Soil Mechanics

. A Branch of Science dealing with the structure, engineering properties, and reactions of soils under loading and weathering.

. Theoretical and practical study of soils for building structures.

. Knowledge of physics, mechanics, and hydraulics applied to study the behavior of soils.

. Also called Geo-Technique / Geo-Tech Engineering

. The Study of mutual interaction of soils and structure.

. The practice of Engineering which applies the principles of soil mechanics to the design of engineering structures is called Soil Mechanics Engineering or Geotechnical Engineering.

Dr. Aitaullah Shah

Chapter Eight
PLANTING EVIDENCE

Returning to our last three Field Observation groupings from Chapter Seven on 'flagstone,' 'clover,' and the 'depression,' we move forward to wrap up our examination for more clues to *Who*, *What*, *Why, When,* & *How*.

Field Observations, continued…

FLAGSTONE (Chapter 8)
2 ft. under soil in depression, is nicely laid floor of flagstone carefully covering hollow
Flagstone was not natural or indigenous to the island, differed from Oak Island stones
Determined to come from mouth of Gold River & Atlantic Ocean, 2 mi. north of the island
Likely placed as a marker, later covered by wind-blown dirt and detritus
CLOVER (Chapter 8)
Clover was red, clover was white and growing in profusion, in a circular clover field
Red clover and surrounding plants were foreign to the island, not native to area, unique
No clover supposed to grow on island, or growing in soil in its natural state
Clover grew in sunken depression below the level of ground all around it [depression]
Clover only grew in circular sunken depression
DEPRESSION (Chapter 8)
Deep, Saucer-shaped, sunken hollow, shaped round, soil settled from previous dug hole
Between 7, 12-13 ft and 16 ft in diameter and deeper in center of depression
Deep bowl-shaped depression directly under extended branch from one of large oaks around it
Soft soil in depression, easy to dig with young timber in it. Clover grew in the depression
Located in the center of a clearing or area of cut trees at base of one large oak, under fork

Flagstones

This is a very important forensic clue which you will later see greatly impacts the calculation on *When* the Money Pit was refilled. As you are aware, flagstone is a thin (1 to 3 inch thick) slab of stone. It can range from 12 inches to 40 inches in width dimensionally and is broken or has odd-shaped edges. Our depression was 13 ft in diameter which equates to 133 square feet (rounded up). Local *native* flagstone is sold in Nova Scotia from many local quarries and can be quarried from ironstone slate, dolomitic limestone, carboniferous sandstone, quartzite, or granite. It is referred to as "random flagstone." In Halifax, NS., *native* random flagstone per pallet, covers 100 square feet and a pallet weighs between 12-1500

lbs.[1] Therefore, for the quantity of 2 inch flagstone to cover the depression as described in the field observations, would conservatively require .9 metric tons (1,984 lbs.) of flagstone. That is a lot of heavy stone to haul from two miles away at the mouth of the Gold River, and across the water to Oak Island! - *Or did they?*

All those who opined and others who commented in Appendix C, "*On the Record*," said the flagstone was not 'from' Oak Island. It was not indigenous to the island, and it was specifically identified as coming from the mouth of Gold River. Yet we have others who say Oak Island, specifically the western drumlin, was made of slates, where flagstone should have been common or attainable. Henry S. Poole, Esq., reported in 1861 to John Rutherford, then Inspector of Mines for the Province, said,

> *"I crossed to Oak Island and observed slate all the way along the main shore, but I could not see any rock in situ on the island."*[2]

Recently, Terry J. Deveau, a scientists and expert in Mi`kmaw heritage, sent me provincial mining maps reflecting Oak Island should be covered in slate and flagstone material. His comment was,

> *"You don't have to go all the way to the Gold River to find slate. Even the eastern half of Oak Island is slate bedrock geology. That rectangular hole they investigated near Dave Blankenship's house (what did they call it again – the Hatch?), was cut into the slate bedrock*."[3]

So what's up with that? Did those 'old timers' who could find the 'old road' leading from the depression also know something about 'old flagstone' and why it was believed to come from the mouth of the Gold River? There was even discussion back then of its color and makeup. Ironically, this Gold River site is home to the Mi`kmaw nation and they call it, *Amapapskeqek* -Mi`Kmaq for "the Rocky River."- *How apropos.* I thought it was "*gontewapsgeg sipu*?"

