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A Special Relationship: Connecticut and Its Settlers

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Walk into any elementary school classroom and ask, “Why are we here?” You will definitely get a variety of answers. Most children’s answers might well consist of replies that focus on their parent’s insistence that they attend school. Some might realize that the law dictates that they receive an education, still others might mention that they live in this school’s district, or in another situation that they are bussed to their magnet school. Perhaps someone might say that they attend this school because their parents live and work in this area. There might be a child who has recently moved and possibly could share some reasons his parents had for picking their new location. A list could be developed of the advantages one area might have over another. They might include: the safety of the area: the affordability of the housing, the quality of the education, the proximity of the school, work shopping areas, buss lines and relatives. Considerations of these more complex issues lead to the theme of this unit. The questions are investigated include: What made Connecticut a place that the Puritans would come to start a new community? and What is the history of the unique geological features that prompted settlement in this region. This curriculum unit seeks to emphasize the relationship between the settlers and the land that they came to inhabit.

Our New Haven Public School’s curriculum at the elementary level includes studies of both Colonial New Haven and Connecticut. It is a period in our history that is wonderfully alive in our area. The New Haven Green with its churches, Grove Street Cemetery, the Pardee Morris House, The New Haven Colony Historical Society, the American exhibit at the Yale University Art Gallery and many Colonial era homes allow for an insight for studies of our recent past. What is generally not acknowledged is that our geological past is ever present and with a little study equally fascinating. In fact, depending on where we are standing in the New Haven area, we may be on bedrock dating back 600,000,000, 400,000,000 or 200,000,000 years. The very material beneath our feet may have been created by heat a pressure miles below the surface of the earth, at one time the floor of an ocean or even finally uncovered lava. Eighteen years in the New Haven School System’s classrooms teaching grades three through six have given me a chance to develop an interdisciplinary approach to this area of study. During my last ten years I have been an itinerant instructor of the talented and gifted students in kindergarten, first, second and third grades in five schools. My colleagues and I develop curriculum around a yearly theme that thoroughly involves the students in a single area of study. Our Nation’s first two hundred years is one of the areas of emphasis. The more preparation I have done for this unit the more involved I have become in a new understanding of the history of New Haven. I grew up in New Haven and attended the public schools. I teach in New Haven and I teach about New Haven, but it was not until I undertook this unit that I began to understand the geological significance of the surrounding landscapes, their history and their relationship to the early settlers.

Goals of the Unit

In this unit students:

- 1) will be able to identify where specific towns and cities are located on a map of Connecticut.
- 2) will learn how to read and interpret a topographical map of the New Haven area.
- 3) will learn a map vocabulary and identify features on a physical map of the state.
- 4) will become aware of and learn to observe the geological features in our immediate community.
- 5) will learn how to examine samples of rock and identify whether they might be sedimentary, igneous or metamorphic.
- 6) will learn a geological vocabulary that will help in an understanding of the rocks and minerals of the area.
- 7) Will have a feeling for the enormous amounts of time that have passed as a result of a study of different types of time lines.

Selected Episodes in The Settlement of Connecticut

Our region has been inhabited for about nine thousand years (Russell 3). Initially there were nomadic hunters and gathers that followed the large herds of caribou into the area as the glaciers retreated. The forested Connecticut of the pre-colonial period had probably been populated for about a thousand years, with more or less well-established native boundaries and hunting grounds. It was the cultivation of the soil that had allowed for the permanent habitation. Once settled systems of art and government began to develop. Estimates of the number of natives vary greatly but Russell states, "Considering all data, we judge that a total of at least 60,000 natives in what are today the three southern New England states and New Hampshire . . ." (27) In the early seventeen hundreds the natives were cultivating six major crops, "maize, pumpkin, squash, beans, sweet potatoes and tobacco"(Van Dusan 32). An interesting extension is to identify the cultivated vegetables, fruits, nuts, flowers and shrubs that are native to our hemisphere. As early as 1602 sea captains visited Plymouth and gathered sassafras for medicinal purposes. In England it was a high priced cure-all. Of equal or perhaps more interest is a comparison of the New and Old World animals. Children's interest is usually piqued when asked, Why didn't native children drink milk as we do? The answer is that it was the colonists that introduced the cow as well as the horse and many other animals to this continent.

