LOOSE THREADS IN A TAPESTRY OF STONE:
The Architecture of the Newport Tower

Suzanne Carlson

The rough stone tower, a clumsy roofless cylinder, propped on eight sturdy but ungraceful legs topped by irregular stone arches, and pierced by an odd array of windows, niches and random holes, was just one stop on the occasional outing to Newport by overworked architectural students from the Rhode island School of Design. This curio reminded one student, me, of the demolished replica remembered from my childhood in Worcester, Massachusetts. Abandoned to the perimeter of a growing repertoire of memorable structures, Newport Tower was forgotten for twenty-five years. During a later European outing, that included the round church at Lanleff, Brittany, Patrick Ferryn suggested I write something about the architecture of that unusual structure and compare it with the Newport Tower.

It seemed like a good idea. I was, and still am, a practicing architect specializing in historic preservation. A love of old buildings, nurtured during my student days in Italy, has led me along the highways and byways of Europe from Iceland to Portugal, from the Orkney Islands to the Aegean, as an ardent student of architectural curiosities. Back home, the day to day confrontation with the building styles and techniques of early New England offered a good basis for evaluating the various waves of theories accounting for this unlikely Newport ruin, which has captured the imagination of many for over two centuries. This is a stopping point on a fascinating quest leading down unexpected paths and allusive trails and I invite you to share my adventure.

INTRODUCTION

Only a rugged stone apse, its back braced against the wind and Atlantic waves, remains of the early Medieval Norse round church of Orphir on the west coast of the Orkney Islands. The puzzling arcaded round church in the village of Lanleff in northern Brittany purports to be a Templar sanctuary, but its style betrays a construction date before the founding of that religious order. The octagonal tower in the abandoned Monastery of Saint Bavo in Ghent hides its upper story above a stone groined vault. The Knights of the Order of Christ chose the octagon for their altar tower in the Templar convent in Tomar, Portugal. Both of the twin towers on the grounds of the Sulpician Grand Seminary in Montreal, Canada features a fireplace with a flue exiting on the side wall, while the other has two fireplaces with the same unusual flue arrangement. Sir Edward Peyto's elegant open-arcaded, round windmill dominates the rolling hills around Chesterton in Warwickshire, England. All of these buildings have been suggested as the inspiration or even prototype for the Newport Tower **(Figure 1)**.

Ranging in style from rude and rugged to the gracious Renaissance work of Inigo Jones, these buildings have more in common than circles and arches. Whether built in the eleventh century or the seventeenth, they would have been constructed with the same tools, the same brute strength of the workmen who spent the same amount of time preparing and completing the construction, and struggling with many of the same technical problems.

Figure 1. Birds eye view of Newport Tower. *James Egan*

But there were differences in Newport. Though perched high above a protected bay, this Tower's builder was on the wrong side of the wide Atlantic. In this investigation, I follow in the wake of a long line of worthy researchers on both sides of the ocean whose imaginations have been fired by the enigmatic icon in Newport's Touro Park.

It was generally assumed that the early settler and first Rhode Island governor, Benedict Arnold, built the tower in 1675 "from the ground up" to serve as a windmill for the fledgling community of Newport.[1] The contention is that he patterned his mill after a windmill near his childhood home near Chesterton, England. This theory was fortified in 1847 by the discovery of David Melville, a rabid Arnoldist, of a picture from the *Penny Magazine of the Society for the Diffusion of Useful Knowledge* (1836) of the windmill at Chesterton. An alternate proposal had made its debut in 1837 when Carl Christian Rafn, Danish archaeologist, scholar, professor and Royal Counselor, who possessed a formidable knowledge of the repertoire of old Norse literature, produced his *Antiquae Vinlandicum.* He presented a forceful case for Norse presence along the New England coast, specifically Rhode Island. Rafn had been sent drawings of the Dighton "Writing Rock" at the mouth of the Taunton River,[2] and, in collaboration with scholar and runologist Finn Magnussen, had concluded that there was indeed written on the rock THORFINN[3] in the runic letters of the eleventh century. This led to the conclusion that the nearby tower in Newport must have also been a product of Viking craftsmanship. Rafn's enthusiastic support of Norse presence in America set off a flurry of interest, theories, and "proofs" supporting the Norse Theory.

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The flurry saw a new burst in 1841, when Henry Wadsworth Longfellow expanded on the discovery of a "skeleton in armor" in nearby Fall River, Massachusetts, and embraced the Newport Tower as the location for the melancholy end to his heroic, if mediocre, poem where the skeleton became a Viking prince and the tower, his lady's bower.[4] Partisans for the Norse theory grew in number, encouraged by the unearthing of the Kensington (Minnesota) rune stone in 1898. Journalist Hjalmar Holland, who had dedicated his life proving the authenticity of the Kensington stone, took up the banner for Newport. The proper Bostonians entered the fray in 1877 with Eben Horsford joining Longfellow, Edward Everett Hale, Lowell, Whittier and Oliver Wendell Holmes, in supporting the Norwegian Ole Bull on the pro-Norse side. Horsford and his daughter Cornelia continued carrying the Viking torch, which was passed on to Frederick Pohl.[5] After an early round of not-so-literary brawls, the Arnoldist side became more entrenched. Proponents (including a bevy of minor historians) during the 1870s and 80s returned to the assertions made in 1858 by John G. Palfrey in his *History of New England* which, however weakly (according to Means), provided evidence for colonial construction.

More theories began to crop up. During the early part of this century, Edmund Delebarre's detailed study of the Dighton Rock led to a Portuguese theory that had its foundation on the voyages of members of the noble Cortereal family. This theory hypothesizes that Miguel Cortereal was shipwrecked in 1501 or 1502 while searching for his lost brother Gaspar in Narragansett Bay and built the tower as a beacon to alert long awaited rescuers from home.

The first century of debate culminated with the publication of Phillip Answorth Means' book *The Newport Tower* in 1942. In my opinion, this publication was a watershed in compiling and assessing the evolution of the Newport Tower "question" from its inception. Means, whose background was in Latin American archaeology, leaves no stone unturned, first discussing the history of the conflict and then investigating each detail of each argument in meticulous detail. He is decidedly on the side of the Norse and, to observant readers, eliminates any possibility that Arnold could have built the tower from "the ground up".

By the end of the 1940s, research on Newport Tower took a scientific turn. The city government and the local preservation society gave permission for an archeological excavation in and around the ruin. A committee of the Society of American Archeology was in charge of the project, with archaeologist Hugh Henken, Harvard University, as supervisor of the fieldwork. William S. Godfrey was in charge of the excavation with assistance from other students.

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[1] The most complete history of the evolution of the different theories and their supporters is found in Phillip Ainsworth Means' book *the Newport Tower*, 1942, Henry Holt, Boston.

[2] The Dighton Rock in Dighton Massachusetts was first noticed in 1630 by Rev. John Danforth. In 1830 a committee appointed by the Rhode Island Historical Society sent a "facsimile" to Professor Rafn.

[3] According to the Sagas, Thorfinn Karlsefni, Lief Erickson's brother-in-law, attempted to settle in Vinland sometime in the first decade of the eleventh century. After three years, the colony was abandoned and the settlers, including Thorfinn's son Snorri, who is said to be the first white child born in America, returned to Greenland.

[4] Despite the romantic and poetic treatment, the Fall River skeleton was later determined to be a contact period Indian buried in a panoply of copper and brass plates and tubes. (Stapler 1998)

[5] Both Horsford and Pohl were primarily in search of Leif Erickson's quarters in Vinland. In the 1890s Horsford had proposed a site on the Charles River, near Boston, and Pohl explored, excavated and proposed a site on Follins Pond on Cape Cod as the Vinland settlement.

The project lasted two years, 1948-49. The first year, a one meter wide trench was dug starting twenty meters south-southwest of the tower, through an arcade opening and then through the interior. The second year's excavation included the tower's interior and surrounding areas excluding the concrete path running under the iron fence. Godfrey's 1951 Ph.D. dissertation titled "Digging a Tower and Laying a Ghost" concluded from artifacts found in the trenches that the tower must have been built in the late seventeenth century. This was a stunning victory for the Arnoldists and still holds sway in academic circles.

Controversy during the post-Means period has been mostly a rehash of earlier theories with several new ideas added. Herbert Pell and Manual daSilva joined the Portuguese faction.[6]

While heirs of Rafn were expounding the Viking presence, a parallel interest in early Celtic visits to New England was evolving. William Goodwin examined a wide melange of stone structures, mostly small "beehive" shaped chambers, in his *Ruins of Great Ireland.*[7] Although focused on the baffling lithic complex in North Salem, New Hampshire, he attracted a body of disciples, who compiled a formidable list of Celtic ruins, adding to Goodwin's original survey. Newport Tower eventually joined the list.

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Arlington Mallery[8] saw a blending of Celtic and Viking traditions in New World construction. An engineer, Mallery concentrated on possible iron production by early visitors, but ranged far and wide in his interests, to the extent of excavating around the Newport Tower column bases. This led to his conclusion based on masonry construction techniques that the tower was certainly of Celtic origin.

Then Horace Silliman[9] advanced the proposition that the tower was built by English Catholics plotting to overthrow the Protestant reign. Funds for this enterprise were to be raised by mining in the New World and the tower was supposedly built as a base of operations.

In the 1950s Frank Glynn began studying a faint and ragged rock carved image in Westford Massachusetts. One result of his correspondence with T.C. Lethbridge was the identification by Lethbridge's colleague, Sir Iain Moncreiffe, of the heraldry discernible on the shield carried by what appeared to be a medieval knight. The arms of Clan Gunn were decoded. It was claimed that James Gunn had accompanied Henry Sinclair, Prince of the Orkney Isles, on his purported voyage west in 1398. Thus, the Sinclair trip resulted in a new theory to account for the tower. In recent years, this conjecture was refined by James P. Whittall and defended by Andrew Sinclair and Niven Sinclair. Though steeped in controversy, and only treated peripherally in published material, an interesting twist has been added to the Sinclair theory, which goes back to the massacre of The Templars in 1307 and the disappearance of their fleet at the Atlantic port of la Rochelle the day after the banning of the order. The theory supposes that the Templars found a ready home in Scotland and that a later generation of secret Templars may have joined Sinclair on his voyage, or even that refugees during the original flight found their way across the Atlantic.

In the early 1990s Danish interest in the tower was renewed. In a news conference in December 1995 in Newport, Rhode Island, Jørgen Siemonsen, Danish businessman and chairman of the Danish sponsored Committee for Research on Norse Activities in North America: A.D. 100 - 1500, presented the committee's final report to the mayor of Newport, David F. Roderick. After four years of research and scientific investigations, the Danish Committee, in cooperation with Danish and Finnish experts, the City of Newport, and the Rhode Island Preservation and Heritage Commission, completed its study on the origin of the tower, concluding that there was a 95% probability that the tower was constructed in the late seventeenth century. I began my evaluation of that report working from a Danish copy prepared by Dr. Johannes Hertz, Deputy Antiquary of the Danish National Museum, and published in the *Annual Report of the Danish National Museum,* as well as a Danish copy with an English translation by Jan Heinemeier and Högne Jungner, the authors of the report on the C-14 dating.

Dr. Hertz, assessing the findings of the Danish committee, supported the Arnoldist theory on four factors: the evidence presented in William Godfrey's 1951 excavation report, photogrammetric computer generated drawings studied for evidence of units of measurement, and new C-14 mortar dating techniques. The last factor considered is the architecture itself.

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[6] The Hon. Herbert Pell, former Ambassador to Portugal, and Dr. Manuel DaSilva a physician of Portuguese heritage, from Bristol Rhode Island, support Dellabarre's theories.

[7] Goodwin, a wealthy businessman from Hartford, Connecticut, was an amateur archaeologist and fierce proponent of Irish Culdee monks colonizing in America. He bought and restored the New Salem complex, which is now a popular visitor attraction.

[8] Mallery was a civil engineer and bridge designer who wrote extensively about Viking presence in America.

[9] Silliman was a retired metallurgist from Waterbury Connecticut and amateur historian. His well researched theories were published by NEARA as *The Newport Tower, the Elizabethian Solution*, in 1979.