Is it possible, our ancient voyagers who came to Mahone Bay asked indigenous people where they could find flat stones or flagstones; before setting foot on Oak Island? Were they directed to the *Rocky River* and procured the needed materials whence they set off to dig to their hearts delight? As I re-read these repetitive claims of someone actually tracking down where the flagstone came from, I wonder for what purpose was this carried out? Who back when the story formed, could care less about the makeup of flagstone dug up under the forest duff? They were miners and they would know their rocks and flagstones, right? Yet Like so much of this treasure story, every aspect has mystery and shadows of doubt.

Wait! There is a reason why the flagstone is important - *where it came from is not it.* The weight of the flagstone placed on the refilled pit is the issue for us.

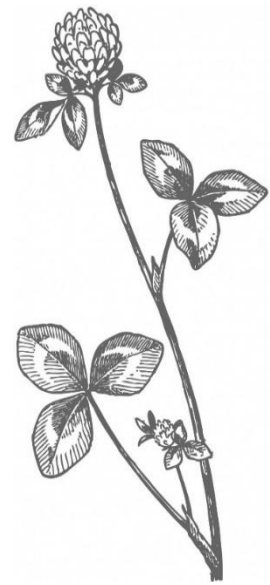
When the Money Pit was backfilled to the top of the forest floor it would be very soft and dangerous to any man or animal who happened to walk across it. It could even have physical aspects similar to quicksand. So whether as a marker, protective barrier, or to hide the obviousness of the pit, a layer of flagstone was used to 'cap' the refilled shaft.

Over a period of time, the soil settled below every log platform as well as at the top of the pit. The settlement below the flagstone was creating a growing depression. As time went on, this depression from the soils settling below, was partially filled in with windblown duff and detritus on top. This added to the vertical weight placed on the disturbed soils below.

Yet where were the centuries of collected acorn masts (shell pieces) within this hollow? With no deer in Nova Scotia at that time, even the red clover was allowed to flourish. - *Which also wasn't indigenous to the area. Oy, oy!*

Red Clover

What was so odd about red clover growing on top of the depression, and why did our observers take such interest in it being there? Why did they say it was nonnative, or foreign to the island? And if indeed clover, was it white clover or red clover and does it have anything to do with this treasure mystery story at all?



Drawing Courtesy
Karen Arnold

Well, red clovers *(Trifolium pratense)* circuit on the Agricultural Revolution had not made it to Nova Scotia – *yet*.

This plant, along with turnips and other legumes are together credited for growing the Agricultural Revolution of the 16 & 17th century.

They literally saved Europe's bacon!

Famine had become widespread, soils were depleted of nitrogen from over farming, over grazing, and over cutting. All while the population of city states boomed. The plants involved in spurring agricultural awakening included vetch, lupins, broad beans, peas, lentils, and various other plants from the family of legumes – including red and white clover.[4] Appendix H*, "Dirty World of Detritus,"* discusses how red clover won over the world and in its spread saved Ireland, Denmark, England, Europe, and eventually Nova Scotia.

White clover *(Trifolium repens)* arrived in the Western Hemisphere as early as 1555 where the Aztecs called it "*Castilian ocoxichitli*," meaning a low native plant that prefers shade and moisture.[5] It is also believed to have hitched rides with Russian fur traders in the northern California territories and in Incan Peru where it was called "*trebol*;"[5] and brought along with English colonizers of Virginia in

1629.[5] It was an important imported forage crop for many and a pervasive weed to many, many more. Today, white clover is first and foremost a pasture species and a much important pasture legume in Atlantic Canada supplying significant amounts of palatable nutritious grazing.[6] It does have its drawbacks, and this is where red clover became the darling of the Agricultural Revolution.