The first documented European account of the New England coastal region was done for Francis I of France in

1524 by Giovanni de Verrazano. He traveled up to fifteen miles inland at intervals along the coast so he could give a comprehensive description of the land. He stated the land was, “as pleasant as it is possible to conceive,” with “open plains as much as twenty or thirty leagues in length, entirely free from trees”; and so fertile, he judged, “that whatever sown there will yield an excellent crop.”(Russell 8). It wasn’t until 1614 that a more explicit documented account of the Connecticut coastline and waterways was available. The Dutch explorer Adriaen Block sailed a forty-four-foot ship, the *Restless*, into our waters. In his log he referred to the land surrounding an excellent harbor as “Roodeburg” meaning red town or place. The harbor was flanked by two red hills, no doubt East and West Rocks. Block also sailed up the Connecticut River to at least Hartford and perhaps as far as the present day Enfield. The Dutch didn’t follow up Block’s explorations by actively colonizing the area. They did trade over the following ten years with the local natives in the Hartford area for beaver skins. Amazingly enough it is estimated that up to 10,000 skins annually may have changed hands.

It was in the same year that John Smith mapped the Massachusetts shoreline and named a spot Plymouth. It was to this location that the *Mayflower* sailed in 1620. In the six short years between Block’s and Smith’s mapping voyages and the *Mayflower*’s arrival the native population had been decimated. The Europeans had inadvertently brought with them either small pox or bubonic plague and from Maine to New York the Native population had been ravaged. The result was that the settlers really didn’t come to and establish their communities in a ‘wilderness’. It may have been a very difficult lifestyle change from urban European to new World agricultural but, “the land affords void ground” and “in many places, much cleared ground for tillage.” A Captain Thomas Dermer at this times added, “Ancient plantations, not long since populous, now utterly void.”(Russell 12). It is not uncommon to find mention of fields of up to fifty acres in size. The Pilgrims of Plymouth interpretation of what had happened is reflected in the following statement, “It pleased Almighty God to plant them upon the seate of an old town . . . abandoned of the Indians,”(Russell 12).

With the availability of now uncontested deared land and the religious fervor of groups of Englishmen a land rush of sorts began. In 1633 the Massachusetts Colony was bursting with groups with slightly different points of view but the same high degree of evangelical commitment. Differing on the oath required of freemen, the necessity of a small ruling body and the desire for a free church caused Roger Williams to be banished. With a group of followers he went to the Rhode Island area and established an independent colony. Similar, nearly as serious, dissatisfaction among the preachers John Cotton, John Haines, Roger Ladle and Thomas Hooker coupled with their desire for the fertile land of the Connecticut river Valley caused a good deal of unrest in the Plymouth area. It wasn’t a matter of just moving out, the Massachusetts General Court had to grant permission. The Court also insisted that any newly established colony continue under Massachusetts’ rule. As fate would have it the prior to the departure of some of the Massachusetts groups the Dutch erected a small two cannon fort in the Hartford area. In 1633 William Holmes brazenly dared them to fire as he sailed by. His group built a fort just to the north at Windsor and successfully held off the Dutch. Two years later Roger Ludlow lead a group to Windsor. This was the beginning of the migration to Connecticut. During the two-year interval John Oldham traveled overland to the Wethersfield area of the Connecticut River Valley. The winter of 1635-36 was particularly severe and the Windsor settlement suffered greatly. Spring brought relief in the form of a fairly large number of settlers coming to both the Windsor and Whethersfield areas. This set the stage for Thomas Hooker, in June of 1636, to travel across land to Connecticut in what was the most famous rnigration to the Connecticut Valley from the Bay Colony. Hooker’s group had about one hundred people and one hundred sixty head of cattle, goats and swine. They settled at Hartford. The Dutch that remained were assimilated into the new community. In 1637 it is estimated the Windsor, Hartford and Whethersfield area was made up of sixty or seventy families, representing a population of about eight hundred people. (Van Dusan 3 5).

