tradition and technologies? Third, did the structures fulfill particular local needs in response to local environmental and social or economic circumstances? The logic of these questions directs that the stone chambers must first be demonstrated *not* to be historic before they can be demonstrated to be anything else. Based on this approach, the question of "proper" context remains moot. The stone chambers must be shown to be architecturally and functionally deviant from the eighteenth and nineteenth century farm setting which surrounds them before they can be examined within the setting of inscriptions and standing stones. Since culture comprises a system of interrelated components or subsystems which cannot exist without each other, verification of one of the components reflects on the validity of the other components. Because the ancient theory proponents maintain that the stone chambers form part of a broader cultural system of ancient European settlement, substantiating or refuting the antiquity of the stone chambers strengthens or discredits the entire system.

How much research is necessary to demonstrate that the stone chambers are architecturally and functionally *normal within or deviant from* the rural American farm setting in which they are found? How much research is necessary to demonstrate that Vermont's stone chambers *are or are not* historic? In the behavioral sciences, such as archeology, it is virtually impossible to *prove* the correctness of an interpretation, particularly when it is an interpretation of past behavior which cannot be linked to written documentation. Even within the historic period, written records infrequently provide unequivocal answers. If the study of the great events and peoples of history presents great difficulties, then study of the lives, activities and thoughts of the average New England farmer is even more difficult. Henry Glassie summarized the problem inherent to historic research when he noted that "the synchronic account of any past era cannot be assembled, because available records concern only a tiny minority of the people and phenomena that existed at any time. A method based on the document is prejudiced: fated to neglect the majority of people, for they were nonliterate, and, within the boundaries of literacy, to neglect the majority of people, for they did not write."<sup>52</sup> Since it is difficult, if not impossible, to arrive at "proof" of an interpretation, the best one can do is to arrive at a "likelihood of correctness."<sup>53</sup> Rather than presuming to prove who built the stone chambers and why they did so, this study attempts to establish whether these structures are likely to be deviant or normal within their historic context. There are many lines of evidence which need examination, and the convergence of the many lines will suffice to demonstrate the likelihood that the interpretation is correct.

The study of Vermont's stone chambers involved a number of different approaches. First, a field survey of a large sample of the chambers was undertaken for three months in the summer of 1977 to define systematically and as comprehensively as possible their structural characteristics and other environmental and cultural attributes, including topographic location, associated vegetation, dimensions, masonry techniques, structural characteristics, associated markings or graffiti, internal and external temperatures, and the relationship and distance to the nearest cultural features.<sup>54</sup> Second, oral evidence was collected from long-time local residents to obtain information they might have.<sup>55</sup> Third, archival research was undertaken to examine factors such as the deed of properties associated with the chambers, census records, land and proprietary records, road surveys and maps, diaries, and photographs.<sup>56</sup> Far from exhaustive, the archival research nonetheless consumed tremendous time, and yet wills, probate records, tax lists and agricultural records were not examined, nor was a systematic search for diaries belonging to the early settlers of the relevant properties undertaken. Fourth, a search of the pertinent

literature was conducted to document and understand the cultural context of the chambers and to determine if the chambers are deviant features of the rural historic landscape or if their origins and functions lie within the two-hundred-year history of permanent European occupation.

The initial inventory of Vermont's stone chambers was acquired primarily through the courtesy of the New England Antiquities Research Association (NEARA), through several NEARA members who have been identifying and recording chambers for a number of years and through other interested individuals who provided information. The final inventory comprised fifty-two stone chambers located in twenty-three towns in five Vermont counties.<sup>57</sup> (See Table 1.)

TABLE 1  
DISTRIBUTION OF STONE CHAMBERS  
IN VERMONT

COUNTY	NUMBER OF CHAMBERS	NUMBER OF TOWNS IN COUNTY WITH CHAMBERS
ADDISON	2	2
CALEDONIA	3	1
ORANGE	10	6
WINDHAM	6	2
WINDSOR	<u>31</u>	<u>13</u>
	52	24

The two-member research staff surveyed only forty-four of the chambers and collected a full set of data on thirty-six of these. Circumstances precluded full data collection on all the structures: some property owners denied access and several chambers had totally or partially collapsed, others were deliberately destroyed, and some were identified too late in the season for a field check. Informants indicated that similar chambers had been frequently torn down. For example, in 1946 Harold Goodwin reported six chambers in a small valley area in which only two chambers now exist.<sup>58</sup>

Because of the documented disappearance of stone chambers over time, the original full distribution of these structures may never be fully known. The study did not include a systematic statewide field survey to locate stone chambers, but in order to identify a broad distribution pattern, inquiries were sent to over one hundred local historical societies throughout the state. These inquiries did not disclose previously unidentified chambers, suggesting that the apparent concentration of the structures

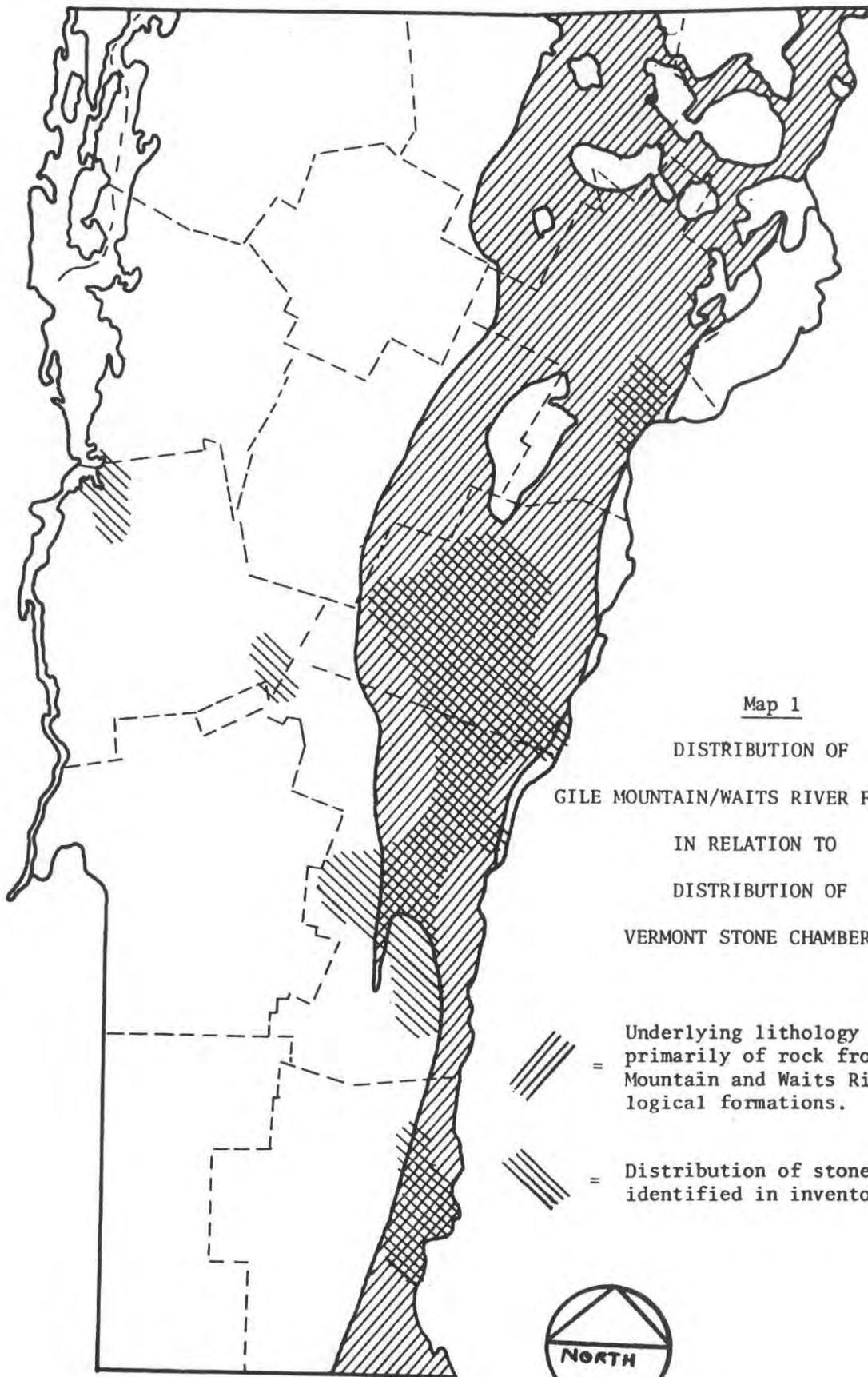
in the eastern part of the state, and primarily in Windsor and Orange Counties, may represent a reliable, if not statistically valid, distribution pattern. Since the chambers tend to be located in upland and sometimes remote areas, similar structures may remain unidentified. For the most part exploration of the structures has focused in a limited eastern part of Vermont, and thus the apparent absence of stone chambers in Bennington County, for example, may simply represent sampling error.

### Primary Data

Based on its major land forms, the State of Vermont has five broad physiographic regions,<sup>59</sup> only three of which contain identified chambers. The Vermont Piedmont region, of particular interest to this study, comprises approximately the eastern third of the state. All but three of the stone chambers are located in this region, near two major eastern drainages of the state: the Connecticut River which forms Vermont's eastern boundary and the White River system which flows in a southeasterly direction before joining with the Connecticut River. The topography, soil types, vegetation and temperature ranges of the Vermont Piedmont present great variety. The Green Mountain Region, like a spine running the entire length of the state, and the Champlain Lowland region, comprising a fertile area of generally low topographic relief from the west central part of the state north to the Canadian border, present more uniform characteristics.<sup>60</sup> One chamber in western Windsor County and the easternmost chamber in Addison County are situated in the Green Mountain Region. The only chamber presently identified in the Champlain Lowlands sits in western Addison County.<sup>61</sup>

All the rest of the chambers are in the Vermont Piedmont region, a relatively rocky or stony area resulting from two massive north-south running belts of metamorphic rocks known geologically as the Waits River and Gile Mountain Formations. The Waits River Formation is composed primarily of quartzose and metamorphosed and recrystallized micaceous crystalline limestone, as well as considerable quantities of phyllite and mica schists.<sup>62</sup> The Gile Mountain Formation has a predominance of quartz-mica schists, black phyllites and micaceous quartzites, although crystalline limestones, frequently indistinguishable from those in the Waits River Formation, exist in isolated areas.<sup>63</sup> With the exception of eight chambers located in Addison County and in westernmost, easternmost and southern Windsor County, the chambers were built of stone from these two formations. (See Map 1)

Physical properties of the Waits River and Gile Mountain Formations make these rock types ideal for use in the construction of stone chambers. Primarily, these lithologies are distinguished by a laminated or foliated



Map 1  
 DISTRIBUTION OF  
 GILE MOUNTAIN/WAITS RIVER FORMATION  
 IN RELATION TO  
 DISTRIBUTION OF  
 VERMONT STONE CHAMBERS

 = Underlying lithology composed primarily of rock from Gile Mountain and Waits River geological formations.

 = Distribution of stone chambers identified in inventory.



structure readily subject to natural or induced cleavage, a feature particularly evident in the limestones, schists, phyllites and gneisses which either outcrop in slabs of useable thickness or are easily separated into useable slabs through common splitting techniques. Although the individual limestone beds range in thickness from four inches (0.10m) to over six feet (1.82m), the normal thickness of both the Waits River and Gile Mountain limestones is one foot (0.30m). Quartzmica schist beds range from one foot (0.20m) to five feet (1.52m) in thickness, and the phyllite beds range from less than one foot to several feet.<sup>64</sup> The simplest quarrying techniques can readily take advantage of the weaknesses along these foliation planes.

Although the seven chambers in western, southern and easternmost Windsor County and easternmost Addison County are located in areas of much more complex and rapidly changing lithologies, preferences for local outcroppings of laminated schists, gneisses and greenstone prevail in the construction of the chambers. The lone chamber in western Addison County is constructed of dolomite, which outcrops throughout the Champlain Lowland region in beds of useable thickness.<sup>65</sup>

The vast majority of the chambers are found on upland valley slopes, ridges or hilltop areas, and only three have been identified in lower valley areas. From a sample of forty-two chambers, thirty, or seventy-one percent, are located at elevations between 1000' and 2090', the remaining eleven, or twenty-six percent, lie between 500' and 1000', and only one chamber, in western Addison County at an elevation of 200', is in a lowland area.<sup>66</sup>

The type and density of vegetation currently associated with the structures depends on their physical location and degree of current use. Adjacent vegetation thus ranges from cleared fields or lawn areas to dense secondary woodland growth. Several chambers have one or more trees of major size growing on top of or on a flank of the chamber mound. Besides demonstrating the structural sturdiness of these chambers by withstanding the threats from the root growth, these trees provide a minimum date for the chambers' construction. At the same time, tree growth on top of the chambers suggests lack of maintenance and may indicate the date of abandonment of the properties associated with the chambers. Core samples indicated an approximate age range of 40 to 126 years for trees growing out of chamber mounds.<sup>67</sup>

The observable and describable structural attributes of individual chambers are conditioned by their present physical relationship to man-made and/or natural features of their immediate environment. The structural qualities of a particular chamber cannot be described without reference to the fact that it may be a three-sided mound or a chamber located in the basement of a house and shares a common wall with the founda-

tion. Such relationships between the chambers and related terrain or man-made features constitute a single observable whole, and the chronological relationship of natural or cultural features to the chambers themselves is unimportant to the initial descriptive process. Visually the structural qualities of the chambers divide into two broad types.

*Type A* Integrated into the stonework of an existing building or foundation hole or located within an existing building or foundation hole.

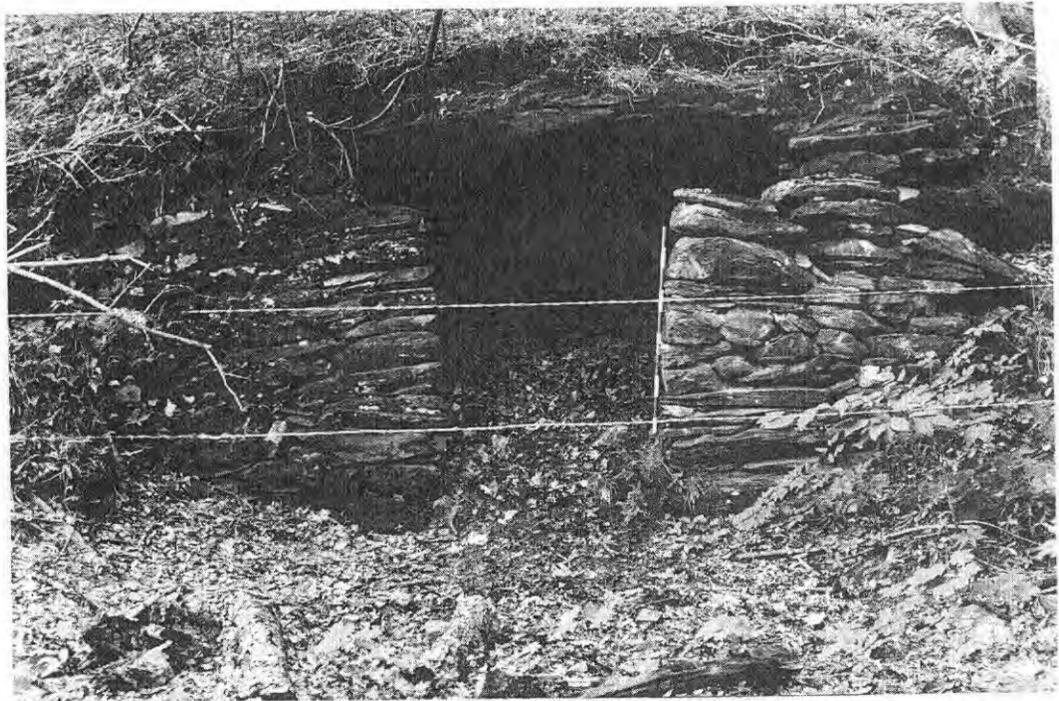
*Type B* Built into a hillside or sloping bank, freestanding and embanked on one or more sides with earth or simply freestanding.

Of the fifty-two chambers identified, fourteen or about one-third are of the Type A variety and thirty or two-thirds are of Type B construction. (See Table 5.) One example of a Type A chamber is located on the lower level of a barn, its entryway in the back wall of one of the horse stalls. Another Type A chamber, for example, is attached to a foundation wall of a defunct cider mill.<sup>68</sup>

Of the twenty-five Type B chambers built by cutting into hillsides or sloping banks, twenty-one are entirely earth covered on the top and sides leaving only the masonry on the front or entryway side fully exposed.<sup>69</sup> The remaining four Type B chambers built against a hillside or slope have partial earth covering only on their lateral sides and rear leaving the masonry on the top exposed. Three freestanding chambers have been banked over with earth on all but their entryway side, and visually they are similar to those built into hillsides. If construction into a bank or hillside was undertaken to facilitate subsequent mounding (an assumption strongly supported by the large number of mounded hillside chambers), such construction most likely entailed less work than the freestanding type which required greater earth moving effort. This assumption suggests that construction of a chamber on a topographically flat area would require subsequent mounding when a convenient hillside was unavailable, which is the case for three chambers. Only one Type B chamber exhibits no earth covering whatsoever, and one Type B chamber is the only truly subterranean structure. (See Table 5.)

The presence or absence of mounding characteristics in the Type A chambers indicates several interesting patterns. Of the fourteen chambers located within or attached to another structure or foundation hole, three exhibit mounding only on those portions which extend outside of the limits of the "parent" structure. On the other hand, four Type A chambers which extend off of foundations are all fully mounded. The only chambers in the sample with no earth covering whatsoever are either entirely located within the lower floors of larger structures or situated within the four walls of an abandoned house foundation.<sup>70</sup>

A large majority of chambers have entryways incorporated into their



*Chamber No. 13. Chamber within house foundation hole (Type A), Windsor County.*

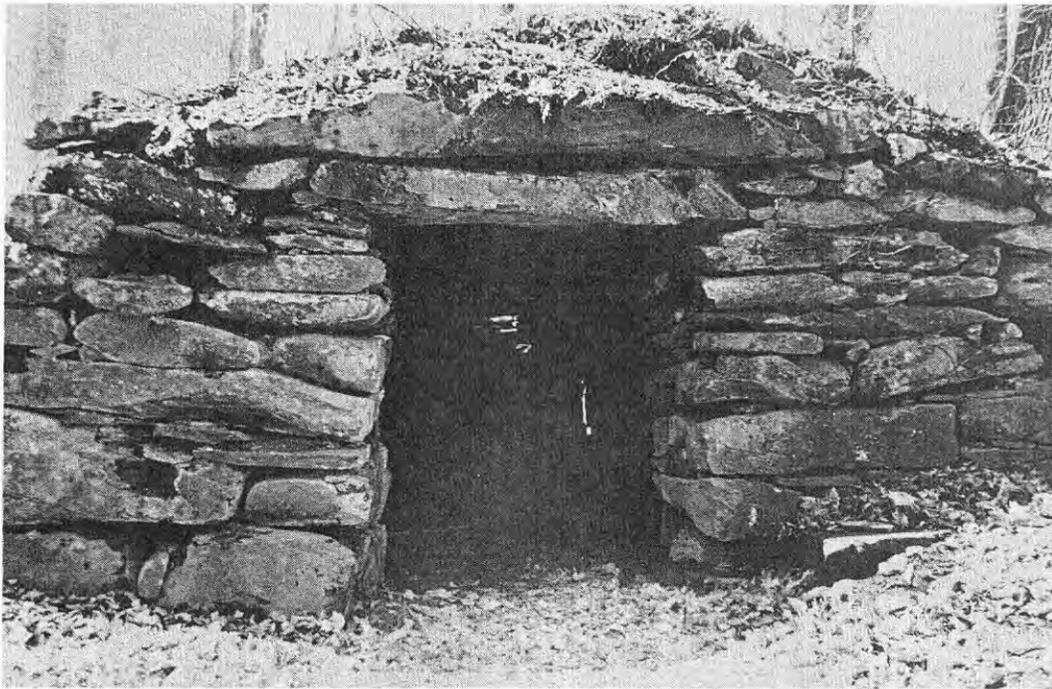
*Chamber No. 16. Hillside chamber (Type B), Windsor County. Note missing lintel stone.*



*Chamber No. 3. The lone subterranean chamber (Type B), Windham County. Note character of entry hole.*

*Chamber No. 32. Freestanding chamber, mounded on three sides and top (Type B), Windsor County.*

front wall. One chamber exhibits a side entrance; one is entered by a stairway and another [No. 3] has a small triangular entry hole on top of the chamber mound.<sup>71</sup> Regardless of construction types, chamber entryways tend to be oriented towards southerly or easterly exposures. (See Table 3). Only two chambers face the north, an exposure which apparently resulted from the lay of the nearest available hillside. Only one chamber faces west. Ten exhibit positive evidence of door framing or hardware, but it is not clear whether or not these are original or later additions. In several cases, wooden doors known to exist have either rotted away or were removed in recent memory. Buttressing walls, predominately associated with Type B chambers, consist of a masonry supporting or reinforcing wall along a chamber's front facade which, besides having a functional purpose, often lends the structures a formidable appearance.

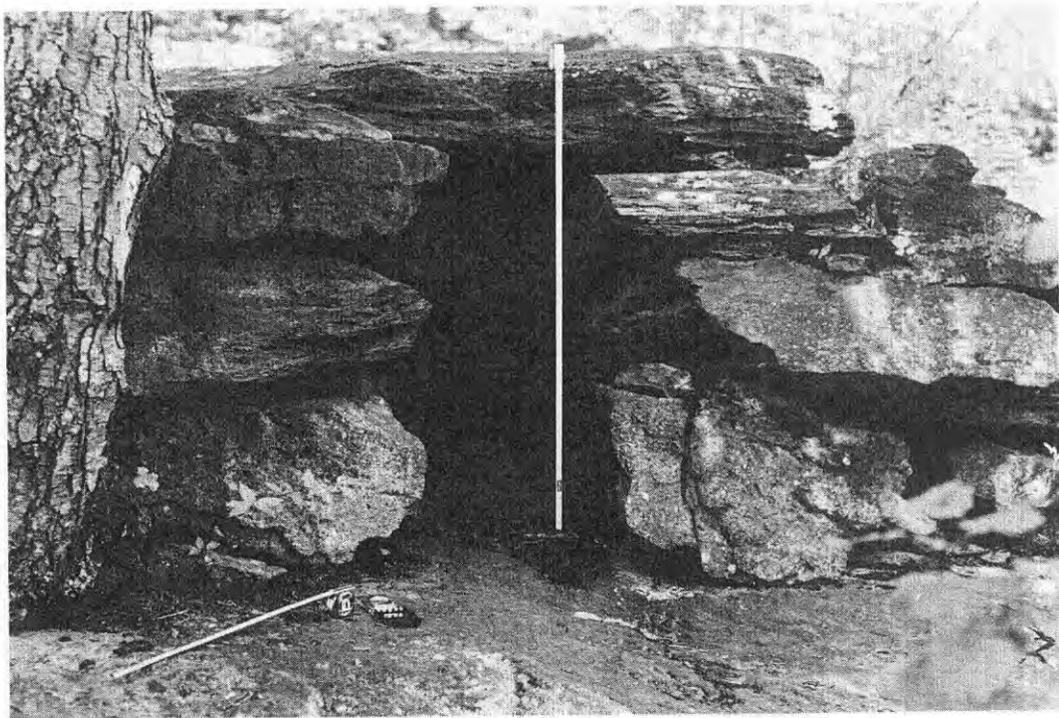
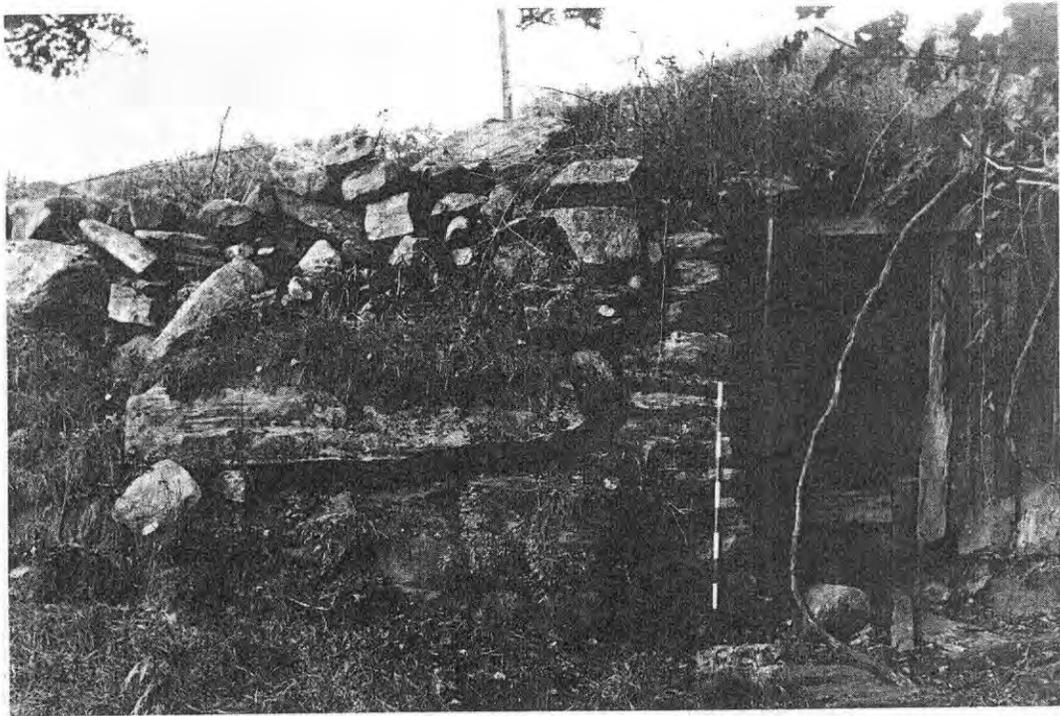


*Chamber No. 32. Freestanding, mounded chamber (Type B), Windsor County exhibits a massive, buttressed facade.*

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#### *Representative chamber facades and entryways.*

In a number of chambers only the front facade and, where present, the buttressing wall are visible, with the rest of the exterior masonry not visible at all or largely obscured by an encircling hillside or banked earth. From a sample of thirty-five chambers, thirty-two are of dry wall construction on their exteriors, two are fully mortared and one exhibits a combination of dry wall and mortar. The relative absence of



*Chamber No. 38. Hillside chamber (Type B), Windsor County.*

*Chamber No. 1. Hillside, partially mounded chamber (Type B), Windham County.*

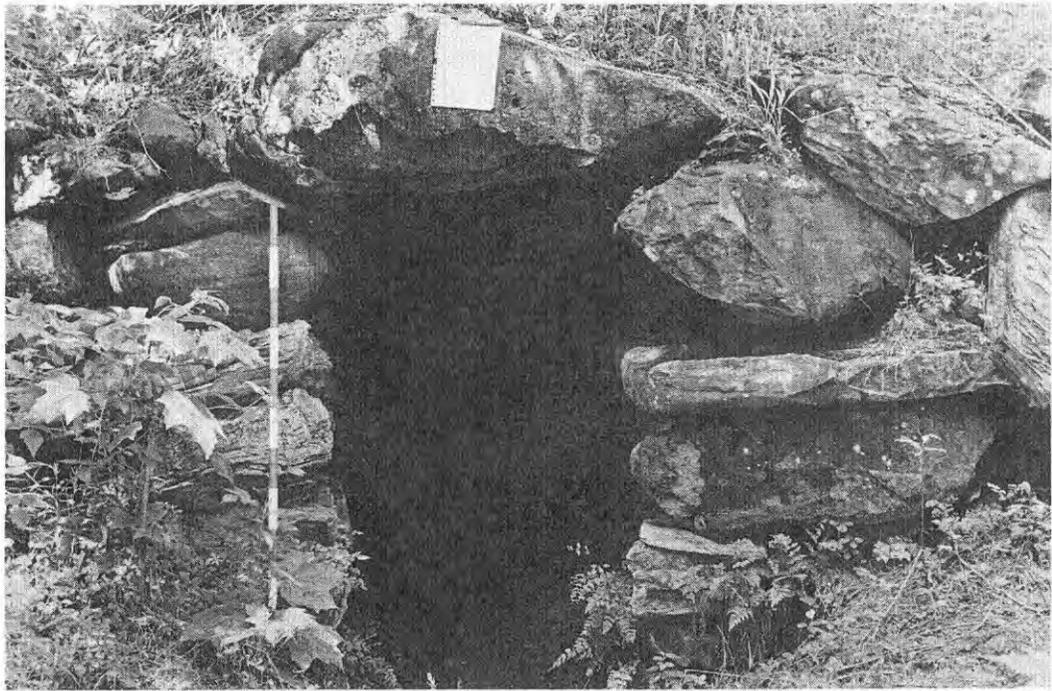
exterior wall mortar contrasts to its more frequent appearance on interior walls, where in most instances mortar is found in the interstices between stones, which strongly suggests it was a feature of original construction. The large majority of chambers, thirty-five or ninety percent, are of random rubble construction consisting of laid up, uncut fieldstone of irregular shapes and sizes. Although only nine chambers exhibit wedge or splitting marks, weathering hampers an accurate assessment of whether or not stones were dressed prior to utilization. Simple splitting, for example, is often impossible to determine on the easily cleaved limestones and schists which naturally outcrop only inches thick.<sup>72</sup>



*Chamber No. 4. Hillside chamber (Type B), Windham County.*

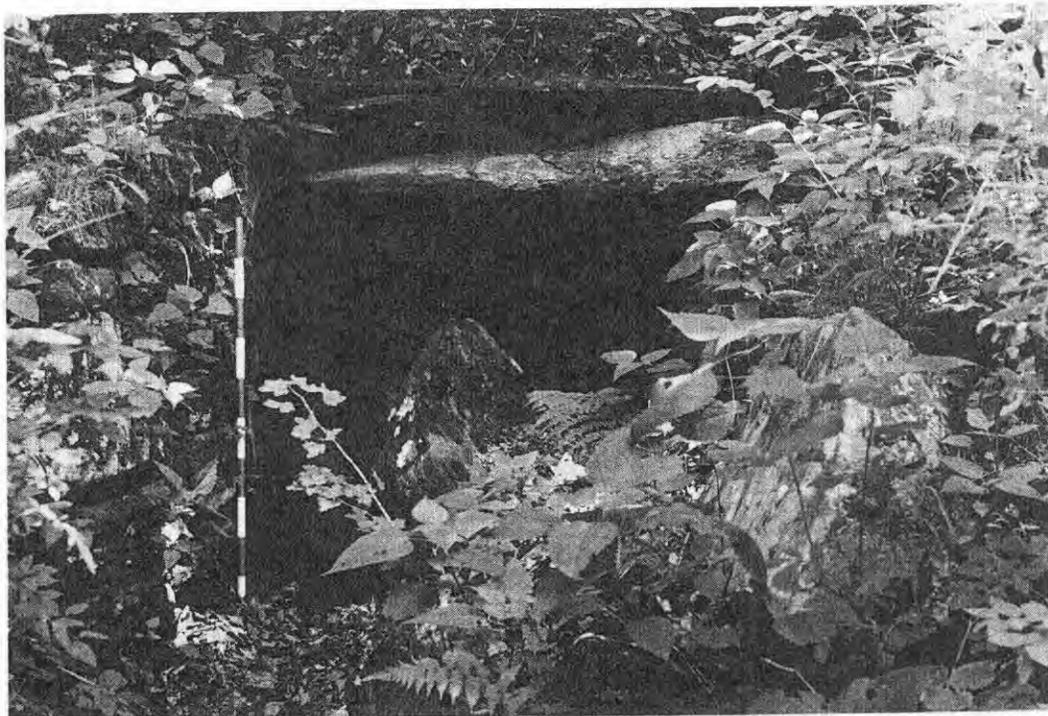
In size, the thirty-one rectangular or square chambers range from 1.63m (5'3") to 6.34m (20'8") in length, from 1.12m (3½') to 3.52m (11'5") in width, and from 0.70m (27½") to 2.32m (7½') in height. The diameters of the four circular or semi-circular chambers average 2.86m (9'4").<sup>73</sup> Although the largest chambers tend to be of Type B construction, this class of chamber exhibits the largest variation; Type A chambers tend to be more uniform in size. (See Table 14; also Table 15.)