The effort of translating the Danish report into English sharpened my wits as well as my pen and I was ready for some jousting. In a spirit of righteous indignation, I published a long rebuttal to the conclusions of the Danish Committee in the *NEARA Journal* titled "Tilting at Windmills" where I attempted to demonstrate that the evidence presented by the Danish committee does not stand up under carefully scrutiny.

Who, How, What, Where, Why, And When

Based on a small comment by C.C. Rafn, who wondered if the octagonal tower at Mellifont Abbey in Ireland might be related to the Tower, I began to pursue an entirely different line of inquiry. Perhaps it is one thread that will help define the whole cloth. Mellifont, it turns out, contains the ruins of a two storied octagonal building with an open arcade on the ground floor and, it appears, at least one enclosed floor above. It served as the monastery's lavabo, or fountain, for the brothers' ablutions before meals. Consideration of a possible monastic theory will be explored below.

In our search for clues to answering these questions, we roam around the Western world studying structures built during a span of over a thousand years. A stone arched tower here, a fireplace with a flue exiting on the wall there, double-splayed windows, and blind arches, serve as diagnostic clues.

I have tried to compile a little chart **(Table 1)** of the candidates that have come to my attention: the HOW is saved for a later section and the WHERE changed to WHENCE.

The North Atlantic Rim

Celtic Monks – sixth to eleventh century

Saint Brendan's seven year shuttle between the various Atlantic Isles, including a "promised land" far to the west, is recorded in the *Navigatio Sancti Brendani Abbatis*, a twelfth century rendition of the sixth century saintly voyage by intrepid monks in their oxhide forerunner of today's Irish curraugh. Arlington Mallery saw vestiges of Celtic religious determination in the Newport Tower. However, the construction skills of the pious anchorites clinging to their remote skelligs was limited to the construction of dry stone beehive cells as living quarters, or the tiny oratories built for meditation and prayer.

By the ninth century, home in Ireland (even on the skelligs) was no longer safe. Heathen Viking long ships descended on Irish shores, plundering the monasteries and capturing Christian slaves. By the twelfth and thirteenth century the descendents of those fearful marauders from the north told of Great Ireland, also called Vitramannaland, White man's land, in the Icelandic Sagas. The sagas also tell us that Hrafn of Limerick reported that the Icelander, Ari Marsson, driven by a storm to Great Ireland, was recognized there but could not get away. He was very much respected there. Godlief Gudlaugsson, also storm driven across the sea, found men who seemed to be speaking Irish and one man who spoke to him in Norse. These Norse tales predate Christian conversion and there is little evidence in the history of architecture that would suggest that these were the builders of our tower.

Table 1: Suggested Prototypes and Builders for the Newport Tower.

Who	What	Whence	Why	When (century)
Celtic monks	Beehive huts	Western Isles	Monastic anchorites	6th to 11th
Irish monks	Round towers	Ireland	?	?
Pagan Vikings	Forts, palisades	Scandinavia	Defense	8th to 11th
Christian Norse	Round churches	Scandinavia, Orkney	Church, defense	12th
Cistercian monks	Lavabos	Europe	Religious ablutions	12th to 14th
Other monks	Octagonal tower	Belgium	Religious ablutions	?
Templars	Round churches	Europe	Church	12th
Lanternes des Morts	Round towers	France	Mortuary towers, Pilgrims' beacons	12th to 14th
Portuguese Charolas	Octagonal structure	Portugal	Altar	12th
Sinclair explorers	Castle towers	Orkney	?	14th
English Catholics	Signal towers	England	Defense	16th
Benedict Arnold	Windmill	England*	Industry	17th

* This theory proposes that Arnold was inspired by a windmill in Chesterton, England.

When finally the long struggle between the Celtic (Culdee) monks and the encroaching Roman church ended and the missionaries representing Rome penetrated the hills and hearts of all of northern Europe, they brought new architecture as well as new haircuts. Following close on the heels of the missionaries came the monks, this time with monastery plans based on the new charters granted to the houses of St. Benedict and of Cluny. With the Monks came the organizational skills inherited from the Romans, the strict adherence to the orders passed down from a central authority, and southern building techniques. Mortar was not introduced until envoys of the Roman church brought it north. Within the walls of monastery compounds we find another type of enigmatic stone structure.

Irish Round Towers

Rising above the treetops, up to ninety feet high, the round towers of Ireland have been a source of speculation ever since the antiquarian rage of the 1830s when George Petrie won an essay contest on the origins and use of the towers **(Figure 2)**. Some 60 remain intact and the ruins or locations of countless others have been recorded. With a base diameter of sixteen feet, plus or minus, the battered stone walls diminish to thirteen or fourteen feet at the top. Sometimes dressed and sometimes random stone, the walls are four feet thick with mortar and rubble fill (reminiscent of Roman construction). Doors were placed high above the ground. Investigators George Barrow and Donald Bird felt this was for structural stability, not for security purposes. Typically, five to seven floors are supported on a corbel ring or else let into beam sockets—with a floor area in the range of forty square feet. Without fresh air, heating method for beating the chill, and no provisions for water, the feasibility of any long-term residency seems doubtful.

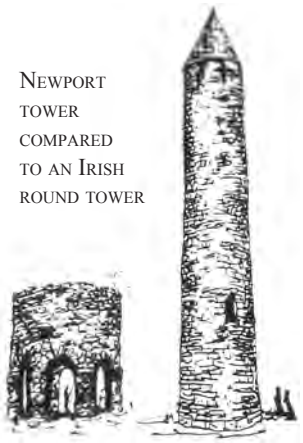
Long accepted as watch bell towers, to assist the Lord in protecting the monks from the fury of the Northmen, Donald Bird poses an alternative method of using the towers as a relay warning system.

Lacking evidence of bells hung and rung from the peak, Bird suggests that the stone tube itself acted as a sort of organ pipe to resonate sound from a big bell located at ground level. The amplification developed could be heard far abroad through the countryside. This theory assumes no intermediary floors. In Bird's second theory, he studied topographic maps to examine distances and relationships demonstrating an efficient early warning system of beacon fires blazing across the country in a matter of hours.

The validity of this theory is confirmed by a well documented series of stone signal towers (though squatter and sturdier in appearance) ranging across the high peaks of the Pyrenees warning the mountain folk of the Languedoc, caught in the vise between French and Spanish sorties, of approaching trouble.

Figure 2. The Irish Round Tower at Antrim. *Suzanne Carlson*

Gerald Hawkins suggested astronomical alignments as an important element. The various windows, which could "like spider lines in a telescope" track star positions, are augmented by solar shadows defining celestial transits.



Newport tower compared to an Irish round tower

Interesting as these towers are, there is no direct evidence that they are associated with the tower in Newport.

Cormac's Chapel on the Rock of Cashel, Ireland

Figure 3. Cormac's chapel on the Rock of Cashel, Ireland showing flue outlets on the exterior wall. *Carlson*

Dwarfed by the round tower on the rock of Cashel, home to the high kings from the earliest times, the fortified chapel caught my attention because of one small detail. The Spartan rectangular church and appended smaller chancel are fitted out for sustained habitation, with a second floor under the roof trusses, including a small fireplace on the west wall **(Figure 3)**. The flue of this fireplace exits on the face of the wall above with no evidence of a proper chimney. Although Means lists several examples in eleventh and twelfth century English castles, I have been able to find only three additional instances of such a configuration in all my travels, actual or armchair: one in a medieval dwelling tucked under a cliff at la Madeleine in the Dordogne, France, and two in the curious twin towers of the Sulpician Grand Seminary on Sherbrook Street in Montreal, Canada. We can only speculate if these similarities are coincidental.

Pagan Vikings — Eighth through Tenth century

Wood was the Viking medium. The great Scandinavian forests were a treasure trove of lumber. The shipwrights are still envied for the beauty and seaworthiness of sleek sea dragons sallying forth from fjord to firth. The elegant joinery and framing concept of the stave churches and the lush carved ornamentation remain the trademark of Viking craftsman. Defensive bulwarks were created by forming massive earthwork enclosures with wooded palisades. Wooden long houses were arrayed geometrically in the inside. Stonework seemed to be limited to stone fences marking out home fields or cattle pounds. There is little evidence that Vikings could have been the builders of Newport Tower.[10]

[10] A series of random of short strokes carved on one of the stones has been proposed as a runic inscription. If they are viewed as being written with severe backhand slant and translated into vertical forms, it is consistent with short twig runes. However there are no diagnostic runes and there is little to substantiate the various translations.

Christian Norse — Eleventh through Fourteenth centuries

Though Bishop Ansgar made modest headway in converting Denmark in the ninth century, he failed completely to convince the Swedes of the efficacy of his God. Ultimately, Christianity arrived in Scandinavia along a circuitous route through England. Although there were over 450 churches in Denmark and Southern Sweden by 1050, they were mostly wood. By the end of the eleventh century and into the twelfth, the missionary phase ended and local bishops and abbots recruited master masons from all over Europe to supervise a construction boom that produced over 2,000 stone churches in Denmark alone. The far-ranging friars of many colors—gray monks, white monks, black, etc.—sought converts among the northern pagans. The earliest buildings were modeled after Anglo Saxon design, perhaps those found in Lincolnshire. These churches were simple little rectangles with a semicircular apse on the east side. The Norse Jarls, or Earls, of Orkney adopted the new fashion for stone with a scattering of little family churches on remote farms. In faraway Garder, Greenland, the first tiny stone church built in the twelfth century was replaced in the mid-fourteenth century with a surprisingly rich cathedral complete with glass windows. In searching the repertoire for prototypes for Newport Tower, however, we find few candidates among the early Norse

Round Churches of Bornholm, Denmark

However, there arose a singular type of church design on the island of Bornholm, in the elbow of the Baltic off the Southern coast of Sweden **(Figure 4)**. Bornholm was caught in the cross fire of medieval mercantile interests as the Danes,

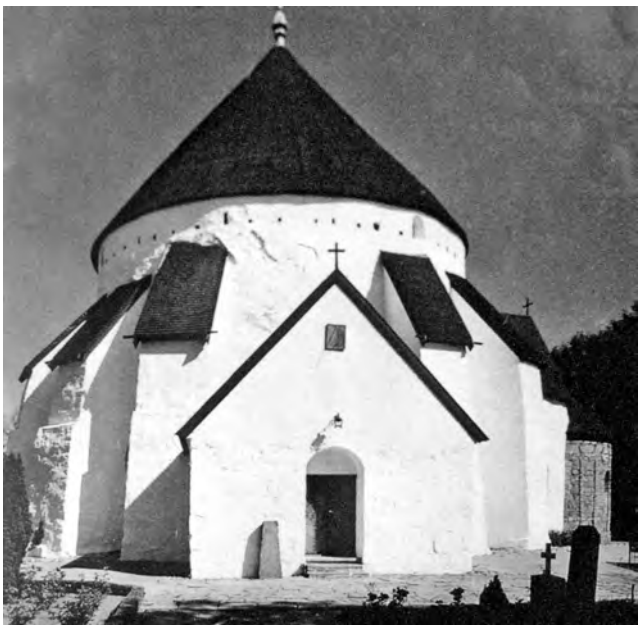


Figure 4. Østerlarskirke on the island of Bornholm. *Web image*

Swedes and German Hansa merchants battled for control of the Kattegat sound and entrance to the Baltic. Architectural evidence suggests that early castle towers, square or round, utilized the bottom floor for the castle chapel, and upper stories for refuge, combining defense and worship in one sturdy building. Perhaps this idea had come from the Irish as we saw in the castle chapel at Cashel. Whether the round form was adopted by returning crusaders turned ecclesiastical architects inspired by the round church of the Holy Sepulchre, or simply a continuation of round or polygonal church design that found its way through the Slavic countries back up the Viking west trail through Russia from Byzantium, we do not know.

Only four in number, the Bornholm holy keeps shared the common features of heavy granite walls between four and six feet thick, and a central pier carrying a circular barrel vault. Sandstone or limestone ornament is simple. Often the original tiny windows have been enlarged or new windows added during the passage of time, but the windows share the same double-splayed configuration as the Newport windows. Typically, a second floor offering a place of refuge was topped by a third floor housing a watch tower surrounded by a crenellated open gallery Also added were exterior stone buttresses to prop up the sagging heavy stone. Both the apses and narthexes were added at various times to all of the buildings and each has its own characteristics.