New Haven began as a self-governing commonwealth. New Haven was an independent colony. It was not a colony supported by Royal Charter or legal title from the English government. The independence of New Haven rested upon the chance that the English government would be friendly or too preoccupied to interfere with their affairs. It was both a Puritan community, dedicated to God and at the same time a commercial enterprise. The Bible contained the word of the Lord. It contained the rules of conduct that individuals must follow and a pattern from which they could draw a plan of social organization. The Colonists perceived no conflict between their religious beliefs and pursuing economic advantages.

Two schoolmates had become the organizers of this company of faithful. The Reverend John Davenport and Theophilus Eaton personified the themes of Puritan community and mercantile enterprise. Eaton was a successful businessman and an administrator familiar with the operation of the joint stock companies of the day. He was a staunch Puritan. John Davenport had been the Vicar of Saint Stephen's Parish in London. In that role he was expected to be a participant in the "prudential and secular affairs" of his parish.(Osterweis 7). He had left England for Holland in 1633, but the fear of his parishioners straying from their beliefs and his communications with Reverend John Cotton, whose accounts of New England were exciting, provoked Davenport to return to England. He joined with Eaton to embark on a business venture to establish a plantation with a good harbor for shipping and at the same time allow the unrestricted practice of their religious beliefs. These settlers were, "the wealthiest group of merchants to come to any New England settlement before 1660"(Shumway 11). They would have attempted to fit into the Boston community if they had not encountered a Puritan church crisis. Anne Hutchinson had scandalized the Boston congregation with her beliefs that divine inspiration came directly from God to the individual and that our earthly conduct had little to do with salvation(Floyd 36). Such a dispute was so offensive to the newly arrived group that Davenport and Eaton immediately sought refuge in another part of this land outside the Massachusetts' charter area. They heard of our area most likely from Captain Mason, who had pursued that aggressive Pequots through the area a few years earlier. Eaton and other members of the group went to the area the summer before the rest of the company followed. In the fall seven remained at the Quinnipiac site, while the others returned to encourage the rest of the company to follow in the spring. There was cleared land, a good harbor and the chance of developing a good fur trade. It thought that it was during the winter stay that the nine square pattern for the city was developed. Thus actually we may agree with the comment that New Haven was "America's first planned city"(Sledge 1). It took two weeks for the Hector and another unnamed sister ship to sail from the Massachusetts Bay Colony to the Quinnipiac harbor. Finally, Saturday, April 24, 1638 about five hundred settlers disembarked.

The location had been well chosen. There were to the east and west successive smaller harbors, estuaries of rivers that suggested good locations for settlement. The Quinnipiac harbor was also about half way between the Dutch settlement of New Amsterdam and the Massachusetts Bay Colony. In addition, there was virtually no threat from the area natives. Less than sixty natives in two small groups remained In order to establish some title to the land treaties with the chiefs, Momauguin and Montowese, were signed in late 1638. The town fathers felt that in order that New Haven become a new trading center they should create a series of communities in the area. These communities would deliver their products to New Haven for export. In 1639 Milford and Guilford were established by the Reverends Peter Prudden and Henry Whitfield respectively. The Henry Whitfield House is still standing and may be visited. Stamford, further west along the coast and Southold, on Long Island, were incorporated in 1641. The last member of this network of local communities was Branford, it came into the fold in 1644. The coastline provided the New Haven Colony with an area from which to seek commercial expansion and financial reward.

Connecticut, A Geologically Unique State

The reasons that the Puritans chose to move to this state are directly to our geological past. The formation of our rich central valley and our sheltered coastline has taken millions of years. It wasn't until the sixties when the theories of plate tectonics and the resulting continental drift were verified and accepted that a true picture was developed explaining Connecticut's unique landforms. Geologists divide Connecticut into four major regions using the "terrane concept. Terranes lump together rocks with similar or related histories, even though these rocks may have quite dissimilar looks or compositions"(Bell 140). The four terranes of Connecticut are, 1) the Western New England Upland, 2) the Connecticut Valley Lowland, 3) the Eastern New England Upland and 4) the Coastal Lowlands(Bell 10). Connecticut is the third smallest state, only about ninety miles east-west and seventy-five miles north-south comprising 5,018 square miles(World Book Ci-Cz 763). Despite the size, within the major regions we find parts of other continents, the remains of ocean floors and the reminders that dinosaurs once walked in our Connecticut River Valley. When a geologist tries to put the time that has passed into perspective he thinks in terms of millions of years, but there are some four billion years to be accounted for. Divisions of this enormous time period were made that were primarily determined by rock's fossil remains. "The Geological eras are called Cenozoic-recent life, Mesozoic-middle life, Paleozoic-old life, and Cryptozoic-hidden life"(Rodgers 3). It was during the Paleozoic era that the first of a series of collisions started that heralded the formation of Connecticut's ancestral bedrock.