Although the floor plans of the chambers exhibit individual variation, the majority are rectangular with a four-cornered interior. Six L-shaped



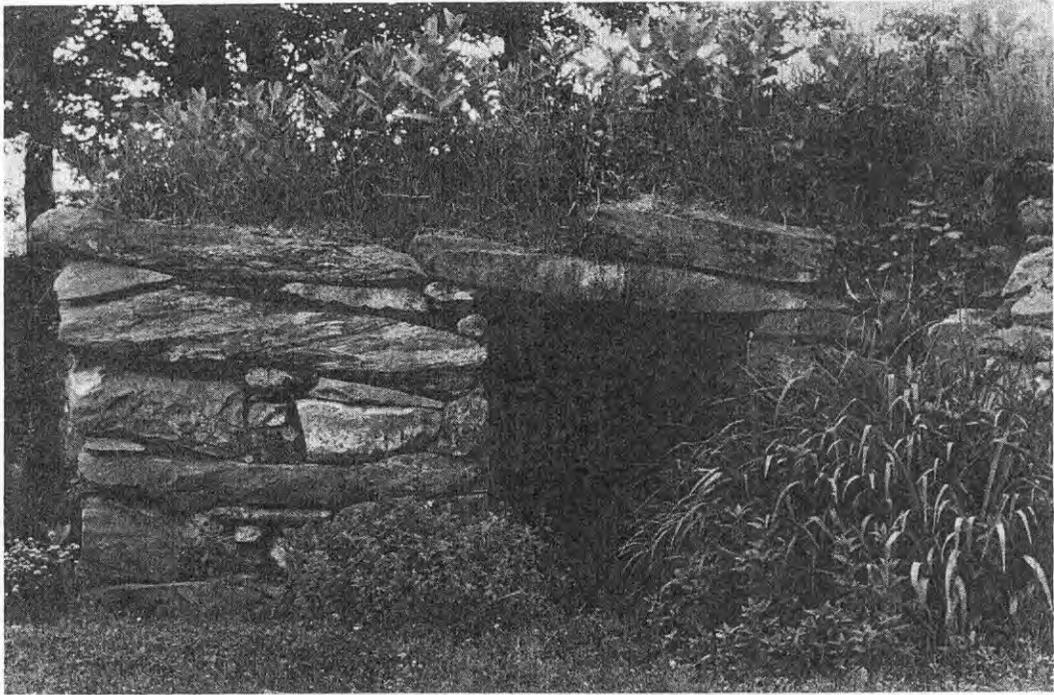
*Chamber No. 9. Hillside chamber (Type B), Windsor County.  
Representative chamber facades and entryways.*

*Chamber No. 20. Hillside chamber (Type B), Orange County.*



*Chamber No. 14. Hillside chamber (Type B), Windsor County. Note entryway lined with large upright slabs.*

*Chamber No. 2. Hillside chamber (Type B), Windham County. Structure is presently used to store cider. Bags of leaves, apparent through the entryway, close off the opening.*



*Chamber No. 12 illustrates an entryway in a Type B Chamber.*

*Chamber No. 27. Close-up of entryway. Note split and dressed stone work and details of doorway.*

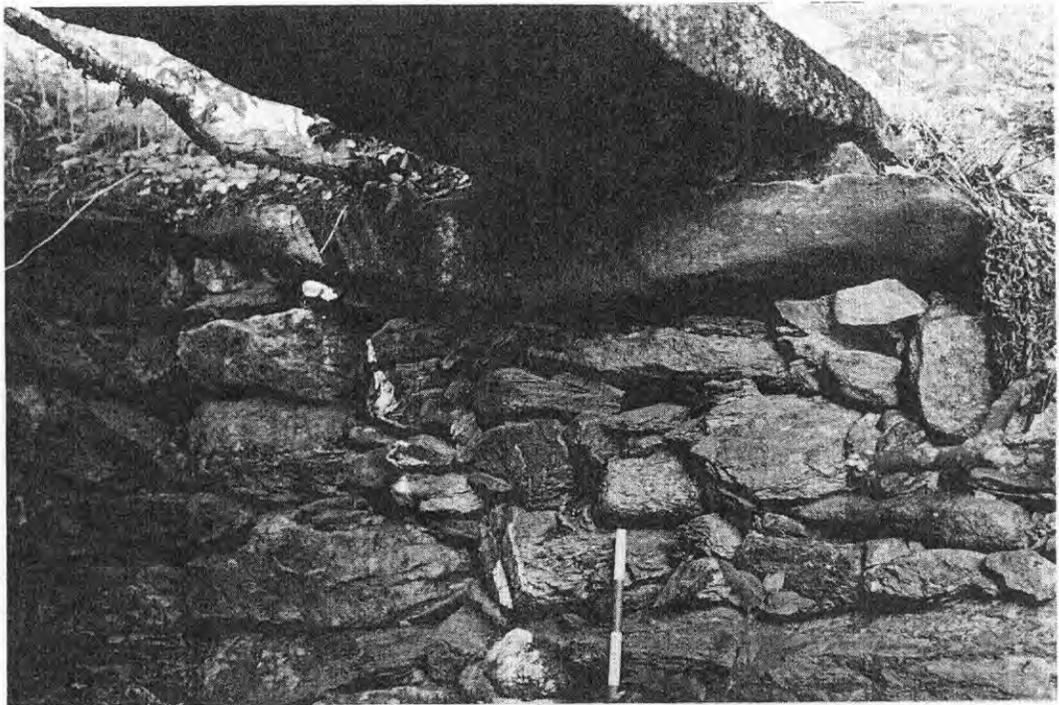
structures have extensions or “ells” either to the left or to the right from the entry. Two chambers are square; one is round; and three are semi-circular or irregular. The majority of chambers have straight-sided walls perpendicular to the ceiling and describe a box. The only fully corbelled chamber is the lone circular structure [No. 6]. Four chambers combine straight lower lateral walls and partially corbelled upper walls.<sup>74</sup> With two exceptions, all the chambers have earthen floors. One structure [No. 1] has a flat bedrock floor extending out from the chamber entry. A carved lengthwise groove runs the length of the bedrock slab, extending from the center back of the chamber to the exterior through the entry. The only fully mortared chamber has a cement floor.<sup>75</sup>



*Chamber No. 6. Hillside chamber (Type B), Windsor County. This is the lone circular structure and the only fully corbelled one.*

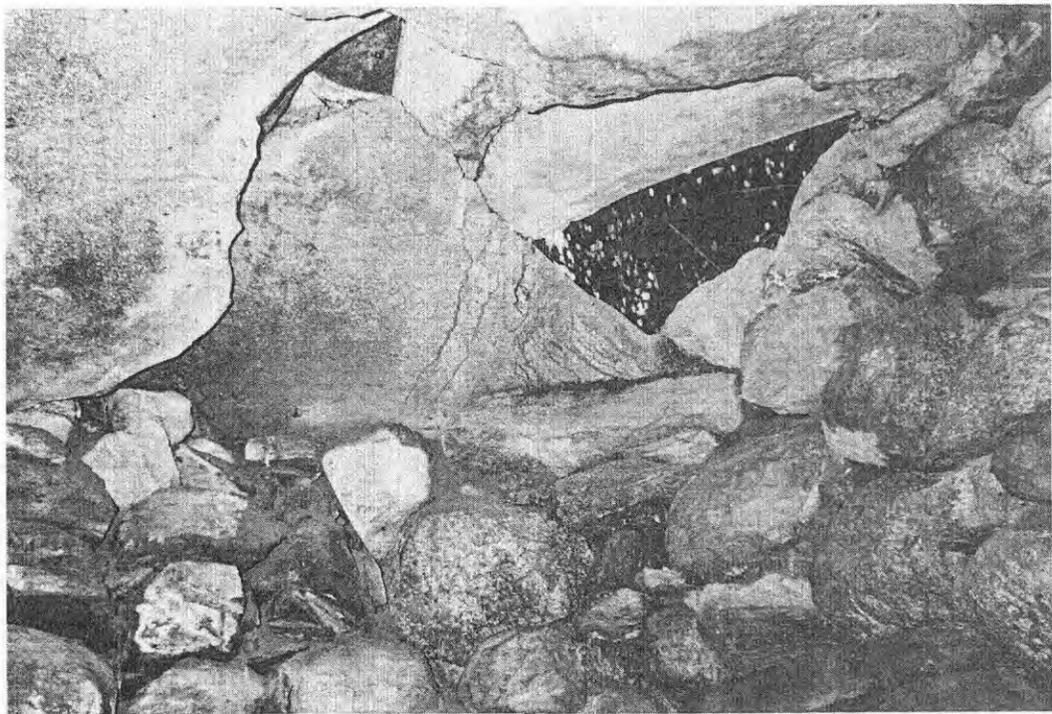
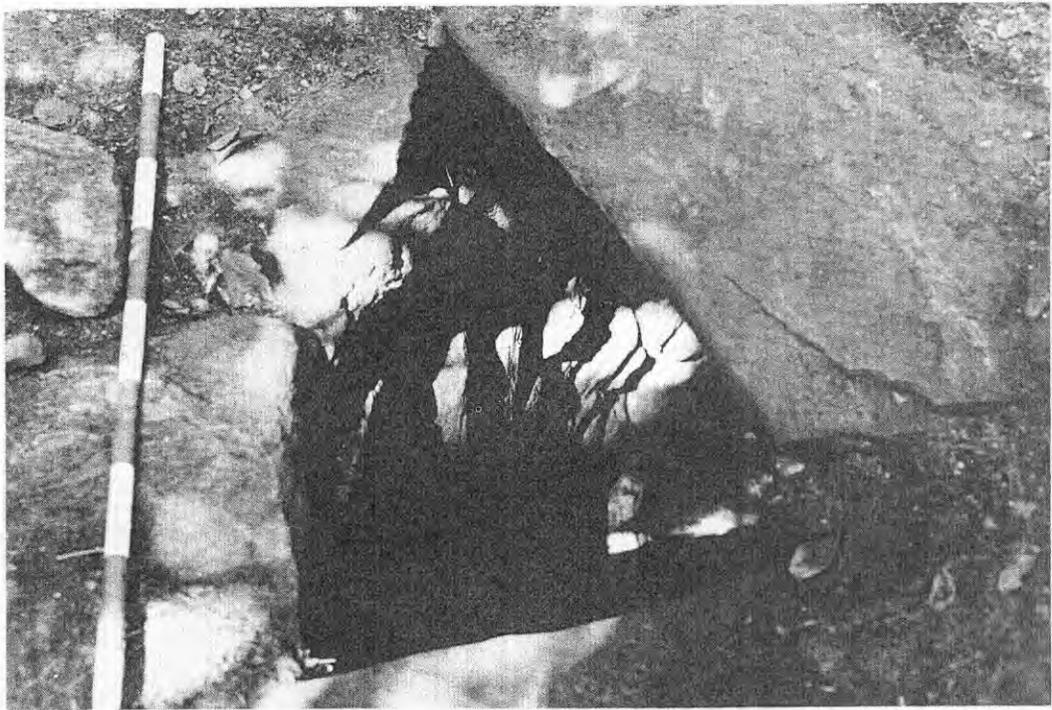
Whatever the construction type and individual variations in size and other structural details, with but two exceptions, all the chambers were built with stone ceiling slabs. (See Table 5.) (One of the two exceptions [No. 40] was built off and entered through the foundation of a larger structure and has a ceiling of wooden logs. The other [No. 50] has a unique arched ceiling of mortared random rubble construction.) The salient feature of the stone slab ceiling construction architecturally connects all the stone chambers and forces a comparison between many otherwise dissimilar structures. With the exception of one chamber (described below)

the ceiling slabs span the entire width of the chambers. Laid perpendicular to the side or lateral walls (which support them) and parallel to each other, the slabs range in number from one to ten. The ceiling slab construction varies, ranging from a neat row of slender slabs to the use of several rougher-looking, broader stones. A close examination of the tiny spaces between the ceiling slabs in some of the hillside chambers discloses a layer of smaller stones laid upon the large ceiling slabs prior to covering the chamber over with earth. Some of the chambers thus appear to have a greater thickness of soil covering on their roof than is actually the case.<sup>76</sup>



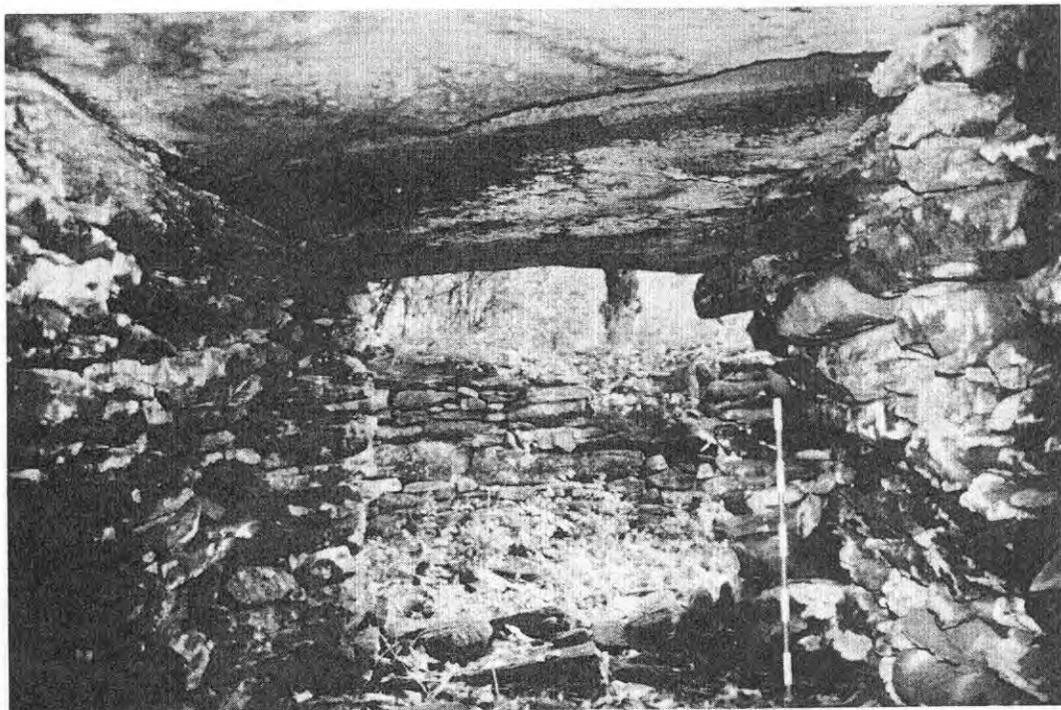
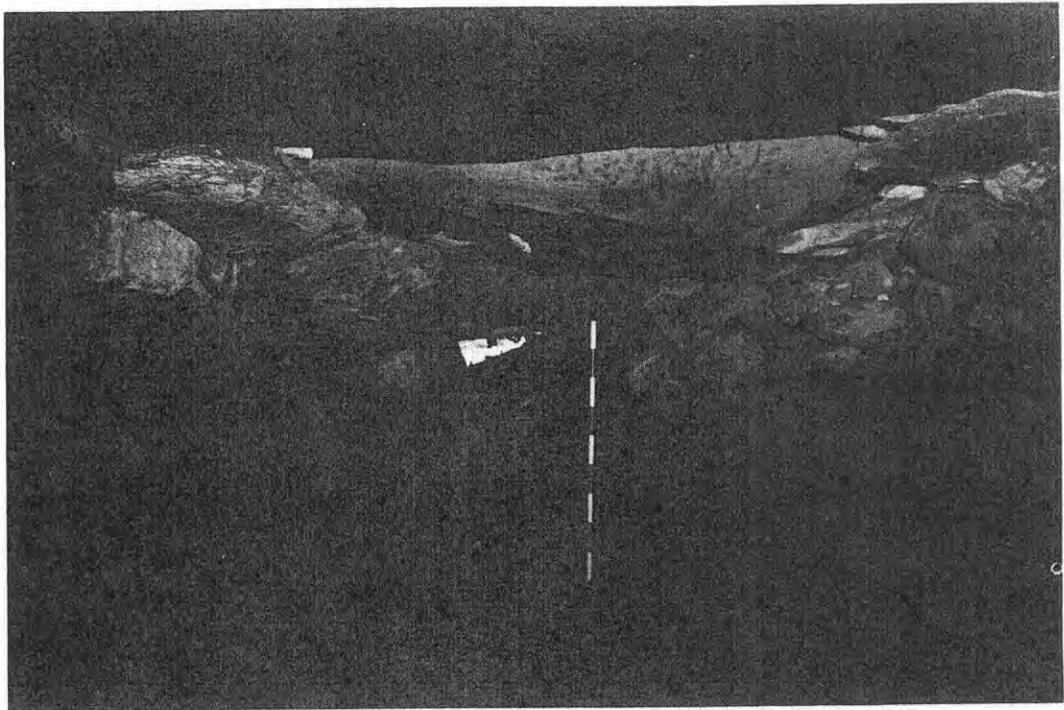
*Chamber No. 26. Collapsed hillside chamber (Type B), Orange County. Typical form of ceiling support construction.*

The lone exception to the basic ceiling slab type of construction is a unique, semi-round subterranean chamber [No. 3] entered via a small triangular opening at the top of the mound. Rather than being laid parallel to each other and spanning the width of the chamber, the three irregularly shaped ceiling slabs overlap rather intricately to form the triangular entry.



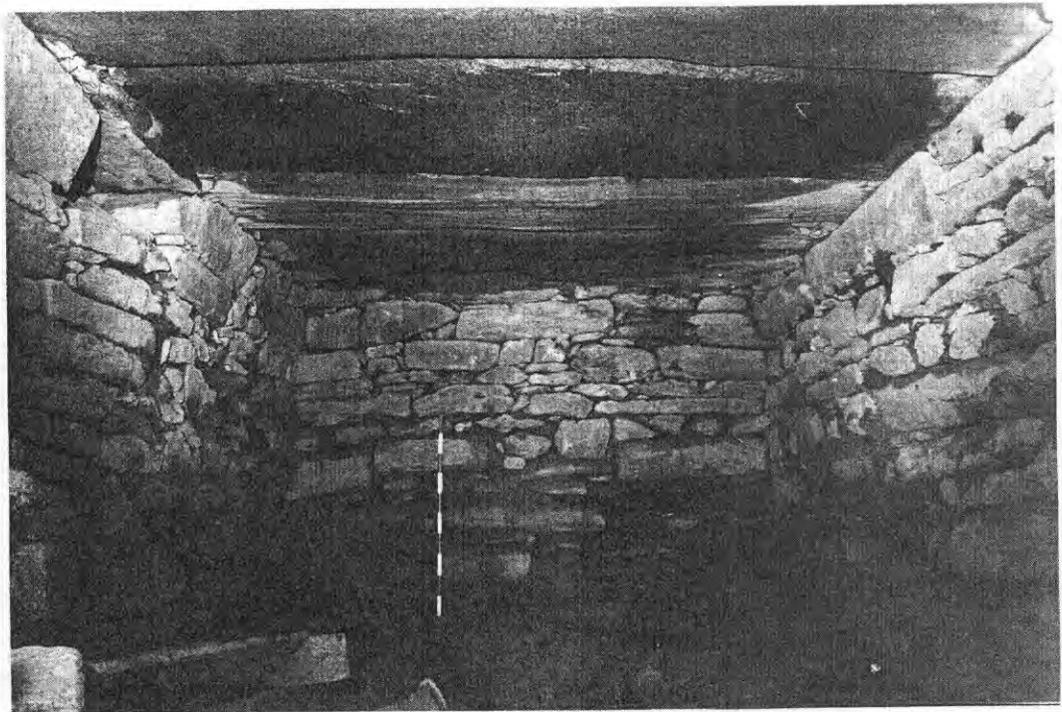
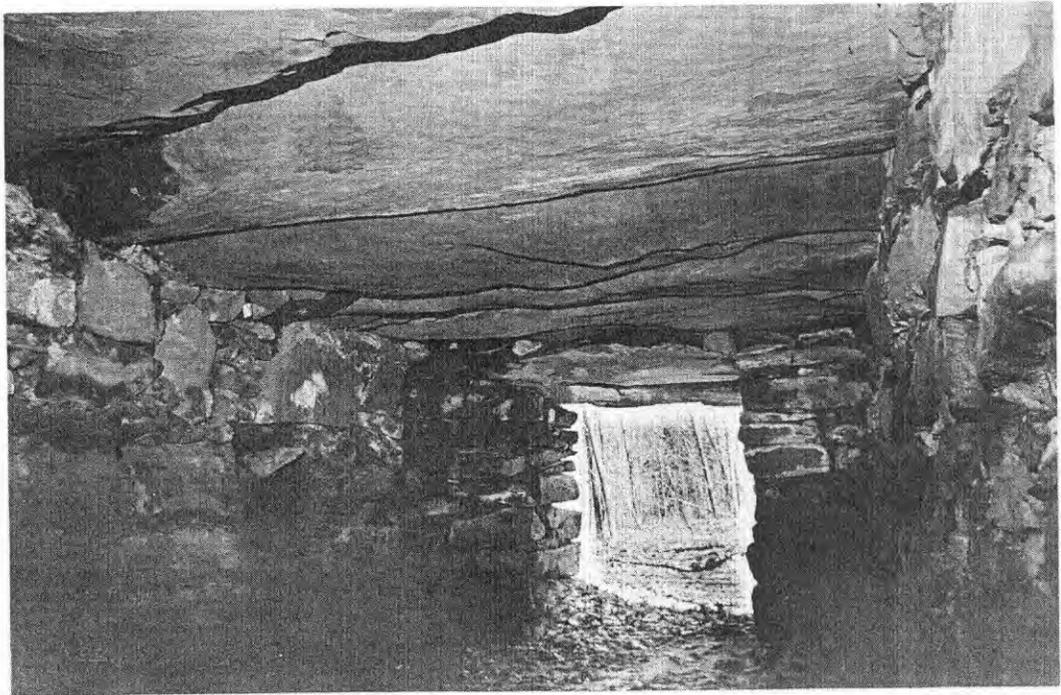
*Chamber No. 3. Close-up of small triangular entryway. From outside looking in.*

*Chamber No. 3. Triangular entryway, composed of overlapping ceiling slabs. From inside looking out.*



*Chamber No. 29. Hillside chamber (Type B), Windsor County. Ceiling slabs are of Waits River limestone; note details of ceiling construction.*

*Chamber No. 13. Chamber within house foundation hole (Type A), Windsor County. Two of the three ceiling slabs are visible.*

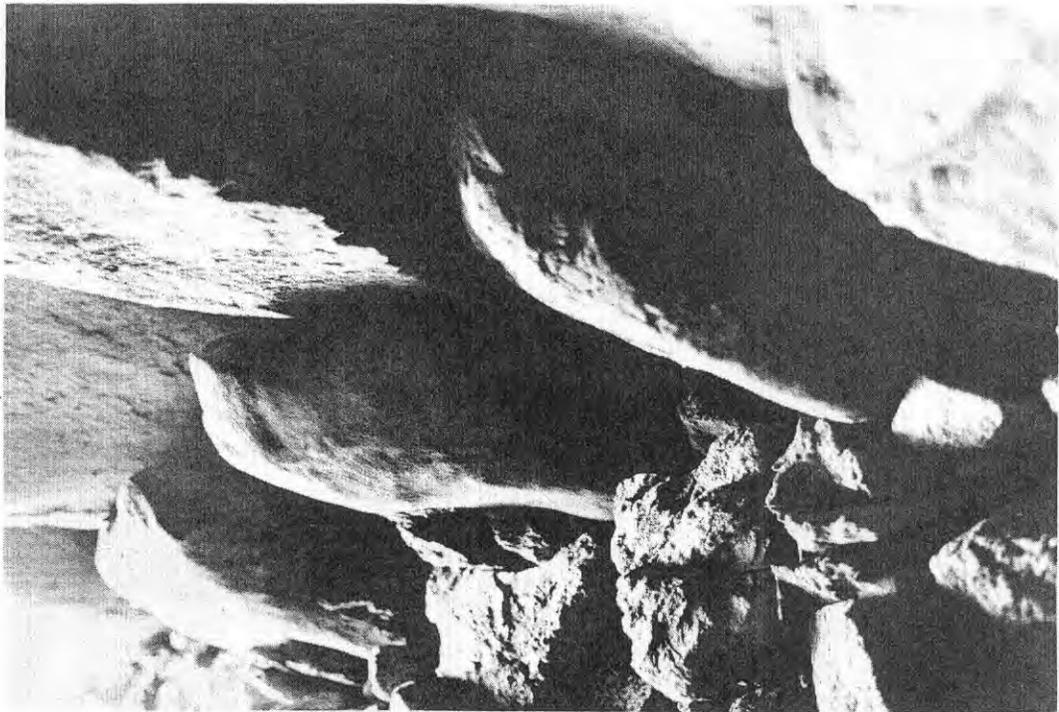


*Chamber No. 32. Freestanding, mounded chamber (Type B), Windsor County. Characteristic slab roof ceiling construction.*

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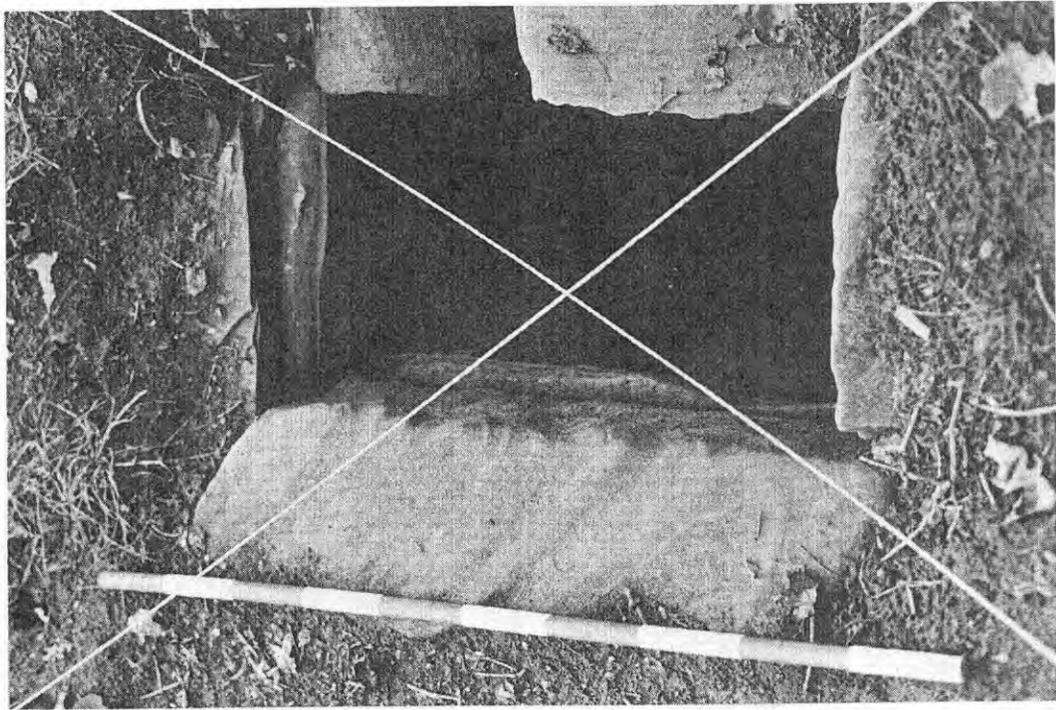
*Chamber No. 11. Chamber built within barn foundation (Type A), Windsor County. Characteristic slab roof ceiling construction.*

Generally, the number of slabs per chamber depends both on the size of the structure and the sizes of slabs used. A comparison of Tables 14 and 17 indicates that small chambers do not necessarily have fewer ceiling stones. For example, although Chamber No. 31 is one of the largest structures with a length of 5.95m (19'5"), it only has four ceiling stones in contrast to Chambers Nos. 7 and 8 with respective lengths of 4.13m (13½') and 1.85m (6') which each have ten ceiling stones. Although a number of ceiling stones weigh several tons, most fall within a quarter ton to one ton range. Because it is frequently impossible to determine the thickness of a ceiling stone, a critical factor in calculating its weight, weight approximations should not be attempted on the basis of a slab's length or width. (See Table 17.)



*Chamber No. 9. Hillside chamber (Type B), Windsor County. Exhibits an unusual ceiling construction method utilizing cantilevered slab support stones.*

Only ten chambers, all Type B and built into hillsides, exhibit what appear to be vent holes. Most often located in the upper back wall of the structure's interior and extending up through the sod layer covering the chamber, the vents average 0.37m (14½") in length, 0.25m (10") in width and 0.60m (23½") in height. Incorporated into the masonry, the vent openings range in appearance from roughly constructed holes to neat, rectangular chimney-like structures.



*Rectangular, neatly constructed vent opening in rear top of Chamber No. 32. (meter rod and triangulation string.)*

Repeated summer field observations suggested that the ambient temperature within the chambers was always less (or cooler) than the outside temperature. Maximum and minimum interior and exterior temperature readings recorded over two to four hour periods for the fifteen chambers in the best state of preservation (with no attempt to cover open entryways) revealed that regardless of structural differences, interior temperatures of 56° - 62°F. are maintained in summer weather conditions of 66° - 83°F.

In addition to the more discrete physical attributes of each chamber, with one exception, all of the stone chambers are physically associated with a late eighteenth century or nineteenth century farm complex, either in use or abandoned. An understanding of the history and structural development of the farms is difficult; homesteads did not exist as fixed entities in time and the make up and location of buildings frequently changed. Over the years, buildings housed a variety of functions, and the present absence of physical evidence does not preclude the existence of a structure on a particular spot. In some instances, a house was built on the foundation of an earlier structure; in other cases informants who express knowledge of an older house are not certain of its exact location or date of construction. Log cabins, for example, seldom had foundations, making their sites difficult to locate.<sup>77</sup>

Table 20 presents the currently observable cultural environment related to each chamber and provides distance measurements between chambers and particular cultural features. One chamber [No. 36] is located near a barn foundation but there is no present evidence of a related dwelling; another [No. 2] is located 84m southwest of a three sided depression which may or may not mark the site of a previous habitation or barn; and a late nineteenth or early twentieth century sugar house presently situated adjacent to this chamber may have been set upon a pre-existing foundation. Only one chamber in the entire sample [No. 17] stands completely isolated from any buildings or foundation holes, and several lines of evidence indicate that no buildings ever existed near the site. It is also the only chamber at any distance from a roadway, although it is nonetheless accessible by hiking about a quarter mile from an abandoned stage road. In all instances the roadways associated with chambers are old highways or turnpikes many of which are still in use.<sup>78</sup>

In a number of instances the masonry of foundations of associated structures is virtually identical to that in nearby chambers, which strongly implies that the same mason or masons built both the foundation and

*Chamber No. 11. Chamber built off barn foundation, shares a common (left) wall with barn (Type A), Windsor County.*



the chamber, probably in the same period of time. The five Type A chambers situated within foundation holes provide the best examples of chambers with masonry walls indistinguishable from the surrounding foundations. A professional stone mason emphatically stated that Chamber No. 32 and the house foundation nearby were built by the same person(s). Chamber No. 11 indisputably shares one wall with the barn foundation and it is unequivocally contemporaneous with or more recent than the attached barn.

Individuals who have questioned the origin of the stone chambers have generally ignored the potential contribution of oral tradition. In every instance local informants, often life-long members of communities which have chambers, had either grown up on one or more properties associated with the chambers or their families descended from the early settlers of the properties. As archival research confirmed, familial relationships in these small clannish communities are complex, frequently long-standing and highly interwoven, and the relationships can often be traced from one farm to another either within the same community or in neighboring towns. Because of these traits, oral tradition in rural Vermont communities provides a major and reliable source of largely undocumented but valuable historic information.<sup>79</sup>

The body of oral tradition concerning Type A chambers was thin. Those located within house foundation holes were referred to by many as bases necessary to support the massive chimney structures when fireplaces were huge and integral parts of dwellings. Tradition held that Chamber No. 8, a tiny bladder shaped structure located within the basement of a beautifully preserved pre-Revolutionary house, was built as a hide-out during Indian raids. One informant whose great-grandfather homesteaded the property associated with Chamber No. 28 indicated that the attached foundation hole supported a cider mill and the chamber served as a storage area where barrels of cider aged.

In contrast to the relative dearth of oral evidence available for the Type A chambers, a considerable body of evidence surrounds the Type B structures. An 1891 issue of the *Vermont Phoenix* refers to one chamber as "a stone pig pen . . . built by Mr. Lewis Miller in the apple orchard west of his house, where the pigs ran at large in the summer time. It was founded," the article continued, "upon a rock and covered with large flat stones and earth, making the enclosure look like a tomb."<sup>80</sup> Although the property associated with the chamber was "the Miller Farm" from 1830 until 1890, Miller himself died in the mid-nineteenth century, and the *Phoenix* based its information on an interview with Miller's daughter.

Unanimous opinion in one community identifies another chamber [No. 18] as a burial site, although descriptions of the deceased vary somewhat, from an Indian to a young girl. The most detailed oral tradition of any

chamber [No. 17] concerns Oliver Plaisted, from whom comes the chamber's local designation as Oliver's Cave. To avoid conscription into the army during the Civil War, according to the story, Plaisted, mentally unbalanced and too old for active duty, fled to a wooded mountainside on the property of his former tutor, Joel Ellis.<sup>81</sup> While some versions of the story claim that Plaisted utilized a pre-existing structure, most versions state emphatically that he built the structure himself. The authenticity of the latter version is supported by the fact that a local man owns the jackscrew with which Plaisted supposedly raised the single roof slab into place. The jackscrew has been in the man's family ever since his grandfather took it in trade from Plaisted for fodder for the lone cow which lived on the mountain with the unbalanced draft dodger. Plaisted and his activities provided a common source of local gossip in the nineteenth century, and one informant, born in 1898, indicated that he had heard many tales about poor Plaisted both from his father, born in 1868, and his grandmother, born in 1838.



*Chamber No. 17. Freestanding chamber, unmounded (Type B), Windsor County. The only chamber not associated with an abandoned or existing farm complex and locally identified as Oliver Plaisted's hideout.*

Local residents refer to a number of Type B chambers as root cellars. Many have stood empty for decades, but some have been used for storage

of foodstuffs within recent memory. One man remembers talking in the 1930's to an eighty-year old descendant of the family who homesteaded the property associated with one chamber [No. 16]. The old man told him that two chambers [Nos. 14 and 16] were built as root cellars and one had a door, long since removed. A resident of a town with another Type B chamber [No. 2] recalled shelves, now gone, which once lined the walls of the structure and affirmed that it served for root storage. Another chamber [No. 36] was constructed by a Mr. Woodward [b. 1819] for use as a "root and grain" cellar. This informant remembers her grandmother-in-law (a Woodward) commenting, after having moved from the property, that she missed the old root cellar as the one under her new house did not keep food as well. Two other informants indicated that two other chambers in the sample [Nos. 12 and 31] were built as root cellars, that it was common knowledge in the community, and that the information had been handed down from older generations. One informant provided an excellent example of "the powers of memory of successive generations."<sup>82</sup> Many years ago he talked with a man in his sixties whose father had told him that *his* own grandfather had helped build five of the chambers as root cellars [Nos. 9, 12, 31, 36 and 43]. The construction of three of these chambers as root cellars is repeatedly mentioned, and in two cases the informants place the chambers back at least four generations in time.

Some chambers have been utilized in recent times for food storage, and apparently one chamber [No. 27] currently serves as a food storage facility in which carrots and turnips, packed into plastic containers, reportedly keep well all winter. Another structure [No. 29] has been variously used for lambing sheep, as a root cellar for storage of mangel-wurtzel and most recently for housing cabbages fed to poultry. Archeological investigations of the chamber entryway uncovered a sheep shearing implement as well as other nineteenth century trash.<sup>83</sup> According to the present property owner, related by marriage to earlier settlers of the property, its vent was enlarged so that the cabbages could be rolled down into the structure. Another chamber [No. 31] was used for potato storage at one time. An informant who grew up near another chamber [No. 39] remembers that apples, vegetables and cider were kept in this structure and fondly recalled that the cider was excellent after wintering over in the chamber.

According to informants, three chambers [No. 15, 34, and 39] were built as family burial vaults. One of them [No. 15], built in 1828, had two family members entombed there until the 1890's when they were re-interred in the public community cemetery. Another chamber [No. 49], the burial tomb of Major David Wright and five members of his family, was built by Wright in 1814 after the death of his wife Hannah.<sup>84</sup>

The lone chamber [No. 50] in western Vermont is rumored to have been built as an ammunition storage berm during the War of 1812.



*Chamber No. 50. Hillside chamber (Type B), Addison County. This one is the only chamber with an arched - fully mortared - ceiling.*

CREDIT: TERRY WINTERS

Despite the wealth of oral tradition, an examination of deeds, land records, road surveys and proprietary records associated with the land and farms on which the chambers are located revealed no mention of them. The deeds generally contain statements such as “home farm with land and buildings” and give no specific description of any of the structures. Of all the maps examined, only one town map, produced in 1949 and showing the lot lines with houses and roads in existence “about 1800 (between 1762-1891),” notes the location of chambers. This map, which shows two chambers [Nos. 1 and 3], does not identify two other chambers [Nos. 2 and 4] also in the neighborhood, and two other nearby stone chambers destroyed within the last generation.<sup>85</sup>

The burden of the oral evidence indicates that many of the chambers served a variety of purposes closely associated with nineteenth century rural living in northern New England, and further that at least some were constructed specifically for such purposes. But this evidence does not

prove that each individual chamber or even the general mode of their construction developed out of local historic traditions and technologies or served a needed function in that context. Furthermore, while the descriptive data demonstrate that the chambers exhibit certain common patterns of location and construction and point to distinctive traits of particular structures, these data do not indicate either their date of construction or their purpose. The answer to the fundamental question of whether or not the chambers are deviant to their setting thus demands an examination of the setting, both environmental and cultural. As virtually all the chambers are situated in late eighteenth century and nineteenth century farmsteads, the setting is, then, defined by all pertinent historic, economic, and agricultural factors.