Østerlarskirke (East Church of Saint Laurence) modified the 15' diameter central pier by making it hollow inside and pierced by a hexagonal arcade. Despite the symbolic implications of the baptismal font located inside, it was probably simply a practical system for distributing the heavy loads from above.

Nylarskirke (New church of Saint Laurence) with its six foot thick walls, retains the original crenellation and gutter, though filled in with stone. It also has a massive central column.

Olskirke (Saint Olaf's Church) is the tallest (42') and the latest. It retains its loopholes on the second floor and has exterior beam sockets indicating wooden hoarding.[11]

Nykirke (New Church) is the simplest with only two stories and a central column 9' 10" thick, but incorporates the layout and design of its sister churches.

Four more round churches are to be found in Denmark, all following a traditional plan of an interior arcade with a vaulted ambulatory. These "mainland" churches all reflect the transition to brick construction. Although interesting architectural examples, they wander from our area of concern.

Newport tower compared to a Danish round church

The usual incorporation of a stone ambulatory as an integral part of these structures and the lack of evidence for a stone or even wooden ambulatory at Newport makes any theory or a direct relationship difficult to defend.

Medieval Star Gazers

Few people today are aware of the importance of astronomical events in the design and orientation of buildings, particularly sacred structures. The ancient Greeks planned their temples so that the God or Goddess would be bathed in the light of the rising sun on a ritually important anniversary. Christian churches beckoned the sun's blessing on the feast day of the Saint or Martyr of the church's dedication.

Fixing the exact date of Easter became an obsession with medieval churchmen. The Celtic Church followed one system and the Roman another. Careful observation, adoption of a uniform calendar, and the persuasive power of the Roman Church would ultimately dominate in Western Europe. In the rigidly ordered world of the cloister, it was also critical to determine the correct times of the canonical hours of nightly prayer. Techniques used in astronomical observation by vigilant monks are discussed in depth by Stephen McCluskey in his *Astronomies and Cultures in early Medieval Europe*. The monks, we are told, were shown how to use the windows and roof lines of the abbey's buildings as accurate guides in tracking the moon and the stars in their canonical timekeeping.

Today, astronomers are investigating multiple events encoded in sacred architecture. Rhode Island astronomy professor William Penhallow examined possible astronomical sightings from the Newport Tower. Lacking an altar as a focal point, Penhallow begins his investigations at the second floor fireplace and develops an array of possible alignments for viewing celestial events, particularly solstice and equinox rising and setting of the sun and the stopping points of the lunar major and minor swings. The accuracy of these predictions was demonstrated on December 25, 1996 when Douglas Schwartz and James Egan conducted a Christmas

[11] Hoarding is an exterior walkway near the top and around the outside of a defensive structure.

vigil to photograph the minor lunar standstill with the rising full moon shining through two of the three windows of the tower. This northern rising alignment is one of the moon's eight cardinal turning points on its 18.5 year cycle through the sky.

Intrigued by the Christmas lunar display, Jim Egan, who is a professional photographer and Rhode Island resident, began a regular routine of photographing the tower **(Figure 5)**. Not only were Penhallow's predictions accurate, but a wide range of more than coincidental astronomically related shadow patterns and sunlight projections were defined by the tower's architecture. Egan has been studying a southern Mediterranean connection transmitted through the influence of the court of Frederick II of Sicily (1194 - 1250) and its legacy of Arab astronomy, early use of the *camera obscura* and a possible Templar connection. We look forward to publication of his research.

After having studied Newport Tower, Penhallow undertook an investigation of the churches on Bornholm, searching for astronomical sight lines, and found startling correlations between the structures.

The emerging science of archaeoastronomy is slowly gaining acceptance by establishment scientists. Penhallow's work has made a significant contribution to the field and to our understanding of the tower, and has posed intriguing possibilities of at least part of its purpose.

Figure 5. Lunar minor standstill through the windows of Newport Tower. *Egan*

A Lost Cathedral — Twelfth Century

Medieval church historian Al Hahn unearthed documentary evidence of an eleventh century fourth Atlantic Diocese. The three known church centers were Skalholt and Holar in Iceland, and in 1126, the tiny church of Gardar became the seat of the usually absent bishop of the See of Greenland. Hahn posits Vinland as the likely candidate for the fourth diocese and muses that the Newport Tower could have been the center of the lost colony that Bishop Eric Gnupson set out to find in A.D. 1121. Without making a direct comparison, he offered the round church in Tønsberg, near Oslo as another Nordic prototype.

Saint Olaf's Church in Tønsberg, Norway.

Built in the twelfth century by Premonstratensian monks, one of the first reforming branches of the Benedictines, the church of the monastery at Tønsberg leaves only a footprint for us to consider. The column bases are similar to the Newport bases in their orientation. An outer ring of stone indicates a stone ambulatory, and pictorial reconstructions lead us to imagine that this church was a smaller version of the Danish round churches. It is impossible to tell if its ecclesiastic use was augmented by upper floors used for defense. Like the Bornholm churches, this structure does not fill our criteria for a prototype for the Newport one.

Earl Haakon Repents

Lying on the west way of Norse exploration, raiding, and eventual settlement, the foundation of the little round church at Orphir **(Figure 6)**, on Mainland (the main island), Orkney finds its origin in the East. Tradition has it that Earl Haakon Paalson and his cousin Earl Magnus Erlendsson were contending for supremacy over Orkney. During a failed attempt at reconciliation in 1115, Earl Haakon murdered his cousin. Filled with remorse, he made a pilgrimage to the Holy Land and, on his return to Orkney, built this imitation

Figure 6. The apse of the round church at Orphir, Mainland, Orkney Islands. *Carlson*

of the church of the Holy Sepulchre in memory of Earl Magnus, as penance for his sinful deed.

The Round Church of Orphir, Mainland, Orkney

Little more survives of the church than the apse. A sand path through the grass defines the outline of the nave, only 20 feet in diameter. The design of the nave of Haakon's church remains a matter of speculation. The apse, which is in good condition, represents the technique of construction, the use of splayed windows and some sockets to suggest wood framing. The number, if any, of the windows has been debated, as has the shape of the roof. The consensus favors a conical roof, but beyond that little is known. It would be curious to know the type of material used for the mortar and the proportion of the mix.

My firsthand study of the construction techniques still visible in Orphir and masonry techniques of other Orkney buildings of the period show a remarkable similarity to the methods of our Newport masons. This suggests to me a common construction tradition derived from North Atlantic Medieval standards.

Saints and Sinners — The Continental Connection

Bernard Of Clairvaux — Twelfth Century

Clinging to the traditions of the fifth and sixth century monasticism, Benedict of Nursia, Italy, inspired the founding of loyal communities of pious brothers dedicated to doing God's work. The wheels of power and submission to the hierarchy of the order grew. By early in the tenth century, the Abbot at Cluny, France answered to no one but the Pope, and all other Benedictine houses followed Cluny. Cluny thrived, indeed prospered, and luxury followed, breeding arrogance and greed, until discontented, still pious brothers set out to return to the long corrupted ideal of Saint Benedict—an austere life of poverty, chastity and good works. One of these spin-offs was located at Citeaux in the heartland of the Loire Valley. Young, aristocratic Bernard of Fountaines was received into the monastery in 1113. In 1115, he moved on to found the Abbey at Clairvaux as a new earthly paradise for the new Cistercian monastic order. A simple devotional life interspersed with prayer and hard work was the goal. Bernard's message was so successful that within a hundred years the whole of Europe from Norway to Portugal was blanketed with monasteries and convents. With their hard work, business acumen and engineering skills, they developed a virtual monopoly on mining and milling operations, became experts in constructing water works, and thus controlled commerce.

Though the individual monk owned nothing, not even his robes or sandals, the order was powerful. The monk ate meagerly and was a strict vegetarian who fasted frequently according to the ecclesiastical calendar. He also never bathed, despite water flowing through the kitchen, fishponds and gardens and made his ablutions before meals by washing his hands and tonsured head, and on feast days, his feet. Only after death was his whole body washed.

Cistercian Lavabos

The water source for these daily cleansings was the lavabo, usually a small, open arcaded, round or octagonal structure, often with evidence of an enclosed second story and usually attached on one facet to the south side of the cloister walk or garth near the refectory **(Figures 7, 8, and 9)**. Few of these lavabos seem to have survived. If they do, they are rarely considered interesting enough to be mentioned by architectural historians. A telltale footprint of a monastery plan, a ruin in the background of an old photo and a visit to the remarkable lavabo at the Monastery of Valmagne, near Montpellier in the south of France, provided the clues for me to follow.

Mellifont was established in 1142 by Bishop Malachy with recruits from Clairvaux, including the French master builder Brother Robert, to manage the construction. Robert followed the established pattern found in nearly all Cistercian monasteries, with the octagonal lavabo on the south side of the cloister garth in front of the refectory and kitchen.

Figure 7. The lavabo at Mellifont Abbey, Ireland. *Carlson*

Figure 8. The lavabo at Maulbrunn Abbey, Germany. *Web image*

Though in ruins, five bays of the ground level arcade with the superimposed second story walls are still intact. The piers supporting the arches are made up of a group of slim engaged columns with simple undecorated capitals and bases. The arches and surrounding walls continue up to a small projecting stone spandrel. The second story continues with dressed stone quoins and random stone walls. Remnants of the ribs from a stone vaulted ceiling, beam sockets and several window openings provide the only clues to the form of the upper stories. We have no inkling of the nature of the roof, and evidence of the lavabo itself has disappeared.

Figure 9. The lavabo at Valmagne Abbey, France. *Carlson*

The imposing gothic Abbey church of Valmagne , begun in 1257, was never finished and has spent most of its life as part of a winery. The stark walls of the church, decorated only with giant wine casks filling each bay does not prepare the visitor for the lush opulence of the lavabo gracing the cloister garth. The softly pointed gothic arches are supported by paired columns joined by a stone lattice, in groups of three on each side of the octagon, the whole resting on a bench high base. Capitals and bases are delicate, but unornamented, of the same honey-colored stone as the body of the structure. Only the ribs of a vaulted ceiling remain or perhaps, like the church, the project was never finished. Now covered with vines, this odd "roof" presents a pretty garden gazebo effect. One wonders if the heavy buttresses were not meant to support something sturdier than the viny roof, and I suspect that the building once had, or was intended to have, the typical second floor above. An octagonal basin and two-tiered fountain complete the interior.

Of the lavabos at Citeaux and Clairvaux, I've found nothing more than the footprint on the abbey plans.

Although the architecture of each lavabo I have studied follows the local current style, the scale, proportions, location within the cloister, and orientation are all remarkably similar, and all are remarkably similar in scale and proportions to the Newport Tower.

The monks' days and nights were passed in silent obedience to the rules of the order, the rhythm of a chosen vocation, whether in the garden, at the mill or mine, or in the scriptorium, and most stringently, the nine canonical hours of prayer. This rigid schedule was broken by the Sabbath, the fixed and movable feast days, and the culminating celebration of Christian faith at Easter. In order to determine this calendar it was necessary to know the exact length of the year.

The true length of the year had confounded calendar makers since the earliest efforts to tally the seasons. The conundrum became more confusing with attempts to make solar and lunar cycles coincide. The early church inherited the Roman Calendar but needed to insert the pivotal Christian events of creation and salvation into a predictable uniform system. The arithmetic astronomy called *computus*, which flourished from the time of Charlemagne through the thirteenth century, and which was based on classical and Arabic models, found its way into remote abbeys and parish churches throughout Christendom. [12]

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[12] I have been trying to learn computus to get my kalends synchronized with the movable feasts and sort quadrans according to Genesis, as patiently taught by Brother Byrthferth in *Byrthferth's Manual*, A.D.1011. Byrthferth is dedicated to teaching the principles of the calendar to "rustic" local priests in England and is still a comprehensive text on the subject for those dauntless enough to learn.