"Eighteen miles of solid crust sits on 3,800 miles of unstable mantle and core. If the earth were scaled down to the size of an egg, the shell would be more than twice the thickness of the crust"(Little 11). Areas of thicker crust, called plates float on top of the mantle moving ever so slowly because of the convection currents from below. These plates may collide creating mountain ranges. Our West Coast is an example of such an on going collision, that is complete with earthquakes along the 'fault' or collision boundaries with the accompanying volcanic action of Mount Saint Helens. Such an area is called a subduction zone. Connecticut has been the site of three such continental collisions. The first of these occurred some 500 million years ago during the Paleozoic Era. As a small area called the Bronson Hill Plate slowly approached the Laurentia Plate, essentially the land mass that we call North America. A body of water named the Proto-Atlantic and its muddy sediment grew more shallow and developed large coral banks in a tropical climate as it was compacted between the two plates. Eventually this area was to make up the Western Highlands of Connecticut. The middle of this one hundred fifty million year period the earth's most spectacular collisions happened and a super continent was formed called, 'Pangea' a Greek word meaning 'all lands'. As a direct consequence of this uniting of the plates the rest of Connecticut's highlands were formed. What took place was another collision first with series of mini-continents, called 'Avalonia', which may have been between five hundred and three thousand miles from our shores in the middle of a body of water called the Iapetus Ocean. In mythology Iapetus was the father of Atlas. The second collision was with the African Continental plate that was equally distant from the mini-continents. These land masses all compacted and crunched. Imagine the pressures exerted when these land masses collided! The heat and pressure of compression changed the coral sea bed into limestone and marble, clays turned into slate, sandstone into quartzite and large areas of ocean floor to gneiss and schist. Along route 8 in Higganum Connecticut you can see folds in the metamorphic rock, the rock resembles a marble cake. Today if we consider the areas that are currently undergoing continental collisions we find mountain ranges, the Rockies and Himalayan chain, earthquake zones and volcanoes. What happened to Connecticut? "At one time, the rocks at today's surface were more than five miles underground: the persistent nibbling of the land by erosion has removed at least that much . . . Yet the outlines of today's terranes probably bear close resemblance to those of earlier times"(Bell 151).

Now as we are aware the drift didn't come to an end, we are no longer one enormous land mass. The megacontinent didn't have a stable foundation and forces from within the mantle and core pulled at the largest plates once more. The formation of our Connecticut River Valley began as the retreating African Continental Plate tried to separate along the same boundaries that had existed before the collision. The strain on the crust along this area caused lava flows above the ground. Above ground flows are called extrusive. Flows that were trapped below ground are called intrusive. The extrusive lava was covered by sedimentary run off from the surrounding mountains. Today we call these lava flows traprock. At 190 million years old it is Connecticut's youngest rock. As the pressure of the drifting continent increased a major crack occurred. This rift is called the Eastern Border Fault. The Eastern Highland landmass slid away from the Western. It didn't crack and open up a gaping hole, it slid down and to the East on a steep diagonal. The lava and sediments that had layered horizontally on the surface were now pitched down to the east exposing their western most edges that now became exposed. This rift created Connecticut's central valley. This rift extends into Massachusetts not quite to the Vermont and New Hampshire border. Throughout this valley are the basalt ridges, the most noted of which is the Metacomet ridge. When a map of the terranes of Connecticut is viewed, the funnel the point, of which is located in the New Haven area. Why then is it that the Connecticut River's estuary at Saybrook? The Metacomet ridge is the problem, it forced the river to cut a path through Eastern Uplands near Meridan to reach Long Island Sound. This ridge formed a topographical boundary isolating New Haven and Hartford. It is interesting to note that the desire to be involved with river trade encouraged the New Haven area businessmen to construct the Farmington Canal after reports of the success of the Erie canal were publicized. The canal ran just west of the Metacomet ridge and it was hoped that it would provide a more attractive path to the Sound. It opened in 1827 only to be replaced in a few short years by the railroad that truly broke the traprock barrier.