Early settlement in Vermont gravitated toward the higher elevations rather than in river valleys. In the period between 1760 and 1830 settlement and the farmsteads were characterized by self-sufficiency, a subsistence pattern which further contributed to the location of the hill farms. The bulk of the needs were met on the farm itself diminishing the necessity of easy transportation and communication.<sup>86</sup> Virtually all the chambers are associated with upland farms situated mostly above 1000' elevation.

The utilization of hillside or banked architecture is apparent in New England and elsewhere in the early settlement period. New settlers typically built a small, temporary shelter which could be rapidly constructed and easily heated in winter.<sup>87</sup> In parts of New York state, for example, settlers customarily used temporary dwellings for up to seven years prior to building a permanent dwelling.<sup>88</sup> In Vermont the head of the household and older sons often spent one or more summers preparing the land before moving the entire family, basic household possessions, and livestock. Availability of materials, exigencies of landscape, and architectural traditions determined the type of temporary dwelling which included: conical huts of branches, rushes, wattle and turf;<sup>89</sup> bark houses;<sup>90</sup> sunken pits;<sup>91</sup> and "dugouts," "caves," or "cellars" built into hillsides.<sup>92</sup> While the use of branch, rush, wattle, clay, and mud shelters derived from building types well known from English country districts,<sup>93</sup> construction techniques which incorporated available banks or hillsides appear to be a local response to the cold winters and generally hilly topography of the Northeast and Mid-Atlantic region. Although not a common practice, these pioneers sometimes used stone to line the dugouts:

These cellars were made by digging a shallow pit in the ground, preferably in a bank, and then lining the sides of the excavation with stone walls carried above the ground enough to give a height of about seven feet [ca. 2.1m], or by setting against these sides upright logs long enough to give the same height. These stone or wood walls were then banked high

with earth on the outside . . . and were roofed over either with logs laid close together and plastered with clay, or with bark or thatch on poles. The probability is that the roofs were of considerable pitch and were thatched.<sup>94</sup>

The construction of hillside dugouts as a temporary form of dwelling was not limited to New England; such dugouts were common in eighteenth century Pennsylvania,<sup>95</sup> areas of Wisconsin<sup>96</sup> and elsewhere in the Midwest<sup>97</sup> in areas settled in the nineteenth century. The widespread use of this functional construction technique over a long period indicates its adaptability. Further, its use from seventeenth century southern New England to nineteenth century Wisconsin clearly indicates that the banked over Vermont chambers represent an architectural tradition with deep American roots.<sup>98</sup>

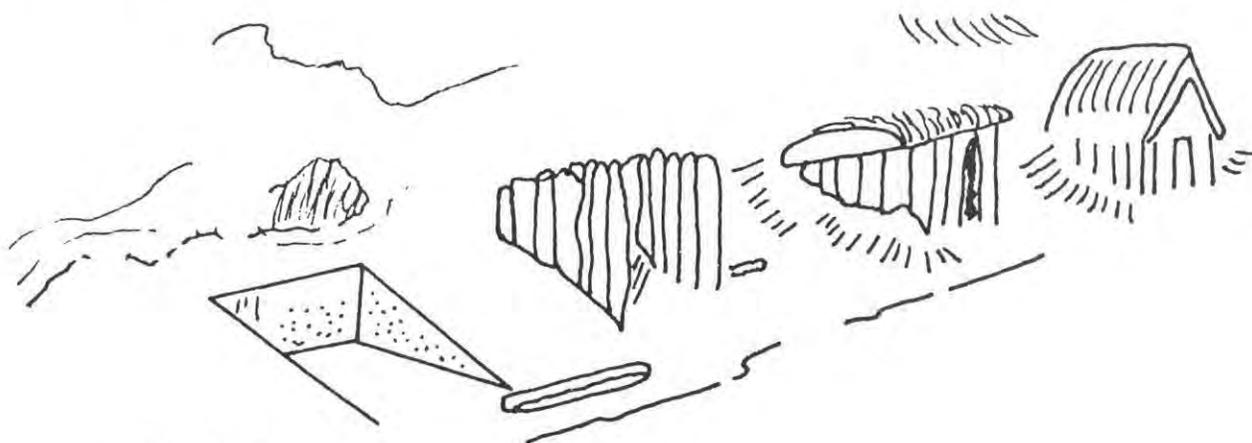


FIGURE 1

*Typical method for constructing hillside, or banked, temporary housing. Adapted from: Norman M. Isham and Albert Brown, Early Connecticut Houses (Providence, R.I.: Preston & Rounds Co., 1900).*

The settlers abandoned temporary dwellings as soon as possible for log dwellings, which they considered an intermediate form of habitation before the construction of a frame, brick, or stone house.<sup>99</sup> From the earliest settlements to about 1830, houses with central chimneys were common to much of Vermont, and "the amount of stone used in [their] . . . construction was very great, and the sheer mass of this tremendous pile of masonry is astounding, when, as has sometimes happened, the house has collapsed and the chimney stack remains standing . . . More imposing in size than even the stack of the chimney at the 1st floor level was its foundation in the cellar. Chimney foundations 10 and 12 feet square [ca. 3.0 - 4.0m] and even larger, are not uncommon."<sup>100</sup> Oral tradition indicates that several of the chambers in the sample were built as supports for massive center chimneys. Five Type A chambers are situated within the four walls of abandoned foundation holes. While

they exhibit the identical stone slab ceiling construction characteristic of the other chambers, they tend to be smaller than the other chambers and have neither earth covering nor vent openings. The fact that a "great many of these chimney bases are not filled with rubble but are left hollow" substantiates the oral tradition of their construction as chimney supports. "The purpose of the opening into the chimney base is a matter of conjecture: some say the space was used as a larder to keep food cool; others that it served as storage for wood ashes used for making lye."<sup>101</sup>

Settlement generally moved from south to north in Vermont, and several generations of pioneers repeated the well-established cycle from the first tenuous shelter to the comfortable farm house. Self-sufficient Vermont farms gradually entered the market economy.<sup>102</sup> Because of the short-growing season, the difficulty and expense of transporting bulky agricultural produce to market, poor soil and other factors, agriculture in Vermont's first decades presented a mixed picture. Only with the coming of sheep to the Green Mountains did Vermont find a staple product suited to the region. By 1830, Addison County "raised a greater number of sheep and produced more wool, in proportion either to territory or population, than any other county in the United States."<sup>103</sup> Most farms had kept a few sheep among their livestock for necessities such as wool, tallow, grease and meat, but by 1840 "not even in the south was there so much devotion to a single crop," frequently to the relative exclusion of all other agricultural activities.<sup>104</sup> In 1837, Rutland County had the largest sheep population in the state, followed by Windsor County, then Addison and Orange Counties.<sup>105</sup> By the mid 1840's, sheep raising began to decline for a variety of reasons, and many Vermont farmers turned to sheep breeding which remained a significant activity in western Vermont until the 1880's, when Vermont farmers had already begun to shift to dairy farming.<sup>106</sup> Western grain, cheap and readily available since the advent of the railroads, increasingly provided a rich winter feed, making possible year-round milk production. The advent of the silo and the concept of ensilage in the 1880's further contributed to the ease with which cows could be supported throughout the winter.<sup>107</sup>

The changing agricultural patterns were clearly reflected in the kinds of crops which were raised and in the techniques of food storage. Because oral tradition links a number of the chambers to root cellars, the importance of root crops needs elaboration. Many local histories and other secondary accounts imply that corn and other grains, especially wheat, were the predominant crops raised for livestock in nineteenth century Vermont. Although wheat yields were high in the early years of tillage, land fertility dropped rapidly. Overuse and insufficient replenishment of nutrients brought on a rapid impoverishment of land, which in a matter

of a few decades became a ubiquitous and circular problem, difficult to alleviate. Diminishing crop yields meant that fewer livestock could be supported and declining numbers of livestock caused a scarcity of fertilizing material for the next growing season.<sup>108</sup> Until the development of transportation facilitated importation of cheap western feed, Vermont farmers had to rely on their own ability to feed their livestock.

Concomitant with the declining grain yields, Vermonters increasingly turned to raising sheep, an industry which peaked in about 1840 with 1,700,000 sheep in the state.<sup>109</sup> This intensive period of sheep raising engendered crop diversification and use of all available produce to obtain sufficient feed.

Vermont farmers had to overcome the difficult problem of providing winter feed. Although the use of western grains, especially after the 1840's, significantly supplemented local crops, only after the introduction of the silo and the concept of ensilage could corn, wheat, and other forage crops be easily stored as succulent fodder. Northern farmers thus needed crops which were easily raised, nutritious, readily stored, and easily fed to their livestock throughout the winter. Root crops, which oral tradition closely links to the chambers, met all these needs.

Throughout most of the nineteenth century root crops were of major significance in the economy of Vermont and New England.<sup>110</sup> Farmer Ora Paul of Pomfret reported in 1878 that "through the long tedious winters of our latitude there is nothing so good as roots of some kind to promote the health and keep in thriving condition all kinds of domestic animals."<sup>111</sup> Henry Safford of Quechee wrote that "no farmer can afford to raise young stock or keep milch cows without an abundance of roots. I speak from twenty years experience in root raising."<sup>112</sup> Roots had many advantages: they were inexpensive to raise;<sup>113</sup> they retained their juices and thereby most of their nutritive value as they could be stored fresh throughout the winter;<sup>114</sup> they produced huge yields per acre;<sup>115</sup> and they doubled the yield of manure.<sup>116</sup> The truly great amount of food which could be grown in the form of roots is illustrated by a premium acreage yield in Pennsylvania of 2065 bushels of mangel-wurtzel weighing more than 44 tons.<sup>117</sup> Although a bushel of roots averaged forty-two to forty-five lbs.,<sup>118</sup> individual roots grew as large as fourteen to sixteen lbs. apiece.<sup>119</sup> Young sheep could consume twenty to twenty-three lbs. of turnips daily; older sheep thirty-eight lbs. daily; and oxen forty lbs. per day.<sup>120</sup> It was generally agreed that root crops were not sufficiently nutritious by themselves and required varying proportions of hay and grain supplements.<sup>121</sup> Although Ora Paul of Pomfret lamented that "the cultivation of roots is not practiced so generally as it ought to be throughout our State,"<sup>122</sup> it was nonetheless widespread. Roots could be readily cultivated in most kinds of soil, and even in Addison County where "the soil is generally too stiff to be ad-

vantageously cultivated for root crops . . . most farmers have patches of land suitable for raising them in sufficient quantities for their own use."<sup>123</sup> Agricultural journals and farmers' accounts make it clear that root culture had an important function as winter fodder for livestock, a function which demanded proper winter storage facilities.

A broad reading of relevant nineteenth century literature reveals that the word "cellar" was synonymous with "root cellar" and, in its broadest definition, referred to any storage area where vegetables and fruits could be kept fresh through the winter.<sup>124</sup> Examples of nineteenth century references to cellars clearly illustrate the traditional usage of the word:

Every farm should have the essential appendage of a cellar - dry, ventilated, cool in summer and warm in winter, for the double purpose of a dairy and the storing of roots.<sup>125</sup>

I have a comfortable shelter provided for all my sheep, with a cellar attached to it, for the purpose of storing roots.<sup>126</sup>

In order that the farmer may make the most of his roots, he should have a cellar fixed to receive them in the fall . . . The cellar should be placed as near the yard as practicable with a watering place at hand.<sup>127</sup>

Whatever their final form, and although different crops had different storage needs, storage areas for roots and apples had to meet several basic requirements including proper temperature, moisture and ventilation. Successfully balancing these variables required experience accumulated through trial and error. Temperatures had to be maintained as close to freezing as possible without dropping below 32°F.<sup>128</sup> This condition was partially met by using earth as an insulating and heat storage material either by burying roots in the ground, by constructing cellars below another structure, or by building cellars into available banks or hillsides. J. Lowell of Boston, writing in 1829, noted that "the temperature of the earth a few feet below the surface in this climate, is generally found to be between 50° and 55°F"<sup>129</sup> in all seasons of the year. Another agriculturist who reported that "sashes with double glass and an intervening thin space of confined air, are nearly equal to stone walls, in shutting out cold," also recommended the protection of "exposed walls with a bank of earth outside."<sup>130</sup> Masonry by itself, according to the accounts, did not provide an adequate insulating material for a cellar and required an earth covering of some kind. Sand, packed around the vegetables or the apples, provided a supplementary insulating material recommended by many, particularly for "those who . . . have cellars which no amount of banking can make proof against the inroads of very severe cold."<sup>131</sup>

The proper balance between dryness and moisture was also critical; too much dryness shriveled the produce, and too much moisture invited molds and fungi. Moisture was controlled by proper ventilation which, at the same time, prevented the accumulation of any gases generated as the produce matured. Use of soil floors also prevented excessive drying

while at the same time contributing to the need for proper ventilation, usually accomplished by means of one or more ducts or openings leading to the outside air. The vent openings were usually located over the doorway, at the rear top of the cellar or at the bottom of the door and although they varied widely in size, one journal recommended an opening three feet long and one foot deep.<sup>132</sup>

Root storage facilities can be grouped into four basic categories: mounding or pit storage, barn cellars, cellars under houses, and outdoor cellars built into hillsides or artificially embanked. The choice of a particular facility depended on the kind of produce being stored, requirements of access and volume, cultural and architectural traditions and weather factors. Although burying was one of the easiest techniques of storage, it was the least preferred method and recommended primarily if a cellar was unavailable.<sup>133</sup> Pit storage often rendered the produce unavailable in winter when the pits were snow covered and the ground frozen. Farmers generally viewed this kind of storage as a temporary solution: "the advantage of keeping [the roots] in good cellars, over this mode of preserving in heaps, "is the saving of labor."<sup>134</sup>

The root cellar, frequently considered an essential part of the ideal barn, was described by one writer as "the most useful apartment in the whole establishment."<sup>135</sup> The barn cellar had many advantages, foremost among them its proximity to the livestock, although roots for family consumption could be stored there as well. Barn cellars could also be quite large, occupying as much of the barn's lower floor as necessary, and thereby able to store considerable quantities of roots. The barn cellar was virtually always located on the lower floor, below ground level and conveniently placed near to the stables or the sheep or hog pens. In some cases farmers located root cellars underneath the natural or man-made ramp leading to the main barn floor.<sup>136</sup> The size of the barn cellars is rarely mentioned and considerable variation is likely. Two reported cellars were 4.6m (15') by 7m (23') and 2.7m (9') by 5.5m (18'),<sup>137</sup> and one agriculturist recommended that the barn cellar be "capable of containing 2500 bushels of roots" for sheep.<sup>138</sup> Where banked barns were common, particularly in Pennsylvania, farmers sometimes built cellars off the barn wall into the bank,<sup>139</sup> because many barn basements were, in fact, too cold, "the floor above not being sufficient guard from the frost, the upper apartments . . . not being kept warm by artificial heat."<sup>140</sup> Only two sources mention the building material used for the barn cellar: one, a banked cellar off the barn, was arched over with stone and then covered with earth, another lined with brick "edgewise."<sup>141</sup> One wall, or two for a cellar located in a corner location, was bordered by a section of the barn's stone foundation.

Secondary sources, including many poorly researched local histories,

frequently imply that the best and most common storage for roots and apples was under the house in the house cellar. House cellars *were* important for storing pickled and canned goods, beverages and other products, but their use for root and apple storage was not as ubiquitous as commonly believed. Nineteenth century writers were divided on the utilization of the cellar under the house. Those who warned that "the best authorities state that the house cellar is no place for fruit and vegetables" were offset by an equal number who advocated it.<sup>142</sup> Even before the advent of the central furnace, many thought house cellars too warm<sup>143</sup> even when the temperature was regulated by the construction of individual insulated compartments.<sup>144</sup> One technique to ensure proper temperatures involved the construction of the cellar into a bank adjacent to the lower level of the house; the cellar was entered through the house basement.<sup>145</sup> Such a cellar provided a conveniently accessible extension of the basement but was fully insulated with earth on three sides. The potential danger of gases and disease from rotting produce was a major liability of all cellars, but in the house cellar it posed a special threat because of its physical connection with the living quarters.<sup>146</sup> When other cellars were available, the house cellar was either not used for roots and apples, or it was used as an interim form of storage, alleviating the need to make daily trips to the primary cellar.

The use of hillsides for the construction of the cellar was the fourth and highly recommended method for storing roots and apples as well as cider.<sup>147</sup> "The leading features of a good root cellar are: cheapness, nearness to the place where the roots are consumed, dryness, ventilation, and above all, it should be frostproof. If a hillside is handy it can aid much in securing all of these important points."<sup>148</sup> Because soil both insulates and stores heat, the temperature several feet below ground level remains fairly constant throughout the year.<sup>149</sup> Consequently, when hillsides were not available, a cellar was insulated by deeply mounding the inner structure over with earth in simulation of a natural hillside.<sup>150</sup>

Farmers used hillside cellars from the earliest settlement period. Log cabins, frequently built without foundations or basement,<sup>151</sup> necessitated the use of outside storage facilities. In his useful *History of Pomfret* Henry Vail noted that "so long as log cabins were the only houses, apples and potatoes were stored in an outdoor cellar," which he described as "a sort of artificial cave dug into a bank, walled up and covered with logs, buried deep under loam. The entrance was protected by a door and by bundles of straw."<sup>152</sup> In addition to the association of the hillside cellar with the foundationless log cabins, Amos Eaton of South Royalton described the outdoor cellar as a supplementary form of storage for the expanding farmstead. "The early houses," according to Eaton, "were small with cellars under only part of the house . . . Cellars built later were

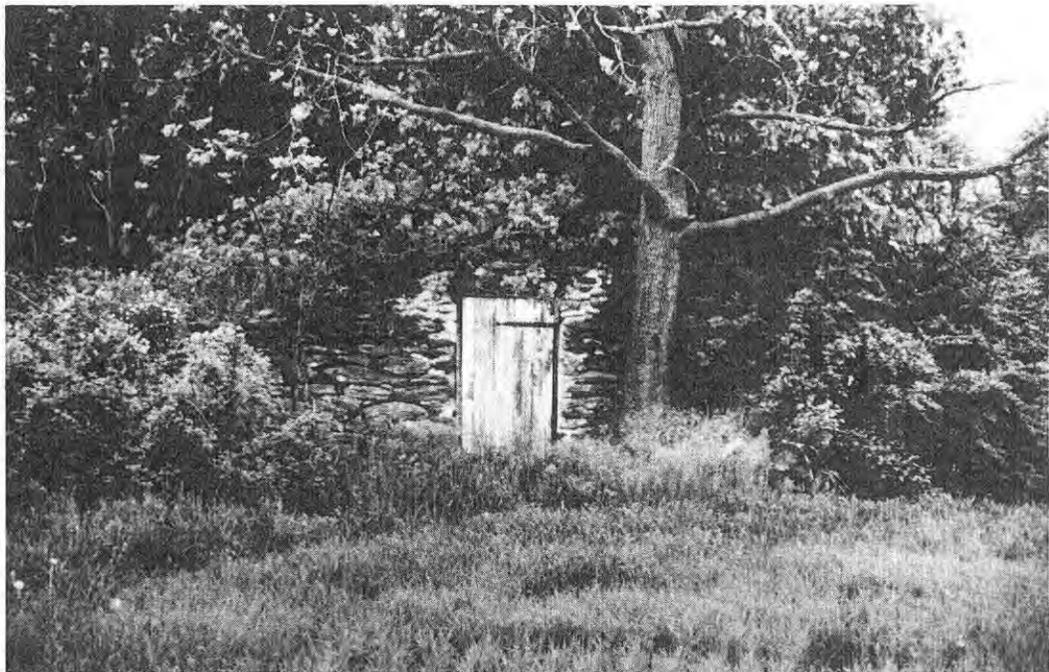
larger, reaching under about one half of the house . . . As the farmer's flock of sheep increased in size this small cellar was too small to hold the necessary turnips for fodder for the sheep, and the family's supply of vegetables, pork barrels and cider barrels. As a result, the outdoor cellar developed."<sup>153</sup>

Many nineteenth century husbandry journals recommended the use of "cellars" rather than pit storage or barn cellars. Because each of these storage types was usually mentioned to the exclusion of the others in the discussion of food storage for livestock, references to "cellars" probably referred to the outdoor, hillside type, apparently sufficiently familiar not to require further elaboration. In his major work on Pennsylvania farms of the eighteenth and nineteenth century, Amos Long devoted considerable discussion to the hillside or "cave" cellar:

When there were large quantities of vegetables and fruits to be stored for late winter use or for marketing purposes, a permanent cellar, constructed with stone, and built into a nearby hillside served best. The ventilated room, excavated from a bank or hillside was walled in on all sides and top with stone or brick to a depth which kept it completely below the ground surface. The roof was covered over, when necessary, so there were several feet of earth for insulation and to provide the conditions necessary for maintaining a reasonably cool temperature as desired. The area over the cave was sodded to prevent erosion during heavy rains. One or more ventilation ducts or openings to provide fresh air, exclude stale air and excess moisture were located usually over the rear top surface of the cellar . . . Steps, laid with stone in a cellar-way which varied from two to four feet wide, were built to enter the vault. Over the cellar-way large flat stones were laid which were likewise covered over with ground and sod . . . The entrances varied from a vertical to a nearly horizontal door which measures upwards to six feet in length, often less. Some of the interior walls had protruding stones to support shelves, usually of wood or slabs of stone, on which vegetables and earthen containers with their contents were placed. In some cave cellars the side walls were corbelled inward near the top to support the roof. The roof then was constructed with large slabs of limestone; or large flat stones were laid over the wall on each side. The stones projected far enough over the cellar wall to support other large slabs of stone which formed the center portion of the roof . . . Most of the cellars contained only an earthen floor and the entrance was in the open . . . The square or rectangular room varied from nine [2.74m] to twelve [3.66m] feet wide and from twelve [3.66m] to eighteen [5.49m] feet long. Some were larger, many were smaller.<sup>154</sup>

Two other descriptions of outdoor cellars, the first written in 1782 and the second in 1920, provide interesting detail and are striking for their similarity despite a difference of 140 years:

We have another convenience to preserve our roots and vegetables in the winter, which we commonly call a Dutch cellar. It is built at the foot of a rising ground which is dug through, about eighteen [5.49] feet long and six [1.83m] feet high. It is walled up about seven [2.13m] feet from the



*Chamber No. 39. The only fully mortared chamber and one in which doorway and hardware are still in place. Interior contains a date rock inscribed with "1806". Windsor County.*

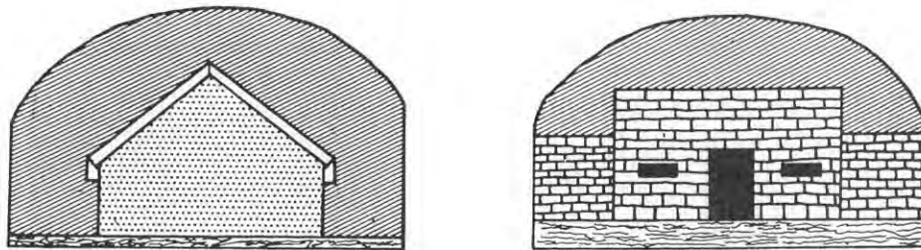
CREDIT: COURTNEY FISHER

*Nineteenth century root cellar, York County, Pennsylvania. Note structural and entryway similarities with Chamber No. 39 as well as identical placement of door hardware.*

CREDIT: WILLIAM O. HICKOK

ground; then strongly roofed and covered with sods. The door always faces the south. There it never freezes, being under the ground. In these places we keep our apples, our turnips, our pumpkins, cabbages, and potatoes. The cellars which are under the houses are appropriated for cider, milk, and butter, meat and various necessaries.

The twentieth century version describes "the only satisfactory" isolated root cellar as one "found by going into the side of a bank and constructing a chamber whose top as well as sides are completely covered by the earth . . . The ground above the top should be at least three feet deep; the entrance - the one side exposed to the air - had best face south, though its exposure may incline to the east or west but never to the north. Ventilation must be provided, which can be arranged by an inlet in the door and a flue carried up above the ground at the back . . . A concrete roof is the best. In fact such a structure is practically indestructible and should serve its purpose as long as it is put to use."<sup>155</sup>



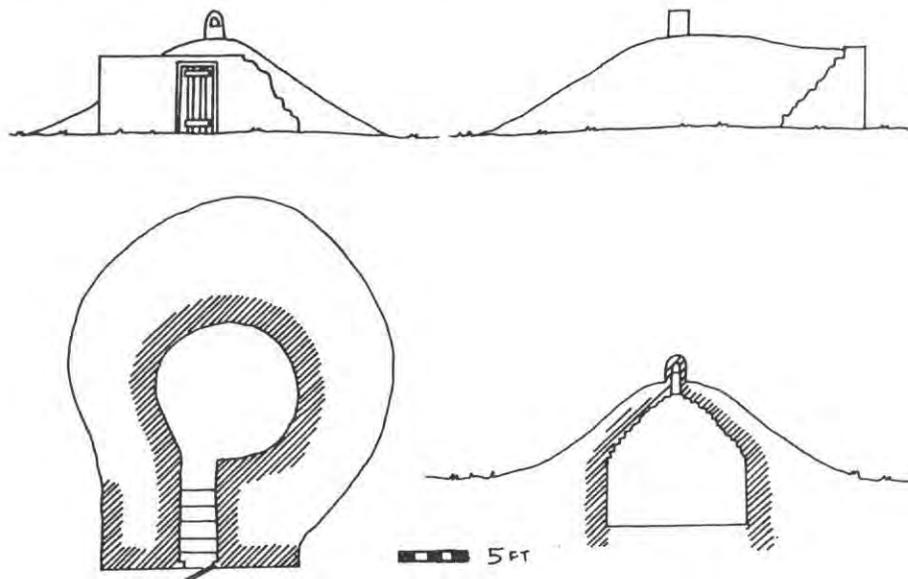
**FIGURE 2**

*Left: Cross section of nineteenth century hillside root cellar. Right: elevation of the same cellar showing stone facing. Adapted from: Byron D. Halsted, Barns, Sheds and Outbuildings (1881, rpr. Brattleboro, Vt.: The Stephen Greene Press, 1977).*

Although the hillside cellar, by virtue of its earth insulation, maintained sufficiently cool temperatures throughout the summer to prevent spoilage of various foodstuffs, the consistent recommendation that they face south suggests a primary function of winter storage. The southern exposure would ensure the greatest amount of winter sunlight, lower snow piles, faster melting in the spring, and radiant heat on sunny (and often coldest) days of winter.

Stone offered the best insulating qualities and the greatest degree of permanency, but proper building stone was not always available, and farmers often used wood in lining the cellars. If Amos Long, a few years

ago, bemoaned the difficulty of locating intact stone root cellars,<sup>156</sup> the difficulty in finding intact wooden cellars is even greater. In constant contact with their soil covering, wooden cellars rapidly decay. For example, the wood linings of a pair of root cellars built in 1914 in Winhall, Vermont, to service several lumber camps exhibit total decay. The only visible remains are two large horse-shoe shaped excavations in the side of a bank.<sup>157</sup> The remains of three wooden root cellars, including both the hillside and artificially embanked types, have been found in northern Maine on the St. John River at the site of the abandoned mid-nineteenth century community of Seven Islands.<sup>158</sup> Evidence of these structures will not last another fifty years. Based on documentary evidence, many hundreds, if not thousands, of wood lined hillside cellars dotted the countryside of the northeast. The low frequency of the stone chamber type of cellar found in Vermont and elsewhere relates to the fact that most of the hillside cellars were of wood and are long gone. The obliteration of the vast majority of wooden cellars of the nineteenth century hampers a comprehensive distributional study of the outdoor cellars.



**FIGURE 3**

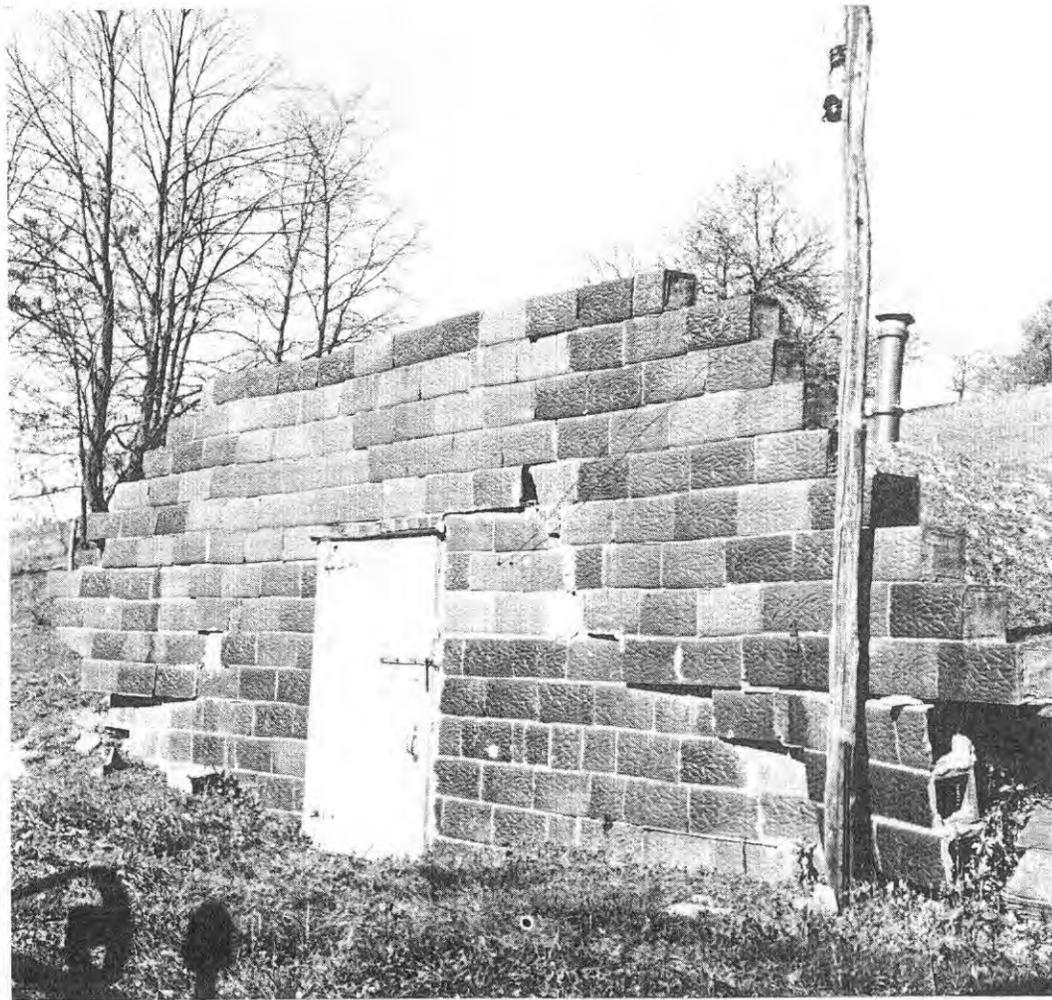
*Banked, or mounded, twentieth century root cellar, Montgomery County, Kentucky. top left: front elevation. top right: side elevation. bottom left: plan view. bottom right: section view. Courtesy of Edward A. Chappell, Kentucky Heritage Commission.*

While a systematic distribution study of the outdoor cellar was not undertaken, research indicates the widespread construction of the hillside or banked cellar form throughout New England and Pennsylvania, and it is also documented from Iceland to Michigan and as far south as Kentucky. The distribution of outdoor cellars indicates that this con-



*Icelandic root cellars, vicinity of Reykjavik, of late twentieth (but possibly nineteenth) century construction. Both are still in use for food storage.*

CREDITS: GIOVANNA NEUDORFER



*Twentieth century root cellar, Holmes Countym, Ohio.*

CREDIT: HENRY J. KAUFFMAN

*Nineteenth century root cellar, Lebanon County, Pennsylvania.*

CREDIT: WILLIAM O. HICKOK

struction type was not limited to the harshest climes for farmers utilized it in more temperate areas as well, the basic requirement being the occurrence of freezing temperatures.

Local topography and architectural traditions also influenced its distribution.<sup>159</sup>

A review of the literature indicates that root cellars of various kinds continued to be constructed into the twentieth century. The gradual shift away from cellar storage started by the last quarter of the nineteenth century with the increasing usage of new techniques. Ensilage and the advent of the silo thus promoted an increased cultivation of corn, grasses and other crops for winter feed for livestock, while family food storage needs were eased by the icebox and pressure canning techniques. Some farms and rural homes undoubtedly utilized the cellars for storage long past the time they became obsolete elsewhere and others were put to different uses from their original intended function. Of all of the root cellars, the stone ones had the longest life simply because of their robust construction, which invited adaptive usage.

### Analysis and Discussion

Based on oral evidence, a number of the stone chambers in Vermont were built to serve as root cellars, and several functioned in that capacity until recently. In contradiction to arguments that history contains "no record of any construction of this kind" and that "the existence of these structures in colonial New England is totally without explanation or rationale," the historic record, oral and written, abundantly documents a tradition of the construction of hillside root cellars. The record also demonstrates the widespread and persistent employment of this construction technique from its use in temporary dwellings in the period of first settlement to the later banked barns. The stone chambers in Vermont exhibit the same sort of variability apparent in documented forms of root cellars: situated under barns or other outbuildings, under houses, in hillsides, or freestanding and embanked with earth. Further, earth mounding apparently served the purpose of temperature regulation. Of the fourteen chambers located within or attached to another structure or foundation hole, only those chambers or portions of chambers exposed to freezing temperatures have earth mounding. In the entire sample, with one exception (the hideout built by Oliver Plaisted), the only chambers which have no earth covering whatsoever are those located entirely within the lower floors of other structures or situated within abandoned house foundation holes. These uncovered chambers either served functions which did not require temperature regulation or they were situated so that extreme temperatures did not effect them. Oral tradition points directly to this

interpretation. Reported by local informants as chimney supports, the five chambers located within abandoned foundation holes are identical to the hollow chimney supports described in the literature. Mounding chimney supports with earth was clearly illogical in terms of their location and unnecessary in terms of their function.