A pocket sized eleventh century liturgical cantata from a French Monastery includes descriptions of how to observe the changing azimuth for stars over the buildings of the monastic enclosure to determine the time of nocturnal prayers. A similar volume from a Cistercian Abbey of Villers-en-Brabant describes ways to tell time by observing the sun and stars as they appeared at various windows.[13]

The majority of monastery plans that I have found show the lavabos on the south wall of the cloister in front of the refectory, certainly a logical location for pre-meal ablutions. Usually the cloisters are on the south side of the church and Abby plans follow a consistent layout. I wonder if the second floor of the lavabo could have served as an observatory for the nightly vigils of the time-keeping sacristans. The church roof could have served as the horizon that could have had practical as well as symbolic value. Imagine a sleepy monk leaning on his prie-dieu chanting his psalms in harmony with the stars until the chanting could serve as the clock on cloudy, rainy or snowy nights, which seems in keeping with the ordered course of the liturgical day (and night). Perhaps the Pascal full moon could also be observed as well as other lunar time-markers for important points in the church calendar.

Newport tower compared to the Mellifont and Valmagne lavabos.

Saint Bavo or Bavon of Ghent

Born into sixth century landed gentry, young Bavo, christened Allowin, led a wild and disordered life until the death of his beloved wife. A sermon by Saint Amandus convinced him of his sinful ways and led to his conversion. As part of his penance, he donated land in Ghent to Saint Amandus, who built a monastery there. Bavo began his saintly life in this monastery, named after Saint Peter. After a period of penance and self-mortification, Saint Bavo sought greater atonement and moved into a hollow tree trunk. He ended his hermit's life living in a tiny stone cell in the forest near Ghent and was buried at the monastery of his friend Abbot Floribert. So great was the veneration of Bavo's saintly example that the monastery's name was changed to Saint Bavo. This is the tale of Ghent's patron Saint. However, we would expect that the buildings of the first monastery were a rough assemblage of wattle and daub wooden buildings, perhaps with some dry stone cells for monks preferring greater isolation. The monastery evolved over the next several centuries until it reached its Romanesque form in the twelfth century.

The Tower of the Monastery of Saint Bavo, Ghent, Belgium

This austere octagon **(Figure 10)** rises unceremoniously from the cloister yard, each face pierced by a simple unornamented arched opening, with sills approximately 18 inches above ground. An interior stone trench follows the outside wall, and was presumably filled with water and used for ritual ablutions. There are no capitals on the exterior of the piers, but the rib brackets on the inside have primitive Romanesque floral and grotesque carvings. The ceiling is a ribbed vault. Access to the second story is by an attached stair tower constructed partially of brick and of a much later design. The wood door set in masonry infill in one of the arches is obviously an later addition, leaving us to ponder the original means of access to the upper story. Each face of the second story has a central round arched window with stained glass sash. The front face window has a trefoil shaped upper sash. Only roof flashing is visible today, and again the original roof configuration remains a matter for speculation. A deep well, which fed water into the trough, sits in front and to the right of the entrance in the cloister yard. We can only muse about possible astronomical significance of the upper floor at this point in the study. The construction in its geometric features offers a viable prototype for Newport Tower.

Figure 10. The tower in the cloister of the Monastery of Saint Bavo, Ghent, Belgium. *Patrick Ferryn*

[13] McCluskey, Stephen C. *Astronomies and Cultures* in Early Medieval Europe: p.112.

Newport tower compared to Saint Bavo's tower

Sinners

Pilgrim Roads — Eleventh Century Onward

The cult of the saints and the miraculous powers of their relics—touching the reliquary containing a mere fingernail was considered efficacious—reached its zenith in the twelfth and thirteenth centuries when lord and yeoman alike took the pilgrim's staff and followed well-trodden paths to venerated holy places. The ultimate pilgrimage aspiration was to visit the Holy Land and walk the Stations of the Cross. Rome, offering the blessing of the relics of Saints Peter and Paul was the penultimate pilgrimage goal. Thousands of sinners traveled the byways of Europe to cross the Pyrenees and converge at the great church of Saint James in Compostella, Spain, where it was fervently believed that the body of Saint James, the apostle and brother of Jesus, was taken to its final resting place. The many roads to Compostella were dotted with additional pilgrim destinations, and churches marked the night trail with lights burning in their open arcaded octagonal lanterns perched on roof transepts. In addition to the high lanterns, numerous churchyards throughout central France, Germany, Austria, and Hungary were graced by miniature versions of Irish round towers. These were usually thin stone needles, fifteen to twenty feet tall, round or octagonal, with an open shaft leading to openings around the top. Origins and purpose of these mysterious structures, known since the eighteenth century as *lanternes des morts*, (lanterns of the dead), remain obscure, but in all probability they were a form of votive light or eternal flame to remember the dead, to dispel ghosts, and light the pilgrims' way. Based on stylistic study, most seem to have been built in the twelfth century. Some of the larger examples exceed the size of our tower and one will demonstrate a variety of round "churches" under consideration.

Lanternes des Morts

The typical lanterne **(Figure 11)** is ten to twelve feet in diameter, but can be as small as three or four feet, varies from fifteen to thirty feet in height, and has various degrees of decoration. Some are round, some polygonal, with or without base, occasionally with engaged columns, a small door, and always with openings on the top and a domed or conical roof.

Figure 11. Typical lanterne des morts, France. *Carlson*

However, near the town of Montmorillion in central France, we find an exceptional version of a "lanterne" **(Figure 12)**. It is located in the cemetery of the Maison Dieu, established by the Knights Hospitallers in 1086 by Robert du Puy and consecrated to Mary Magdalene to house poor pilgrims. In 1113, returning crusader Guillaume 9th of Poitou

Figure 12. Lanterne des morts, Vienne, France. *Carlson*

endowed an octagonal funerary chapel inspired by the Holy Sepulchre. An imposing structure, over 45 feet in diameter and more than 50 high, it bears little resemblance to the usual lanterne. The glow from the open lantern at the top welcomed the pilgrims while shining on the rows of bleak stone tombs of the graveyard. The interior, decorated with rustic Romanesque carvings, shared the beacon's light through a series of open holes or occulae descending to the main rotunda and through another occula to a partially subterranean crypt, which also served as an ossuary. The light limestone walls are pierced by tiny windows at the crown of recessed blind arches filling each face of the exterior walls. More study of the possible astronomical associations and the purpose of the occulae might provide some distant clues to the astronomical enigma encoded in Newport Tower.

Frères Maçons — Twelfth Through Fourteenth Century

The order of The Knights of the Temple of Solomon or Templars were, we are told, dedicated to protecting pilgrims traveling in the Holy Land. Their original charge to rebuild the Temple of Solomon in its entire physical and symbolic splendor loomed large on their agenda. To this end, they called each other "brother masons" (*frères maçons)*, surviving in English as the Freemasons of today. The central role of the Templars in Jerusalem expanded, along with an increase in wealth, throughout Europe. Templar Commanderies dotted the countryside. Full of zeal, the returning knights imitated the round form of the church of the Holy Sepulchre in their own churches.

Conceived among the saints, and committed to monastic vows, the Templars' fall from grace was swift and fatal, marked with the badge of the basest of sinners. As originally chartered in 1118, with its rule devised by Bernard of Clairvaux, this was to be a combination military-aesthetic order dedicated to selfless service to God. But service to God became extremely profitable and the Order flourished. By 1300 it had become a powerful force both politically and financially. As heirs to the Gnostic mysteries acquired from the Desert Fathers in the Holy Land, their rituals were shrouded in mystery. Suspicions about the rituals were used to plot their overthrow, particularly in France, where King Philip the Fair and Pope Clement IV were anxious to join forces in assuring their destruction and the confiscation of Templar wealth and property. The intrigue culminated on the fateful day of October 13, 1307, when Grand Master Jacques de Molay and 15,000 brother masons were snared by French storm troopers, and turned over to the Pope's resourceful inquisitors for inconceivable tortures and ultimate deaths. The Grand Master, Jacques de Molay, languished, cruelly tortured, for seven years until at last, proclaiming the innocence of his Order to any abominations and cursing Philip, he was slowly burned to death in March of 1314.

After October 14, the Order of the Knights of the Temple of Jerusalem ceased to exist, at least in France. In Spain, where the Pope was not favored over the wealthy knights, the Kings of Aragon and Castile found them innocent. In Portugal, they were reconstituted as the Knights of Christ. The Germans were indifferent to the Pope's edict disbanding the Order. The English were busy with other enemies, and it was not until the Pope's inquisitors arrived in 1313 that persecution began in earnest.

The remaining vestiges of Templar power simply disappeared the night before the assault. The eighteen ships of the Templar fleet anchored at the Atlantic port of la Rochelle were gone. Gone, too, was much of the Templar wealth.

Where did the survivors go? The most popular theory is that the fleeing knights sought refuge along the rugged coast of Scotland where Robert Bruce, in his increasingly bloody fight against English domination, would have welcomed these warrior monks to his forces. The victory over the English at Bannockburn would have assured the refugees a secure haven for many years to come. Several investigators have wondered if, in conjunction with Scots renegades or Norse-rooted Orkney Islanders, some ships of the fleet found their way across the Atlantic to a western refuge.

One wonders if the "refugio" or "Norman Villa" noted on Verrazzano's 1524 map, or the tiny tower shown at the mouth of today's Narragansett Bay on Mercator's 1569 map, offer any clues. Even cartographer Marc Lescarbot shows a Latin cross (representing a Christian settlement or just a stop?) on the bottom left corner on his 1609 map focusing on the Saint

Lawrence seaway where other crosses abound on the map. To pursue our quest for a prototype for the Newport Tower, let us consider the building traditions of the *frères maçons*.

Newport tower compared to the London Temple Church

Church of the Holy Sepulchre, Jerusalem

Not far from the never-fulfilled dream of a rebuilt Temple of Solomon, the best known Templar construct in the Holy Land is the Church of the Holy Sepulchre in Jerusalem. Built by Constantine in the fourth century over the reputed tomb of Jesus, the Church of the Holy Sepulchre was variously damaged and defaced by Persians and Muslims before it was rebuilt by the Crusaders in the twelfth century. Far more grandiose than its numerous offspring, the rotunda is surrounded by an arcade supported by twelve round columns and six square pillars. They, in turn, support a gallery repeating the same columns and pillar configuration supporting a dome, which was originally open to the sky. Its form became the model of round churches throughout Europe. Charlemagne echoed it in his chapel Aix la Chapelle in Achen, Germany. The Templars followed the model wherever possible, as have penitents of all nations, who copied it in memory of their Savior. The common bond in all of these sacred buildings is their roundness.

Templar Round Churches

Templar Churches in England

Means lists fourteen round churches in England. Some are parish churches, but most were built by the Templars. Of the four that remain, the Temple Church in London is the most famous. Its simple Norman exterior has proportions and an apparent scale that suggest a much smaller building, giving no indication of the soaring later Gothic rotunda with its lofty clerestory.

The round nave of this church has an inside diameter of 41 feet, with eight heavy columns supporting a central cylinder approximately 19 feet diameter, which is composed of an arcaded triforium and a matching clerestory above. Built in this configuration between 1120 and 1140, it was "improved" by 1807 with a "hideous two storied lantern with ugly Gothic windows." Happily, it has been restored to its original form. Other English Templar churches seem to have mimicked either the London or Cambridge models, though in varied sizes. It is interesting to note that despite the tremendous difference is sizes, all these structures share the same scale and proportion, and the scale and proportion of Newport Tower.

The Church at Laon, France

The little twelfth century Templar church at Laon, in France, is actually an octagon without an ambulatory **(Figure 13)**. The style is Romanesque vernacular, with thick walls and fairly large, symmetrically placed windows topped by a gored dome. The Romanesque Templar church in Paris has six piers surrounded by a round ambulatory topped by a ribbed vault and pinched by over-scaled gothic narthex and choir. The English Templar buildings also follow the styles of the day, but where these churches have ambulatories, they are constructed of the same masonry as the body of the building.

Figure 13. Templar church at Laon, France. *Gistaf Kunstler*

The round church of Lanleff in Brittany.