New Haven finds itself located in a unique position. The Eastern Border fault converges with the Western Uplands at our harbor entrance. If we stand at Lighthouse Point and look to the west we are looking at Iapetus oceanic terrane that is from the middle to early Paleozoic age about 350-500 million years old metamorphic rock. Looking to New Haven we see the red-orange of East rock the Early Jurassic Age igneous rock only about 190 million years old. At our feet and along the coast we are on Avalonian continental terrane that is from the Protozoic age some 600-700 million years old metamorphosed sedimentary and igneous rock. Just out of sight to the north and east is more 350-500 million year old Iapetus oceanic terrane.

The last of Connecticut terranes to be discussed is the Coastal. The indented natural seacoast that has many natural harbors is one of Connecticut's greatest resources. Bell points out that the thirty harbors of differing sizes along our coast have, "supported such enterprises as fishing, lobstering, oystering, whaling, shipbuilding, international trade, ferrying, privateering and pirating. . . Today we can add marinas, vacationing, tourism, year-round residences submarine building and a naval base to the list"(78). It is amazing that there is six hundred eighteen miles of coastline within the ninety miles from the New York to Rhode Island State lines. These were relatively safe harbors because of the absence of the ocean's pounding erosive force. Long Island is a natural boundary protecting our shoreline from all but the worst storms. This sheltering effect is a result of our most recent major geological phenomena, glaciation. As the crustal plates have shifted over the millions of years our area has changed from a tropical to a more temperate climate. The red soils and limestone deposits found in our state are indicative of a much warmer period. Our shifting on the globe to a more northerly position allowed for, "over 20 glacial advances during the last 2 1/3 million years." At times our area may have been under as much as a mile of ice. In fact today some scientists say we are between ice ages. "Even Mt. Washington's 6,300-foot summit is capped by erratic boulders, mementos of victorious ice . . ." (Little 55) Initially the glacier grew and was very active, eroding fertile soil and rock from the inland areas. The force was so great that gouges in bedrock are visible today on the uphill ridges the glaciers ground over.

From the downhill side boulders were plucked because of the pressures exerted by the glaciers. The New England area found itself under a huge immobile glacier. New England's hilly terrain slowed the glacier down. As the climate warmed again the glacier melted. It was an uneven melting, no doubt darker, dirtier areas absorbed more heat causing holes in the glacier. Geologists have given the different types of glacial formations and deposits names. We have kettles, drumlins, eskers, till and moraines. Long Island is essentially a type of glacial deposit called a moraine. The rate at which the ice melted and the speed at which the glacier was moving were nearly equal. This resulted in the massive amounts of soil and rock that had become part of the glacier as it moved being dumped in a long narrow pile. Block Island, Martha's Vineyard and Nantucket also are moraines. Not only did the glaciers protect our coast from erosion by building Long Island it also scraped and notched it.

In the Connecticut River Valley the glacier caused, "New England's largest glacial lake, Lake Hitchcock, which eventually extended along the Connecticut River Valley for 150 miles to Lyme, New Hampshire"(61) It is estimated that the lake was formed about 13,700 years ago a combination of glacial ice and deposits blocked the spillway. Just imagine as the glacier cliff melted, icebergs thundering into the lake. At the same time many streams annual brought large amounts of sediments into the lake. The large aggregate formed deltas of gravel that are used today in construction. The further from the origin of the delta the finer the deposits, gravel first, then sand and finally clay. The yearly snowmelt run off in the spring carrying coarse sediment and the slower more constant flow of the rest of the seasons carrying finer sediment caused pairs of clay and sand or silt deposits called varves. Along many of Connecticut's rivers clay pits that were used to make brick still can be found. The Rocky Hill dam was able to withstand, "the forces of erosion for several thousand years"(63) All at once the lake was gone and a vast barren lake floor remained. Winds swept the lake floor, clouds of dust and sand piled up in certain locations along the eastern edge of the valley creating, "" the most extensive inland dunes in New England. ""(70) Streams cut new channels to the river through the different types of sediments. The next several thousand years brought more rich sediment to the Hartford floodplain. This was the land Thomas Hooker sought for settlement.