The Vermont stone chambers also exhibit other patterns or distinctive attributes which conform to documented information on root cellars. Regardless of the location of the chamber, with two exceptions the entryways are oriented towards southerly or easterly exposures; one chamber faces west and another north. Arguments using the systematic orientation of the entryways with respect "to the ancient rites of the Celtic solar year" as evidence of prehistoric construction to the exclusion of later construction ignore the fact that the late eighteenth and nineteenth century farmers were also intimately concerned with the proper orientation of their structures. The historic documentation emphasizes that root cellars and various other outbuildings should be oriented to the south or east.<sup>160</sup>

Only a few Vermont chambers differ in size from between 3-5m (9'-16') in length, 1.5-2m (5'-6¼') in height, and 1.5-3m (5'-9') in width and readily compare with documented hillside cellars in Pennsylvania which average between 3.7-5m (12'-18') in length and 2.7-3.7m (9'-12') in width. As expected, since the hollow storage areas were incidental to their primary function, the chimney supports tend to be smaller than the overall average dimensions, and the two smallest chambers in the sample [Nos. 8 and 18] were built, according to oral evidence, as a hiding place from marauding Indians and as a grave. Historic descriptions of root cellars indicate that cellar sizes varied widely depending upon the storage needs of the homestead, the number of livestock, and whether or not storage for the two units was kept separate or combined. Unfortunately, a dearth of quantified data on the food storage requirements of a typical nineteenth century farm family and on the storage capacity of documented root cellars hampers comparison between the potential storage capacity of the chambers and actual requirements of the farmstead. Research suggests that the largest chambers had the storage potential sufficient for a moderately sized livestock herd and much larger than the average household needed to store the family's share of the produce.<sup>161</sup>

Ten chambers, all built into hillsides, exhibit vent holes comparable to those described in documented root cellars. Cited by Byron Dix as an example of the "Megalithic Yard,"<sup>162</sup> a unit of measurement used by ancient peoples of Europe, the vent in one chamber [No. 32], an opening 0.82m (32") long and 0.37m (14¼") wide located at the rear top of the structure, also corresponds in size to the 3' (0.90m) by 1' (0.30m) dimensions recommended for a root cellar vent by a mid-nineteenth century

periodical.<sup>163</sup> Documented cellar vents were usually placed over the doorway, at the bottom of the doorway, or at the rear top of the cellar. The current absence of vents in many of the chambers thus suggests that they may have been incorporated into the wooden doorways, long since decayed or removed, which are documented to once have existed on many of the chambers. From the few chambers which still exhibit doors or door frames it is apparent that the builders rarely used hardware to attach the wood to the masonry. Instead they wedged the framing into the stone entryway and mounted the door onto the framing. Consequently the masonry around the entryway shows no evidence of hardware holes, or other, doorway apparatus.

Several stone chambers exhibit traits which distinguish them from the rest of the structures. The lone subterranean chamber [No. 3], fully mounded with earth, has a unique entryway construction on top of the mound. Formed by overlapping roof stones, the entry is a small triangular opening barely large enough for a large man to squeeze through. Seemingly inconvenient for root storage, this kind of entryway ensured the greatest insulation for the roots. In describing various options for root cellar doorways, one nineteenth century periodical reported that "a door should be provided upon the exposed side or end. This door may be large enough to enter without stooping. *Or it may be simply a 'man hole,' which is better than a regular door, so far as protection from frost is concerned, but not so convenient for putting in and taking out roots.*" (Italics added.)<sup>164</sup>

Another chamber [No. 50] has a unique arched roof of mortared random rubble construction. Local tradition ascribes it to an early nineteenth century munitions magazine associated with Commodore Macdonough's operations on the Otter Creek during the War of 1812. Its masonry detailing closely resembles several other structures erected by Macdonough's men in Vergennes. On the other hand, its hillside construction and arched roof are identical to many Pennsylvania root cellars described and photographed by Amos Long, and its location immediately behind a late eighteenth century brick house suggests a closer association with the farm complex than with military operations almost a mile away.

Ceilings of stone slab construction, frequently cited as a highly significant and distinctive trait of the chambers, mark virtually all the chambers regardless of whether or not they are attached to or located within other structures, built into hillsides, or artificially embanked. The slab ceiling construction thus demonstrates a strong architectural continuity among the chambers based in Vermont upon a building tradition primarily associated with distributions of the thinly laminated and easily split rock types of the Waits River and Gile Mountain Formations. This construction form was employed on diverse building types including chimney supports, burial

vaults, and barn and hillside cellars as well as bridges, roadside drains, mining shaft entrances, and other structures. The widespread distribution of the slab roofed stone chambers from Maine to Kentucky in regions with readily available suitable metamorphic rock types demonstrates the practicality of this architectural tradition.

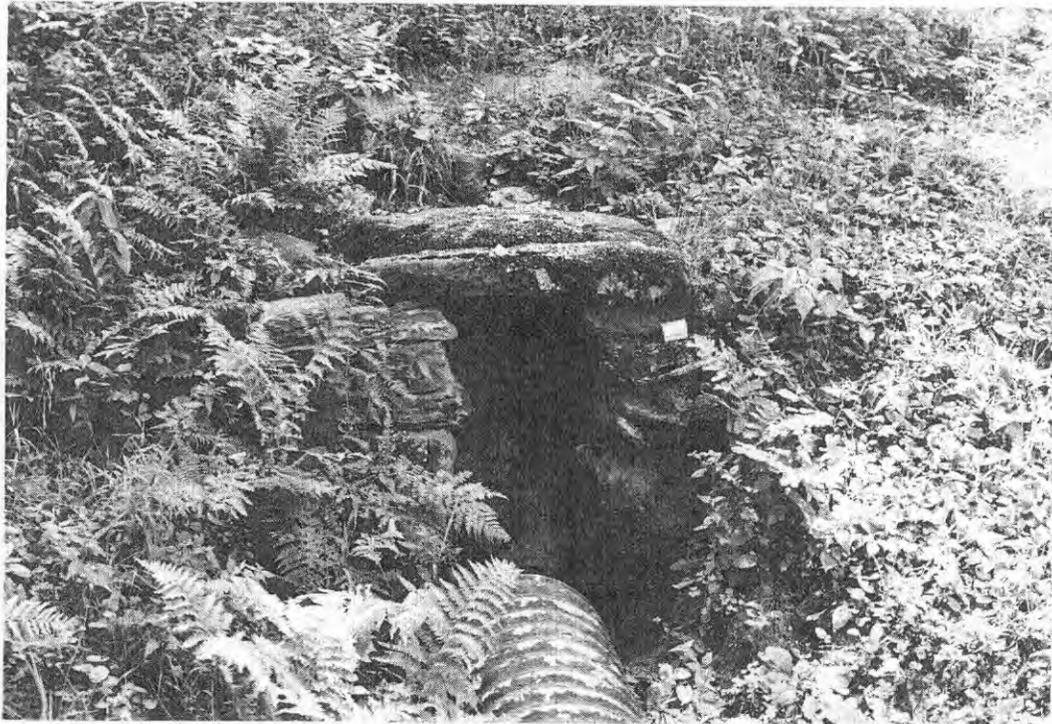
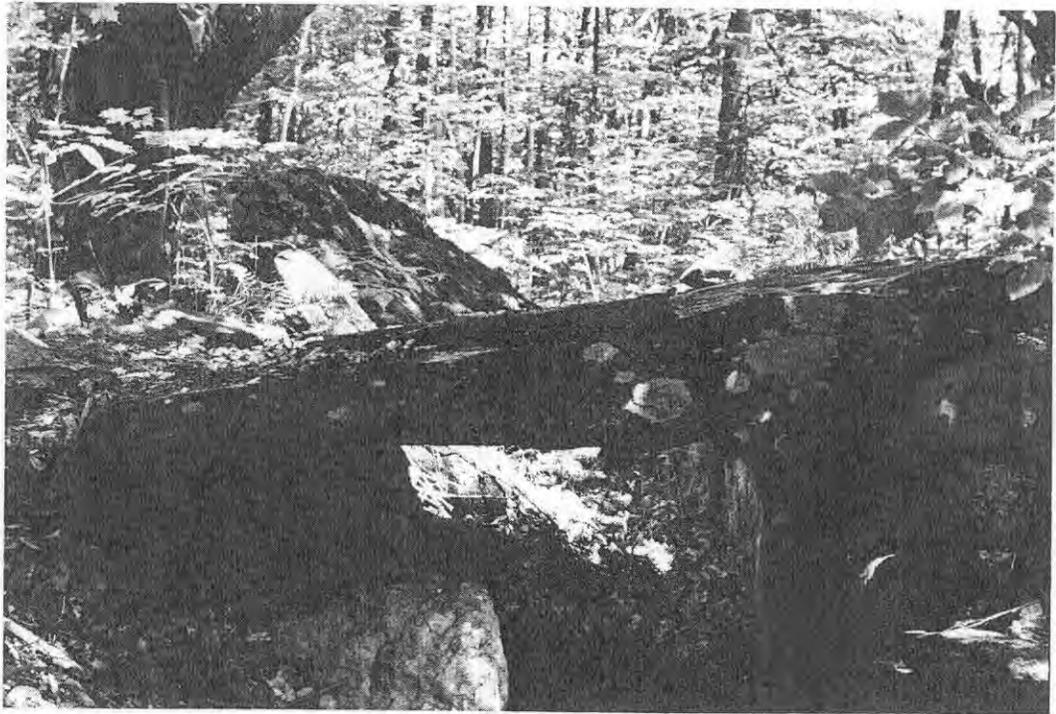


*Rare example of early nineteenth century (ca. 1825) stone slab bridge, Windsor County.*

CREDIT: COURTNEY FISHER

Of all possible construction materials, the literature recommended that where stone “exists in abundance, where the cost of quarrying is little or nothing, and that of moving and cutting it is slight, stone may be advantageously employed on buildings of moderate cost.”<sup>165</sup> Use of stone construction instead of brick presented a choice, which included availability and relative cost benefits. Wood was frequently the most economical material for many kinds of structures, such as dwellings and barns. Good quality field or quarry stone was not always available, and even if available, local architectural traditions and the needs and whims of individual farmers often precluded its use. When stone was available, the labor involved in procuring it, especially if undertaken personally, was abundantly compensated by the cheapness of the material.

The technologies of stone hauling, cutting and building were common knowledge in the early settlement period and throughout the nineteenth century. Field stone and quarries were the main sources. The quarries

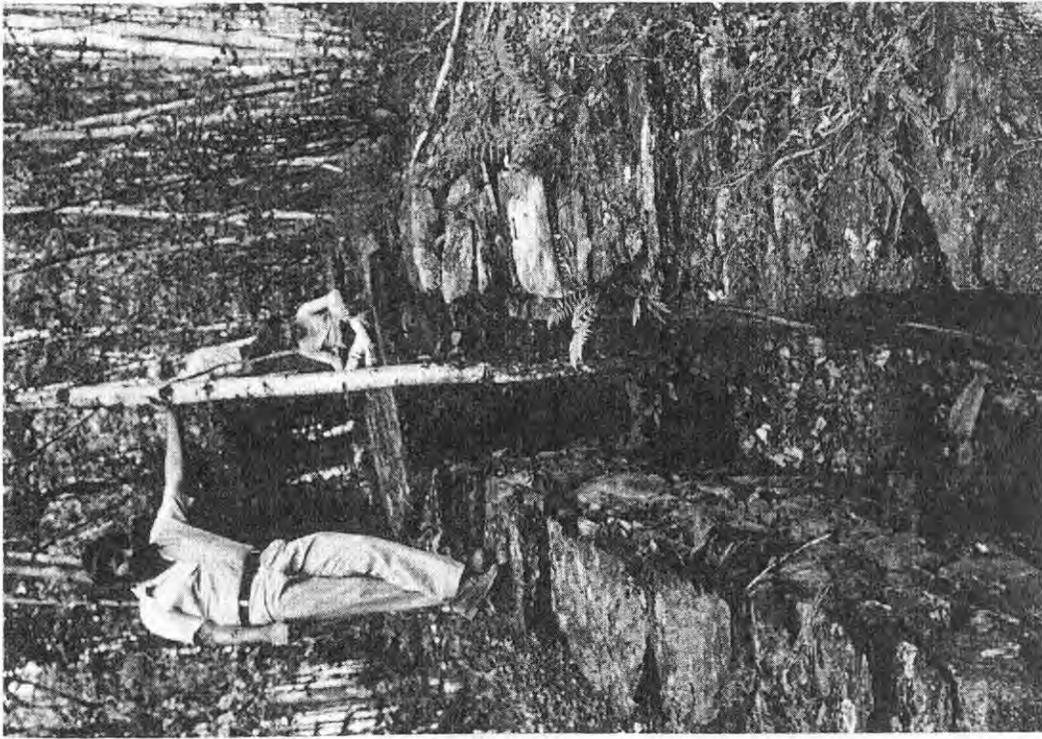


*Example of typical slab roofed entry "tunnel" into house basement, Windham County.*

CREDIT: GIOVANNA NEUDORFER

*Slab capped roadside drain, Windsor County. Roll of film of right hand stone work provides scale.*

CREDIT: CHARLES ASHTON



*Stone lined and slab roofed flue, Ely Copper Mine, Orange County, built in 1877 to carry off sulphurous fumes from the roasting kilns. See Footnotes 177 and 180.*

CREDIT: GIOVANNA NEUDORFER



*Terminal opening of the flue at the Ely Copper Mine.*

CREDIT: GIOVANNA NEUDORFER

were not usually huge cuts, but simply bedrock exposures or outcroppings which necessitated splitting and other “quarrying” techniques before the stone could be utilized. Particular varieties of stone would readily split into useable pieces with straight edges and smooth faces. “In many quarries stones are often taken out ten or twenty feet in length, and from six to ten or twelve inches in thickness, and sometimes from one foot to three feet in width, with straight edges and true and smooth sides.” The nineteenth century guide recommended that, “to break them in pieces of a desirable size, let little fires be made of with hard, dry wood, across the stone where it is desirable to break it, and in a few minutes a seam will be formed so that a crowbar will easily separate them. We have often broken large flat stone, very true and straight, with fire.”<sup>166</sup>

The stone was also split by wedges driven into the seams or holes drilled into the stone. Once split, many kinds of stone required little or no trimming to produce a smooth face ready for laying.<sup>167</sup> Very large stones of suitable thickness which required little preparation were especially valuable for foundations, sills, lintels, hearths, and doorstones: “if you can find huge, flat stones of one or two yards area, and six to twelve inches thick, you will feel especially fortunate.”<sup>168</sup>

Large field stones could be broken by fire or moved intact. Builders often hauled large stones in winter when sleds could transport heavy loads

for long distances. "For the big ones they would have to use the oxen and a stoneboat. They would dig around them and then flip a chain over the stone with what they called a rolling hitch . . . With a proper rolling hitch the oxen could pull the stone right out of the ground and on to the stoneboat."<sup>169</sup> Stoneboats, or runnerless sleds, were essential hauling devices and when drawn by oxen they could transport extremely heavy loads. A combination of tools and methods were used to move heavy stone. With proper tools "it is but the work of a few moments to tumble a large stone six or eight feet."<sup>170</sup> Canthooks, for example, enabled a man to roll a six or eight hundred pound boulder with ease. Grapple hooks, used singly or together, windlasses, crowbars, sheers and tackles, and planks, rollers, ropes, and chains were all standard farm equipment for moving stone.<sup>171</sup> The custom of communal and "change" work expedited both the hauling of stones and subsequent construction work and permitted pooling resources such as oxen,<sup>172</sup> which performed many tasks including the common practice during the nineteenth century of moving entire dwellings and other structures.<sup>173</sup> In Plainfield, Vermont, for example, forty team of oxen moved one large barn.<sup>174</sup> Arguments against the historic construction of the stone chambers which focus upon the supposedly illogical and inconvenient use of great stone slabs and "the enormity of the task of emplacing stone roof slabs and the seemingly insuperable difficulty of sliding such stones onto unmortared stone walls" have not taken into account the construction practices common in Vermont.

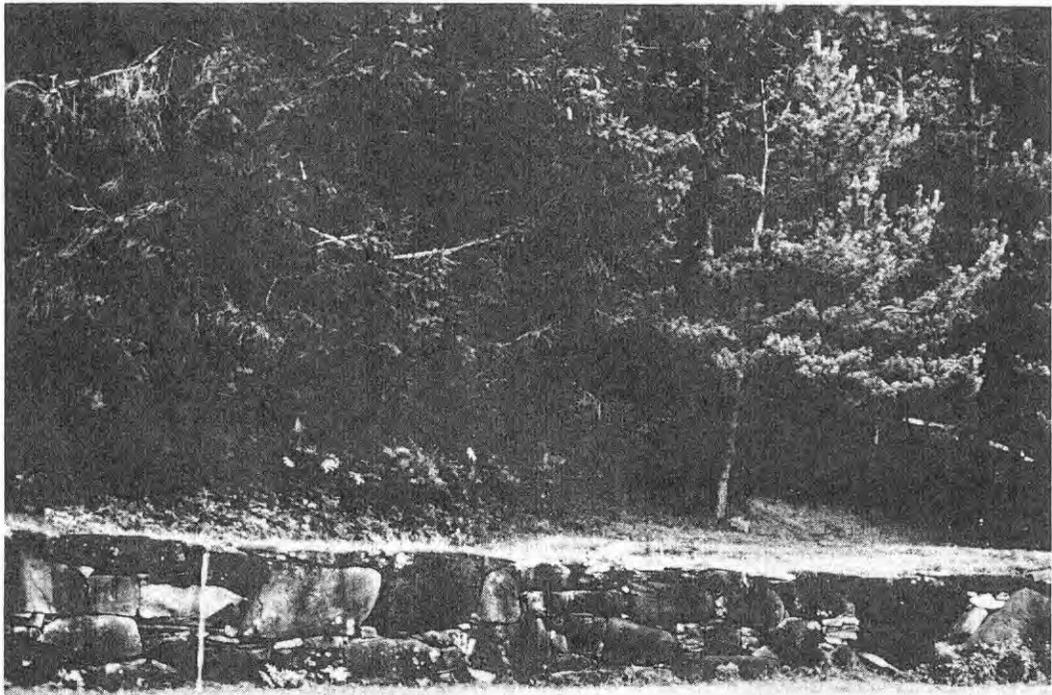
Although there were certain conventional masonry techniques and styles, stone work was as diverse as the men who executed it, the stone they used, and the dictates of local tradition. For example, in western Windsor County, a "very interesting method of stone-laying" resulted "from deposits of stone that splits naturally into thin sheets. These are broken into handy sizes and set on edge in the wall instead of flatways (the usual way). These edge-set pieces are bonded by smaller stones set flat."<sup>175</sup> This construction technique exactly describes the masonry in one chamber [No. 14] which some proponents of the ancient theory single out on the basis of its "unique" masonry detail.

While most farmers had basic masonry skills and did much of their own work, there was also some specialization of labor. Itinerant "jobbers" frequently built stone walls.<sup>176</sup> Although some particularly distinctive masonry can be readily attributed to individual masons, most masonry styles were sufficiently uniform to obscure identification of the builder.

Examination of Vermont's historic sites survey inventory reveals clear trends relating to the tradition of stone construction. The state survey (roughly two-thirds complete), consisting of a town by town inventory of the entire state, suggests that Addison and Windsor Counties have the highest proportion of stone buildings, the vast majority of which were

built between 1790 and 1850. Houses constitute the predominant stone structure still standing, followed by public buildings and structures such as schoolhouses, churches and bridges and commercial structures, such as mills, foundries, kilns, and blast furnaces.<sup>177</sup> While the geographic distribution and architectural traditions of most of these stone structures are functions of the availability of good building stone, the use of stone in the construction of blast furnaces was an ubiquitous practice. The stone work represented in these furnaces provides additional evidence of the sophistication and skill of Vermont masons between the 1790's and 1830's. For example, the Forestdale Iron Furnace, built in Brandon in 1824, has a stone stack sixty feet high and thirty-two feet square consisting of random coursed, random sized stone slabs.<sup>178</sup> The twelve furnaces documented in the Vermont state survey, built between 1791 and 1837, are of dry masonry construction with walls six to eight feet thick.<sup>179</sup> In comparison to these great stone furnaces, the slab roofed chambers required considerably less technical building skill.

The most common use of stone, however, was in the building of hundreds of miles of stone walls. Besides being repositories for millions of stones removed from the field, stone walls, some as wide as eight feet, delineated property and field boundaries and roadways and served to keep livestock out of one field and inside another. While the longevity



*Stone wall, Windsor County, constructed with large slabs of Waits River limestone placed on edge.*

of most stone houses and churches was assured by their continued use through time, stone walls met the fate of most facilities whose utility had come and gone. In the twentieth century and earlier stones were removed wholesale from stone walls, pounds (square enclosures with high stone walls used to pen livestock), furnaces, abandoned foundations, drains, mining facilities, and other structures and were put to new uses.<sup>180</sup> The rock crusher converted many into gravel, new foundations were built from the stones of old ones, and the larger stones were appropriated for doorsteps, sills, walkways and patios. Occurrences such as these undoubtedly took their toll of many stone chambers.

### Conclusion

Oral evidence identifies seven slab-roofed stone chambers constructed expressly as root cellars, including two [Nos. 14 and 36] specifically cited by Professor Fell as "Celtic temples."<sup>181</sup> While only one builder, Mr. Arunah Woodward, has been identified by name, the other unnamed builders were local residents at least one of whom participated in the construction of five neighboring chambers. This group of structures conclusively demonstrates that banked architecture incorporating large ceiling slabs was a popular building tradition in particular Vermont communities which was readily undertaken with available local technologies. The popularity of this slab roof building form is further confirmed by its use in the construction of functionally different chambers built as chimney supports, burial vaults, and barn cellars.

The interpretation of those chambers for which there is no direct conclusive evidence must rest on the examination of their relationship to cultural traditions. The written record clearly shows that banked architecture, so common in the construction of cellars, was a widespread and persistent American tradition. The record also documents that hillside cellars structurally identical to the bank form of chamber were a preferred form of storage facility for roots in an era of pervasive root cultivation. The written record and field observations demonstrate a strong nineteenth century concern with proper solar orientation of the hillside cellars and other structures. The evidence confirms the availability of appropriate stone working technologies. The historic record, thus, conclusively refutes many of the arguments presented by the ancient theory proponents that the chambers could not derive from the historic period. The historic record also corroborates the oral tradition. The careful examination of each chamber further demonstrates that their structural attributes are consistent with their documented counterparts. Three lines of evidence —

historic documentation, oral tradition, and primary data — all converge on the same interpretation. Based on the evidence, it is proper to conclude that most of Vermont's stone chambers were built as root cellars in the nineteenth century with some possibly as early as the late eighteenth century. The evidence also confirms that not all the chambers were root cellars; some were built for other purposes such as chimney supports.

The documented conclusion that some of the Vermont stone chambers were demonstrably built as root cellars and for other purposes and that all the chambers in the sample fit comfortably into the historic milieu in which they are found places the association of purported Celtic inscriptions, phallus stones, and animal figures in obvious conflict. This conflict is best illustrated by the fact that two chambers *known* to have been constructed in the nineteenth century as root cellars [Nos. 14 and 36] allegedly exhibit evidence of Celtic inscriptions and markings. On the basis of present



*Chamber No. 36. Passage entry to chamber; main portion of chamber has collapsed.*

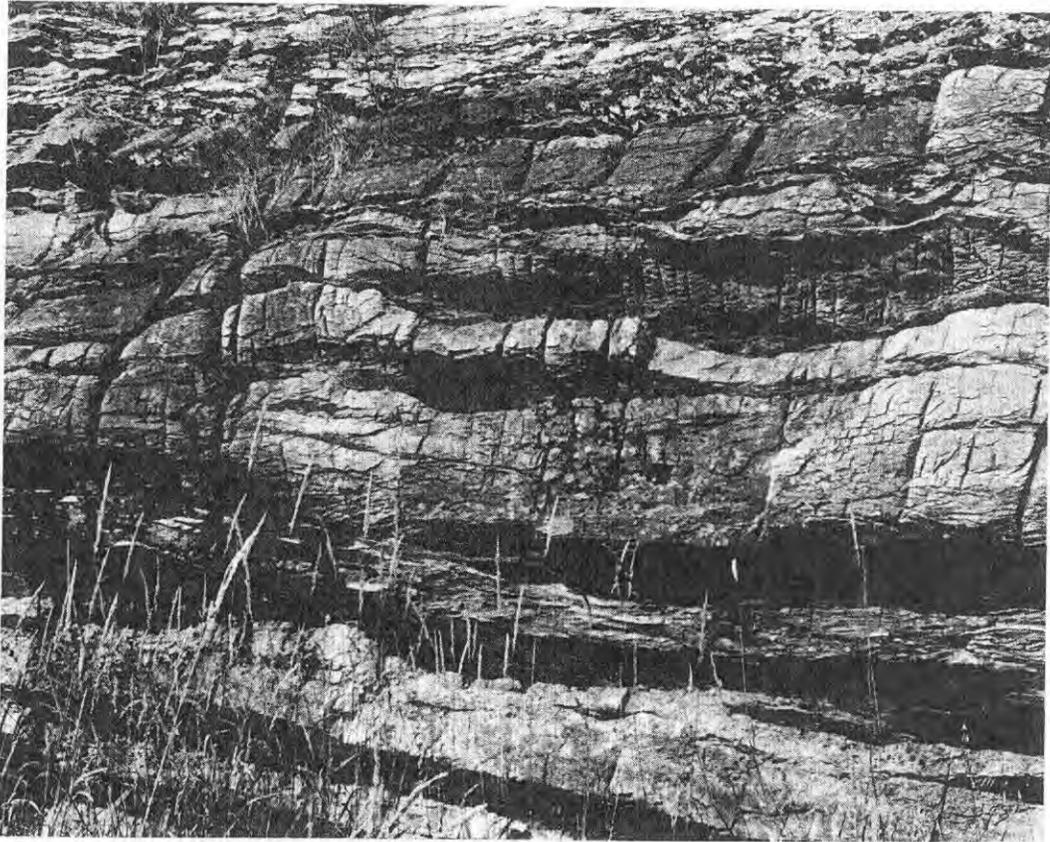
evidence, the “inscriptions” and other “Celtic evidence” associated with the chambers are not what they are purported to be. Again, several lines of evidence converge. Professor Anne Ross, a foremost authority on the Celts and on Ogam script, made a field inspection of a number of the stone chambers and associated markings. She concluded that she could not “with any honesty, say that at the moment . . . the scoriations on

the stones . . . , either in reality or on numerous slides and photographs [are] . . . any form of script at all." She concluded emphatically that she "certainly cannot accept them as Ogams."<sup>182</sup>

If the grooved markings examined by Professor Ross are not an ancient Ogam script, what are they? Based on documented stone working practices of the nineteenth century, the many grooved markings found on the large lintel and ceiling stones of the chambers in particular appear to have resulted from chains and other tools used in the process of hauling and emplacing these large stones. Identical linear and parallel grooves are also evident on many other large rocks found elsewhere, usually at the edge of a field or adjacent to or incorporated into a stone wall.<sup>183</sup> Many of these rocks are crystalline limestones from the Waits River and Gile Mountain Formations which have a particularly soft rind and are easily scored. Many of the chambers exhibit initials, dates, and graffiti, some of nineteenth century derivation, others demonstrably more recent. The metamorphic rocks of the Waits River and Gile Mountain Formations, especially the limestones, are easily weathered, and any scratches or markings rapidly lose their clarity and sharp edges. According to Dr. Charles Ratté, Vermont State Geologist, who visited chamber No. 14, constructed in the nineteenth century as a root cellar, "the representation of Tanith, the Mother Goddess" was carved by someone, but within the past twenty or thirty years.<sup>184</sup> Other marked or grooved stones which have been cited as evidence of ancient settlement are similarly equivocal. According to informants, many are harrow or drag marks: the initial impact would leave a deep gouge; the machinery would then kick into the air leaving a shallower tail at the end of the groove.<sup>185</sup> A few are glacial scars. Even the nineteenth century farmers were impressed by the scoriations left by the glaciers, called by one man "the original Vermont plow." "Dig away the soil that covers a rock," he instructed, "and the surface of this rock will almost surely be found channeled and smoothed like a stone roadway. The lines drawn over the surface of the rocks are from the faintest of fine marks to channels a foot or more in breadth and depth."<sup>186</sup>

In the western part of Vermont in the Champlain Lowlands region, the dolomitic rocks are particularly susceptible to weathering. One "inscription" (which received attention in the Vermont news media) was the "Salisbury Stone," found in 1977 and originally labelled the first discovery of pre-Columbian European inscriptions in the Champlain Valley. Professor Fell translated the inscription to read "dedicated Temple Bel,"<sup>187</sup> but geological assessments have since verified that the Salisbury "inscription" is an example of "beeswax-weathering," an ubiquitous phenomenon in the dolomite beds of the Champlain Valley. The grooves or indentations characteristic of this kind of weathering "occur because the dolomite developed abundant tight cracks when the strata were warped and folded, and

calcite later filled these cracks as a paper-thin vein. The calcite dissolves more rapidly than the dolomite, so that on weathering the calcite is etched, and this faint groove holds more water than the adjacent stone, causing the groove to enlarge."<sup>188</sup>

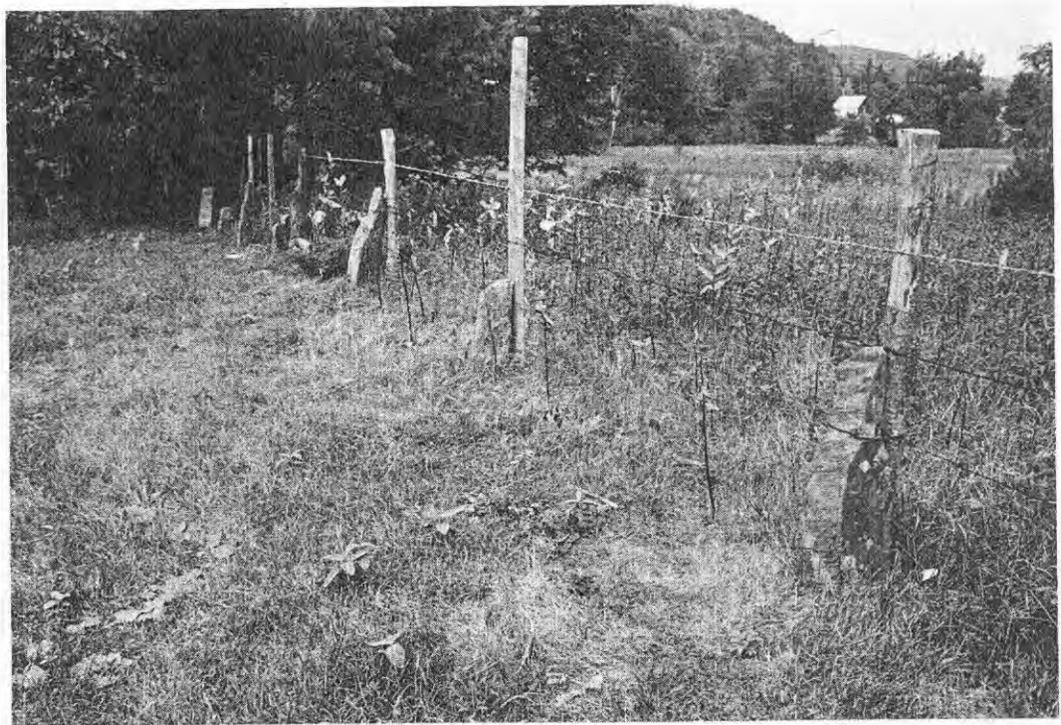


*Characteristic "beeswax" weathering in western Vermont dolomite, Addison County.*

CREDIT: GIOVANNA NEUDORFER

One of the most noticeable characteristics of the Waits River and Gile Mountain limestones is their susceptibility to weathering into soft, rounded, amorphous shapes. Eastern Vermont is riddled with large boulders or outcroppings which exhibit this characteristic weathering phenomenon. The many alleged phallus stones and animal figures are naturally weathered limestone and not, as Professor Warren Cook has suggested, rocks "originally shaped by nature and later modified by a culture that regarded unusual rocks as sacred."<sup>189</sup> Many of these large stones exhibit the typical grooves resulting from dragging activities. In dimension, the purported phallus stones conform to typical thicknesses of the thinly laminated limestones which split off in both their horizontal and vertical planes and are subsequently rounded by weathering into cigar-like shapes.<sup>190</sup>

It has been suggested that one or more of the Vermont stone chambers were ancient Celtic prototypes whose architectural form was copied again



*Typical examples of nineteenth century stone posts and fence rows,*  
stones conform to typical thicknesses of the thinly laminated limestones

CREDITS: BOTTOM: DAN NEARY

TOP: CHARLES ASHTON

and again by later Vermont farmers. If this construction tradition were unique to Vermont, instead of existing also in the older New England colonies, then this possibility would merit consideration. However, there is no record of Vermont's chambers in early travelers' accounts and the historic record clearly shows that this architectural tradition was widespread in the eastern and central United States and ranged from the seventeenth, well before Vermont settlement, through the nineteenth centuries. While Pynchon's reference to a "stone chamber" in his 1654 letter to Winthrop merits further inquiry, the evidence makes it clear that the stone chambers in Vermont are a local response to local environmental conditions. On that basis alone the chambers deserve preservation and protection as poorly known but significant aspects of rural nineteenth century Vermont.

While there appears to be no evidence of ancient pre-Columbian European settlement in Vermont, it does not mean that evidence of ancient European settlements may not be identified in the future. In Vermont and elsewhere, there are features which are presently unexplained. For example, the "Memphremagog stone" on the Vermont-Quebec border exhibits markings which appear to be neither weathering, dragging or glacial scoriations, nor plowmarks.<sup>191</sup> These markings also have no resemblance to what is presently known of Indian petroglyphs and clearly require professional study. Similarly, the grid pattern carved on a stone near the chamber built by Mr. Woodward is undoubtedly man-made.<sup>192</sup> Whether it is an eighteenth or nineteenth century boundary symbol, a mason's doodle, an aboriginal petroglyph, or something else has yet to be determined. However, as this study has shown, much of what is sometimes thought "exotic" or "mysterious" proves to be commonplace after a modicum of research. While there are still many archeological puzzles in Vermont, the stone chambers are not among them.

## Epilogue

The termination of any long-term exhaustive effort brings relief first, then a bittersweet mixture of delight in a completed and well done task and sadness that something so consuming, so familiar has come to an end. The three-year period of the stone chamber study, from its inception to the publication of this book, carried out in the midst of a public, media-reinforced controversy over their origins and over potential pre-Columbian European settlement of New England, was a long, slow journey in which every mile brought new scenery and the passage of time provided a maturing, more thoughtful perspective with which to view it. So, it is fitting that this final brief section of the book is written last and only at the end of the journey. My purpose in this epilogue is to share with the readers my concluding impressions of this frequently tumultuous period in the hope that these thoughts will clarify several issues and conflicts which pervaded the controversy and prompt a reconsideration of particular avenues of thinking.

It is my perception that the common ground or common language essential to any dialogue was never established at the outset of the controversy. A meaningful debate that has as its goal the resolution of a problem or question is impossible if the participants do not share and abide by the same ground rules. And it is the absence of these shared ground rules that differentiates an inquiry from a controversy. While an inquiry striving for historic truth may become controversial, a controversy is not always an inquiry. It may simply become a vehicle for airing personal myths and metaphysical beliefs in which the "believer" is pitted against the "non-believer." Within these three years absence of basic common ground between the disparate parties resulted in scholarly frustration and public confusion and served as a catalyst that transformed an historic inquiry into a highly publicized controversy.