Of all the Templar remains, the ruin of a round church in Brittany **(Figure 14)** was the first to attract our attention. In the village of Lanleff near St. Brieuc on the north coast, a sign in the village directs the visitor to the Templar church built in the twelfth century, but its brief brochure tells a different story. This circular stone building, known as "the Temple" is one of the most curious structures in Brittany and was listed as a historic monument in 1836. After a brief background on the evolution of Romanesque architecture, the brochure lists the meager documentation concerning the temple, mostly discussing the fate of a famous yew tree that was growing in the center of the ruins by 1735. The arched arcade, this time 12 arches, support a cylindrical superstructure which appears to have contained an upper story, and possibly two. Randomly placed windows suggest astronomical orientations. Indeed, mid-morning during one autumnal equinox, I watched the sun's ray slip suspiciously up a west column before it was lost to the ragged edge of the ruined walls. Only a small section

Figure 14. The round church at Lanleff, France. *Sally Strazdins*

of the vaulted ambulatory remains and there is no evidence of exterior windows at that level. The worn capitals are shadows of the original cushion capitals, but grotesque carvings can be distinguished. One rare feature is the carved column bases in the form of upside cushion capitals with added mystery presented by geometric, floral and animal designs.

Figure 15. The equinox rising sun projected on the west interior wall of the church at Lanleff. *Strazdins*

Like the Newport Tower, the "temple" at Lanleff has had many candidates proposed as its purpose: a Gallo-Roman temple for sun-worship, a Gallic temple for sun-worship (these commentators had also noted the sun's penetration on sacred calendar days), or a Merovingian, or Carolingian baptistery **(Figure 15)**. The crusader theory expanded to include the Knights Hospitallers of Jerusalem (the black monks) or the Knights of the Temple known as the Templars (the white monks). Some pundits have proclaimed that the architecture pre-dates the crusades and that a reference to the Lord of Chatelaudren donating the sanctuary, dedicated to Sainte Marie de Lanleff, to the Benedictine monastery of Lehon clinches the argument. William Penhallow has applied his same analytical skills to a scale model of the sanctuary to determine the probability of sophisticated astronomical events captured through the openings. His initial studies indicate a fascinating array of astronomical alignments. Both these buildings are shrouded in mystery and both seem to share the esoteric astronomical mapping features.

Although documented evidence evades us, it is tempting to speculate on the possibility of a "Templar connection" with the construction of the tower. In conjunction with clues from other medieval sources, we may begin to develop a tentative hypothesis.

Prince Henry Sinclair of the Orkney Isles — Fourteenth century

Legend has it that the northern threads meet the southern in the last half of the fourteenth century, when Prince Henry Sinclair, Earl of the Orkney Islands, was joined by the aristocratic Venetian seafarers, Antonio and Nicolo Zeno.

Henry's lineage melds his paternal Viking roots through Rollo, the first Norman, with his maternal Norwegian ancestors, The Jarls of Møre. The Norman line, transformed into the French Saint Clairs, were with William at Hastings and were richly rewarded for it by gifts of land grants in Scotland, where rejoining their Norse cousins, they received the Orkney Islands in 1363 from Haakon the Sixth of Norway. Young Henry learned the ways of the world on the latter-day Sixth Crusade battling the Muslims at Acre in 1365. Later, in 1398, Henry assembled a fleet to explore the west (west from the Orkneys), and as his captains or co-captains he had the unlikely help of the Venetian Zeno brothers.

Our story now switches to the attic of the Zeno palazzo two hundred years later. A little boy playing among forgotten memorabilia tore a bundle of vellums into little pieces. As an adult, the remorseful Nicolo Zeno found the letters, pieced them back together, contrived a map from his existing material, and published the posthumous report of his great-great-great grandfather's (also called Nicolo) travels in the North. The narrative is called *The Discovery of the Islands of Frislandia, Eslands, Engronelanda, Estotilanda, and Icaria;*

made by the brothers of the Zeno Family, namely Messire Nicolo, the Chevalier, and Messire Antonio, With a Map of the Said Islands.[14]

The Zeno narrative, though lengthy, with lots of sailing directions, vivid descriptions and details of time spent traveling hither and thither, seems to demonstrate that the expedition reached North America (under the guise of such strange names as Frisland, Icaria, Estotiland and Drogio). Antonio returned to Orkney with most of the mutinous and exhausted crew, but Nicolo and Henry wintered over. The date of return is not known, but Henry died in Orkney between 1400 and 1404 and Nicolo returned to Venice to write his memoirs. The authenticity of the Zeno narrative and its infamous map is still hotly contested with passions akin to the Newport controversy.

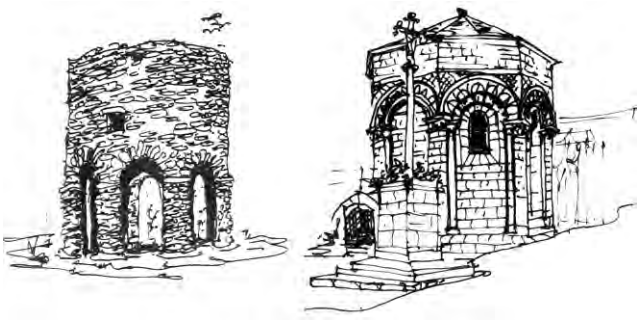
American interest in Henry Sinclair began in 1954, when amateur archaeologist Frank Glynn spotted or imagined the figure of a medieval knight on a faint stone carving, known as Indian Rock, in Westford, Massachusetts. In his attempt to identify the carving, Glynn began to correspond with British archaeologist and writer T.C. Lethbridge. As a result of Lethbridge's interest and the identification of the "knight" as holding a shield bearing Clan Gunn heraldic insignia, another subject of controversy erupted. The Gunn in question (possibly James) had been a close comrade in arms of Henry's and could very likely have been a travel-mate as well. The nearly invisible pecked marks on a bedrock slab received new attention in 1998 with the celebration by both the Sinclair and Gunn Clans of the 600th anniversary of Henry's voyage. The authenticity of the carving is still being contentiously debated.

The proximity of Westford to Newport quickly led to the speculation that it was Henry who must have been the patron for the construction of the Newport Tower located in his New World paradise. Other than the Old Norse round church at Orphir however, the Sinclair advocates have no prototype structures in mind to bolster the theory. I would like to suggest that a tiny chapel in the Massif Central in France dedicated to Saint Clair is a distant but potentially significant relative.

Saint Clair Chapel in le Puy en Velay

Le Puy en Velay was another important place of veneration on the road to Compostella. The "high" places atop the sharp, rugged volcanic peaks have been a holy connection to heaven since time immemorial. At the summit of le Puy, the church of Saint Michel d'Aiguilhe called the "gateway to the celestial Jerusalem," occupies the site of a Roman Temple dedicated to Mercury, messenger of the Gods. Set at the foot of the rocky pinnacle is a small octagonal chapel, with scale and dimensions similar to Newport **(Figure 16)**. The blind or filled arches are pierced by the door and high rounded windows set in the spring to the Romanesque arches. The arches have an alternating colored pattern and there is a band of lozenge-shaped colored brick from the spring to the top of the arches, all giving an Islamic appearance to this little twelfth century chapel. Consecrated to Sanctus Clarus , "Holy Light" leads one to ponder if this chapel is associated with the Norman Saint Clairs, who eventually settled in Scotland as the Sinclairs, ancestors of our Henry.

Figure 16. Chapel of Sanctus Clarus, Puy en Veley, France. *Frederic Chaboud*



Newport tower compared to the Chapel of Sanctus Clarus

Portugal's latter-day Templars, the Knights of Christ—sixteenth century

Caught in the throes of exploration fever, with sails emblazoned with the cross of the Knights of Christ, Gaspar Cortereal set forth in the year 1500 with three caravels and a commission from King Emanuel to take and possess whatever he might find. Cortereal however, was not venturing into uncharted northern waters. In 1472 or 1473,

[14] The Zeno Narrative was first published in 1558 in Venice, and reprinted in English in 1582 by Richard Hakluyt in *Divers Voyages Touching on the Discovery of America*.

his father Jaõ Vaz Cortereal represented the Portuguese Crown in a joint venture with Danish interests, sponsored by the Danish King Christian I. Deitrik Pining and Hans Pothurst led the expedition with the Norwegian Jon Skolp as navigator. It appears that after visiting Greenland (with a stopover in Iceland, no doubt,) they crossed over to Labrador.[15] It seems reasonable to guess that they were attempting to follow the old Viking Vinland route south along Newfoundland, Nova Scotia and perhaps south into the Gulf of Maine. However, I doubt that they tarried long enough, nor had reason to undertake any construction projects.

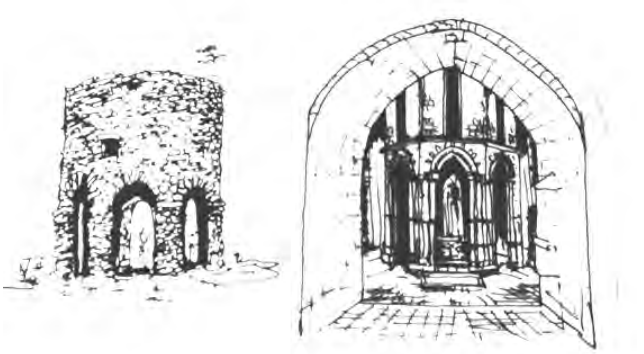
Gaspar's first trip took him to land on the fiftieth degree latitude. On his second trip, his explorations carried him further north. He sent two of the ships home, but the flagship and Gaspar never returned to Portugal. The next sailing season, Gaspar's brother Miguel, also a knight of the Order of Christ, went west with his three caravels in search of his lost brother. After arriving in the New World, the three arranged an August rendezvous and parted to accomplish their mission. Two of the ships made the rendezvous, but another Cortereal had disappeared, never to be heard from again.

Never to be heard from again—until Professor Edmund Dellebarre of Brown University began to unscramble the palimpsest of petroglyphs on the Dighton writing rock, a large bounder poking above the high water mark in Assonnet Bay in the Taunton River upstream from Fall River, Massachusetts. His published studies beginning in 1917 revealed the date of 1511, some Latin letters, which included MIG–L, and an outline of the Portuguese cross. This gave credence to the presence of the Cortereals near Narragansett Bay in the early years of the sixteenth century. The theory contends that Miguel and his crew were shipwrecked and built the tower as a watch and signal tower while they waited for rescuers from across the sea. Although Dellebarre assures us that there are many round towers in Portugal, the charola or baldachin over the high altar in the Templar convent of Tomar may have served as Cortereal's inspiration for his signal tower.

The Altar in Christ Convent, Tomar, Portugal

Legend says that Gualdim Pais, grandmaster of the Temple in Portugal, drew lots three times and received the answer three times to locate the new Templar fortress on a hill between the river Fria and St. Gregory's Creek. Begun in 1160, it survived the onslaughts of the Moors and avoided the deprivations forced on their French brothers in arms. Reconstituted as the Order of Christ, the Templars continued to play a pivotal role in Portuguese affairs. Money from the full coffers of the Knights of Christ sponsored the Prince Henry the Navigator's school in Sagres, preparing the way for Portuguese supremacy on the high seas. In the center of the new convent, they built an octagonal open-arched altar enclosure, called a "charola." The arcade with the super structure featuring tall lancet windows echoes the Moorish influence overlaid on Gothic principles resulting in an Iberian architecture with rich detail woven into the carved stone elements. Given the similarity to the Cistercian lavabos, one wonders if we are seeing a common architectural and sacral theme in a Portuguese form **(Figure 17)**.

Figure 17. Altar in Christ Convent, Tomar, Portugal. *Web image*



Newport tower compared to the Altar of Christ Convent

[15] Lindahl, Sigurður, *Saga Islands*. Islendinga Fornrit, Reykjavik. 1992

English Catholics — sixteenth and early seventeenth centuries

Horace Silliman, in his articles and monograph on the Newport Tower, published by NEARA, was the lone proponent of a carefully reasoned theory that the tower was built by restive Catholics as a secret base from which to plot the restoration of a Catholic monarchy in England. He traces the intricate interrelationships between various factions—Catholic-Protestant, merchant adventurers, Spanish sympathizers, anti Spanish forces, free-booting pirates, privateers and agents for all or any patron. Narrowing the field to Henry Fitzalan, twelfth Earl of Arundel, who had the connections and capacity to have implemented such a project (probably in 1570, or possibly a few years earlier), Silliman expands his theory to suggest that later adventurers such as Humphrey Gilbert or Bartholomew Gosnold might have gotten wind of this base of operation and, under the patronage of the Protestant faction, set out with the dual purpose of ousting the Catholics from their base, and using it themselves as a base for prospecting for gold, silver or other precious metals. Although the research is sound and the theories plausible, Silliman makes only casual and not very convincing reference to the style or possible architectural inspiration, except for showing an old photo of the fountain in the main quadrangle of Trinity College, Cambridge, England, built in 1602 **(Figure 18)**.