A Quick Guide to Rocks and Minerals

Rocks are formed in three ways. Areas representative of each of these methods are easily located in the New Haven area. East and west Rocks are examples of lava or igneous rock that is of volcanic origin. Molten or liquid rock is called magma below the ground and lava once on the surface. In geologic terms the lava in our area that is commonly called basalt cooled quickly. Rapid cooling doesn't allow time for any minerals to crystallize. These rocks are hard and massive. Granite is an igneous rock that cooled slowly deep below the earth's surface. Rocks formed this way have coarse mineral grains and crystals that can be easily seen. We see granites because of the erosion of the earth's surface or because of the activity of the continental plate activity.

Sedimentary rock was once loose material that was deposited in layers (strata) millions of years ago. The materials include older rock, plants and animals. The passage of time caused these materials to form solid rock. As layers of clay were deposited, the water is squeezed out and shale is formed. Natural chemical substances bind the aggregate together in sandstones and conglomerate rock. These are common and found throughout the Connecticut River Valley. There are also organic sediments that turn into rock. In the northwest corner of our state are the limestone deposits that were coral reefs and shell deposits from the

lapatos sea. Coal is also considered a rock formed from organic material.

The final type of rock is called metamorphic. This is rock that has changed in appearance and perhaps even in mineral composition. These changes may take place because of the heat and pressure from the movement of the earth's crust as mountains are built or by nearby igneous (lava) intrusions. Such extremes of pressure and temperature often make these rocks look crunched. They may be irregularly banded with light or dark minerals. This happened when the crevices formed under great pressure and were filled with chemically active fluids that cooled slowly forming crystals. Sedimentary rock may be metamorphosed, under such conditions shale becomes slate, limestone becomes marble and sandstone quartzite. The two most common metamorphic rocks are schists and gneiss. Schists glisten with mica and other minerals and are metamorphosed from impure sandstones, limestones and shale. Gneiss is a rock banded with light and dark minerals.

Perhaps you have noticed the word mineral repeatedly used in the above paragraphs? Minerals are the ingredients that rock is made of. All rock contains minerals. The term mineral refers to a substance that meet the following criteria: 1) it is found in nature, 2) the substances making up the mineral were never alive, 3) no matter where on earth it is found it is chemically the same, 4) they can form crystals, that is they also can be arranged in a regular pattern. Oil and coal are not minerals because they were formed from the remains of plants and animals. The elements gold, silver, copper, graphite, and sulfur are minerals, but most are combinations of elements.

Glaciers and their deposits pose a problem for us. We find rocks dropped here that have traveled thousands of miles. The identification of a student's finds becomes more difficult with this variable introduced. Students should first observe identified samples of rocks noting the similarities and differences. Then they can apply what they have learned to the samples that they find. An individual's ability to observe the different characteristics of the rocks is the key.

A Timely Lesson

Understanding the concept of time is a developmental process. The child enters kindergarten interested in young and old as it relates to him. During their first or second year of school the teacher may have students make simple personal time lines complete with baby pictures and events that the children recall. Sequencing events leads to charts that designate who has what task during the day or week. The teacher usually assures the class everyone will have a turn. This suggests that you will have your turn and that your turn will come again. You just have to wait! Class task assignments are augmented by the addition of art, physical education and music schedules. The cycle of the seasons is usually introduced as part of the science curriculum. At about seven years of age telling time has been mastered and some children may become fascinated with more complex schedules. They all know when their favorite television shows are on. It isn't until around ten years of age that, "the child is better oriented with respect to historic time." (Gessell 427). Now the child has become confident with the concepts of years, dates and minutes. The fourth grader understands long division, decimals and fractions. He can apply the math he has learned to solve problems. There is an advance in creative and abstract thinking. This is an excellent time to develop an appreciation of historical time.

In this unit the idea of time is important. One hundred fifty years ago the Civil War was about to begin and New Haven was a world leader in the manufacturing of horse drawn carriages. One hundred fifty million years

ago a rift in the central part of our state developed as the African Continent pulled away from what was to become North America. How can we approach these types of time spans?

A valuable starting place is a variation on the time line that can be used to refine the idea of past time.

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