I ultimately believe that if there is genuine interest in knowing Vermont's historic and prehistoric past, if the current debate about ancient pre-Columbian European settlements in New England seeks understanding and answers based on honest thought and the best available knowledge then all participants must use the same standards of scientific and historic reasoning. These standards are not one individual's personal opinion; they are the objective bases upon which scientific and historic inquiry operates. While they should allow ample room for speculation and those theoretical leaps which are essential to vigorous pursuit of knowledge and do not require scholarly impartiality, these standards at least assure that the work is subject to correction and criticism by the rest of the scientific and historic community. These standards, or common language, can be expressed as follows: that there exists a body

of inviolate facts that cannot be altered by personal opinions or beliefs; that there is a scientific method or process for moving toward a fact or a truth or an understanding or for obtaining evidence; that any evidence offered must be obtained through that scientific method and must withstand the scrutiny of appropriate disciplines; that there are uniformities of culture and rules of linguistics fundamental to any study and analysis of human behavior and language; that every idea or theory is not equal in value; and that the burden of proof in any scientific endeavor falls on the proponent of the new theory or hypothesis who, in turn, must utilize accepted scientific methods to develop theory and accumulate and present data.

Since the Vermont controversy, among others, is based on anthropological issues relating to culture and human behavior, it is the responsibility of the anthropologist and the historian to communicate the known facts, to explain the scientific method, to clarify the nature of evidence, to identify the uniformities and continuities of human behavior and language, to establish credibility with the public, and to respond critically and openly to new theories and data that are developed through the scientific method and presented with similar rigor. It is the responsibility of the public to inform itself of these fundamental findings and methods so that it can evaluate the issues. I have sadly concluded that until there is an agreed upon, well understood approach or method of moving toward a truth and there are uniform rules of evidence by which all abide, the entire issue of possible ancient pre-Columbian European settlements in Vermont and New England will remain simply a forum for helter-skelter opinion and not a serious historical inquiry.

This three-year journey has taught me that our individual and collective memory is short, so short in fact, that we do not even know that we have forgotten. Poor memory has caused many common things to appear uncommon. Problems have been posed and questions asked that should never have arisen in the first place had our historic memory been more vivid. Furthermore, our collective tendency is to believe that our past cumulative experience is still with us. Frequently this is not the case. Our basic orientation with the present has impaired our view of history and, at the same time, shortchanged it. We conclude that since we don't know about it now, no one else ever did.

A good example of our poor memory is the issue of stoneworking technology. Many have cited the stone slab construction of the chambers as evidence of their "unusualness" and thereby exotic ancient origins. This thinking is based on the belief that the technological expertise evident in the construction of stone chambers was unknown to Vermont farmers. Documented nineteenth century practices patently contradict this and, in fact, indicate that the slab-roofed chambers were minor examples of a very

sophisticated technology of both stoneworking and hauling. Had we known more of past traditions, past technologies and past subsistence patterns, the stone chambers would not have become cultural and architectural freaks. Because our memory is so poor, we should at least remember that and proceed accordingly.

Finally, it is apparent to me that ignorance of documented Vermont pre-history has contributed to the basic attraction for an "exotic" past far removed from our own experience. One particular letter to the editor of the *Rutland Herald* best exemplifies this curiosity: "doesn't it feel a lot more vibrant to think that all this was going on here?" I find it extraordinary that 10,000 years of documented Native American occupation of Vermont through periods of changing climate, vegetation, and fauna does not fuel more interest than a mythical past founded on non-verifiable evidence. Again, it is the responsibility of the archeological community to communicate their finds, and it is the responsibility of the public to inform itself of the large quantity of factual knowledge that is currently available on the complex Native American occupation of Vermont, in particular, and the Northeast in general.

Our present and our future are founded on our past: only through the cumulative experience of history can we hope to learn the lessons of long-term human adaptation and survival. Even if we do not learn from past wisdom or error, we can at least be aware of the options. So, it is incumbent upon us to understand that past by using all the available tools of science, research, and reasoning with rigor and effort. Anything less provides a distorted and limited version of history and human experience; and a history based on wishful thinking and fantasy rather than on unembellished facts and sound interpretation will ultimately prove an inadequate basis for successfully coping with our future.

GIOVANNA NEUDORFER  
*Division for Historic Preservation*  
*Montpelier*  
*February, 1980*

Please note the following errata.

See NOTES, page 65.

Note 2 should read as follows:

<sup>2</sup> Popular books and articles which have received wide circulation include Barry Fell, America, B.C. (New York: Quadrangle/The New York Times Book Co., 1976); Salvatore Michael Trento, The Search for Lost America (Chicago: Contemporary Books, Inc., 1978); Warren L. Cook, ed., "Ancient Vermont," Proceedings of the Castleton Conference, Castleton State College (Rutland, Vt.: Academy Books of Rutland, 1978); Barry Fell, "Columbus was a Johnny-Come-Lately," Saturday Review, October 16, 1976, pp. 16-19; Dewitt Copp, "Goodbye Columbus or, was Massasoit a Celt?," Country Journal, August 1976, pp. 59-69; and Thomas Fleming, "Who Really Discovered America?," Reader's Digest, February 1977, pp. 69-73. Media interest is apparent in dozens of newspaper stories written since 1975. While most stories have appeared in Vermont dailies, such as the Rutland Herald and Burlington Free Press, coverage includes the London Times (January 30, 1978) and the Boston Globe (February 12, 1978). See a sample of Vermont media coverage in John R. Cole, "Barry Fell, America B.C., and A Cargo Cult in Archeology," New York State Archeological Association Bulletin, 74, November 1978, 1-10.

Note 3 should read as follows:

<sup>3</sup> Trento, Search, Fig. 2.5; Goodwin, p. 175.

## NOTES

<sup>1</sup>For many years the "Mystery Hill" site (also known locally as Pattee's Caves) in North Salem, New Hampshire, was, in particular, the focus of this speculation. See, for example, William B. Goodwin, *The Ruins of Great Ireland in New England* (Boston: Meador Publishing Co., 1946); Hugh Hencken, "The 'Irish' Monastery at North Salem, New Hampshire," *New England Quarterly*, 12 (1939), 429-442; Hugh Hencken, "What Are Pattee's Caves?," *Scientific American*, November (1940), 258-259; Gary S. Vesceius, *The Antiquity of Pattee's Caves*, Report to the Early Sites Foundation (Hanover, N.H.: The Early Sites Foundation, 1955), unpublished manuscript; and Richard V. Humphrey, ed., *The Mystery Hill Source Book 1907-1945* (Salem, N.H.: Teaparty Books, 1979). Mystery Hill continues to be the source of much conjecture, discussion and research. See, for example, Mark Feldman, *The Mystery Hill Story* (North Salem, N.H.: Mystery Hill Press, 1977); numerous articles in *New England Antiquities Research Association (NEARA) Newsletter* and *Early Sites Research Society Bulletin and Work Reports*; James L. Swauger, "The Stone Structure of Mystery Hill, North Salem, New Hampshire, U.S.A.," *Almogaren* [Akademische Druck-u. Verlagsanstalt, Graz, Austria], 7 (1976), 191-198; and Glyn Daniel, "Editorial," *Antiquity*, 46 (1972), 1-7. For an analysis of the Mystery Hill "evidence" from a contemporary archeological and scientific point of view, see Charles J. Cazeau and Stuart D. Scott, Jr., *Exploring the Unknown, Great Mysteries Reexamined* (New York: Plenum Press, 1979), pp. 37-60.

While Goodwin, pp. 385-386, only gives passing mention to stone chambers in Vermont, William S. Godfrey, "A Stone Structure in Hancock, Vermont," *Vermont History*, 23, No. 1 (1955), 60-62, presented the first published evaluation of one of the Vermont structures. For an encapsulated history of the personalities and investigations that led to the current interest in Vermont's structures, see William Lovering, "Origin of 'Site' Interest," *Rutland Herald* [Rutland, Vt.], December 10, 1977.

In contrast to this relatively recent interest in New England's stone chambers, conjecture about the evolution of culture, the possible exotic origins of the American Indian and claims of ancient transoceanic voyages to the New World have sparked debate in America since at least the eighteenth century. For example, the possibility of ancient Phoenician inscriptions on the "Dighton Rock" in Massachusetts caught the attention of Benjamin Franklin (see Benjamin Franklin, *Writings of Benjamin Franklin*, 10 Vols., ed. Albert Henry Smyth [New York: MacMillan, 1905-1907], IX, 246-248), as well as that of Ezra Stiles, president of Yale from 1778 until 1795, who also commented on them in both his "Literary Diary" and "Itineraries" (letter to the author from Dorothy W. Bridgewater, Yale University Library, March 27, 1979).

In 1855, Henry R. Schoolcraft (*Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States*. Collected and prepared under the direction of the Bureau of Indian Affairs, Dept. of Interior, Vol. 5 [Philadelphia: Lippincott & Co., 1855], 34) announced that "the ancient Celtic character had been found" on a tablet in a West Virginia burial mound. Interest in this subject matter is enduring although cyclical in intensity, waxing and waning for various reasons over at least a century and a half and producing a vast literature of theories and claims and countertheories and counterclaims. The output of newspaper stories, journal articles and books is defined by peaks of interest in a particular "discovery" or "problem," for example, that of the Kensington rune stone, Newport Tower or Davenport tablets, or theory, such as the hypothesized Nile River Valley origin of American Indian civilization. The best summaries and analyses of the various theories and claims, with accompanying references, are found in Robert Wauchope, *Lost Tribes and Sunken Continents* (Chicago: The University of Chicago Press, 1962) and Marshall McKusick, *Atlantic Voyages to Prehistoric America* (Carbondale, Illinois: Southern Illinois University Press, [In Press] 1980). See also references cited in Footnote 22.

<sup>2</sup>Trento, *Search*, Fig. 2.5; Goodwin, p. 175.

<sup>3</sup>Trento, *Search*, Fig. 2.5.

<sup>4</sup>Brief construction or contextual descriptions of burial vaults are found in John Gregory, *Centennial Proceedings and Historical Incidents of the Early Settlers of Northfield, Vt.* (Montpelier, Vt.: Argus and Patriot Book and Job Printing House, 1878), pp. 302-303; Cecile B. and Mildred B. Hay, *History of Derby* (Littleton, N.H.: Courier Printing Co., Inc., 1967), p. 108; William M. Newton, *History of Barnard, Vt.* (Montpelier, Vt.: Vermont Historical Society, 1928), pp. 216-217; Interview (September, 1978) with Leon Dean, Burlington, Vt., founder of Vermont Old Cemeteries Association. For charcoal and lime kilns, see Amos Long, *The Pennsylvania German Family Farm*, Publications of the Pennsylvania German Society, Vol. 6 (Breinigsville, Pa.: The Pennsylvania German Society, 1972), 469-487; Arthur W. Wall, "Lime Kilns of Rockport [Maine]," *Down East Magazine*, May 1969, pp. 32-55; and Victor R. Rolando, "Ironmaking in Vermont: 1775-1890," M.A. Thesis, College of St. Rose, Albany, 1980, pp. 18-19. For potash burners, see George A. Russell, comp., "Articles on the Potash Industry Transcribed from Various Sources," *Bulletin of the Business Historical Society* [Arlington, Vt.] 7, No. 3 (1933), pp. 11-14; and William Shotwell, "An Address to the Manufacturers of Pot and Pearl Ash," in *The Act of Congress for Promoting the Progress of Useful Arts* (New York: Childs & Swaine, 1791), pp. 9-26. For iron furnaces, see J.P. Lesley, *The Iron Manufacturers Guide to the Furnaces & Rolling Mills of the United States* (New York: John Wiley, 1859); William Neilson, *Charcoal and Blast Furnaces, Rolling Mills, Forges & Steel Works of New England in 1866* (American Iron & Steel Institute, 1867); Victor R. Rolando, *A Survey of the Stone Blast Furnaces of New England and Eastern New York State* (n.p., 1977), and Rolando, "Ironmaking."

<sup>5</sup>Barry Fell, "Celtic Iberian Inscriptions of New England," *Occasional Publications of the Epigraphic Society*, 3, No. 50 (1975), 1-5. See also Barry Fell, "The Romano-Celtic Phase at Mystery Hill, New Hampshire, in New England," *Occasional Publications of the Epigraphic Society*, 3, No. 67 (1975), 1-3.

<sup>6</sup>Fell, *America*, p. 125.

<sup>7</sup>*Ibid.*, p. 91.

<sup>8</sup>*Ibid.*, p. 7.

<sup>9</sup>See *Ibid.*, pp. 219-245; Cook, "Ancient Vermont" pp. 6-9, Figs. 42-48, 50-64 and throughout.

<sup>10</sup>Trento, *Search*, pp. 31-43; Salvatore Michael Trento, "A Preliminary Report: Some Stone Structures in America," *Anthropological Journal of Canada*, 16, No. 2 (1978), 18-20; Fell, *America*, pp. 130-134, 147, 151, 154, and 199; Barry Fell and John Williams, "Inscribed Sarsen Stones in Vermont," *Occasional Publications of the Epigraphic Society*, 3, No. 53 (1975), 1-2; Cook, "Ancient Vermont," Figs. 40 and 41.

<sup>11</sup>Fell, *America*, pp. 247-251.

<sup>12</sup>Trento, *Search*, pp. 71-77 and 193-194; James P. Whittall, II, *Sean Seomraí Cloiche De An Nua-Shasana* [trans. Ancient Stone Chambers of New England] (Danielson, Conn.: Early Sites Research Society, 1977), n.p.; James P. Whittall, II, "Pre-Colonial New England - Western Europe Architectural Affinities," in Cook, "Ancient Vermont," pp. 28-30; Fell, *America*, pp. 96 and 127-128; and Barry Fell, "Vermont's Ancient Sites and the Larger Picture of Trans-Atlantic Visitations to America, B.C.," in Cook, "Ancient Vermont," p. 74.

<sup>13</sup>Byron E. Dix, "An Early Calendar Site in Central Vermont," *Occasional Publications of the Epigraphic Society*, 3, No. 51 (1975), 1-3; and Byron E. Dix, "A Second Early Calendar Site in Central Vermont," *Occasional Publications of the Epigraphic Society*, 3, No. 61 (1976), 1-18. Although Dix to date has declared his findings tentative and has made no conclusions about the possible age and cultural affiliations of the sites, Fell uses Dix's archeo-astronomical work to support the thesis of the chambers' great antiquity.

<sup>14</sup>Warren L. Cook, "Vermont's Lithic Sites and Artifacts," in Cook, "Ancient Vermont," p. 8.

<sup>15</sup>A brief overview of the archeological literature suggests that the oldest and best documented example of stone construction by northeastern aboriginal populations may be the stone burial mound at L'Anse Amour, Labrador, dated to 5580 B.C. (see Robert McGhee and James A. Tuck, *An Archaic Sequence from the Strait of Belle Isle, Labrador*, Archeological Survey of Canada Paper No. 34 [Ottawa: National Museums of Canada, 1975], pp. 85-92.) Use of stone slab linings and/or coverings continued to be a frequent characteristic of Indian burial practices throughout the Archaic period (until approximately 1000 B.C.) from Labrador to Massachusetts and New York as documented by William W. Fitzhugh in "Indian and Eskimo/Inuit Settlement History in Labrador: An Archeological View," in *Our Footprints are Everywhere*, ed. Carol Brice-Bennett (Nain, Labrador: Labrador Inuit Association, 1977), p. 9; Dena F. Dincauze in *Cremation Cemeteries in Eastern Massachusetts*, Papers of the Peabody Museum of Archeology & Ethnology, Vol. 59, No. 1 (Cambridge, Mass., Harvard University, 1968); and William Ritchie in *The Archeology of New York State* (Garden City, N.Y.: The Natural History Press, 1965), pp. 213-225. However, use of stone in burials is absent in the Maritime Provinces and rare in Maine (telephone interview with David Sanger, Professor of Anthropology, University of Maine-Orono, Nov. 1978; and Warren K. Moorehead, *The Archeology of Maine* [Andover, Mass.: Andover Press, 1922] pp. 90, and 92-93). In Labrador and elsewhere in Northeastern Canada use of stone in dwelling construction, for example, in the lower courses of house walls and in paving stones surrounding central hearths, is found in Pre-Dorset (approximately 1850 B.C.) Inuit sites, in Dorset (approximately 800 B.C. - A.D. 500) sites and in Thule (post A.D. 1000) sites. In addition to its customary use in fire hearth construction and in tool manufacturing, Charles C. Willoughby in *Antiquities of the New England Indians* (Cambridge: Peabody Museum of American Archeology & Ethnology, Harvard University, 1935), pp. 292 and 161-170 documents its use as a heat source in sweat lodges and in art work, including sculptured stone faces, animal effigies and petroglyphs. Aboriginal use of standing commemorative stones has also been reported (Samual Farnar Jarvis, "A Discourse on the Religion of the Indian Tribes of North America," *New York Historical Society Collections*, 3 [1921] 263).

<sup>16</sup>In his article, Alfred M. Bingham, "Squatter Settlements of Freed Slaves in New England," *The Connecticut Historical Society Bulletin* 41, No. 3 (1976), 65-80, concludes that several stone chambers in southeastern Connecticut were used, and perhaps built, by freed black slaves from estates neighboring the chambers.

<sup>17</sup>A study conducted on a number of New Hampshire stone chambers concludes that at least these chambers were untypical forms of trapping cubby's used between the 1880's, or earlier, and the 1930's. See Jonathan Hall and Eric Woodman, "Beehive-Shaped Stone Structures: Ancient or Recent Origin," *Man in the Northeast* 5 (1973), 60-62; Andrew Rothovius, "The Purpose of the Beehive-Shaped Stone Structures in Southwestern New Hampshire," *New England Antiquities Research Association Newsletter* 8, No. 1 (1973), 2-7; and Trento, *Search*, pp. 44-45. Although there is little supporting evidence, some have theorized that the chambers were springhouses, as appears to be the case with some of the "beehive" chambers in central Massachusetts (Richard Rose, "Stone Beehive Structures: Myth and Reality," Northeastern Anthropological Association Meeting, Henniker, New Hampshire, 31 March 1979; and descrip-

tions of springhouses in Long, *Pennsylvania Farm*, pp. 106-112).

Professor Dena Dincauze, University of Massachusetts, Amherst, and Michael Roberts, Institute for Conservation Archeology, Harvard University, personally visited some of the Vermont stone chambers in 1975 and concluded that it was "reasonable and highly likely" that the structures were constructed as cold cellars for crops or ice storage (Dena Dincauze and Michael Roberts, "Notes," November 10, 1975, through the courtesy of Dena Dincauze). A University of Massachusetts, Amherst, research group, directed by John R. Cole, investigated eight western Massachusetts stone chambers and related sites and concluded that there were significant functional differences among them, including use as wells and springhouses. A report on their project is forthcoming.

In addition to the numerous excavations conducted at the Mystery Hill site (see various issues of the *New England Antiquities Research Association Newsletter* and *Early Sites Research Society Bulletin* and *Work Reports*), a number of New England stone chambers including several in Vermont have been excavated within the past decade. In each case, only historic period artifacts were recovered, if anything at all was found. See, for example, Paul E. Holmes, "The Noyse Rock Shelter [stone chamber]," *The New Hampshire Archeologist*, December, No. 17 (1972), 7-12; Anonymous, "The Gilmore Chamber," *Early Sites Research Society Bulletin* 3, No. 1 (1975), 6-8; James P. Whittall, II, "Excavation - Stone Chamber, Groton, Connecticut," *Early Sites Research Society Bulletin* 4, No. 1 (1976), 26-27; Godfrey, pp. 60-62; and James P. Whittall, II, "Windham, New Hampshire, Stone Chamber on Beacon Road," *Early Sites Research Society Work Reports* 1, No. 6 (1975), 1-2. In his excavation summary of a southwestern Vermont chamber, James P. Whittall, II ("Archeological Survey, Dry Stone Chamber, WD-16, Windham County, Vermont, Preliminary Report," *Early Sites Research Society Bulletin* 7, No. 1 [1979], 2-11) reported the discovery of what appeared to be "chipped stone" artifacts, presumably of prehistoric manufacture, within the context of the chamber and identified as such by at least one archeologist. Personal examination of these "artifacts" indicates that they are nothing but natural cobbles and quartzite fragments.

Also see Walter T. Silver, "Whither the 'Beehives,'" *The New Hampshire Archeologist* 20 (1978-79), 62-69, who counters the theory proposed by Hall and Woodman.

<sup>18</sup>Over eighty town histories, many written in the nineteenth century, and various primary accounts by eighteenth and early nineteenth century travellers passing through Vermont were perused in the course of this study; for example, Thomas Anburey, *Travels Through the Interior Parts of America* 2 Vols. (London, 1789; rpt. Boston: Houghton Mifflin Co., 1923), Timothy Dwight, *Travels in New England and New York*, ed. Barbara Miller Solomon (Cambridge, Mass.: Belknap Press of Harvard University Press, 1969), John A. Graham, *A Descriptive Sketch of the Present State of Vermont* (London: Henry Fry, 1797), John Lambert, *Travels Through Canada, and the United States of North America in the Years 1806, 1807, and 1808* (London: Baldwin, Cradock & Joy, 1816), J.C. Myers, *Sketches on a Tour Through the Northern and Eastern States, The Canadas and Nova Scotia* (Harrisonburg: J.H. Wartmann and Bros., 1849), and Zadock Thompson, *Geography and Geology of Vermont* (Burlington: Zadock Thompson, 1848). While examples of unusual natural features such as caves, novel flora and fauna and manmade features or alterations to the landscape such as cleared forests and Native American petroglyphs (see Edward A. Kendall, *Travels Through the Northern Parts of the United States in the Years 1807 and 1808* [New York: I. Riley, 1809]) are vividly described or at least noted, there is no mention of "unusual stone chambers" in any of these accounts. For example, although his eighteenth century travels took him throughout New England and Vermont, Peter Kalm's only report of unusual stone features (Adolph B. Benson, trans. and ed., *The America of 1750; Peter Kalm's Travels in North America; The English Version of 1770*, Vol. 2 [New York: Wilson-Erickson, Inc., 1937], pp. 441-442) is a reference to "great pillars of stone, leaning upon each other" nine hundred miles west of Montreal.

<sup>19</sup>For example, in the course of studying Dutch barns John Fitchen, *The New World Dutch Barn*, (Syracuse: Syracuse University Press, 1968), p. 17, discovered that "deeds to the end do not record the numbers, size or disposition of any buildings thereon. It is rarely, if ever, that deeds to real estate property describe or even mention the erection of any barns." Although there are still many surviving seventeenth and eighteenth century Dutch barns, the earliest newspapers do not mention their erection: "at most, the building of a fort or a courthouse, or perhaps a church or a large mill, was recorded, but never a barn. Contemporary circumstantial accounts of any building's erection are simply nonexistent." In their study of frame dwellings in the seventeenth century colonies, Harold R. Shurtleff and Samuel Eliot Morison, *The Log Cabin Myth: A Study of the Early Dwellings of the English Colonists in North America*, (Cambridge, Mass.: Harvard University Press, 1939), pp. 51-55, similarly addressed the scarcity of available documentation on these structures. "The reason for this seems clear. Anything normal or usual in the colonies, such as Englishmen dwelling in the same sort of houses that they had at home, was not a subject of contemporary comment in an age that was not self-conscious about every day material things. . . . Negative evidence must be used by historians with caution and common sense. If contemporary chroniclers do not mention clothes, we are not to conclude that the colonists were naked; only that their clothing offered nothing remarkable." See also Thomas C. Hubka's study, "The Connected Farm Buildings of Northern New England," *Historical New Hampshire*, 32, No. 3 (1977), 87-115, ref. 91-93.

<sup>20</sup>For many reasons, anthropologists have refused to seriously consider the possibility of the chambers' ancient origin and related theories maintaining, for one, that complex issues have been presented and argued in a simplistic manner often out of context with what is known (after many decades of work) about prehistoric Native American cultures and historic American settlement and subsistence patterns. This academic non-response or outright rejection of proposed theories and claims has traditionally been perceived by many ancient European settlement proponents as intellectual snobbery, ivory-tower isolationism, or simple refusal to consider new ideas for fear of altering the *status quo* of accepted fact and theory (see Warren L. Cook, "Reflections on the 'Ancient Vermont' Conference," in Cook, *Ancient Vermont*, pp. 132-137; Barry Fell, "Press Conference," in *Ibid.*, p. 95; and Wauchope, pp. 69-82). Fortunately, some anthropologists and other scholars have responded to the need to address these issues although particular approaches to communication and explanation have not always been effective. See, for example, Glyn Daniel, "They Came Before Columbus," rev. of Fell, *America B.C.*, New York Times Book Review, 13 March 1977, p. 8; M. Pamela Bumsted, "The Use and Misuse of Archeology," *Anthropology Newsletter* 19, No. 3 (1978), 14-15; Ives Goddard and William W. Fitzhugh, "A Statement Concerning *America B.C.*," *Man in the Northeast*, 17 (Spring, 1979), 166-172; Ives Goddard and William W. Fitzhugh, "Barry Fell Reexamined," *Biblical Archeologist* 41 (1978), 85-88; John R. Cole, "Anthropology Beyond the Fringe: Ancient Inscriptions, Early Man, and Scientific Method," *The Skeptical Inquirer*, Spring/Summer (1978), 62-71; Anne Ross and Peter Reynolds, "Ancient Vermont," *Antiquity* 52, No. 205 (1978), 100-107 [the same article is printed in Cook, *Ancient Vermont*, pp. 139-147]; Marshall McKusick, "The North American Periphery of Antique Vermont," *Antiquity* 53 (1979), 121-123; Marshall McKusick, "Polemics and Irenics," *Biblical Archeology* 42, No. 3 (1979), 137-140; Cazeau and Scott, *Exploring*, pp. 37-60; Cole, "Barry Fell," pp. 1-10; and Dean Snow, "Ancient Vermont in Perspective: A Review Essay of 'Ancient Vermont,'" *Vermont History* 48, No. 1 (1980), 33-40.

<sup>21</sup>The nature of such ancient European settlements is best summarized by Fell himself in *America*, p. 100. Phoenician voyages from Tarshish, he states, "were probably not explorers but rather merchants trading with the New England Celts who, by that date [700-600 B.C.], would already be well established fur trappers, and very likely also mining precious metals on those sites where ancient workings have been discovered."

<sup>22</sup>Anthropologically, this second level of contact describes the concept of "cultural diffusion." Geoffrey Ashe ("Conclusion" in *The Quest for America*, ed. Geoffrey Ashe, [New York: Praeger, 1971], p. 278) further clarifies the distinction between these two levels of contact: "cultural diffusion across the oceans, if proved, would also prove contact. Diffusion would not have happened without it. The converse, however, does not hold. Contact could have happened without diffusion."

A small group of archeologists and anthropologists have produced a considerable volume of literature on diffusion theory and transoceanic contacts and lively debate has engaged a number of individuals for years. See, for example, Carroll L. Riley, J. Charles Kelley, Campbell W. Pennington and Robert L. Rands, eds., *Man Across the Sea: Problems of Pre-Columbian Contacts* (Austin, Texas: University of Texas Press, 1971); John H. Rowe, "Diffusionism and Archeology," *American Antiquity*, 31, No. 3 pt. 1 (1966), 334-337; Stephen C. Jett and George F. Carter, "A Comment on Rowe's 'Diffusionism and Archeology,'" *American Antiquity*, 31, No. 6 (1966), 867-870; Marion J. Mochon, "The Nature of Theory and Its Validation: Transpacific Origins?" *American Anthropologist*, 78, No. 1 (1976), 106-110; George F. Carter, "Movement of People and Ideas Across the Pacific," in *Plants and the Migrations of Pacific Peoples*, ed. Jacques Barrau, Tenth Pacific Science Congress, Honolulu (Honolulu, Hawaii, Bishop Museum Press, 1963), pp. 7-22; Carroll L. Riley, "Interhemispheric Contacts?" *Archeology*, 31, No. 6 (1978), 59-61; and Gordon Ekholm, "Transpacific Contacts," in *Prehistoric Man in the New World*, eds. J.D. Jennings and E. Norbeck (Chicago: University of Chicago Press, 1964), pp. 489-510; and Cazeau and Stuart, *Exploring*, pp. 17-28.

<sup>23</sup>Archeological research has conclusively identified a Norse site at L'Anse Aux Meadow, Newfoundland. See Helge Ingstad, "The L'Anse Aux Meadow Site," *National Geographic* 126, No. 5 (1964), 708-734; Anne Stine Ingstad, *The Discovery of a Norse Settlement in America* (Oslo: Universitetsforlaget, 1977); and Morison, *The European Discovery*, pp. 38-52. A genuine eleventh century Norwegian coin was discovered in a site on the coast of Maine in 1957 and identified as such in late 1978. Whether the coin was carried to Maine by Norsemen or was a well travelled, precious heirloom in the possession of the native prehistoric population is not yet known and remains one of the many unresolved questions surrounding the coin's origin (see Marshall McKusick, "Some Historical Implications of the Norse Penny From Maine," *NNF-Nytt, Norsk Numismatisk Forening*, 3 [September, 1979], 20-23).

<sup>24</sup>Cole, "Anthropology," p. 67.

<sup>25</sup>*Ibid.*, p. 67.

<sup>26</sup>*Ibid.*, p. 68.

<sup>27</sup>Peter Reynolds, "Commentary," in Cook, *Ancient Vermont*, p. 58.

<sup>28</sup>Fell, *America*, p. 128, for example, attempts to pre-empt the question of missing archeological evidence by suggesting that the New England Celts lived in "skin-covered hovels of interlocked boughs. These, of course, have left absolutely no trace in either Europe or America." While evidence of skin-covered hovels would, of course, be difficult to find, evidence of Old World diseases which the

settlers would have carried with them should be traceable. Long term pre-Columbian European settlement in New England would have been accompanied by disastrous smallpox and bubonic plague epidemics among the Native American populations as was the case in sixteenth and seventeenth century Mexico and South America and sixteenth century New England. For example, diseases carried by Portuguese and Basque fishermen to the Northeastern coast of America in the sixteenth century demolished huge Indian populations; the Indian mortality rate was between seventy-five and ninety percent at that time. There is no such archeological evidence for this wholesale population demise in the period of purported Celtic settlements. If Old World diseases had been transmitted to Native American populations by ancient European settlers, New England Indians should have eventually developed sufficient resistance to them so that by the seventeenth century their tolerance of European diseases would have approached that of their European contemporaries. It is a fact that it was not, hence the disastrous epidemics. (Communications with William Haviland, Department of Anthropology, University of Vermont, in January, 1979, and Peter Thomas, Department of Anthropology, University of Vermont March, 14, 1979.) Prolonged trans-oceanic contact among ancient European settlers and Native American populations would, at the same time, have resulted in the transmittal of New World diseases, such as syphilis, to the Old World. Again, there is no such evidence. "It is nearly certain that if syphilis were present in pre-Columbian Europe, and likely that if it were present in any of the high civilizations of the Old World engaged in long-distance commerce before 1493, one of the [30,000 ancient Egyptian and Nubian] skeletons examined by [Dr. Elliot G.] Smith [in the early twentieth century] would have shown syphilitic lesions." They did not. See Alfred W. Crosby, Jr., *The Columbian Exchange: Biological and Cultural Consequences of 1492*, Contributions in American Studies No. 2, (Westport, Conn.: Greenwood Press, 1972), p. 126.

<sup>29</sup>See Goddard and Fitzhugh, "Statement," pp. 166-172; Ives Goddard, "Eastern Algonquian Languages, in *Handbook of North American Indians*, ed. William C. Sturtevant, Vol. 15, (Washington, D.C.: Smithsonian Institution, 1978), 70-77; William F.H. Nicolaisen, "Celtic Place Names in America B.C.," *Vermont History* 47, No. 2, (1979), 148-160.

<sup>30</sup>Betty Meggers, "North and South American Cultural Connections and Convergences," in *Prehistoric Man in the New World*, eds. J.D. Jennings and E. Norbeck (Chicago: University of Chicago Press, 1964), 513; see also Rowe, "Diffusionism," pp. 334-337.

<sup>31</sup>Stephen Jett, "Diffusion Versus Independent Development," in *Man Across the Sea*, ed. Carroll L. Riley, et. al. (Austin, Texas: University of Texas Press, 1971), p. 32.

<sup>32</sup>Ross and Reynolds, "*Ancient*," pp. 100-107.

<sup>33</sup>See Donald B. Marsh, "The Stone Winter Houses of the Sadlermiut," *The Beaver*, Winter, 1976, pp. 36-39.

<sup>34</sup>See Edward Allen, *Stone Shelters* (Cambridge, Mass.: MIT Press, 1969).

<sup>35</sup>See James P. Whittall, II, "Pre-Columbian Parallels Between Mediterranean and New England Archeology," *Occasional Publications of the Epigraphic Society*, 3, No. 52 (1975) 1-5; Whittall, *Sean*, n.p.; Whittall, "Pre-Colonial," pp. 28-30; Michael F. Doran and Bernd Künnecke, "The Stone Enigmas of New England," *Anthropological Journal of Canada*, 15, No. 2 (1977), 17-22; and Fell, *America*, pp. 81 and 134:

<sup>36</sup>Cook, "Reflections," in Cook, "*Ancient Vermont*," p. 132.

<sup>37</sup>Fell, *America*, pp. 134 and 81-142. It must be emphasized that although Fell focuses upon a "Celtic" thesis of ancient settlement, others, such as Professor Warren Cook ("Reflections," in Cook, "*Ancient Vermont*," p. 136) are "loathe to ascribe cultural affinities, for now, to what [he had] preferred to call 'Ancient Vermonters'."

<sup>38</sup>Fell, *America*, pp. 134-135 and 151.

<sup>39</sup>Trento, *Search*, pp. 53-56.

<sup>40</sup>Cook, "Vermont's Lithic Sites," in Cook, "*Ancient Vermont*," p. 6.

<sup>41</sup>Feldman, pp. 6-7; and Trento, *Search*, pp. 48-49.

<sup>42</sup>Cook, "Vermont's Lithic Sites," in Cook, "*Ancient Vermont*," p. 6.

<sup>43</sup>George F. Carter, "Commentary," in *Ibid.*, p. 130; see also Norman Totten, "The First European Colonists in New England," *Occasional Publications of the Epigraphic Society*, 3, No. 49 (1975), 2.

<sup>44</sup>Trento, *Search*, p. 51.

<sup>45</sup>Whittall, "Pre-Colonial," p. 28.

<sup>46</sup>Whittall, *Sean*, p. 3.

<sup>47</sup>Giovanna Neudorfer, "A Preliminary Analysis of Vermont's Stone Chambers," in Cook, "*Ancient Vermont*," pp. 9-13.

<sup>48</sup>Carter, "Commentary," in *Ibid.*, p. 130.

<sup>49</sup>See Henry Glassie, *Folk Housing in Middle Virginia* (Knoxville: University of Tennessee Press, 1975), p. 114-115.

<sup>50</sup>*Ibid.*, p. 115.

<sup>51</sup>Meggers, p. 512. For additional references on diffusion theory and requirements for proving contact, see Note 22.