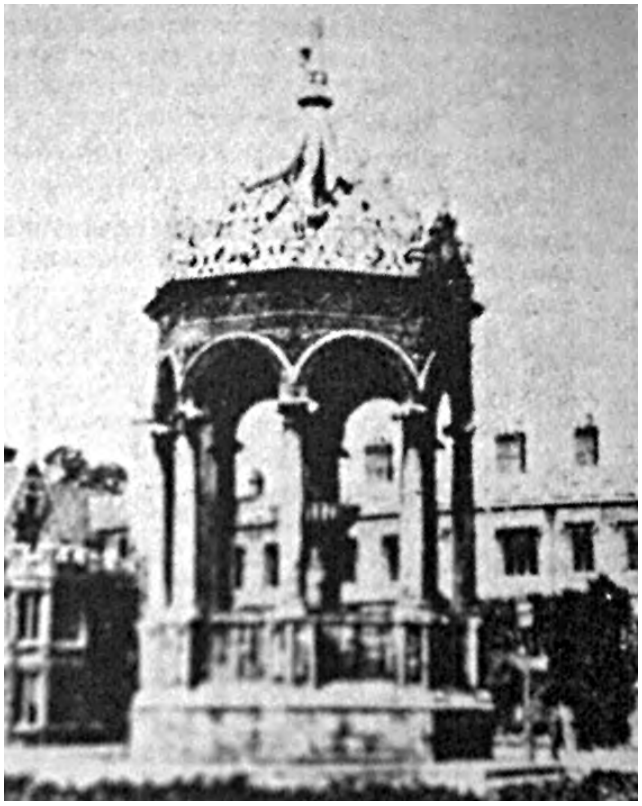


Figure 18. Fountain at Trinity College, Cambridge, England. *NEARA archives*

Market Crosses and Renaissance Fountains

Throughout Europe, town fountains have been given a protective covering. One wonders if many of these memorialized sacred springs or holy wells cherished by our ancestors. Market crosses were perhaps located on crossings of importance to early people. During the medieval period and well into the Renaissance, these sites were embellished with carefully designed shelters reflecting the highest standards of prevailing taste. Some large, some tiny, many were open polygonal arcades with graceful columns, and capitals, and supporting a myriad of super-structures and roof forms. In style and form, these structures seem to be unlikely candidate for our prototype.

Black Robes and Fur Traders — seventeenth century

While English adventurers were making deals and carving out huge land grabs, the French were pursuing their own exploitation of New World resources. In addition to fur, the French black robed missionaries were reaping the reward of saved souls. Joining the trappers and traders, the "black robes" lived with the native peoples, learning their ways and winning their souls. Although no one has proposed French priests as builders of the Newport Tower, the remains in downtown Montreal, Canada, of twin stone towers, guarding the entrance to the Sulpician Grand Seminary caught our attention **(Figure 19)**. There seems to be nothing extraordinary about them, they are reminiscent of the solid

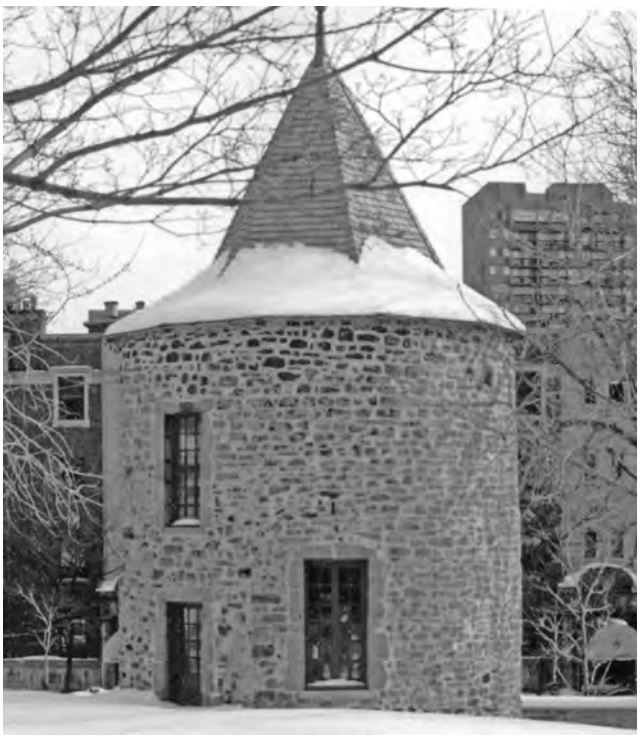


Figure 19. Tower at the Grand Seminary of the Sulpicians, Montreal, Canada. *Gerard Leduc*

round corner tower found in chateaux throughout the hills and valleys of renaissance France. They were presumably built by the rich Sulpician, François Vachon de Belmont in 1685 as a combination mission and bastion, originally with four towers at each corner, to protect the Sulpicians while they preached to the Indians who were lodged outside the walls. On careful inspection, these ordinary towers reveal some extraordinary features and may turn out to be distant relatives of the Newport structure.

The Twin Towers of the Grand Sulpician Seminary, Montreal, Canada

The two features that attract our attention are the windows and the fireplaces. The windows in both towers are narrow slits, randomly placed. Although providing glimpses of paths to the (former) enclosure and the street (meadows) below, these openings seem too small for a sharpshooter and his musket to see and aim at a target. In addition to their impractical size, the majority of them are high above the floor level and out of reach for any comfortable manipulation of a weapon. If not defensive loopholes, what was the purpose? The light admitted was meager. Upon careful inspection, I concluded that the seventeenth century windows facing the inner court were a later modification. The doors also appear modified, probably a part of the same modernization.

On the interior, the west tower has one fireplace on the "ground floor," and the east tower, two fireplaces, one on a lower or basement level, the other directly above on the first floor level. All three of these fireplaces seem small and shallow for sixteenth century construction. But the peculiarity of the flue exiting through the wall to the outside, without a true chimney, similar to the flues of Newport Tower, invites us to the question the origins and age of these towers in Montreal.

Benedict Arnold's Stone-Built Mill — seventeenth century

Fleeing the stern autocracy of the puritans, Roger Williams and Anne Hathaway brought their brand of tolerance to their new colony at Providence Plantations. Benedict Arnold joined the reformers in 1636, but being a scrappy and irascible young man, he squabbled with the local Baptists and removed himself to Newport in 1651. By 1663, the upwardly mobile Arnold had succeeded Roger Williams as president of the colony. In 1663, under a new Royal Charter, he was appointed the first governor of Rhode Island, a post he held until his death in 1677. With politics and privilege came opportunities for developing business interests and amassing wealth. So, it is not surprising that after Peter Easton's wooden windmill was destroyed in a late summer storm in 1675, Arnold undertook to be the benefactor of a new mill.

The tempest that destroyed Easton's windmill was not the only tempest raging on the horizon. Metacomet or King Philip, Chief Sachem of the Narragansett Indians, had rallied his braves into action. The natives were seething from the inhuman treatment showered on them in the name of Christian piety, or rather, Protestant piety. The French Catholics in the north had treated the natives more as trading partners and were able to exploit their ferocity as allies on the American front in the interminable French-English wars of the seventeenth and eighteenth centuries. Despite the tremors of war, Arnold was able to get a windmill operating on top of the existing tower on high ground above the harbor. Although in his will he refers to "his stone-built mill", he does not say who did the building.

The Arnoldists have always presented one fail-proof prototype as the inspiration for the Tower. In Chesterton, Warwickshire, England, there stands a round stone windmill of a design that is remarkably similar to the Newport Tower. The theory holds that Arnold, having grown up in nearby Leamington, would have remembered the octagonal arcaded tower and would have been inspired to replicated it in his New World estate. In his sleuthing, Means discovers that Arnold was not born anywhere near Chesterton. He was born in Limington in Somerset, not Leamington, and the windmill had started out as an observatory designed by Inigo Jones (or a student) in the latest renaissance style, for the enlightenment and entertainment of Sir Edward Peyto, wealthy lord of the manor. Following a drought, the observatory was converted into a windmill to replace a water mill that had run dry, some years after Arnold had left for America.

The findings of the Danish *Committee for Research on Norse Activities in North America: A.D. 1000 - 1500* were evaluated and expanded by Dr. Johannes Hertz in his report published in the *Annual Report of the Danish National Museum* (1995), and later in the Journal of the Newport Historical Society in English translation (1997). He based his defense of the later date on three scientific factors: the carbon dating sponsored by the Danish committee, the photogrammetric study, and William Godfrey's Harvard Ph.D. dissertation. He concludes with the architectural evidence itself.

The carbon study as published has been methodically studied and its validity questioned by at least four qualified scientists. The sampling, testing, and interpretation of a new experimental technique was considered seriously flawed and the results dismissed by all of these researchers (de Bethune, 1998, Guthrie, 1996, McCulloch,1996, and Watchman, 1996).

The photogrammetric study produced no conclusive unit of measurement, only the possibility that its closest match was the Norwegian and Icelandic short ell. I find it impossible to imagine that an English mason, with English tools would have used any unit of measure other than English feet, yard

and rods. This factor seems to exclude the Arnold theory rather than prove it.

Careful analysis of Godfrey's excavation report indicates pieces of mortar, nails, some seventeenth century artifacts, and, most importantly, a boot print in the mud of an early excavation trench. Although this appears to be foolproof evidence of seventeenth century construction, anyone with experience building and erecting staging would realize that from the dimensions given, it would have been impossible to stage and build the tower from within the trench. In addition, subsurface excavation is invariably back-filled and compacted to hold the entire weight of staging and material before construction begins. The nature of the artifacts and the boot print demonstrate that that trench noted by Godfrey was probably a test trench to inspect and repair the columns before a seventeenth century conversion of the extant tower into a windmill (Carlson 1996).

Hertz transforms the rough crude appearance of the masonry into Renaissance elegance by imagining the surfaces covered with classical details executed in plaster, which, of course have long since disappeared.

This does seem an exercise of the imagination and an unlikely possibility. In my opinion, the Danish report does not present any useful data to help us understand the origins of the tower.

The Chesterton Windmill

This English tower has been hailed as the prototype for Arnold's windmill. In it a neatly dressed-stone arcade supports a cylindrical upper story upon which is mounted the rotating machine works for the blades of the mill. Though simple in form without elaborate detail, the structure retains the symmetrical proportions of the latest seventeenth century taste **(Figure 20)**. Mill expert Rex Wailes wrote to Means in October 1937: "The Chesterton windmill has been converted to its present (or more properly past) purpose beyond all doubt. This can be seen by inspection of the 'cap' which is the revolving top portion carrying the sails…. The revolving top has undoubtedly always revolved and it is not difficult to guess for what purpose the building was designed. In the early seventeenth century the old country houses were being rebuilt or replaced by those of Renaissance or Classical style and Science was becoming the hobby of the fashionable and wealthy. Among the Sciences, astronomy was not the least popular, and this observatory, as we can be sure it was, was built in accordance with the style of the house."

Figure 20. Chesterton windmill. *NEARA archives*

Newport tower compared to the Chesterton Windmill

How was it Built? The Construction of the Newport Tower

Almost every observer has offered an opinion on the "how" of the construction, but few qualified masons, engineers or architects have undertaken the effort to "reconstruct" the construction of the tower. Questions abound: exactly how was it built, how much material was needed and where did it come from, how many workers were needed and how long did it take, and what were the credentials of the master builder who planned and was responsible for the execution of the work? After more than thirty years' experience in project planning, consulting with masons, and supervising builders, I am ready to tackle my view of the "specifications" for the construction of the Newport tower.

Though picturesque and oddly out of place among the refined Georgian homes surrounding the Touro Park, Means tells us "… the distinctive features of the tower cannot be described even by a friendly critic as masterpieces of masonry". Modest in size and scale, the outside diameter is a mere 24'-8", reduced by the thick walls to and interior diameter of 18'-5". The eight stout straight columns range in height from 7'-2" to 7'-10" with rough stone arches reaching the crown at 12'. The existing height is 26', but an attempted sabotage by retreating British soldiers during the revolution blew off the upper part of the walls. The distinctive features include the randomly placed double splayed windows, the niches, beam sockets and most curious of all, the fireplace on the second floor. What skills were needed to fabricate this stone anomaly? What tools did they use? We turn our attention to the construction of the tower.

The builders of our Tower were faced with unique challenges. The wide Atlantic separated them from the ready resources found at home. Itinerant joiners, carpenters and most of all, skilled stone masons were not waiting impatiently in the guildhall for job offers. These builders were in a sense, subsistence builders. They were obliged to manufacture nearly all of their materials. Raw material was plentiful, ancient hardwood trees for framing, staging, and centering, for making stone boats, carts, sledges, buckets and barrels and perhaps charcoal for burning shells. Narragansett Bay was the benefactor of the glacier's last gasp and the more than 450 tons of fieldstone needed to build the tower was theirs for the taking. Shell middens, bequeathed by generations of native clambakes (or oysterbakes) at the beach could be gathered and burned to make crushed shell (called tabby) lime mortar mixed with washed sea sand. Iron, if needed (or even used) was the one imported item.

Workmen of all times have supplied their own tools. The woodsmen: axes and adzes, levers, and ropes. Carpenters and joiners: planes, drills, hammers, wedges and froes, chisels, gouges, and saws. The master mason's kit included hammers and chisels for a myriad of purposes; his most important tool was his knowledge of the technique of selecting the shells, building the kiln and burning, slaking and mixing mortar which is the glue that has kept the building intact for so many years. He would have known how to achieve the exact temperature to transform a heap of shells into silvery lime putty, known just the right proportions to make a strong, long lasting mortar mix and to judge the right amounts needed to do the job. He would have known how to wash the sand and shells to extract all salt, which is ruinous to the strength of the mortar. Careful planning would have been in order as well. The sequence of tasks, the time required for cutting, gathering and transporting materials (and probably constructing the vessels for transportation) for drying, burning stacking, and stockpiling would all have been planned ahead.

Here we have a partial materials list — just enough to get started:

> Stone: Good assortment of granite fieldstones, free from weathering cracks or other defects. About 450 tons.
>
> Lime: Good quality tabby lime from selected clam or other approved shell heaps. About 5 tons and one ton additional for the parging.
>
> Sand: Hauled and washed in good clear running fresh water and dried. About 38 tons and eight tons for the parging.
>
> Water: Clear fresh water: About 1750 gallons.
>
> Wood: Healthy chestnut or oak trees about five feet around and sixty feet tall (four good trees); pine for staging centering and miscellaneous carpentry three feet around (three tall trees); sundry hardwoods for vessels and tools.

Assembling and preparing such a mass of material would require three to six months, depending on the weather. Most of the work is ideally done in the winter when it is easier to skid heavy materials over snow or ice and there is no danger of being mired in mud. Construction could wait until the mud dried in the spring.

Having compiled a materials list, we can proceed to account for the crew. In addition to the master, in this case acting as architect-engineer-general contractor, the job descriptions might look like this:

> One master mason or assistant master mason, with experience in laying up mortared stone, arch-work, and building columns, to manage the stone work.
>
> One apprentice to help lay up stone.
>
> One mortar maker.
>
> Two laborers, no experience required.
>
> One water boy.
>
> Four carters to transport materials.
>
> Two carpenters, one to supervise woodcutters, and to prepare framing and rough carpentry; one a skilled finish carpenter and joiner.
>
> Two apprentice carpenters or joiners to work on the staging, falsework, centering and framing.
>
> Two laborers, no experience required.

Preparations

If our builders had recently arrived by sea, they would have made landfall in late spring or early summer, in time to build shelter and get crops in for autumn harvest. The astronomical alignments detected through the random windows suggest repeat visitations, if not a lengthy habitation by the builders. But this was not necessarily the case. The alignments could have been determined with the skilled use of an astrolabe without long term observation.[16] In any case, our architects knew the land and sky well. Knowing the land meant sharing the territory with the natives, seasonal shifts, snow time, freeze time, mud time, and knowing the sources of water, shell middens and good timber.

The nature of construction—masonry with only heavy timber beams, planks and rafters—would have accommodated the use of green wood. Deep in winter, when the huge logs could be maneuvered over frozen ground more easily, selected trees would have been felled, stripped, and debarked. Some would have been reserved for firewood, hot burning ash or maple for burning the shells for tabby lime, and other hardwoods for sledges and tools.

Stone quarrying, or more likely gathering existing field stone or dismantling existing stone rows, would be a much easier and pleasant task before spring thaw mired the sledges in mud.

For millennia, the shellfish bakes have been a token of summer all along the New England coast, resulting in middens or shell heaps reaching as high as thirty feet in some places. These would have been a boon for our mortar makers, who would have gathered the shells, carefully washed them to eliminate the salt, and burned them to calcination to be mixed with clay and washed sand for the final product. Clear fresh spring water would have been the first consideration in establishing any type of settlement, however short the stay, and beach sand was plentiful along the low lying coast, only to be gathered and washed.

There are no indications whether the plaster was ever painted, either inside or out. Certainly, the materials for making paint, or at least whitewash, were at hand: ochre and earths or natural vegetable dyes for color mixed with animal or nut oil and sap as binders, lime and water and resins for whitewash.

The windows are constructed to receive glazing of some type, but we have no clues to the type and material used, if at all.

[16] William Penhallow, personal communication.

Building the Tower

Once materials have been assembled, or at least located, the real project began. Did the master keep the plan tucked away in his head or was it plotted out on paper, parchment, bark, or scratched in the sand or clay. This we don't know and probably never will. But from the remaining structure, we can reconstruct a fairly accurate image of the builder's (or patron's) intentions. This structure was to be a round open arcade, nearly octagonal, with a second story and third level above. The second floor was to have a fireplace and several niches set in the stone and an array of small double-splayed windows, located in precise relationship to a number of astronomical events. The columns and heavy walls were to be built of mortared stone, with heavy timber framing for the floors. We don't know the configuration of the roof, or even if there was a roof. The upper story was to be a stone cylinder with eight shallow stone arches supported by heavy round columns. The column bases and capitals were to be the simplest practical forms, just sufficient to support the arches above. I would guess that our designer had had experience building round towers and round towers with arches, perhaps windows, doors or relieving arches in defensive structures but had never faced the problem of setting a stone cylinder on round columns, resulting in a rough and awkward connection.

We do know that shallow pits, about thirty inches deep, must have been dug for the stone column footings. The footings and round stone columns were brought up to grade level, and the pits backfilled to support rough wood staging growing around the rising columns. Two sorts of centering devices would have been necessary, one type for construction of the arches, and the other a system to keep the circle true.

After the columns were complete and the spring of the arches underway, sockets were set just above the capitals to receive the heavy wood brackets which would support the timber floor framing. Brackets would certainly have been used, otherwise the framing would have bypassed the arch, creating an odd effect that would not have been acceptable to any master builder at any age.

With the master directing the mortar making below, laborers hoisted wooden pallets of stone and buckets of mortar through wooden staging to the ever higher plank walkways near the top. I would guess that the process was repeated a second time after the initial work was dry, to apply the parging or stucco.

Row by row, the cylinder of stone would grow above the arches, with a break for the masons while the carpenters set the floor and eventually, the ceiling or roof framing in place. Heavy floorboards would replace staging on the interior as the work rose higher. Only in our imagination can we guess the form of the thick roof trusses swinging into place from

a flimsy wood crane with pulleys straining both crane and rafters. We can assume any pitched roof was covered with wood, (shingles or boarding) with bark waterproofing protecting a first layer of planking. All of this effort would have taken continuous work during daylight hours from May or June until September, with rest on Sundays and feast days. The finishing touches and details of décor and furnishing I leave to your imagination.

Through the long winter of preparation and the summer of construction, the workers needed to be fed, housed, possibly entertained, possibly defended and, we suspect, have their souls nurtured for service to God. This translates into a complex of shelters that include: dormitory, refectory, kitchen, workshops, and master's quarters, (be he Captain or Abbot). These could have been under one roof, in the manner of Viking long houses, or an array of small buildings arranged around a central courtyard.

One can only wonder why this was the only stone structure, solid and permanent, achieved by our builders. Was it the first of a complex built to satisfy the needs of God and man? Was it a chapel—for the baptism of native neighbors, for remembrance of the dead, for ablutions or absolutions for the remittance of sin—combined with a beacon light welcoming pilgrims to this distant refuge? And what was the meaning of the most curious and perhaps most sophisticated use of the tower, that of an astronomical clock?

So many threads in this investigation dangle without anything to draw them back into a verifiable frame of fact. Aerial photos indicated a vague rectangular shadow which could represent building foundations deeply buried and long forgotten. A ground scan radar investigation conducted by the Early Sites Research Society in 1994 proved to be inconclusive, but were a starting point for further investigation. Preliminary results from a new ground scan conducted by Dan Welch (2001) also produced inconclusive results but further study and interpretation of the data may clarify some of anomalous features detected by the scan. Only a meticulously executed archaeological excavation in Touro Park can provide additional clues to the everyday life of the builders of the Tower.

Architectural Analysis

Walls

The thick walls are made up of "field stones," the legacy of the glacier to New England rocky shores **(Figure 21)**. Rhode Island, near the leading edge of the glacial moraine, received more that its share of erratic stones and boulders of every geological type and size. Set in a thick bed of mortar in rough-and-ready construction, these walls provide no trace of the builder's identity. Despite the abundance of building stone, the early colonial New Englanders continued their wood building traditions, and we find stone only used as house chimney foundations and, in western Rhode Island, used for the chimney wall in some small dwellings.

Columns, capitals and arches

From the earliest times, posts were topped with some sort of cap. Refined in the ancient world, the simple Doric capital evolved into the spiraled Ionic, then acanthus leaves created the Corinthian. Finally, the Romans blended both into the Composite capital. The fall of the Roman Empire spelled the end of the classical orders of architecture for over a thousand years, although early Christian, and eastern Byzantine architects retained the basic forms of the classical world, Byzantine ornamentation became more intricate and varied.

Emerging from the "dark ages," stone cutters devised new forms based on a cushion-shaped capital. Some were unadorned simple forms, while others represented a frenzy of flora and fauna both real and imagined, often each column supporting a different menagerie. The exquisite classical proportions of columns are due to entasis (the subtle convex curve in the vertical profile). During the "dark ages", columns lost their entasis, and became increasingly short and stocky. As gothic churches soared to new heights, increasingly attenuated columns demanded order, symmetry and similarity in the capitals with floral motifs preferred. The Renaissance brought the stone cutter's art back full circle returning to classical derivations and rediscovered entasis. The same evolution holds for column bases, although they were only decorated, and then rarely, during the Romanesque period.

Figure 21. Wall, capitals and columns. *Egan*

The chunky columns of the Newport Tower are of particular interest because they have only a stone abacus or impost (uppermost member of a capital) without any suggestion of a capital. In my search for topless columns, I found very few examples, all from medieval structures. This anomaly adds to the uniqueness and mystery of Newport. Newport's bases appear to be more like exposed footings than proper column bases. All of the examples presented here have some degree of articulated capitals and bases.

Greek order and architecture was one of post and beam. It was left to the Romans to develop the arch as the workhorse of building elements. In the western world, the arch has been employed in the construction of everything from sewers to grand basilicas, from Roman times on. The round Roman arch shrank and expanded in its proportions to match changing styles; the horseshoe-shape was favored in the Islamic world. Gothic architects stretched the arch heavenward into the pointed form that is the mark of Gothic architecture. In addition to reviving the round arch, the Renaissance introduced new refinements of form, with circle segments of varying length combined to create complex profiles. The Newport arches are a common sort of rude stone construction made up of flat stone slabs on end, without a defined keystone and without any telltale signs of style or period. We can say only what they are not, but not what they are.