<sup>52</sup>Glassie, *Folk Housing*, p. 8. Vermont local histories, including nineteenth century summaries, and contemporary regional historians repeatedly lament the silence of most eighteenth and nineteenth century rural people. Even in 1878, the Honorable John Gregory wrote in *The Centennial Proceedings...of Northfield* (Montpelier, Vt.: Argus and Patriot, 1878), p. 23, that "commencing at a late date to gather historical incidents, the compiler has been somewhat embarrassed by finding them so meagre." Hubka, "Connected Farm Buildings," pp. 92-93, summarized the problem underlying this and similar studies: "the majority [of people] were modest farmers who seldom recorded the ideas, processes, and traditions behind the construction of their farms."

<sup>53</sup>See Leroy Johnson, "Problems in 'Avant-Garde' Archeology," *American Anthropologist*, 74, No. 3 (1972), 366-377.

<sup>54</sup>Site survey forms are available from the Division for Historic Preservation for those who wish to record presently unsurveyed chambers.

<sup>55</sup>Oral information was obtained through personal interviews. Informants also wrote letters, frequently unsolicited. All interview notes and correspondence are on file with the Division for Historic Preservation, Montpelier, Vermont.

<sup>56</sup>Each piece of deed research averaged six hours in a town clerk's office.

<sup>57</sup>The total number of stone structures in the chamber inventory continuously changed in the course of the study as more information was obtained on individual structures. For example, chambers which upon field inspection proved to be public burial vaults located within cemeteries were eliminated from the final tally. Since this report has been in preparation, six previously unknown stone chambers from Washington and Windham Counties have been brought to our attention. Time precluded visiting any of these chambers, and most were assigned to the "unconfirmed" file. Two of the chambers, however, were both surveyed and photographed by their thorough and thoughtful owner and are included in the final tally. Recent inquiries also indicate that stone chambers such as those in question were once located in Grand Isle and Lamoille Counties but have long been destroyed. Each chamber in the inventory has its own numerical designation and maintains its own identifying number throughout the text, in the Notes and in Tables.

<sup>58</sup>Goodwin, *Ruins of Great Ireland*, p. 385. Similarly an informant reported the relatively recent destruction of three stone chambers in the vicinity of chambers No. 2, 3, and 4. Informants also report the existence of a second chamber, permanently closed off, adjacent to chamber No. 10. (Both are located in the lower floor of a barn).

<sup>59</sup>This discussion uses physiographic subdivisions as defined by David P. Stewart, *The Glacial Geology of Vermont*, Vermont Geological Survey, Bulletin No. 19 (Montpelier, Vt.: Vermont Development Department, 1961), p. 45. See also *Vermont Land Capability*, (Montpelier: Vermont State Planning Office, 1974) p. 11.

<sup>60</sup>See Elbridge Churchill Jacobs, *The Physical Features of Vermont* (Montpelier: Vt. State Development Commission, 1950), pp. 57-86; R.J. Hopp, R.E. Lautzenheiser, and K.E. Varney, *Growing Degree Days in Vermont*, Agricultural Experiment Station, Bulletin 654 (Burlington: University of Vermont, 1968), pp. 1-16.

<sup>61</sup>Respectively, chambers No. 47, 21, and 50.

<sup>62</sup>Jacobs, *Physical Features*, pp. 33, 36, and 81; Bertram G. Woodland, *The Geology of the Burke Quadrangle, Vermont*, Vermont Geological Survey, Bulletin No. 28 (Montpelier: Vermont Development Department, 1965), p. 23; Ernest H. Ern, Jr., *Bedrock Geology of The Randolph Quadrangle*, Vermont Geological Survey, Bulletin No. 21 (Montpelier: Vermont Development Department, 1963), pp. 46-47; and Charles G. Doll, ed. and comp., *Centennial Geologic Map of Vermont* (Montpelier, 1961).

<sup>63</sup>Ping Hsi Chang, Ernest H. Ern, Jr., and James B. Thompson, Jr., *Bedrock Geology of the Woodstock Quadrangle, Vermont*, Vermont Geological Survey, Bulletin No. 29 (Montpelier: Vermont Water Resources Department, 1965), p. 41; and Ern, *Bedrock Geology*, pp. 40-45.

<sup>64</sup>Jacobs, *Physical Features* pp. 36-37; Ern, *Bedrock Geology*, p. 47; and James B. Hadley, *Geology of the Bradford-Thetford Area, Orange County, Vermont*, Vermont Geological Survey, Bulletin No. 1 (Montpelier: Vermont Development Commission; 1950), pp. 19-21.

<sup>65</sup>Doll, n.p.; Philip H. Osberg, *The Green Mountain Anticlinorium in the Vicinity of Rochester and Middlebury, Vermont*, Vermont Geological Survey, Bulletin No. 5 (Montpelier, Vermont: Vermont Development Commission, 1952), pp. 55-65.

<sup>66</sup>The only lowland chamber is No. 50.

<sup>67</sup>Tree borings were obtained and analyzed by John Boutin, Vermont Department of Forests and Parks with the following results: Chamber No. 16 (maple, birch), 40 years; Chamber No. 14 (maple), 98-100 years; Chamber No. 32 (ash), 80 years; Chamber No. 29 (ash), 126 years; Chamber No. 1 (black birch), 40 years; Chamber No. 3 (black birch), 81 years; Chamber No. 2 (maple), 82 years.

<sup>68</sup>Chambers Nos. 11 and 28, respectively. Although attached to another structure, chamber No. 28 is also incorporated into a hillside.

<sup>69</sup>Unlike the other chambers whose lengthwise axis lies into the slope of the hill, chamber No. 9 is positioned *across* the slope. The chamber entry consequently faces the nearby old roadway.

<sup>70</sup>The completely unmounted type A chambers are Nos. 8 and 32, located entirely within the lower floors of larger structures, and chambers Nos. 13, 23, 30, 57, and 54 situated within abandoned house foundations.

<sup>71</sup>Chamber No. 3 is a unique structure because of its subterranean construction and tiny entry hole and has been the focus of recent archeological excavations by James Whittall. Charcoal fragments recovered from the prefill ground level in a test square on the south side of the chamber mound were submitted for radiocarbon dating and yielded a date of approximately 545 A.D. (1405 ± 190 B.P., GX-5733; see Whittall, "Archeological Survey," pp. 4-5, 12, as well as Deborah Graham, "Professor 'Proves' Pre-Viking Habitation in Vermont, But Others Still Skeptical," *The Times Argus* [Barre-Montpelier, Vt.], November 17, 1978, p. 7; and "Ancient Sites: Celts or Cellars?," *Vermont Vanguard Press* [Burlington], 1, No. 44, November 1978, 28). This date may relate to an old forest fire and in no way proves the antiquity of the chamber. Its reliability must be evaluated in terms of the integrity and context of the charcoal sample, the relationship of the sample to the chamber stone work, and corroboration with additional dated samples.

<sup>72</sup>Weathering produces a soft, brown rind on the Waits River and Gile Mountain limestones further obscuring evidence of splitting and trimming activities. The surface is thus particularly vulnerable to scratching and marking as a consequence of removing the stone from its bed, of being scraped against, or of being deliberately marked. It is thus not surprising to find many scratched, grooved or incised stones on the chambers' interior and exterior masonry, including initials, dates, random scars and deep linear and parallel scratches particularly on the large lintel and ceiling stones resulting from quarrying, dragging and other construction related activities.

<sup>73</sup>Heights of doorways, which were measured from the ground surface to the base of the lintel stone, may not accurately reflect the original door height because of the unknown quantity of soil accumulation at the foot of the entryway. For example, a photograph of Chamber No. 29 in Fell, *America*, p. 153, (compare this photograph to Cook, "Ancient Vermont," Fig. 3) illustrates the amount of soil which had either naturally accumulated or was deliberately deposited in the entryway. Subsequent excavations of the entryway by James Whittall radically altered its appearance and confirmed that the chamber and entryway had been deliberately filled in.

<sup>74</sup>Corbelling is a construction technique in which each course, or layer, of stonework abuts a little further out than the course below it. The lateral walls gradually slope inward and the ceiling area is consequently smaller than the floor area.

<sup>75</sup>Utilization of existing bedrock is apparent in the construction of chambers Nos. 1, 9, 14, 24, 25, 29, 38 and 39.

<sup>76</sup>In Chambers Nos. 4 and 6, spaces between the ceiling slabs show that a second slab layer was superimposed on the first set of slabs at right angles to them.

<sup>77</sup>Hubka, "Connected Farm Buildings," pp. 92, 98-105, and 108-109, abundantly documents the strong tradition of saving, reusing, remodeling and relocating the various structures on the farm through time. For example, of the pre-1890 farms of Topsfield, Massachusetts, more than a third contained relocated structures. For pre-1850 farms, Hubka, p. 109, notes that "one half contained relocated buildings, and this figure does not include the movement of barns and smaller structures which were seldom recorded." His study confirms both the difficulty of constructing precise developmental histories of individual farms and that of studying traditional, anonymous architecture. See Note 86.

<sup>78</sup>In several cases, chambers are located along the course of the same roadway. For example, the stage road above (11m away) chamber No. 9 also runs by chamber No. 36 (80m distant), on the other side of the hill. This road connected White River Junction with Barre.

<sup>79</sup>In several localities, these interwoven family relationships are frequently associated with properties on which stone chambers are located.

<sup>80</sup>David L. Mansfield, *Vermont Phoenix* (Brattleboro), December 25, 1891.

<sup>81</sup>Ellen Mayhew, "Oliver Plaisted Built Cave Home in East Barnard to Escape Draft," *Valley News*, October 1968; and Hope Nash, *History of Royalton, Vermont* (So. Royalton: Town of Royalton, So. Royalton's Woman's Club, Royalton Historical Society, 1975), p. 117.

<sup>82</sup>Jan Vansina, *Oral Tradition: A Study in Historical Methodology* (London: K. Paul, 1961), p. 1.

<sup>83</sup>Interview with James P. Whittall, II, April 1977. Whittall conducted archeological test excavations in the entryway of this chamber several years ago; he has not yet published a report.

<sup>84</sup>John W. St. Croix, *Historical Highlights of the Town of Hartford* (Hartford: Imperial Co., 1974), p. 41.

<sup>85</sup>On the basis of the deed research, the lands and farms associated with the chambers were first acquired and/or settled between approximately 1780 and 1830. One farm complex, associated with Chamber No. 37, does not appear on a local 1855 map but is evident on the 1869 *Beers Atlas*. The deed research abundantly documents the complex family networks in various communities and the close correlation between particular families and properties containing stone chambers. As noted also by Hubka, see Note 77, and Fitch, Note 19, precise dating of individual structures on Vermont farms is almost impossible, particularly for the outbuildings which are so rarely cited in deeds.

<sup>86</sup>Harold F. Wilson in *The Hill Country of Northern New England: Its Social and Economic History, 1790-1930* (New York: Columbia University Press, 1936), pp. 16-17 noted that "under the prevailing [economic] conditions the location of the farm was not vital to its successful operation. Altitude and distance from the village were not of so much consequence when only a few necessities were purchased from outside" (see also pp. 124-131). The potential disadvantages of the inaccessible hill farms were certainly not considered at the time of their settlement and this trend continued even into the 1830's and 1840's in the most isolated areas. See also E.R. Pember, "Our Hill Farms," *Eighth Vermont Agricultural Report* (Burlington, Vt., 1844), pp. 362-370; Douglas R. McManis, *Colonial New England* (New York: Oxford University Press, 1975), pp. 65-66; and Rodney C. Loehr, "Self-Sufficiency on the Farm," *Agricultural History*, 26 (1952), 37-41.

Again and again historians of rural life and traditions lament the dearth of substantive information about the majority of farmers who rarely recorded the traditions and processes behind the construction of their farms and who were even less frequently the objects of others' recordings. Town and family histories tend towards generalizations and descriptions of the lives of prominent and successful citizens. While the makeup and evolution of the earliest Vermont homesteads are poorly documented and descriptions of outbuildings virtually absent, some descriptions of later, well established farms are not uncommon. One especially good description of a Vermont farmstead was written in 1840 by Jabez Delano of West Windsor (Mary B. Fenn, *Parish and Town, The History of West Windsor, Vermont* [Taftsville, Vt.: The Countryman Press, 1977], pp. 78-79). This farm complex may not be typical in its extent and variety of facilities, obviously describing a well established farm many years removed from its early homesteading days: "Said farm contains 180 acres of valuable farming land and a due proportion of mowing land, plough land and pasture land. Also a good proportion of wood land consisting of Sugar Maple, Butternut, Basswood and White Ash. Most of it is young and thrifty. Also three good barns, well filled, averaging 30 and 40 feet each Barn. Also a good farmhouse. Also several outhouses, Viz: One Boil house with two cauldrons set and a good brick chimney and fireplace with a crane. The upper story is finished off for a Wood loft with a good planed floor. Said Hall is plastered and has two windows. The building is 45 Ft. by 20 in width and is spacious enough to hold and has held at one time 600 fat wether's pelts and carcasses together with 5000 lbs. of fleece wool, 1600 lbs. tallow. Also a good slaughter house. Also a good proportion of sheds to the said barns and slaughter house. Also a Chaise house and a large deep cellar under the same, large enough to hold 14 or 1500 bushels. Also a good supply of orcharding." The Grand List in 1833 recorded him as having 4 oxen, 18 neat cattle, 6 horses, 1400 sheep and 165 acres.

The spatial arrangement of the farm buildings is never described in the community histories. Mary R. Cabot (*Annals of Brattleboro, 1681-1895* [Brattleboro: E.L. Hildreth & Co., 1921], p. 266), for example, simply notes that "the necessary buildings around [the farmhouse] give it the air of being a little community." This absence of descriptions is unfortunate because, as evident from Glassie's study of Virginia Farms in *Folk Housing*, pp. 143-144, there was probably a definite patterning in the layout of the farmstead, be it of a functional or traditional nature. His description of a rural Virginia farm is noteworthy and corresponds to observations made in the course of this study that dwellings and outbuildings were frequently distant from each other: "Few very early outbuildings are left, but the old barns that remain are located far from the house, whereas the smokehouses are near it. Indications are that the old farm had two centers, the house and the barn, around which smaller dependencies were dropped. Beside the house are the outbuildings needed by the women in order to get food on the table; beside the barn are the outbuildings needed by the men to keep the cattle fat."

<sup>87</sup>Myra Himelhoch, *Early Plainfield and Its People* (Plainfield: Himelhoch, 1965), p. 12; Frederic P. Wells, *History of Newbury, Vermont* (St. Johnsbury: The Caledonia Co., 1902), p. 18; B. Frisbie, J. Joslin, and E. Ruggles, *A History of the Town of Poultney, Vt., From its Settlement to the Year 1875* (Poultney: Journal Printing Office, 1875), p. 23; and A.M. Gaverly, *History of the Town of Pittsford, Vermont* (Rutland, Vt.: Tuttle & Co., 1872), p. 28. Repeated reference in these and other local histories to "rude huts" and "shanties" suggests that research on temporary quarters was often not original but based on other secondary accounts.

<sup>88</sup>Fitchen, *Dutch Barns*, p. 5. This custom is mentioned often in local histories.

<sup>89</sup>Fiske Kimball, *Domestic Architecture of the American Colonies and of the Early Republic* (New York: Charles Scribner's Sons, 1922), pp. 3-8; and Shurtleff and Morison, *Log Cabin Myth*, pp. 20-22.

<sup>90</sup>Carl Bridenbaugh, *Cities of the Wilderness: The First Century of Urban Life in America, 1625-1742* (New York: The Ronald Press, 1938), p. 8.

<sup>91</sup>William B. Weedon, *Economic and Social History of New England, 1620-1789* (Boston: Houghton, Mifflin & Co., 1891), I, 214; Gerald F. DeJong, *The Dutch in America, 1609-1974* (Boston: Twayne Pub., 1975) p. 72; and Alonzo Lewis and James R. Newhall, *History of Lynn, Essex County, Mass.* (Boston: John L. Shorey, 1865), p. 114.

<sup>92</sup>George F. Dow, *Everyday Life in the Massachusetts Bay Colony* (Boston: Society for the Preservation of New England Antiquities, 1935), p. 17; Martin S. Briggs, *The Homes of the Pilgrim Fathers in*

*England and America (1620-1685)* (New York: Oxford University Press, 1932), p. 122 and 154; and William Deloss Love, *The Colonial History of Hartford* (Hartford, Conn., 1935), pp. 15-16.

<sup>93</sup>Kimball, p. 3.

<sup>94</sup>Norman M. Isham and Albert Brown, *Early Connecticut Houses: An Historical and Architectural Study* (Providence: Preston & Rounds Co., 1900) p. 13.

<sup>95</sup>Long, *Pennsylvania Farm*, p. 13.

<sup>96</sup>Wisconsin is called the "Badger" state precisely because of the traditional use of temporary hillside dwellings by the early settlers, particularly the Cornish and the Norwegians. Letter received from Katherine E. Hundt, State Historical Society of Wisconsin, October 7, 1977; and Halvor L. Skavlem, *The Skavlem and Odegarden Families* (Madison: Wisconsin Historical Society, 1915) pp. 26-27.

<sup>97</sup>Robert W. Shoppell, *How to Build, Furnish and Decorate . . .* (New York: The Cooperative Building Plan Association, 1883), n.p.

<sup>98</sup>The banked form of barn, in fact, appears to be a uniquely American feature with no direct European counterpart; see Long, *Pennsylvania Farm*, p. 358.

<sup>99</sup>Dozens of Vermont town histories indicate that the first real homes of the settlers were log cabins. The Oread Literary Club Committee, *History of Johnson, Vermont* (Essex Junction: Essex Publishing Co., 1961), p. 102, relates one particular building sequence: the settler built first a log house and barn; then, "in the year 1807 after building up his farm and being able to raise all kinds of produce, he built a small frame house. This house they occupied until 1826 when he built the present brick structure." For other particulars, see Samuel Swift, *History of the Town of Middlebury* (1859, Rpt. Rutland, Vermont; Charles E. Tuttle Co., 1971), p. 167; and D.P. Thompson, *History of the Town of Montpelier 1781-1860* (Montpelier: E.P. Walton, 1860), p. 40.

<sup>100</sup>Frederick J. Kelly, *The Early Domestic Architecture of Connecticut* (New Haven: Yale University Press, 1924), p. 71.

<sup>101</sup>Henry L. and Ottalie K. Williams, *Old American Houses 1700-1850* (New York: Bonanza Books, 1967), p. 47. The field team visited a number of center chimney houses presently in use. In some instances massive chimney supports with stone roof slabs are still in place, but frequently these had been taken out (and replaced by upright supports) to provide space for central heating units.

<sup>102</sup>See, for example, Wilson, *Hill Country*, pp. 30-48.

<sup>103</sup>*Ibid.*, p. 80.

<sup>104</sup>Earle Newton, *The Vermont Story* (Montpelier: Vermont Historical Society, 1949), p. 166.

<sup>105</sup>C. Benton and S.F. Barry, *A Statistical View of the Number of Sheep in the Several Towns and Counties in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania and Ohio . . .* (Cambridge, Mass.: Folsom, Wells, & Thurston, 1837).

<sup>106</sup>Henry M. Seely, *Third Biennial Report of the Vermont State Board of Agriculture, Manufactures, and Mining for the Years 1875-1876* (Rutland, Vt.: Tuttle & Co., 1876), p. 213.

<sup>107</sup>John B. Mead, *Sixth Report Upon Vermont Agriculture by the Superintendent of Agricultural Affairs* (Montpelier: Freeman Steam Printing House & Bindery, 1880); W.W. Cooke, *Eleventh Vermont Agricultural Report by the State Board of Agriculture for the Years 1889-1890* (Montpelier: Argus and Patriot Book & Job Printing House, 1890), pp. 27 and 32; Wilson, *Hill Country*, p. 199. Webster's *New International Dictionary* (1942) defines silage as fodder which has been converted into succulent winter feed for livestock through processes of fermentation to replace or supplement hay and pasture. Most forage crops can be successfully made into silage if their moisture content is lowered prior to storing.

<sup>108</sup>Wilson, *Hill Country*, p. 123; and Clarence H. Danhof, *Change in Agriculture: The Northern United States, 1820-1870* (Cambridge, Mass.: Harvard University Press, 1969), pp. 251-254.

<sup>109</sup>Vermont Agricultural Experiment Station, *Sheep in Vermont*, Pamphlet No. 27 (Burlington, Vt.: University of Vermont and State Agricultural College, 1957). Wilson, in *Hill Country*, p. 80, noted that by 1830 Addison County "raised a greater number of sheep and produced more wool, in proportion either to territory or population, than any other county in the United States."

In 1837, Rutland County had the largest sheep population in the state, followed by Windsor County, then Addison and Orange Counties (see Benton & Barry, *A Statistical*). By the mid 1840's, sheep raising was already on the decline due to the lowering of the price of wool by the Tariff of 1841 and competition with western wool production as well as a massive influx of British and Australian wool. Although the Civil War stimulated a second round of wool production, this ultimately resulted in over-production and prices soon fell drastically (see Seely, *Third Biennial Report*, p. 213), and in conjunction with other factors, this spelled the end of Vermont's wool boom. Taking advantage of the high esteem in which Vermont's flocks were held, some farmers turned to sheep breeding, a move which according to Wilson, *Hill Country*, pp. 89-94, "kept sheep farming in a position of primary importance," particularly in western Vermont, through the 1860's, 1870's, and 1880's.

<sup>110</sup>Root cultivation was not a custom which the Pilgrims brought with them. For agricultural purposes it was not introduced into England until the middle of the seventeenth century and did not become a general practice until the mid-eighteenth century. Sir Richard Weston, who introduced this new agri-

cultural concept in 1644 after studying Flemish methods of agriculture, was regarded as "a greater benefactor than Newton." See Lord Rowland E.P. Ernle, *English Farming Past and Present*, new 6th ed. (Chicago: Quadrangle Books, 1961), pp. 103-108 and 208. The cultivation of roots for livestock fodder was consequently not extensively practiced in the seventeenth and eighteenth centuries in southern New England colonies, and the use of roots was limited primarily to home consumption in this period (see McManis, pp. 88-99).

It is unclear when root cultivation came to the foreground in agricultural significance, but by 1825 it had become of major importance in the economy of the Northeast and continued to be into the twentieth century. For example, John Beale Bordley, writing in 1799 about Pennsylvania farmers in *Essays and Notes on Husbandry and Rural Affairs* (Philadelphia: Thomas Dobson, 1799), p. 134, noted that "roots are seldom given to their livestock, being too little thought of." This situation soon changed in Pennsylvania. By 1815, John Nicholson in *The Farmer's Assistant* (Albany: Henry C. Southwick, 1815), p. 156, advised that it "would be a great improvement of our husbandry if our farmers and graziers, stimulated by the experience of those in Great Britain and elsewhere, would enter largely into the culture of roots and cabbages for feeding milch cows and fattening cattle." Questionnaires circulated between 1807 and 1819 by the Massachusetts Society for Promoting Agriculture show that although Massachusetts farmers of this period favored crop diversification, virtually all raised varying quantities of roots for winter and spring feeding. See *Papers; Consisting of Communications Made to the Massachusetts Society for Promoting Agriculture, and Extracts* (Boston: Adams and Rhodes, 1807), p. 37; and *Massachusetts Agricultural Repository and Journal* 3 (November 1813), 62 and 68; 3 (May 1814), 121; 3 (January 1815), 265; 3 (June 1815), 343; 4 (January 1816), 49; and 5 (January 1819), 287. By 1826, Leonard Lathrop in *The Farmer's Library or Essays Designed to Encourage the Pursuits and Promote the Science of Agriculture* (Windsor: Wyman Spooner, 1826), p. 165, reported that "the farmers in England, and some of the first practical farmers in the United States, do not think they can well succeed in rearing and supporting a good breed of sheep, without feeding them abundantly through the winter with succulent food, such as carrots, turnips, etc." At the height of Vermont's sheep era in 1840, Jesse Buel in *The Farmer's Companion, or Essays on the Principles and Practice of American Husbandry* (Boston: Marsh, Capen, Lyon, and Webb, 1840), p. 163, wrote that root culture is "by far the best means of economically feeding and fattening farm-stock, and adds greatly to the means of fertilizing the soil." The advice of these agriculturalists was heeded by many, and by 1855 Massachusetts raised per acre a greater amount of root crops than wheat (see Danhof, *Change in Agriculture*, p. 256).

<sup>111</sup>Ora Paul, "Home Productions," in *Fifth Report of the Vermont Board of Agriculture, for the Year 1878*, ed. Henry M. Seely (Montpelier: J. & J.M. Poland, 1878), p. 182.

<sup>112</sup>Henry Safford, "Farm Buildings," in *Third Biennial Report of the Vermont Board of Agriculture, Manufactures, & Mining for the Years 1875-76*, ed. Henry M. Seely (Rutland: Tuttle & Co., 1876), p. 344.

<sup>113</sup>Henry S. Randall, *The Practical Shepherd: A Complete Treatise on the Breeding, Management and Diseases of Sheep* (Rochester, N.Y.: D.D.T. Moore, 1864), p. 234; and Thomas G. Fessenden, *The Complete Farmer and Rural Economist* (Boston: Otis, Broaders, & Co., 1842), p. 213.

<sup>114</sup>Lathrop, *Farmer's Library*, pp. 154-155; Henry Stewart, *The Shepherd's Manual. A Practical Treatise on the Sheep Designed Especially for American Shepherds* (N.Y.: Orange Judd Co., 1890) p. 63; and Fessenden, *Complete Farmer*, p. 41.

<sup>115</sup>Orange Judd in *The American Agriculturist* (N.Y.: Orange Judd, 1863), 22, p. 177 reported that although a given weight "of grain will add more pounds of flesh than the same amount of roots, yet a larger quantity of food per acre can be secured from the latter. Fifty bushels of corn is above the average yield; with fair cultivation 1200 bushels of mangel wurtzels can be produced." Three tons of mangel wurtzels or potatoes are the nutritional equivalent of one ton of hay according to Fessenden, *Complete Farmer*, p. 250.

<sup>116</sup>Buel, *Farmer's Companion*, p. 163. One indirect advantage of root cultivation was that a good root supply permitted the farmer to sell off his surplus grain and corn; see Frederick Butler, *The Farmer's Manual* (Hartford, Conn.: Samuel G. Goodrich, 1819), p. 32.

<sup>117</sup>Fessenden, *Complete Farmer*, p. 250.

<sup>118</sup>Henry Stephens, *The Farmer's Guide to Scientific and Practical Agriculture Detailing the Labors of the Farmer in All Their Variety, and Adapting Them to the Seasons of the Year as They Successively Occur* (N.Y.: Leonard Scott & Co., 1858), p. 202.

<sup>119</sup>Fessenden, *Complete Farmer*, p. 248.

<sup>120</sup>*Ibid.*, pp. 213 and 248; Stephens, p. 202; Robert R. Livingston, *Essay on Sheep* (Concord, N.H.: Daniel Cooledge, 1813), p. 111. Root crops were essential for pregnant and nursing ewes (Livingstone, *Essay on Sheep*, pp. 46, 52, and 58); for fattening sheep in general (L.A. Morrell, *The American Shepherd: Being a History of the Sheep with Their Breeds, Management, and Diseases* [New York: Harper & Bros., 1854], p. 237; and Butler, *Farmer's Manual*, p. 118); for the few days before turning the flocks out to pasture in the spring (Robert Jennings, *Sheep, Swine and Poultry* . . .

[Philadelphia: J.E. Potter & Co., 1864], p. 129); and for ensuring that the sheep were fed in late fall prior to the start of winter (Henry S. Randall, *The Practical Shepherd*, 1864, p. 202). For cows, daily feeding on root crops assured a winter milk production equal to the summer's yield (Fessenden, p. 248; Nicholson, p. 153).

<sup>121</sup>Fessenden, *Complete Farmer*, pp. 41 and 213; Alexandre Tessier, *A Complete Treatise on Merinos and other Sheep* (N.Y.: Economical School Office, 1811), p. 61; and Luther Tucker, ed., *The Cultivator, A Monthly Journal* (N.Y.: C. Van Benthuysen & Co., 1845); Vol. 2. Besides simultaneous feeding of several feeds in differing proportions, crop schedules for different times of the year were recommended. For example, cattle were best fattened by starting out with root crops and finishing the process with corn and wheat (Fessenden, *Complete Farmer*, p. 45). Lambs should be fed old grass and clover until the beginning of autumn, followed by cabbages in mid-September; after a short time, turnips were mixed in with cabbages to prepare the lambs for their steady winter diet of turnips (Randall, *The Practical Shepherd*, p. 199).

Various agricultural advisors stressed the benefits of different roots, and farmers had their individual preferences. Frequently, the cultivation of a particular root crop for particular livestock was emphasized. Butler, *Farmer's Manual*, pp. 58 and 118, was emphatic about the excellence of the potato, which was found "by the experience of the best farmers, to exceed in value any other feeding even the Indian corn." Potatoes were thought by some to be particularly important for hogs (*Ibid.*, p. 26) and oxen (Fessenden, *Complete Farmer*, 1823) p. 278, although other writers such as Arthur Young in *The Farmer's Letters to the People of England* . . . (London: n.p., 1821), p. 165; and Randall (*The Practical Shepherd*), p. 202, advised that any kind of root crop could be fed to any type of livestock. Joseph N. Harris, *History of Ludlow, Vermont* (Charlestown, N.H.: Mrs. Ina Harris Harding, Mr. Archie Frank Harding, 1949), p. 73, reports that in Cavendish in 1838 the Mayo brothers raised 1100 bushels of potatoes on two acres of land. Potatoes also grew well in Addison and Chittenden Counties, producing yields of 200 to 500 bushels per acre according to Luther Tucker, ed., *The Cultivator, A Monthly Journal* (N.Y.: C. Van Benthuysen & Co., 1845), p. 219. One Shelburne farmer, for example, predominantly raised peas and potatoes as winter feed for his 2000 sheep and other livestock (Tucker, *The Cultivator*, pp. 257-258). Fessenden, *Complete Farmer*, pp. 248-250, reported on the advantages of the mangel-wurtzel which he valued much higher than the potato, and in an earlier article in *The New England Farmer, and Horticultural Journal* . . . (Boston: Thomas W. Shepard, 1823), Vol. 1, 401, he mentioned that Jerusalem artichokes were preferable to turnips or potatoes because they were easier to grow. Butler, *Farmer's Manual*, p. 32, on the other hand, declared the rutabaga, also known as "Swedes" or Swedish turnips, "an object worthy of the attention of the farmers of our country . . . valuable both for the table and for cows, hogs, and ewes." L.C. Fisher, a farmer in Cabot, advised in "Winter Management of Neat Stock," *Third Biennial Report of the Vermont State Board of Agriculture, Manufacturing & Mining*, ed. Henry Seely (Rutland: Tuttle & Co., 1876) p. 113, that "the root crop should be made a specialty . . . and the turnip crop is the most profitable of any."

Tessier, *Complete Treatise on Merinos*, p. 59, emphasized that roots must be washed and cut-up before being given to sheep. This requirement was rarely mentioned although its practice was probably common as is evident from the description of a "root slicer" in Josiah T. Marshall, *The Farmers and Emigrants Complete Guide* (Cincinnati: Applegate & Co., 1854), p. 71, as standard, ordinary farm equipment. Jennings, *Sheep, Swine and Poultry*, p. 52, indicated that roots should be cooked prior to giving to the livestock, although elsewhere (p. 113) he notes that all animals will eat them raw or cooked; and in several instances reference is made to "steam boilers" for potatoes and other roots (Luther Tucker, *The Cultivator, A Monthly Journal* . . . [New York: Luther Tucker & Son, 1857], Vol. 5, pp. 310-311, and Nicholson, *Farmer's Assistant*, p. 253) suggesting that the practice may have been common although there is no evidence that it was a mandatory procedure.

<sup>122</sup>Paul, "Home Productions," p. 182, reported that "it is almost unheard of in some sections, and in others practiced so slightly that no legitimate conclusions can be drawn as to the results obtained . . ." For example, William Jarvis of Weathersfield, who introduced the Merino sheep into Vermont in 1811, apparently did not raise roots at all and, in 1837, wrote that hay and oats were the best feed for his sheep (Benton and Barry, *Statistical View of Sheep*, p. 133). Buel, *Farmer's Companion*, p. 165, attributed any resistance to root cultivation to ignorance of its benefits as well as to the tyranny of tradition: "The great obstacle to root culture, other than the potato crop, has been the labor which is required to secure the roots from the frosts of winter; yet the labor and expense required for this purpose, are perhaps no greater than we expend in securing our grain and forage, if they are so great . . . It is the novelty of the labor, rather than the amount of it, and a want of practical knowledge in their cultivation and preservation, which intimidate and deter very many." Lathrop, *Farmer's Library*, p. 89, believed that the task of properly storing the roots through the winter was considered an obstacle by some.

<sup>123</sup>Samuel Swift, *Statistical and Historical Account, County of Addison, Vermont* (Middlebury: A.H. Copeland, 1859), p. 95. In general, however, roots were not an important source of livestock

feed in Addison County due to the difficulties of harvesting these crops from the clay soils; interview with Dr. Richard Hopp, Experiment Station, University of Vermont, April 14, 1978.

<sup>124</sup>References were sometimes made to particular kinds of cellars, such as "projected cellar" or "fruit cellar," and root cellars were known under various labels including "root house" and "muggs," an expression used in Connecticut. Letter received from Alfred Bingham, Esq., August 7, 1978.

The importance of apples in the early diet should not be underestimated. In fact, the early settlers considered water unfit to drink and so manufactured cider in such quantities that they could drink it instead. Every family stocked 20 to 50 barrels each year and according to Henry H. Vail (*Pomfret, Vermont* [Boston: Cockayne, 1930], p. 149), 40 to 50 barrels for one family was common. Orchards were ubiquitous and Nickerson and Cox, comps. and arrang. (*The Illustrated Historical Souvenir of Randolph, Vt.* [Randolph: Nickerson & Cox, 1895], p. 9), indicated that "a thousand bushels of apples was no unusual gathering for the cellar, or the mill or the still."

<sup>125</sup>Adolphus E. Ryerson, *First Lessons for Canadian Farmers and Their Families* (Toronto: Copp, Clark, & Co., 1871), p. 163.

<sup>126</sup>Benton and Barry, *Statistical View*, p. 142.

<sup>127</sup>Fessenden, *Complete Farmer*, p. 217.

<sup>128</sup>Judd, *American Agriculturalist*, p. 321; Madison Cooper, *Practical Cold Storage: The Theory, Design and Construction of Buildings and Apparatus for the Preservation of Perishable Products . . .* (Chicago: Nickerson & Collins, 1905), pp. 557-561.

<sup>129</sup>Thomas G. Fessenden, *The New England Farmer and Horticultural Journal*, Vol. 7 (Boston: John B. Russell, 1829), 212.

<sup>130</sup>Judd, *American Agriculturalist*, p. 321.

<sup>131</sup>Tucker, *The Cultivator*, p. 63; see also Stephens, *Farmer's Guide*, p. 197; Butler, *Farmer's Manual*, p. 111; Thomas G. Fessenden, *The New England Farmer*, Vol. 1, pp. 44 and 101.

<sup>132</sup>Thomas G. Fessenden, *The New England Farmer*, Vol. 3, 150; Long, *Pennsylvania Farm*, p. 159; Helen Canon, Flora Rose and Martha Van Rensselaer, Comps., *A Manual of Home-Making* (New York: The MacMillan Co., 1919), p. 586.

<sup>133</sup>The custom of pit storage was known both from England and Europe, even though the relatively warmer climates of some areas mitigated the need for even this kind of storage (see Fessenden, *The New England Farmer*, 1827, pp. 397-398; Benton and Barry, *Statistical View of Sheep*, p. 41; and Seely, *Third Biennial Report*, p. 351). The use of pits for storing corn, in particular, was ubiquitous among the Northeastern Indians, and the early European travelers were sufficiently impressed with this custom that they frequently commented on it. See Dwight B. Heath, ed., *A Journal of the Pilgrims at Plymouth* (1622, rpt. New York: Corinth Books, 1963), p. 85; Marilyn C. Stewart, "Pits in the Northeast: A Typological Analysis," in *Current Perspectives in Northeastern Archeology*, ed. Robert E. Funk and Charles F. Hayes, III, *Researches and Transactions of the New York State Archeological Association*, 17, No. 1 (1977), 149-164. Aboriginal storage pits of great size, some ten feet square, were found both in Vernon, Vermont, and across the Connecticut River in New Hampshire at the seventeenth century Fort Hill Site; interview with Dr. Peter Thomas, University of Vermont, October, 1978.

<sup>134</sup>Tucker, *The Cultivator*, Vol. 7, p. 352. A pit storage area of the type under discussion was archeologically excavated a number of years ago. Found in association with an 1815 to 1845 homestead, the large pit was oval in shape and about 84" by 102." See A.K. and R.P. Bullen, "Black Lucy's Garden," *Bulletin of the Massachusetts Archeological Society*, 6, No. 2 (1945), 17-28.

<sup>135</sup>Fessenden, *Complete Farmer*, p. 74. See also Byron D. Halsted, *Barns, Sheds and Outbuildings* (1881, rpr. Brattleboro: Stephen Greene Press, 1977), pp. 19, 33-34, 38, 42, 44, and 76; Fessenden, *The New England Farmer*, Vol. 1, p. 81; Buel, *Farmer's Companion*, p. 165; J.C. Myers, *Sketches on a Tour Through the Northern and Eastern States, the Canadas and Nova Scotia* (Harrisonburg: J.H. Wartmann & Brothers, 1849), p. 259; Shoppell, n.p.; Safford, "Farm Buildings," p. 344; Stewart, *Shepherd's Manual*, p. 51; and Lewis F. Allen, *Rural Architecture . . .* (New York: C.M. Saxton & Co., 1856), pp. 294 and 306. While this discussion focuses specifically on root cellars under or within barns, they were just as frequently located within other outbuildings such as under carriage houses or various kinds of sheds. See for example, Note 86.

<sup>136</sup>Long, *Pennsylvania Farm*, p. 345.

<sup>137</sup>Shoppell, *How To Build*, n.p.

<sup>138</sup>Morrell, *The American Shepherd*, p. 260. The large cellar under the carriage house on the Delano Farm in West Windsor contained 1400-1500 bushels (see Note 106).

<sup>139</sup>Shoppell, *How To Build*, n.p.; Myers, p. 259.

<sup>140</sup>Tucker, *The Cultivator*, Vol. 5, p. 371.

<sup>141</sup>Shoppell, *How To Build*; Safford, "Farm Buildings," p. 344.

<sup>142</sup>E.C. Gardner, *Homes and How to Make Them* (Boston: James R. Osgood & Co., 1874), p. 228; Allen, *Rural Architecture*, pp. 54-56; and Helen Dodd, *The Healthful Farmhouse* (Boston: Whitcomb and Barrows, 1906), pp. 28-29.

<sup>143</sup>Stephens, *Farmer's Guide*, p. 196; Canon et. al., *Manual of Home-Making*, pp. 584-585.

<sup>144</sup>Lilian Baker Carlisle, ed., *Look Around Richmond, Bolton, and Huntington, Vermont* (Burlington: Chittenden County Historical Society, 1975), p. 47.

<sup>145</sup>Hancock Historical Committee, *The Story of Hancock, Vermont, 1780-1964* (Hancock: Hancock Historical Committee, 1969), p. 64. In principle, this was identical to that of constructing barn cellars into the earthen bank abutting the barn wall.

<sup>146</sup>Marshal, p. 62; Dodd, *The Healthful Farmhouse*, pp. 28-29; Fessenden, *The New England Farmer*, Vol. 5, p. 342; William Drown, *Compendium of Agriculture, or The Farmer's Guide in the Most Essential Parts of Husbandry and Gardening* (Providence: Field & Maxcy, 1824), p. 260; D.H. Jacques, *The House: A Manual of Rural Architecture . . .* (N.Y.: George E. Woodward, 1860), p. 32; and Samuel D. Backus, William Backus, and Henry W. Cleveland, *Village and Farm Cottages . . .* (N.Y.: D. Appleton & Co., 1856), p. 89.

<sup>147</sup>John Nicholson, *Farmer's Assistant*, p. 30; Samuel Deane, *The New England Farmer, or Geographical Dictionary* (Worcester, Mass.: Isaiah Thomas, 1797), p. 273; Butler, *Farmer's Manual*, p. 99; Fessenden, *The New England Farmer*, Vol. 2, 1826, 209-210; Halsted, and C.W. Elliot, *Cottages and Cottage Life* (N.Y.: A.S. Barnes & Co., 1848), p. 219. The construction of dugout dwellings, as evident in the period of early settlement, was possibly ancestral to and in some cases contemporaneous with the hillside cellar. The continuity through time of this architectural tradition is particularly evident in areas of Pennsylvania with a sequence of early hillside dwellings, hillside barns, other banked outbuildings, and hillside cellars. Long, *Pennsylvania Farm*, pp. 13-14, 156-167, and 314-359; and letter received from William O. Hickok, Pennsylvania Historical and Museum Commission, 3 April 1978.

<sup>148</sup>Halsted, *Barns, Sheds, and Outbuildings*, p. 224.

<sup>149</sup>In fact, the lowest ground temperatures are not reached until April - an effect of delayed temperatures known as a "thermal flywheel" - when outside temperatures are finally warming. Ray Wolf, "The Good Feeling of Living in the Earth," *Organic Gardening*, December, 1978, pp. 58-65.

<sup>150</sup>Thompson, *History of the Town of Montpelier*, p. 47.

<sup>151</sup>Ernest L. Bogart, *Peacham, The Story of a Vermont Hill Town* (Montpelier: Vermont Historical Society, 1948), p. 59; George Fuller Webb, *Rockingham Historical Notes* (Bellows Falls: Bellows Falls Historical Society, 1969), p. 7. While log cabins were most often built without foundations, this was not always the case. See David C. Gale, *Proctor, The Story of a Marble Town* (Brattleboro, The Vermont Printing Co., 1922), p. 29.

<sup>152</sup>Vail, *Pomfret*, p. 149.

<sup>153</sup>Amos Eaton, *Green Mountain Whittlin's* (Burlington: Green Mountain Folklore Society, 1960), Vol. 3, 38.

<sup>154</sup>Long, *Pennsylvania Farm*, pp. 158-162.

<sup>155</sup>J. Hector St. John De Crevecoeur, *Sketches of 18th Century America* (New Haven: Yale University Press, 1925), p. 145, and Alfred Hopkins, *Modern Farm Buildings* (New York: Tobert M. McBride & Co., 1920), pp. 200-203.

<sup>156</sup>Long, *Pennsylvania Farm*, p. 156.

<sup>157</sup>Telephone interview with Junior Harwood, Vermont Department of Forests and Parks, June and December, 1978. These cellars are 12' - 15' long.

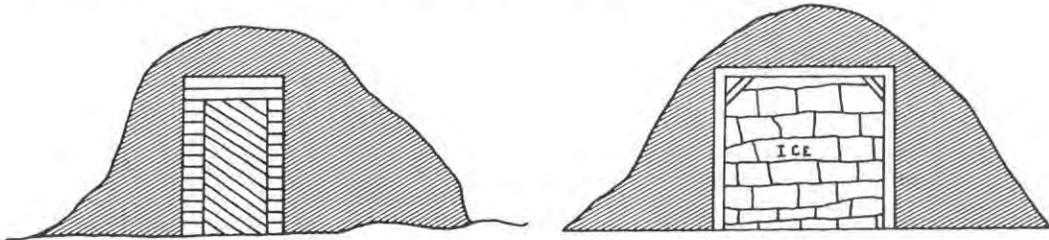
<sup>158</sup>Both the hillside cellar and the artificially embanked form are represented at the Seven Islands site. Letter from Robert L. Bradley, Maine Historic Preservation Commission, May 10, 1978. See also David Sanger, *Cultural Resource Management in the Dickey-Lincoln School Reservoir, Maine*, report prepared for the Corps of Engineers (Orono: University of Maine, 1977). Skavlem, *The Skavlem and Odegaarden Families*, pp. 26-27, mentions that by 1915 there was not the slightest trace of a 16' by 20' wood-lined temporary dugout home built in about 1840 due to the rapid decomposition of the wood. Similarly, the remains of a stone-lined hillside cellar in Oxford County, Maine - roofless and with a heavy accumulation of soil within the chamber - suggests the former existence of a long-decayed wooden ceiling which, upon collapsing, deposited its earthen covering into the chamber. Interview with Lyle Wiggins, U.S. Forest Service, White Mountain National Forest, September 1978.

<sup>159</sup>Descriptive information and photographs of Icelandic outdoor cellars were provided by Gudrun Ellefsen Benner of Keflavik, Iceland, by way of Charlotte McCartney, Montpelier, Vermont in September, 1977. Description of a Michigan hillside cellar is found in an anonymous news story in *The Vermont Centennial* (Bennington), 1, No. 14, July 17, 1877. Information about Kentucky root cellars was provided by Edward Chappell, Kentucky Heritage Commission, letter and drawings of March 21, 1978, and by Nathan Power, University of Vermont, telephone interview, December, 1978. Kentucky's hillside cellars are concentrated in the colder central and northern parts of the state, adjacent to Ohio, where one or two feet of snow cover the ground during a number of winter months. On the other hand, the construction of this kind of cellar in warm locales is not completely unlikely where its cooling properties would be valuable in the summer months. The influence of cultural architectural traditions is evident in Henry Glassie's study of Virginia *Folk Housing*, 144-145. For example, the Pennsylvania Germans traditionally used distinctive architectural styles in hilly terrain and in flat country and maintained these two separate architectural traditions wherever they migrated. Native Virginians, on the

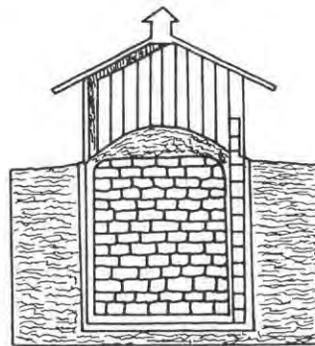
other hand, whose architectural traditions reflected the flat terrain to which they were accustomed, did not have these separate building traditions. When they moved into upland country, they continued to build as if their land were flat.

<sup>160</sup>Fessenden, *Complete Farmer*, p. 43, emphasized that stables should face to the east or "have an eastern aspect;" Jennings, p. 57, advised that piggeries should face south. Northern exposures were desirable in the construction of ice houses (Fessenden, *Complete Farmer*, p. 79; Allen, *Rural Architecture*, p. 236; and Jacques, *The House*, p. 149) and Fessenden, *Complete Farmer*, p. 79, was emphatic that "the dairy house . . . should not front the south, southeast, or southwest."

It is worth emphasizing that only one stone chamber in the study faced North. It is possible that this structure served as an icehouse, and, of course, any of the other chambers may also have served this function. While banked ice houses were described in various farm publications such as Horace R. Allen, *The American Farm and Home Cyclopedia* (Philadelphia: W.H. Thompson, Pub., 1883), p. 690, they do not appear to be the most common form. See Cooper, *Practical Cold Storage*, p. 492; Long, *Pennsylvania Farm*, pp. 206-217; Robert B. Thomas, *The Farmer's Almanac* (Boston: n. pub., 1833), n.p.; Allen, *Rural Architecture*, pp. 258-263; and letter and unpublished data from John Worrell, Staff Archeologist, Old Sturbridge Village, March 30, 1978.



*Front elevation (left) and section view (right) of typical nineteenth century banked ice house. Adapted from: Horace R. Allen, The American Farm and Home Cyclopedia (Philadelphia: W.H. Thompson, Publisher, 1883).*



*Section of typical nineteenth century underground ice house. Adapted from: Byron D. Halsted, Barns, Sheds and Outbuildings (1881, rpr. Brattleboro, Vt.: Stephen Greene Press, 1977).*

<sup>161</sup>Documented root crop yields and number of livestock suggests that root storage areas must have been large indeed. Because the few documented barn cellars exhibit storage potential of 1400-2500 bushels of roots, it is apparent that the present sample of barn and outbuilding cellars under study constitutes an extremely limited sample of what once existed. Table 15 indicates the estimated volume capacity of the chambers under study. An analysis of family size, family storage needs, livestock size and livestock storage needs and root cultivation figures for individual farms might clarify the intended storage purposes of the stone chambers. Such an analysis, however, would have to consider that all the variables listed above changed through time. The family/livestock food storage requirements would radically change with any substantial increase or decrease of family and /or livestock size.

<sup>162</sup>Byron E. Dix, "Possible Evidence of the Megalithic Yard at Calendar Site II, Vermont," *NEARA Journal* 1976, p. 27.

<sup>163</sup>Fessenden, *The New England Farmer*, 1825, Vol. 3, 150.

<sup>164</sup>Halsted, *Barns, Sheds, and Outbuildings*, p. 224.

<sup>165</sup>Backus, et. al., *Village and Farm Cottages*, p. 58. Allen, *Rural Architecture*, p. 39, emphasized that "if it be possible, never lay a cellar or underground wall of perishable material, such as wood or soft bricks" (original underlining). See Note 177. In the manufacture of potash, broad flat stones with carved out centers were used as bases for wooden receptacles; William H. Tucker, *History of Hartford, Vermont* (Burlington: The Free Press Assoc., 1889), p. 116. Soap-making tubs were attached to a long pole which in turn was supported by two large standing stones with grooves carved into their tops (Newton, *Vermont Story*, plate opposite p. 254). Flat stones were used for anvils (Wells, *History of Newbury*, p. 45) and large or distinctive stones were used as boundary markers, resulting in the frequent reference in deeds to "stake and stones." Milestones were put up along roadways and stone gateposts, fenceposts, and hitching posts of varying sizes and rock types were erected around the farmstead. Openings in stone walls were defined by stone posts. Since the posts were so deeply embedded, they were often left in the ground when the stones in the wall were removed for use elsewhere (Eric Sloane, *Our Vanishing Landscape* [New York: Wilfred Funk, Inc., 1955], p. 35; Howard S. Russell, *A Long Deep Furrow* [Hanover, N.H.: University Press of New England, 1976], pp. 36 and 188). At an early date large stones were believed to have special properties and "soil that is occupied by a large stone is better than the rest of the field."

<sup>166</sup>Todd, *The Young Farmer's Manual*, pp. 164-165, also pp. 158-159; and Edward Shaw, *Operative Masonry: or, A Theoretical and Practical Treatise of Building . . .* (Boston: Marsh, Capen, & Lyon, 1832), pp. 36-37.

<sup>167</sup>Allen, *Rural Architecture*, p. 38; and Shaw, *Operative Masonry*, p. 37.

<sup>168</sup>Jacques, *The House*, p. 159.

<sup>169</sup>Barrows Mussey and Walter Needham, *A Book of Country Things* (Brattleboro: The Stephen Greene Press, 1965), pp. 56-57.

<sup>170</sup>Todd, *The Young Farmer's Manual*, p. 148.

<sup>171</sup>*Ibid.*, pp. 160-163.

<sup>172</sup>Bogart, *Peacham*, p. 245; Mary E. Gould, *The Early American House* (N.Y.: Medill McBride Co., 1949), p. 110; Himelhoch, *Early Plainfield*, p. 21; Newton, *Vermont Story*, p. 407; Frank R. Bent, *History of the Town of Essex* (Essex: Essex Publishing Co., 1963), p. 18.

<sup>173</sup>In his study of connected farms, Hubka, "Connected Farm Buildings," pp. 101-109, abundantly documents the strong tradition of relocating buildings, either disassembled or intact: "the frequency of moving major existing buildings, when recorded, appears staggering to a contemporary observer (the movement of smaller sheds, houses, and barns occurred with greater frequency and was seldom recorded)." Also reported by Charles Hummel, "The Business of Woodworking, 1700-1840," *Tool and Technologies: America's Wooden Age Seminar Series*, Fleming Museum, Nov. 6, 1978.

<sup>174</sup>Himelhoch, *Early Plainfield*, p. 21.

<sup>175</sup>Herbert W. Congdon, *Old Vermont Houses* (Brattleboro: Stephen Daye Press, 1940), p. 106.

<sup>176</sup>Todd, *The Young Farmer's Manual*, p. 145.

<sup>177</sup>Essex, Grand Isle, Franklin, Caledonia and Orange Counties have only been partially surveyed.

The use of stone construction, for dwellings or for particular kinds of structures or facilities, was dependent not only on the availability of proper stone material but perhaps more importantly on local and/or ethnic cultural traditions which dictated aesthetic, architectural, functional and technological preferences. Different traditions thus resulted in pockets of distinctive construction styles across the state and may be described, using Hubka's ("Connected Farm Buildings," p. 90) terminology, as representing "locally popular but regionally isolated phenomenon." On the basis of their known distribution, Vermont's stone chambers characterize this pattern.

Relationships between particular construction styles and techniques and particular ethnic communities have not been systematically evaluated on the Vermont landscape. One especially interesting correlation between stone construction and a particular ethnic community is evident at the nineteenth century site of the Ely Copper Mine in Orange County, operated by the Vermont Copper Mining Company (see Collamer Abbott, *Green Mountain Copper: The Story of Vermont's Red Metal* [Randolph, Vt.: Herald Printing, 1973]). The large stone roof-slab type of construction is ubiquitous at the site and structures of this type range from adit entrances to the extraordinary quarter-mile long flue from the smelter to the top of the hill. Collamer Abbott (*The Ely Copper Mine, Orange County, Vermont* MS in Special Collections, Bailey Library, University of Vermont, Burlington, and "Mining Excursion of 1877" by a member of Massachusetts Institute of Technology Expedition to Ely mine, June 20-30, 1877, Abbott Notebook 40, p. 109, Bailey Library, University of Vermont, Burlington) documents that "in June of 1877, an effort to carry off some of the sulphurous fumes from the roast kilns was made by the construction of a giant flue. A ditch about 4' deep [MIT accounts provide measurements of 5' deep by 4' wide] was dug a quarter

of a mile up the hill and lined with giant slabs of stone quarried out of the nearby ledges. Other slabs closed the top of the ditch and chinking made it more or less airtight. At the top was an 80' wooden chimney." In its early days, Ely was virtually a transplanted Cornish village, Cornishmen being the backbone of the work force (Abbott, *The Ely Copper Mine*, pp. 47 & 52). Based on their traditional skill with stoneworking back home, it is probable that the Cornish were responsible for the stone working or at least influenced the construction style and techniques of stone working at the Ely mine site. We must thus consider the possibility that the stone-lined, slab-roofed stone chamber type of construction arose out of a building tradition associated with a particular ethnic group and was copied by others in the community because of its demonstrated utility. To fully understand the roots of particular building traditions and their distribution patterns, historians and cultural geographers could fruitfully investigate ethnic origins of community members and identify their earlier ancestral homes in southern New England, as well as those of "jobbers" in particular trades (see Note 176) who were known to travel from community to community for the purpose of undertaking "specialty" labor such as masonry.

<sup>178</sup>Chester Liebs, National Register of Historic Places Nomination Form, prepared in 1974, on file at the Division for Historic Preservation, Montpelier. Also Rolando, *Ironmaking in Vermont*, pp. 30-34.

<sup>179</sup>Victor Rolando, "Vermont's Iron Making Industry and Furnaces," Annual Meeting of the Vermont Archeological Society, Burlington, Vermont, October 14, 1978. Other kinds of industrial archeological sites exhibit similar labor intensive efforts relating to stone working. For example, Vance Packard ("The 'Questions' of Industrial Archeology," Society for Industrial Archeology, Occasional Publications, No. 3 [1978], p. 5) documents the practice of cutting water wheel pits into solid rock in early Pennsylvania saw mills located within narrow gorges.

<sup>180</sup>Corinth Historical Committee, *History of Corinth, Vermont* (West Topsham, Vt.: Town of Corinth, 1964), pp. 207-208; Fortnightly Club, *The History of Putney, Vermont, 1753-1953* (Putney, Vt.: The Fortnightly Club, 1953, p. 149; and Lyman S. Hayes, *History of the Town of Rockingham, Vermont . . .* (Bellows Falls: Town of Bellows Falls, 1907), p. 97. One of the saddest examples of this kind of vandalism is evident at the site of the Vermont Copper Mining Company in Orange County (see Note 177). The large slabs covering the quarter-mile long, stone-lined flue have been removed wholesale from its southern portion, which is most accessible to the roadway and encompasses the least pitched stretch of hillside.

<sup>181</sup>See Fell, *America*, pp. 135, 141, 142 and 153 in reference to "Calendar Site I" (Chamber No. 36) and pp. 141 and 238 in reference to the "temple to the Mother Goddess" (Chamber No. 14).

<sup>182</sup>Anne Ross, "Commentary," in Cook, *Ancient Vermont*, p. 88.

<sup>183</sup>See Cook, *Ancient Vermont*, Fig. 4.

<sup>184</sup>Personal interview with Dr. Charles Ratté, Vermont State Geologist, June 1977. See Cook, *Ancient Vermont*, Figs. 38 and 39; and Fell, *America*, pp. 236, 238, and 243. On the basis of this ceiling "figure," Fell infers "that this temple was visited by both Celts and Phoenician visitors from Tarshish."

<sup>185</sup>See Cook, *Ancient Vermont*, Figs. 7, 8, 10, 23, 42 and 49.

<sup>186</sup>Henry M. Seely, "The Original Vermont Plow," in *Fourth Report of the Vermont Board of Agriculture for the Year 1877* (Montpelier: J. & J.M. Poland, 1877), p. 170.

<sup>187</sup>Harry Jaffee, "Discovery of more 'Ancient Sites' Announced by Castleton Professor," *Rutland Herald*, June 3, 1977.

<sup>188</sup>Report received from Professor Brewster Baldwin, Department of Geology, Middlebury College, June 27, 1977; and memorandum received from Dr. Charles Ratté, Vermont State Geologist, Agency of Environmental Conservation, June 20, 1977. See also Wallace M. Cady, "Stratigraphy and Structure of West-Central Vermont," *Bulletin of the Geological Society of America*, May (1945), pp. 550-551, especially Plate 3, Figs. 1-3.

<sup>189</sup>Cook, *Ancient Vermont*, Fig. 31 and Figs. 28-32 and 54-56; also Cook, "Discussion," *Ibid.*, p. 115.

<sup>190</sup>*Ibid.*, Figs. 42-48, 50-60 and 62-64.

<sup>191</sup>*Ibid.*, Fig. 9.

<sup>192</sup>See Byron E. Dix, "A Possible Plinth Monument in Central Vermont," *Occasional Publications of the Epigraphic Society*, 3, No. 60 (1976), 1-6; Cook, *Ancient Vermont*, Fig. 69; and Fell, *America*, pp. 71-72.

TABLE 2

LEVEL OF STUDY

CHAMBER NO.	VISITED	INTENSIVE DATA COLLECTION	INCOMPLETE DATA COLLECTION	DESTROYED	INCLUDED IN FINAL REPORT
1 <sup>a</sup>	X	X			X
2	X	X			X
3	X	X			X
4	X	X			X
5	X		X	X	X
6	X	X			X
7	X	X			X
8	X	X			X
9	X	X			X
10	X	X			X
11	X	X			X
12	X	X			X
13	X	X			X
14	X	X			X
15	X	X			X
16	X	X			X
17	X	X			X
18	X	X			X
19	X		X		X
20	X	X			X
21	X	X			X
22	X	X			X
23	X	X			X
24	X	X			X
25	X	X			X
26	X	X			X
27	X	X			X
28	X	X			X
29	X	X			X
30	X	X			X
31	X	X			X
32	X	X			X
33 <sup>b</sup>	(X)	(X)			
34	X	X			X
35	X	X			X
36	X	X			X
37	X	X			X
38	X	X			X
39	X		X		X
40	X		X		X
41					
42	X		X		X
43					
44					
45				X	
46					
47 <sup>b</sup>	(X)		(X)		
48				X	
49	X		X		X
50	X		X		X
51	X		X		
52 <sup>b</sup>	(X)		(X)		
53	X		X		X
54		X			X
55					
TOTAL 52	44	36	9	3	44
%	85%	70%	17%	6%	85%

- a. Numbers refer to individual chamber designations. The number assigned to each chamber remains consistent throughout the study.
- b. Included in original sample but in final analysis differ sufficiently from rest of chambers to preclude inclusion in present discussion.

TABLE 3

ROCK COMPOSITION & UNDERLYING GEOLOGIC FORMATION<sup>a</sup>

Chamber No.	Rock Composition	Underlying Geologic Formation
1	limestone (Waits River)	
2	limestone, gneiss, schist (Waits River)	
3	limestone (Waits River)	
4	limestone (Waits River)	
5 <sup>b</sup>	limestone (Gile Mountain)	
6	gneiss (Gile Mountain)	
7	gneiss, schist (Waits River)	
8	gneiss, schist (Waits River)	
9	granite, gneiss, basalt (Waits River)	
10 <sup>b</sup>	(Gile Mountain)	
11	gneiss (Gile Mountain)	
12	limestone (Waits River)	
13	limestone, schist, quartz (Waits River)	
14	limestone, schist (Waits River)	
15	limestone, marble (Profound Unconformity)	
16	limestone (Waits River)	
17	limestone, schist (Gile Mountain)	
18	limestone (Gile Mountain)	
19	granite (Waits River)	
20	limestone, granite (Waits River)	
21	limestone, greenstone (Pinney Hollow)	
22	limestone, granite (Gile Mountain)	
23	limestone (Waits River)	
24 <sup>b</sup>	(Waits River)	
25	limestone, schist, quartz (Waits River)	
26	limestone, schist, granite (Waits River)	
27	schist, granite (Gile Mountain)	
28	limestone, schist (Waits River)	
29	limestone, quartz (Waits River)	
30	schist (Waits River)	
31	limestone (Waits River)	
32	limestone (Waits River)	
33	limestone, schist (Ottawaquechee)	
34 <sup>b</sup>	(Breze/Forestdale Marble)	
35 <sup>b</sup>	limestone (Waits River)	
36	limestone (Waits River)	
37	limestone (Waits River)	
38	granite (Profound Unconformity)	
39	limestone (Waits River)	
40 <sup>b</sup>	(Gile Mountain)	
41 <sup>b</sup>	(Waits River)	
42 <sup>b</sup>	(Gile Mountain)	
43 <sup>b</sup>	(Waits River)	
44 <sup>b</sup>	(Orfordville)	
45 <sup>b</sup>	(Waits River)	
46 <sup>b</sup>	(Gile Mountain)	
48 <sup>b</sup>	(Waits River)	
49 <sup>b</sup>	(Orfordville)	
50 <sup>b</sup>	dolomite (Hortonville/Glenns Falls Undifferentiated)	
51 <sup>b</sup>	(Waits River)	
53 <sup>b</sup>	(Gile Mountain)	
54	schist (Gile Mountain)	

<sup>a</sup>Rock composition as listed indicates the dominant rock type(s) used in the chamber's construction. Underlying geologic formation is in parenthesis. From Charles G. Doll, ed., and comp., Central Geologic Map of Vermont (Montpelier, 1961).  
Data not available.

TABLE 4

TOPOGRAPHIC POSITION

TYPE A					TYPE B				
VALLEY SLOPE	RIDGE	HILLTOP	OTHER	ELEVATION (IN FEET)	VALLEY SLOPE	RIDGE	HILLTOP	OTHER	ELEVATION (IN FEET)
		X		1520	1		X		1340
		X		1520	2	X			1280
10	X			680	3			X	1280
11	X			680	4	X			680
13		X		1620	5	X			900
22		X		1180	6	X			1020
23			X	1320	9	X			920
24			X	2000	12	X			1020
28	X			860	14	X			1500
30		X		1800	15	X			800
37	X			1080	16			X	1800
40			X	2090	17	X			1500
53 <sup>a</sup>				1800	18	X			600
54	X			1180	19		X		a
TOTAL	5	5	3	0	20		X		1100
%	38%	38%	23%		21	X			1000
					25		X		1660
					26			X	2000
					27			X	1400
					29			X	1080
					31	X			980
					32			X	2000
					34			X	1760
					35			X*	1160
					36		X		1200
					38			X	a
					39	X			1430
					42		X		900
					49			X*	620
					50			X*	200
					TOTAL	13	6	8	3
					%	43%	20%	27%	10%

TYPE A	TYPE B
TOTALS	18
%	42%
	11
	26%
	11
	26%
	3
	7%
	AVE. EL
	1249

\* In valley.  
a Data not available.

**TABLE 5**  
CONSTRUCTION TYPE A

	WITHIN HOUSE FOUNDATION HOLE	WITHIN EXISTING HOUSE	WITHIN BARN/OUTBUILDING FOUNDATION HOLE	WITHIN EXISTING BARN/OUTBUILDING	EXTENDS OFF FROM BARN OUTBUILDING FOUNDATION HOLE
7 <sup>a</sup>				X (Carriage shed)	
8		X			
10				X (Barn)	
11			X (Barn)		
13	X				
22					X (Barn?)
23	X				
24					X (Shed)
28					X (Cider Mill)
30	X				
37	X				
40					X (Shed?)
53			X (Barn)		
54	X				
TOTAL	5	1	2	2	4
%	36%	7%	14%	14%	29%
TOTAL A	14				
%	32%				

a Numbers refer to individual chamber designations. The number assigned to each chamber remains consistent throughout the study.

CONSTRUCTION TYPE B

	BUILT INTO HILL-SIDE MOUNDED	BUILT INTO HILL-SIDE/PARTIALLY MOUNDED	FREE-STANDING/MOUNDED	FREE-STANDING/UNMOUNDED	SUBTERRANEAN MOUNDED
1		X			
2	X				
3					X
4	X				
5	X				
6	X				
9	X				
12	X				
14	X				
15	X				
16	X				
17				X	
18		X			
19	X				
20	X				
21			X		
25		X			
26		X			
27	X				
29	X				
31	X				
32			X		
34	X				
35	X				
36	X				
38	X				
39	X				
42	X				
49	X				
50			X		
TOTAL	21	4	3	1	1
%	70%	13%	10%	3%	3%
TOTAL B	30				
%	68%				

**TABLE 6**

SOIL COVERING\*

TYPE A					TYPE B				
	TOP & SIDES	SIDES ONLY	NONE	DEPTH		TOP & SIDES	SIDES ONLY	NONE	DEPTH
7	X			a	1		X		
8			X		2	X			0.19
10	X			a	3	X			0.21
11			X		4	X			0.23
13			X		5	X			a
22		X			6	X			0.16
23			X		9	X			0.28
24	X			a	12	X			0.10
28	X			0.38	14	X			0.62
30			X		15	X			a
37			X		16	X			a
40	X			a	17			X	
53a					18		X		
54			X		19	X			0.60
TOTAL	5	1	7	—	20	X			0.17
%	38%	3%	54%		21	X			0.34
TYPE A & TYPE B					25		X		
					26		X		
					27	X			a
					29	X			0.26
					31	X			a
					32	X			0.71
					34	X			0.14
					35	X			0.10
					36	X			a
					38	X			a
					39	X			a
					42	X			a
					49	X			a
					50	X			a
					TOTAL	25	4	1	—
					%	83%	13%	3%	

a Data not available or could not be measured.

\* All measurements in this table and elsewhere are in meters unless otherwise indicated.

**TABLE 7**

ENTRYWAY CONSTRUCTION

	UNROOFED				ROOFED				COURSED				
	DOOR WAY	EXTENDED ENTRY	OPEN- SIDED ENTRY	ROOFED- EXTENDED ENTRY	DOOR WAY	EXTENDED ENTRY	OPEN- SIDED ENTRY	ROOFED- EXTENDED ENTRY	POST & LINTEL	OTHER LINTEL	POST & LINTEL	OTHER LINTEL	COURSED WORK
7					X								X
8	X												X
10	X												X
11	X												X
13		X											
22	X												X
23		X											X
24	X												X
28	X												X
30		X											X
37		X											X
40	X												X
53a													X
54													X
TOTAL	7	0	5	0	1	0	1	0	1	0	1	0	12
%	54%	0%	38%	0%	8%	0%	8%	0%	8%	0%	8%	0%	92%
TYPE A													
TYPE B													
25a													
26													X
27													X
29													X
31													X
32													X
34													X
55													X
56													X
38													X
39													X
42													X
49													X
50													X
TOTAL	16	4	3	4	1	3	4	1	1	3	4	1	22
%	57%	14%	11%	14%	4%	11%	14%	4%	4%	12%	14%	4%	85%
TYPE A & TYPE B													
TOTAL	23	4	8	4	2	3	4	2	3	3	4	2	34
%	56%	10%	20%	10%	5%	8%	10%	5%	8%	8%	10%	5%	87%

<sup>a</sup>Data not available.

**TABLE 8**  
ENTRYWAY MEASUREMENTS

TYPE A				TYPE B			
LENGTH OR THICKNESS	WIDTH	HEIGHT		LENGTH OR THICKNESS	WIDTH	HEIGHT	
7		0.88	1.00 <sup>e</sup>	1	0.63	0.39	0.86
8		0.62	0.99	2b	2.40	0.90	1.45
10	1.00	0.99	1.80	3c	0.47	0.70	0.78
11	0.28	1.12	1.42	4b	3.30	1.55	1.50
13d		1.15	1.37	5a			
22	0.43	0.20	1.47	6	0.90	0.90	1.15
23a				9	1.30	0.78	1.51
24	0.40	0.45	1.17	12	1.86	1.16	1.43
28	0.87	1.53	1.67	14	0.24	1.26	1.40
30d		1.60	1.60	15	0.93	0.83	1.68
37d		1.62	1.45	16	0.47	1.05	1.70
40a				17	1.45	0.77	1.86
53				18d		1.22	0.54-0.73
54d		1.19	1.50	19a			
				20	2.40	1.07	1.70
				21	0.66	0.80	1.15
				25a			
				26	0.70	1.34	1.37
				27	1.37	1.12	1.54
				29	1.00	0.25	0.96
				31	2.25	1.41	1.70
				32	1.00	1.28	1.61
				34	1.18	0.44	1.19
				35d		1.59	1.12
				36b	2.95	0.84	1.33
				38d		2.27	1.77
				39a			
				42a			
				49a			
				50		1.08	1.74

- <sup>a</sup>Data not available.
- <sup>b</sup>Measurements are of entry passage - in this case, term "length" is applicable.
- <sup>c</sup>Figures are dimensions of triangle-shaped entry into this subterranean chamber.
- <sup>d</sup>Chamber is open-sided, no thickness to entryway.
- <sup>e</sup>Represents height of stairway leading down into chamber.