Windows

The small splayed openings in stone buildings appear to be practical elements, the sort found in defensive architecture such as castles, forts, signal towers, battlements and gateways **(Figure 22)**. The apparently arbitrary placement of the Newport windows poses valid questions. Included in the ranks of buildings with randomly placed windows are the round churches of Scandinavia, Irish round towers, the chapel at Cashel in Ireland, and some of the Templar churches, including the enigmatic church at Lanleff in Brittany. They bear little relationship to Renaissance design and have no prototype in the early architecture of New England. In addition to letting in light, various theorists have proposed that the openings act as lenses, beaming the light of the fireplace (or torches) out into the bay. Windows that are double-splayed, or single-splayed on the exterior, are a feature of medieval architecture. Not only are the Newport window double-splayed, but the splays vary in their angles and orientation. It is not possible to ascertain whether this is to insure accuracy of the astronomical function or due to inept construction techniques. My guess is that the astronomy was the controlling factor.

Figure 22. Window. *Ferryn*

Fireplaces

As late as the sixteenth century, rural buildings in England lacked chimneys. We can assume that this was true for the rest of Northern Europe where a roof hatch sufficed for the release of smoke. In big drafty stone rooms, a brazier eased the chill. Where this was not possible, we might also assume that some sort of chimney was devised. One such chimney was incorporated into the stone-built façade of a medieval house built into the overhanging cliff of La Madeleine in central France. But once fireplaces were introduced in the thirteenth century, they tended to be large, with huge chimneys open to the sky, probably pulling out rather than conserving heat, and doing double duty for cooking as well as heating. The only other examples I have found of a small fireplace with a flue exiting on the face of the exterior wall similar to Newport Tower **(Figure 23)** is a fireplace in the loft of the Chapel at Cashel and in the intriguing stone towers on the grounds of the Sulpician Grand Seminary in Montreal. Means argues convincingly that the danger of fire from mill dust argues against a fireplace near the grinding mechanism, further degrading the theory of the tower having been built as a mill.

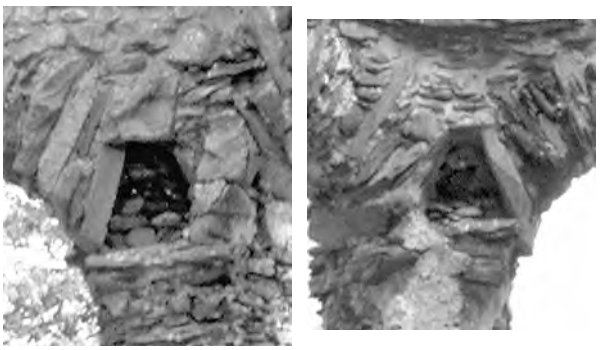
Figure 23. Fireplace. *Carlson*

Plaster and mortar

I have found it surprisingly difficult to find information on the ancient manufacture of plaster and its various uses. The classical Mediterraneans used mortar for bonding masonry and finish wall coatings. This knowledge was brought to Ireland in the sixth century, but was not used in most construction. The round towers were all dry stone construction. It was not until the eleventh century and the arrival in northern Europe of missionaries from Rome bringing southern masons and techniques, that mortared stone construction was introduced for ecclesiastical buildings, mainly churches and bishop's palaces. Most buildings continued to be wood frame with wattle and daub fill. The conversion of limestone or shells into a white paste was known early in Ireland where the walls of hill forts of the High Kings were whitewashed with lime. Scandinavians adopted whitewash for their stone churches in the eleventh century, and interior walls were coated with plaster to be frescoed. The paintings were suggestive of Byzantine styles which were brought home by returning crusaders, or even earlier Vikings following the "east way" to Constantinople. Many of the Scandinavian round churches appear to have been plastered (stuccoed) on the outside, but the date of the application is unknown. Along with the ubiquitous Romanesque stone churches, the

medieval feudal system brought incessant war and castle construction. The ability to withstand siege had been the major defensive prerogative until the musket and cannon changed the ways of war on the dawn of the Renaissance. Early castles could not afford the luxury of finished walls. The energy was spent on tapestries and wall coverings. Probably the wattle and daub tradition of wood building joined with elaborate masonry decorative trim to produce interior plaster walls during the Tudor period.

The consensus is that the Newport walls were parged (coated with plaster) on the exterior. From evidence of plaster in the beam sockets above the columns, we might assume that the interior was plastered as well **(Figures 24 A & B)**. Evidence for this practice on medieval buildings is slim, even the gleaming stucco of the Scandinavian round churches appears to have been added later. There seems to be no clear prototype for the parging, leaving another unsolved mystery to ponder.



Figures 24 A & B. Beam sockets. *Carlson*

Missing links

We can analyze the stone built edifice. Of the remaining elements of construction, forever lost, some can be surmised from scant evidence. For others, only a guess is possible.

The beam sockets provide our scant evidence for the floor construction. Hammer beams must have been used. Were they rough-hewn timbers, or did a finish carpenter plane and smooth the surfaces, add chamfers and beading? Was there any carved detail? How thick were the floorboards, certainly wide planks from the virgin forests. Stone protrusions show a shadow of a stair from the second floor to the third, but what was the access from the ground to the second floor—trap door, or spiral stair? The mystery of access to the upper floors also haunts us as we study the lavabos which, for the most part, leave us wondering about access.

The Viking theory advocates depend on the existence of an ambulatory to substantiate the round church theory. All of the round churches proposed, and many of those not proposed as a prototype for Newport which have ambulatories, are constructed with stone vaults. Some, as in the Bornholm churches, have a simple barrel vault. In others following the Templar example, we find groined vaulting in the highest styles of the age. The projection of the column imposts beyond the outer ring of the cylinder above have been offered as bearing plates to carry framing for a wooden roof ambulatory structure. Although the early reconstruction drawings by Mason make this appear plausible, careful reconstruction using actual measurements show that there would not be sufficient bearing on the column tops and that the framing and roof pitch required to support an ambulatory would extend above the second floor windows sills, rendering the windows useless. One would also expect to find sockets to relieve the upper members of the ambulatory rafters and there is no indication of there ever having been such sockets. Nor was any evidence was found of ambulatory post holes or footing or foundations in Godfrey's excavation, convincing me that there never was, nor was there ever intended to be, an ambulatory surrounding the tower.

One lost thread, with no trail whatsoever, is the form and material of the roof. Most reconstructions, based on the round tower theory, show conical roofs in imitation of the Bornholm predecessors. Investigators of the Bornholm churches suspect that the steep, full conical roofs were a later addition and the defensive structures were fitted out with a small diameter guard tower with a surrounding rampart complete with crenellations. A ring of closely spaced beam sockets near the top of Österlar's walls indicate that hoarding (a wooden catwalk) was hung from the out side of the tower. Could the two highest openings in the Newport tower have been gargoyles or drain spouts from a stone paved rampart?

The other towers we have considered have various roof configurations, from steep conical, to very shallow, to no roof at all, which are presumably a function of the climate and customs or local architecture. It is intriguing to think that where there is no evident access to the second floor, that retractable ladders led to the roof and the visitor then dropped down into the second floor room. I am tempted to imagine that these upper closed off rooms, in the lavabos at least, might have been observatories used as to track a celestial calendar. Penhallow and Egan have demonstrated that Newport Tower was also designed to follow the sun and the stars.

Design elements

We have discussed individual elements to try to find some mark of the builder. Now we shall examine form and function. Means treats the question of windmills in depth, showing examples of every known type of windmill and citing leading authorities of the time (1940) on the history and construction of windmills. He finds no correlation to the Tower and is a fierce opponent of the Arnold theory. At any rate, none of the windmills examined have an arcaded base. I will accept Means' evidence that the Chesterton structure was built as an observatory for Lord Edward Peyto. Despite

the corresponding elements, it is unquestionably a sophisticated Renaissance structure. Other early round structures built for military purposes are set on solid bases. Whether signal towers perched along the spine of the Pyrennees, or Irish round towers, they have impregnable bases. I have studied castle keeps, the battlements of walled cities and city gates, displaying the forms of all the elements of Newport tower, but all on solid bases. The most interesting of the military structures are the dual purpose, Scandinavian round churches. They meet the criteria of form, several stories, and randomly placed windows.

One searches in vain for a plausible prototype for the Newport Tower. Everything about its design is inconsistent with seventeenth century sensibilities. Examples can be found—including the Chesterton Windmill, garden pavilions, and other Renaissance curios or follies—of polygonal arcaded structures. There are few earlier northern European architectural forms consisting of an open, arcaded, circular or polygonal structure. Medieval market crosses and baldachins located under cathedral transepts meet the arcade criteria. The mysterious lanternes des morts found in France offer no real parallels. By adding a usable second story or stories, my search has produced only one example, the lavabos included in the cloisters of Cistercian Monasteries, a lavabo being an enclosure surrounding a water basin meant for ablutions before religious exercises or meals. In my lavabo hunt, I have found a full range of medieval design from the solid Norman structure at Mellifont in Ireland, to the French flowery southern gothic at Valmagne near Montpellier, France. An odd little lavabo in Germany features a conical roof with a jerkin head, another German example defies the rules of Cistercian austerity and sports a fairy-tale half timbered upper story. The octagonal tower in Ghent cited as a source of inspiration for the tower turns out to be a lavabo of sorts as well.

Weaving the Threads Together

We have woven a coarse cloth: the warp made from small stone structures scattered throughout medieval Christendom, the woof intertwined with the ideals of chivalry and echoing the dreams of Bernard of Clairvaux; in other words, the holy mission of the austere Cistercian monks, tempered by Templar zeal. We wonder if the circle and the octagon and the shared scale and proportions of the buildings we have studied encode an arcane sacred geometry understood only by the initiated.

Our speculations range through time and space. The tower could have been built over the course of one sailing season, but the astronomical observations observed by Penhallow might have required at least forty years of stargazing to define unless, of course, the master mason used an astrolabe to lay out his structure. Did the ancestors of Metacomet, the New World's King Phillip, share their knowledge with astronomers from across the ocean? Did a line of students of the Icelandic astronomer Star Oddi carry the information to Vinland for future use? Did the legendary inhabitants of Vitramannaland apply Druidic lore to aid newly arrived Christian brothers in laying out the Tower?

Had the surviving Knights of the Temple of Jerusalem defected to a new paradise in the wake of the Vikings? Had they been accompanied by Cistercian monks, who were known to be skilled architects, engineers and astronomers, to help realize their dreams? Were their refuges known to later brethren, now surviving as Scottish masons or Portuguese Knights of Christ, to Henry Sinclair or Miguel Cortereal? Perhaps even Columbus, thought by some to have been a Knight of Christ, could have been in the long line discoverers carrying the secrets of the Frères Maçons in their sea chests.

The common thread in a loose web of structures stretched across Europe, disregarded by architectural historians, is found in the polygonal, usually octagonal, arcaded open enclosures surmounted by a superstructure also round or polygonal, difficult of access and displaying local tastes in architectural style. Whether called more romantically from the Latin "lavabos" or just wash houses, these remnants and a common architectural motif are derived from the ideals of Saint Bernard of Clairvaux. Brother Robert, the master builder, left Clairvaux to build an abbey in far away Ireland. We don't know how many of the early Cistercian monasteries Robert designed (more than seven hundred eventually were built in Europe), but we can be sure that the trade secrets of the builders were shared. We can guess that they were also shared with their spiritual brothers, the Templars. With a legacy imparted down through the generations of initiates from Scotland to Portugal, they were united in their vision.

At this point in a journey of discovery, we don't know if the Newport tower reflects this vision transplanted to the New World. Before we can make such an assertion, there are many paths of study to follow. The primary element of the sacred structures we have examined was the use of water as part of church rituals. What evidence might we find of a near by water source, or even water fed to the inside of the tower's arched enclosure?

A more comprehensive study is needed of the architectural history of towers, monastic architecture, and particularly of lavabos and small ecclesiastical structures, and should include an examination of the geometry, sacred and secular, involved in the planning. A study of the history itself is necessary to put the subject in context. Archeoastronomy is a new field, and the use of these structures as observatories is open to fresh investigation. And, of course, using Godfrey's excavation, the ground scan results, and the Danish committee's

research as a base, a comprehensive excavation conducted in an extended area around the site may provide invaluable clues to the solution of the mystery of the Newport Tower.

The question remains—who built the Newport tower, when, and why?

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