**TABLE 9**

TYPE OF ENTRYWAY

	FLUSH EXTENDED (WITH WALL)			OTHER			EVIDENCE OF HARDWARE/FRAMING			FLUSH EXTENDED (FROM WALL)			OTHER			EVIDENCE OF HARDWARE/FRAMING			
	TOP	SIDE	TOP	FRONT	SIDE	TOP	FRONT	SIDE	TOP	FRONT	SIDE	TOP	FRONT	SIDE	TOP	FRONT	SIDE	TOP	
7	X					X						X							
8																			
10	X																		
11	X																		
13	X																		
22	X																		
23	X																		
24	X																		
28	X																		
50	X																		
57	X																		
40	X																		
53a																			
54	X																		
TOTAL	12					1													
%	92%					8%													
TYPE A																			
TYPE B																			
1																			
2																			
3																			
4																			
5a																			
6																			
9																			
12																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
25a																			
26																			
27																			
29																			
31																			
32																			
34																			
35																			
36																			
38																			
39																			
42																			
49																			
50																			
TOTAL	19					1						8							
%	68%					4%						29%							
TYPE A & TYPE B																			
TOTAL	31	8	2	39	1	2	10												
%	76%	20%	5%	95%	2%	5%	24%												

a Data not available.

TABLE 10

COMPASS ORIENTATIONS OF CHAMBER ENTRIES<sup>a</sup>

	NORTH	SOUTH	EAST	WEST	NORTHEAST	NORTHWEST	SOUTHEAST	SOUTHWEST
7		X17 <sup>o</sup>						
8					X30 <sup>o</sup>			
10							X118 <sup>o</sup>	
11		X200 <sup>o</sup>						
13			X98 <sup>o</sup>					
22				X286 <sup>o</sup>				
23			X90 <sup>o</sup>					
24							X153 <sup>o</sup>	
28		X182 <sup>o</sup>						
30			X110 <sup>o</sup>					
37 <sup>b</sup>		X178 <sup>o</sup>						
40 <sup>b</sup>								
53 <sup>b</sup>								
54		X180 <sup>o</sup>						
TOTAL								
TYPE A	1	4	3	1	1	0	2	0
%	8%	33%	25%	8%	8%	0%	17%	0%

TYPE B

1			X108 <sup>o</sup>					
2			X112 <sup>o</sup>					
3		X180 <sup>o</sup>						
4			X70 <sup>o</sup>					
5			X98 <sup>o</sup>					
6	X356 <sup>o</sup>							
9		X198 <sup>o</sup>						
12			X108 <sup>o</sup>					
14		X180 <sup>o</sup>						
15			X98 <sup>o</sup>					
16		X <sup>c</sup>						
17							X136 <sup>o</sup>	
18							X154 <sup>o</sup>	
19			X 98 <sup>o</sup>					
20		X199 <sup>o</sup>						
21								X212 <sup>o</sup>
25								X204 <sup>o</sup>
26			X86 <sup>o</sup>					
27			X80 <sup>o</sup>					
29								X208 <sup>o</sup>
31			X88 <sup>o</sup>					
32							X126 <sup>o</sup>	
34								X242 <sup>o</sup>
35			X100 <sup>o</sup>					
36			X106 <sup>o</sup>					
38			X100 <sup>o</sup>					
39								
42 <sup>b</sup>			X <sup>b</sup>					
49 <sup>b</sup>								
50				X <sup>b</sup>				
TOTAL								
TYPE B	1	5	14	1			3	4
%	4%	18%	50%	4%			11%	14%
TOTAL								
ALL	2	9	17	2	1	0	5	4
TYPES	5%	22%	42%	5%	3%	0%	12%	10%

a Compass readings were sighted from center rear of chambers through center of entryways. Compass declinations: 14½<sup>o</sup> for Windham County chambers; 16¼<sup>o</sup> for all others.

b Data not available.

c Rear of chamber inaccessible.

TABLE 11

EXTERIOR STONEMWORK AND MEASUREMENTS

	MOR- DRY WALL	TARED JOINTS	MIXED RUBBLE	COURSED RANDOM RUBBLE	RANDOM RUBBLE	BUTTRESS- ING STONES ON FRONT	WEDGE MARKS/ EVIDENCE OF SPLITTING	DRESSED/ TRIMMED	MAX LENGTH	MAX WIDTH	MAX HEIGHT
7*	X			c					c	c	c
8a									c	c	c
10a									c	c	c
11*	X				X				c	c	c
13	X			X			X	4.23	3.89	2.07	
22*	X			X				c	2.99	1.69	
23	X				X			c	5.35	2.49	
24*	X			X		X		X	c	c	c
28*	X			X		X			c	c	c
30	X			X			X	7.50	8.80	2.19	
37	X			X				4.85	3.35	2.00	
40c								3.60	3.24	2.35	
53c											
54	X			X				2.74	3.66	1.93	
TOTAL	10	0	0	7	2	2	1	3	--	--	--
%	100%			78%	22%	17%	--	--	--	--	--

TYPE B

1*	X				X	X			3.60	6.10	1.01
2*	X			X			X		10.45	6.10	1.97
3*	X			X						9.90+	2.10
4d*	X			c					c	c	c
5b											
6*	X				X	X			c	6.00	1.70
9*	X			X		X			9.60	c	2.06
12*	X			X		X	X	13.23	12.91	2.06	
14*	X			X			X	8.50	5.95	2.50	
15*	X				X	X		8.00	5.00	2.33	
16*		X		X		X		7.20	6.60	2.31	
17	X			X				3.66	3.90	1.97	
18a								2.10	2.20	0.90	
19c											
20*	X			X		X		c	12.80	2.15	
21*	X			X				7.45	6.30	2.40	
25a								c	c	c	
26*	X			X		X		c	c	c	
27*	X				X	X		X	10.10	7.65	2.65
29*	X			X		X		10.10	8.10	2.35	
31*	X			X		X		8.20	10.01	2.15	
32*	X			X		X		11.36	9.32	2.67	
34*	X				X	X	X	7.30	8.10	1.88	
35*	X					X		5.70	5.80	1.67	
36d	X			X		X		c	c	c	
38*	X			X		X		c	c	c	
39*		X		X		X		c	c	c	
42c						X		c	c	c	
49e		X			X	X		X	c	c	c
50*	X			X		X		c	c	c	
TOTAL	22	2	1	17	6	20	4	3	--	--	--
%	88%	8%	4%	74%	26%	71%	--	--	--	--	--

a. Exterior masonry not visible.

b. Chamber destroyed.

c. Data not available.

d. Passage entry into collapsed chamber only.

e. Was originally dry wall.

\* This is a circumference - exterior of chamber is a circular mound.  
Only entryside or partial exterior masonry visible due to earth mounding or location within another structure.

**TABLE 12**  
INTERIOR STONEMWORK

	DRY WALL	MORTARED JOINTS	MIXED	RANDOM RUBBLE	COURSED RANDOM RUBBLE	DRY WALL	MORTARED JOINTS	MIXED	RANDOM RUBBLE	COURSED RANDOM RUBBLE	
TYPE A						TYPE B					
7	X			X		1	X			X	
8			X	X		2	X			X	
10	X				X	3	X			X	
11	X				X	4	X			X	
13	X			X		5a					
22	X			X		6	X			X	
23	X			X		9	X			X	
24	X			X		12	X			X	
28	X			X		14		X		X	
30	X			X		15		X		X	
37	X			X		16			X	X	
40a						17	X			X	
53a						18			X	X	
54	X			X		19	X			X	
TOTAL	11		1	10	2	20	X			X	
%	92%		8%	83%	17%	21	X			X	
						25			X	X	
						26	X			X	
						27	X			X	
						29	X			X	
						31	X			X	
						32			X	X	
						34	X			X	
						35			X	X	
						36	X			X	
						38	X			X	
						39		X		X	
						42		X		a	
						49a					
						50		X		X	
TOTAL	29	7	4	35	4	TOTAL	18	7	3	25	2
%	73%	18%	10%	90%	10%	%	64%	25%	11%	93%	7%

<sup>a</sup>Data not available.

**TABLE 13**

INTERIOR STONEMWORK

TYPE A						TYPE B					
WEDGE, SPLITTING MARKS		DRESSED/ TRIMMED		INTER- LOCKING BUTTED CORNER CORNERS BRACES		WEDGE, SPLITTING MARKS		DRESSED/ TRIMMED		INTER- LOCKING BUTTED CORNER CORNERS BRACES	
7	X			X		1				X	
8						2				X	
10	X	X		X		3					
11		X		X		4	X			X	X
13		X		X		5a					
22				X		6		X			
23		X		X		9				X	
24	X			X		12				X	
28				X	X	14	X			X	X
30				X		15				X	
37				X		16					
40a						17				X	
53a						18				X	
54						19					X
TOTAL	3	4	0	10	1	20				X	X
%	25%	33%		83%	8%	21					
TYPE A & TYPE B						25				X	X
						26	X	X		X	
						27	X			X	X
						29				X	
						31	X				
						32	X			X	X
						34				X	
						35				X	
						36		X			
						38				X	
						39a					
						42a					
						49a					
						50					
						TOTAL	6	3	0	18	7
						%	23%	12%		70%	27%

<sup>a</sup>Data not available.

TABLE 14

CHAMBER DIMENSIONS

	LENGTH	WIDTH	HEIGHT		LENGTH	WIDTH	HEIGHT	DIAMETER
TYPE A				TYPE B				
7	4.13	3.21	1.75	1	2.26*	1.66*	0.85*	
8 <sup>b</sup>	1.38 Ave. Dia.		1.07*	2	3.33+	1.63*	1.50*	
10	4.60+	1.81*	1.84*	3 <sup>b</sup>			1.60	2.28*
11	4.55+	2.38*	1.74*	4 <sup>d</sup>	(3.30)	(1.55)	(1.50)	
13	3.12+	1.83*	1.39*	5 <sup>a</sup>				
22	2.18+	1.12+	1.22*	6			1.58*	2.75
23	3.00+	1.51	1.97	9	4.14+	1.67*	1.51*	
24	4.02+	1.80*	1.32+	12	5.21+	2.85*	1.56*	
28	6.23+	2.27*	1.83*	14	4.00+	3.37*	1.74*	
30	3.35+	1.66*	1.64*	15	4.45+	2.67*	2.07*	
37	2.54+	1.62*	1.55*	16	a	2.40	1.70	
40 <sup>a</sup>				17	2.31+	2.39	2.14*	
53 <sup>a</sup>				18	1.63+	1.37*	0.70*	
54	2.00	1.19	1.47	19 <sup>a</sup>				
AVERAGE	3.61	1.85	1.57	20	3.63	1.30*	1.79*	
				21	2.64+	1.81*	1.97*	
				25	6.34+	1.56*	1.53*	
				26	4.43+	3.39*	1.72	
				27	3.99+	2.64+	1.55*	
				29 <sup>b</sup>			1.55*	3.54*
				31	5.95+	3.40	1.84	
				32	6.13+	2.98*	2.11*	
				34	3.16+	2.17*	1.53*	
				35	5.35	1.57*	1.55*	
				36 <sup>d</sup>	(2.95)	(0.84)	(1.33)	
				38	3.85	1.93*	1.66+	
				39 <sup>a</sup>				
				42	3.66	2.44	1.79	
				49 <sup>a</sup>				
				50	5.66	3.52	2.32 <sup>c</sup>	
				AVERAGE	4.11	2.32	1.66	2.86

+ Average of two.  
 \* Average of three.  
 a Data not available.  
 b Irregular more than circular.  
 c Maximum height of arched roof.  
 d Main chamber has collapsed; measurements are of entry passage only.

TABLE 15

VOLUME AND BUSHEL CAPACITY

VOLUME <sup>b</sup> BUSHEL <sup>c</sup>			VOLUME    BUSHEL		
TYPE A			TYPE B		
7	23.2	644	1	3.2	88
8	1.6	44	2	8.1	226
10	15.3	425	3	6.4	178
11	18.8	522	4 <sup>a</sup>		
13	7.9	219	5 <sup>a</sup>		
22	3.0	83	6	9.4	261
23	8.9	247	9	10.4	289
24	9.6	267	12	23.2	644
28	25.9	719	14	23.5	653
30	9.1	253	15	24.6	683
37	6.4	178	16 <sup>a</sup>		
40 <sup>a</sup>			17	11.8	328
53 <sup>a</sup>			18	1.6	44
54	3.5	97	19 <sup>a</sup>		
			20	8.4	233
			21	9.4	261
			25	15.1	419
			26	25.8	717
			27	16.3	453
			29	15.2	422
			31	37.2	1033
			32	38.5	1069
			34	10.5	292
			35	13.0	361
			36 <sup>a</sup>		
			38	12.3	342
			39 <sup>a</sup>		
			42	16.0	444
			49 <sup>a</sup>		
			50 <sup>d</sup>	46.2	1283

<sup>a</sup>Data not available.

<sup>b</sup>In cubic meters.

<sup>c</sup>Webster's New Collegiate Dictionary defines a bushel as "any of various units of dry capacity" and gives 0.036 cubic meters as the standard capacity. An attempt to locate a comparable figure for the common farmer's bushel basket of the nineteenth century was unsuccessful. The figure above was thus used as an average, acknowledging that standards for bushel capacity may have varied over the years.

<sup>d</sup>These figures are high since h, in the volume computation, was defined as the maximum height of the arched ceiling.

TABLE 16

FLOOR PLAN

ELEMENTS OF CONSTRUCTION - INTERIOR

	L-SHAPED	SQUARE	RECTAN- GULAR	ROUND	SEMI- ROUND	BOX	CORBELLED	COMBI- NATION
TYPE A								
7			X			X		
8					X	X		
10			X			X		
11			X			X		
13			X			X		
22			X			X		
23			X			X		
24			X			X		
28			X			X		
30			X					X
37			X			X		
40	X					X		
53			X			X		
54			X					X
TOTAL	1	0	12	0	1	12	0	2
%	7%		86%		7%			

TYPE B

1			X			X		
2			X			X		
3					X	X		
4			X			a		
5a								
6				X			X	
9			X			X		
12	X					X		
14		X				X		
15			X					X
16a								
17	X					X		
18		X				X		
19			X			X		
20	X					X		
21			X					X
25			X			X		
26			X			X		
27	X					X		
29					X	X		
31			X			X		
32			X			X		
34	X					X		
35			X			X		
36			X			a		
38			X			X		
39			X			X		
42			X			X		
49a								
50			X			X		
TOTAL	5	2	17	1	2	22	1	2
%	19%	7%	63%	4%	7%	88%	4%	8%

TYPE A & TYPE B

TOTAL	6	2	29	1	3	34	1	4
%	15%	5%	71%	2%	7%	87%	3%	10%

a Data not available.

TABLE 17

CEILING CHARACTERISTICS

	NUMBER OF SLABS	DRESSED/TRIMMED	NATURAL BEDROCK	WEIGHT OF 3 LARGEST SLABS <sup>d</sup>		
				#1	#2	#3
TYPE A						
7	10		X	1185	792	620
8	10		X	234 <sup>e</sup>	73	247
10	7		X	734 <sup>c</sup>	1565	1721
11	9		X	1208 <sup>c</sup>	1643	1241
13	3		X	1573	1541	393
22	3		X	706	547	a
23	3+		X	1764	a	a
24	7		X	a	a	a
28	3+		X	4157	9858	369
30	5		b	293	829	1420
37	4		b	1601 <sup>c</sup>	1084	1700
40 <sup>a</sup>						
53 <sup>a</sup>						
54	3		X			

TYPE B

1	5		X	a	a	a
2	4		X	691 <sup>c</sup>	594	1466
3	3		X	691 <sup>c</sup>	1460	a
4	5*		X	1964	637	a
5 <sup>a</sup>						
6	6		X	a	a	a
9	6		X	4205 <sup>c</sup>	1365	1021
12	5		X	1593 <sup>c</sup>	7692	4185
14	5		X	768 <sup>c</sup>	a	a
15	8		X	a		
16	2+		X	5081	9059	
17	1			3719		
18	3		X	625 <sup>c</sup>	698	a
19 <sup>a</sup>				a	a	a
20	3		b	a	a	a
21	5		X	564 <sup>c</sup>	a	a
25	3+		X	1698	a	a
26	3+		X	4150	1627	1678
27	6		b	408 <sup>c</sup>	4892	1485
29	3		X	788	a	a
31	4		X	6515	1901	3969 <sup>c</sup>
32	9		X	2822	3409	5769
34	3		X	a	a	a
35	5		X	633 <sup>c</sup>	a	a
36	2*		X	a	a	a
38	3		X	2576 <sup>c</sup>	a	a
39	9		b	a	a	a
42 <sup>a</sup>						
49 <sup>a</sup>						
50	Arched Ceiling		Random Rubble			

- a Data not available \* Passage entry only; presently collapsed inner chamber probably also capped with slabs.  
 b Not determined  
 c Lintel stone + May originally have been additional slabs  
 d Compared to denser, more compact marbles the recrystallized limestones of the Waits River and Gile Mountain Formations are lighter in weight. Although the marble industry uses 168 lbs. per cubic foot for calculating stone weight the weights of the ceiling slabs were computed on the basis of limestone density (110-160 lbs. per cubic foot). Since the Waits River limestone falls to the lower side of the scale, the formula of 135 lbs. per cubic foot was used to compute the weight of the ceiling stones. Not all chambers were constructed of the recrystallized limestones, however, and several of the weight calculations tend to the low side. Slab weights were computed only for those stones for which adequate thickness, width and length measurements were available.

TABLE 18

VENT DATA<sup>b</sup>

	REAR WALL	SIDE WALL	FRONT WALL	LENGTH	WIDTH	HEIGHT
1	X			0.29	0.06	a
2	X			0.60	0.18	a
9	X			0.20	0.20	0.70
14	X			0.15	0.11	a
17	X			a	a	0.91
20		X		0.05	0.05	0.05
29	X			0.76	0.87	a
32	X			0.82	0.37	0.56
34			X	0.12	0.18	0.78
39	X			a	a	a
TOTAL	8	1	1			
%	80%	10%	10%			

a Data not available.  
 b Chambers are all Type B.

TABLE 19

TEMPERATURE READINGS<sup>b</sup>

	EXTERIOR		INTERIOR		EXTERIOR		INTERIOR		
	VENT	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	VENT	MAXIMUM	MINIMUM	
TYPE A									
7a									
8a									
10a									
11a									
13	No	78°	66°	62°	60°				
22a									
23a									
24a									
28	No	79°	70°	62°	62°				
30a									
37a									
40a									
53a									
54a									
AVER-AGE		--	--	--	--				
TYPE B									
1a									
2a									
3	No	70°				70°	57°	57°	
4a									
5a									
6a									
9a									
12	No	83°				76°	56°	56°	
14	Yes	72°				70°	60°	60°	
15	No	78°				72°	56°	56°	
16a									
17	Yes	72°				72°	64°	61°	
18a									
19a									
20a									
21a									
25a									
26a									
27	No	75°				75°	58°	58°	
29	Yes	70°				66°	62°	58°	
31	No	74°				74°	58°	58°	
32	Yes	72°				68°	62°	61°	
34	Yes	76°				76°	58°	57°	
35	No	72°				72°	59°	59°	
36a									
38	No	68°				68°	58°	58°	
39a									
42a									
49a									
50a									
AVER-AGE		74°				72°	59°	58°	

a Data not available.  
 b Entryways were not closed off in course of recording temperatures.

TABLE 20

CULTURAL CONTEXT OF CHAMBERS

	DISTANCE FROM HOUSE	DATE CONSTRUCTED	DISTANCE FROM HOUSE FOUNDATION HOLE	DISTANCE FROM BARN/ OUTBUILDINGS	DISTANCE FROM BARN/OLTBUILDING FOUNDATION HOLES	DISTANCE FROM ROAD	WATER SOURCE/ DISTANCE	PROPERTY FIRST SETTLED
TYPE A								
7	12m	c. 1760		chamber under carriage shed.		87m	*	c. 1760
8	chamber in basement	c. 1760		12m		75m	*	c. 1760
10	30m	c. 1855		chamber on lower level of barn.		80m	*	pre-1816
11		c. 1807	3m		chamber within barn foundation hole.	15m	well-70m	1833?
13		+	chamber within foundation hole.			20m	well-6m	a
22	adjacent	a			chamber extends off barn (?) foundation hole.	25m	*	c. 1800
23		+	chamber within foundation hole.			20m	*	c. 1768
24		+	20m		barn-15m; hamber extends off shed foundation hole.	10m	*	1778?
28	38m <sup>d</sup>	pre 1855		63m	chamber extends off cider mill foundation hole.	60m	well-38m	1784?
30		+	chamber within foundation hole.		barn - 43m	3m	brook-20m	a
37		+	chamber within foundation hole.		barn - 32m	X <sup>a</sup>	*	a
40		+	X		barn; chamber extends off foundation hole. <sup>c</sup>	X <sup>a</sup>	*	a
53	X	1840 <sup>d</sup> +	X		chamber extends off barn foundation hole.	X	*	a
54		+	chamber within foundation hole.			15m	10-15m	a

	DISTANCE FROM HOUSE	DATE CONSTRUCTED	DISTANCE FROM HOUSE FOUNDATION HOLE	DISTANCE FROM BARN/ OUTBUILDINGS	DISTANCE FROM BARN/OUTBUILDING FOUNDATION HOLES	DISTANCE FROM ROAD	WATER SOURCE/ DISTANCE	PROPERTY FIRST SETTLED
TYPE B								
1	31m	recent +	32m		barn - 30m - 40m and other buildings.	16m	spring-29m	pre-1830
2			84m <sup>b</sup>	sugar house - 16m		170m	well-20m	c.1780's
3		+	38m			30m	brook-73m	c.1798
4	36m	recent +	16m	31m	barn - 32m	29m	well-28m	c.1788
5	18m	a +	35m	barn - 35m		70m	*	a
6	32m	pre-1800		carriage shed - 20m	barn - 13m	abandoned 70m used 23m	spring-70m well-24m	pre-1800
9		+	7m <sup>c</sup>			11m	brook-25m	c.1795
12	8m	1805		barn - 30m		27m	well-18m	pre-1801
14	55m	c.1807			7m <sup>c</sup>	28m	spring-26m	pre-1807
15	60m <sup>d</sup>	1840				45m	well-18m	c.1789
16	76m	1790	15 <sup>c</sup>	barn - X		41m	well-23m	1780?
17						c.½km.	well-18m	1795?
18	70m	a	X			58m	*	a
19	X	a			barn <sup>X</sup>	X	*	a
20		+	12m		barn - 14m	75m	spring-64m	a
21		+	8m			35m	well-14m	pre-1800
25		+	28m		barn - 39m	33m	well-30m	1775?
26		+	3 in vicinity closest at 30m			adjacent to of chamber	rear *	a
27	10m	c.1805		barn - 25m		15m	well-18m	c.1800?
29	55m <sup>d</sup>	a		55m		48m	*	c.1785?
31	6m	1807 +	X		barn - 39m	adjacent to of chamber	rear**	pre-1809
32		+	10m <sup>c</sup>		2m <sup>c</sup>	75m	well-120m cistern-9m	c.1782
34	75m	a				8m	*	a
35	10m	1784-89 +	29m	barn - 1m		43m	*	a
36			6m <sup>b</sup>		30m <sup>c</sup> (barn?)	80m	spring-60m	1784?
38		+	27m		69m	35m	*	a
39	8m	c.1806		barn - 6m		2m	*	pre-1806
42 <sup>a</sup>						5m	a	pre-1824
49 <sup>a</sup>								
50	9m	c.1784				X	a	a

a Data not available.

b Possible foundation hole.

c Nature of foundation undetermined.

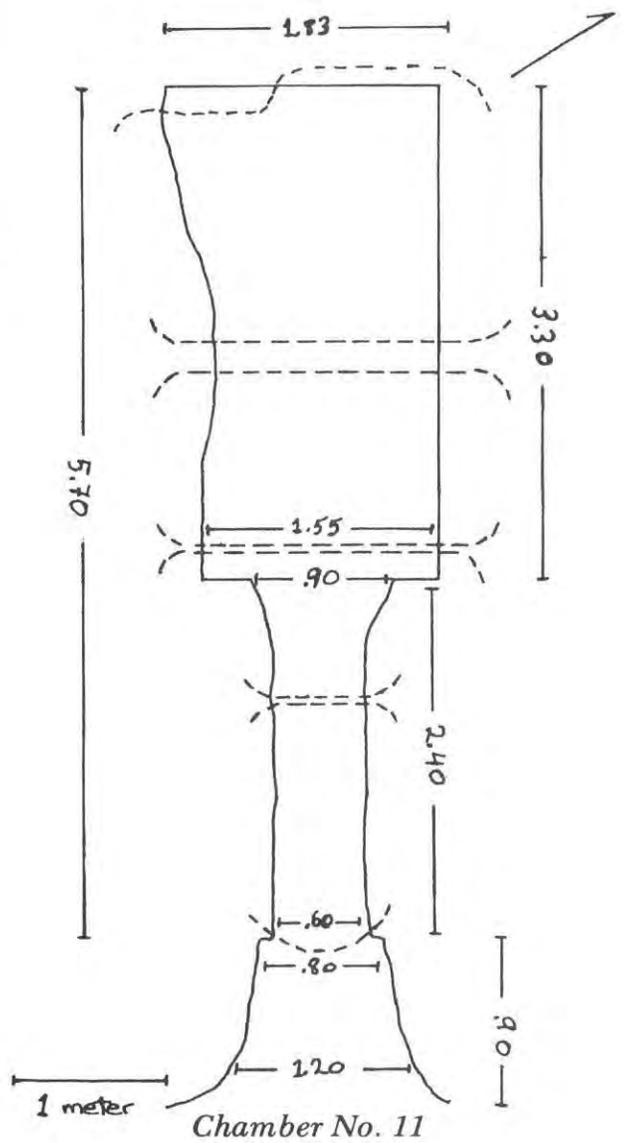
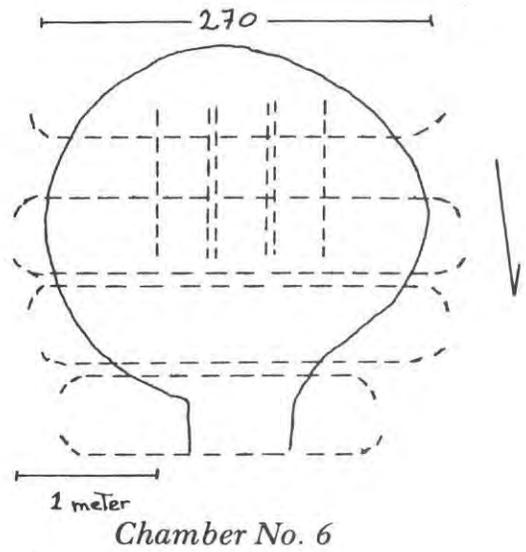
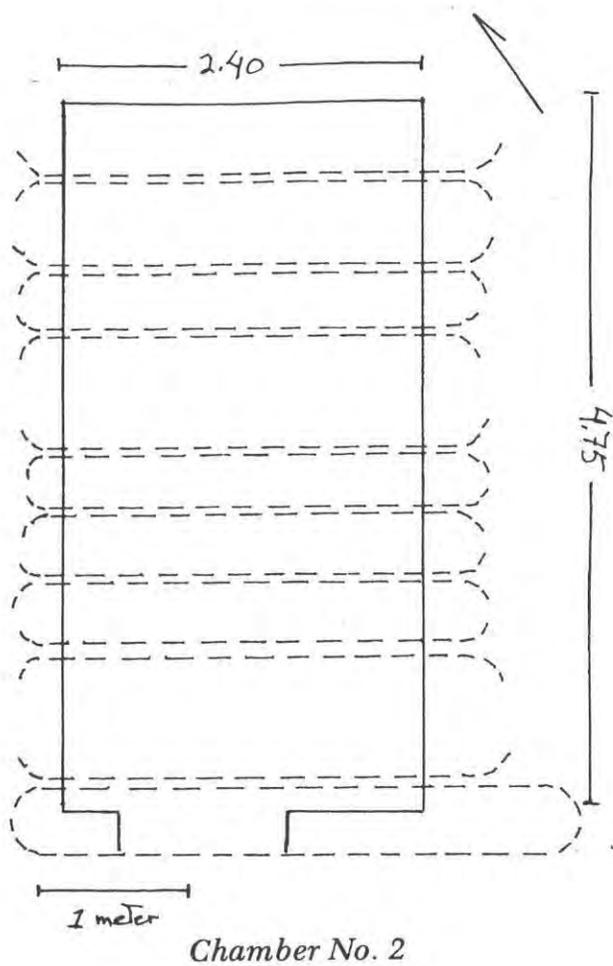
d Second house built in same site.

+ House foundation hole not dated.

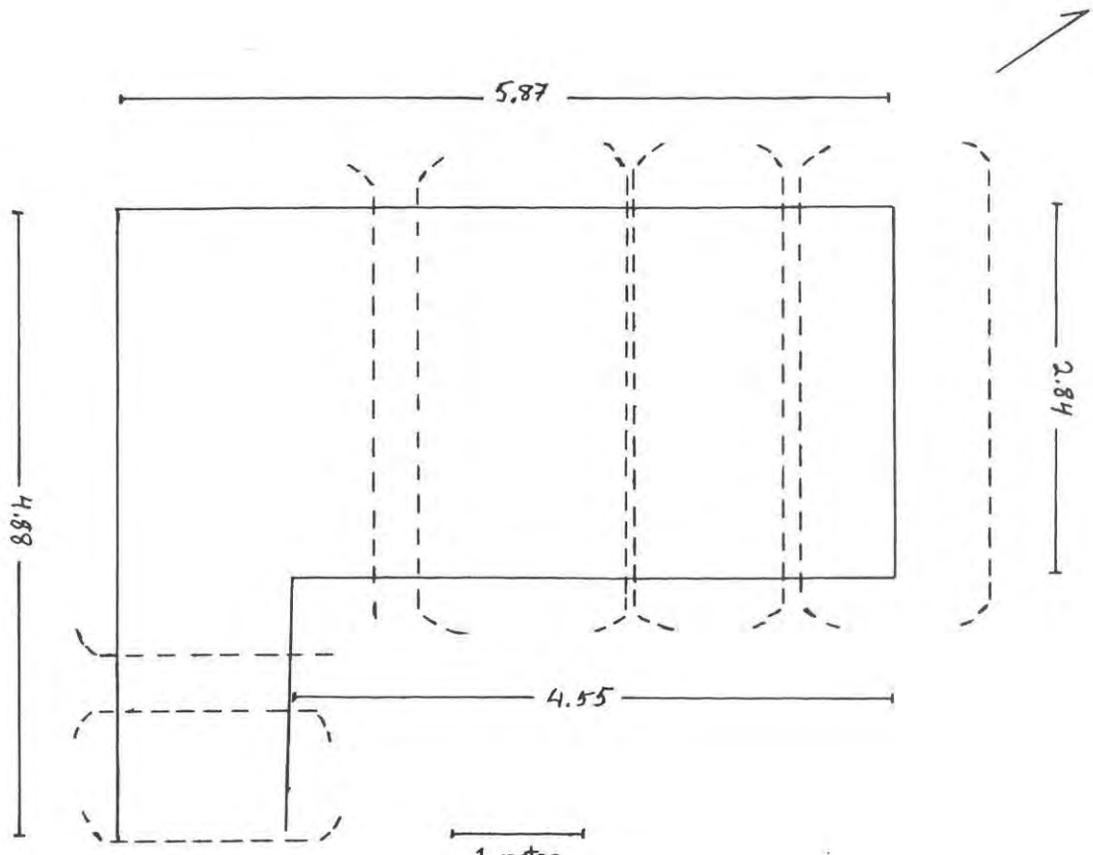
X Evidence of feature; distance measurement not available.

\* Cases where a source not located but with a nearby farm complex, the assumption made that there was some provision for a steady supply of water.

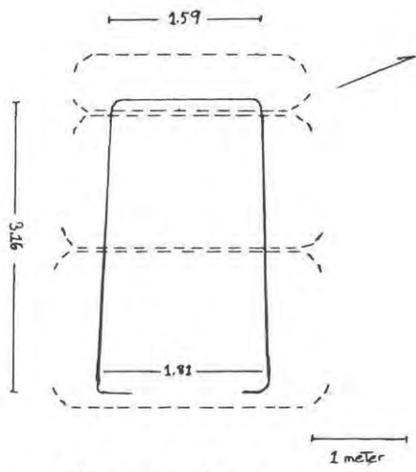
\*\* Informed of one but could not locate .



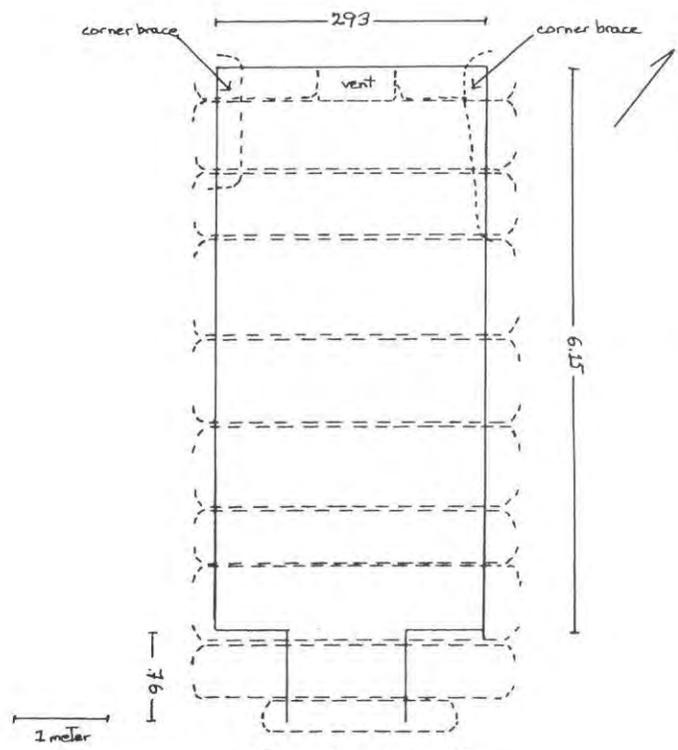
*Floor plans of various representative chambers: broken lines indicate outlines of stone ceiling slabs.*



1 meter  
Chamber No. 12



Chamber No. 13



Chamber No. 32

*Floor plans of various representative chambers: broken lines indicate out-lines of stone ceiling slabs.*

10/10/10

10/10/10

10/10/10

10/10/10

10/10/10

10/10/10

10/10/10