Red clover was a wild plant in Europe and the Middle East and remained so until it was domesticated much later by Moorish Andalusians (Moorish Spain) around 1270.[4] With the rise of Christian Spain, a rapidly expanding powerbase of the time period, domesticated red clover and its benefits were equally expanded into Lombardy and the Netherlands, both of which were under Spanish rule. By 1583, red clover reached France. 1620 it was exported from the Netherlands to England and was known as "Flemish Clover." Written up by Sir Richard Weston in his famous book "*Discours of Husbandrie used in Brabant and Flanders*," his book described the miraculous Flemish clover farming and red clover became the rage by 1644.[4] The success of the clovers effect on improving grazing lands, farming plots, and other arable lands became something to celebrate throughout the British Isles, Scandinavia, Europe and soon in the new colonies. It was a favorite of William Penn.[7]

However, Nova Scotia was for all intents and purposes still in the Dark Ages. Even though explorers looking for easy passage to points beyond started exploring its land in 1497, the French did not attempt their first settlement until 1605 in the land known as "Acadie." Due to weather, war, Indians, and the lack of experience of those early settlers, New Scotland was unable to host a successful, sustainable encampment through the mid-1700s. The one thing the "Planters" did not know how to do was plant. As refugees from across Europe and with diverse economic backgrounds, these settlers were foisted upon a land covered in gigantic old-growth medieval forests up to its shorelines.

This was no easy nut to crack as they attempted to scratch out a meager existence. They could not live on timber and fish alone. This time period and the horrific conditions these people experienced is covered in Appendix B, "*The Truth in Timber and Timing.*" Though advertisements for red clover were popping up around Boston, MA. as early as 1730's, sales of it in South Hadley and Northampton by 1757, and then exported from Boston in 1773; Nova Scotia did not get the flyer on red clover's importance.

Suffice it to say, by the end of the 17th century the settlers, Indians, livestock, and the morale of those Acadian people were desperately low, and any help from the Agricultural Revolution of Europe had not trickled into Nova Scotia, nor would it for another fifty years.

The first glimpse of any introduction of red clover to Nova Scotia I found, was a letter written back to England. The young Englishman was informing his family on his condition. It included a story about a five pound bag of red clover seeds recently arriving in Halifax. It was destined to help the Mi`Kmaq, Yet it was so cold that year and firewood was scarce, livestock frozen, and foodstuffs eaten, that the lucky recipients of the red clover seed could not wait for spring to plant it. So they did the next best thing and poured it into hot water and ate it as a soup for their malnourished souls.[8] Red clover had arrived in Nova Scotia as this letter attests in 1798, yet with little fanfare and jubilation. The explanation and proper use of red clover was not revealed to Scotians until John Young started publishing the '*Argricola Letters'* in the *Acadian Recorder*, in 1818.

Even later, when Pierce Stevens Haliburton published *"Forest Destruction"* in 1879 [9], he had not a kind word to report.

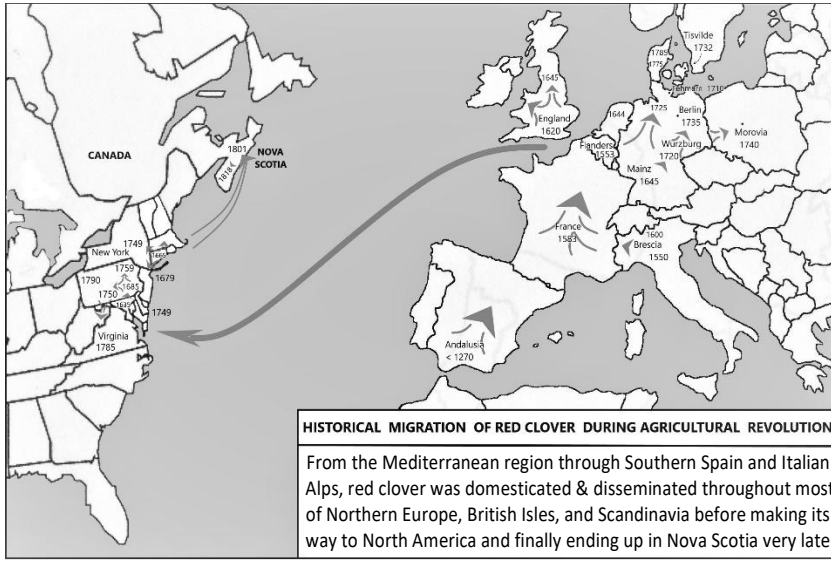
> "*In a new country the power of manure was not much regarded. The luxuriant power of vegetation In the virgin molds was such that artificial aid was deemed unnecessary and it was not until after its fertility was either diminished or exhausted by repeated and judicious cropping that recourse was sought to restore its vigor."*[10]

So, what was red clover doing growing solely on the top of the depression on Oak Island? Had Samuel Ball learned about its importance when a slave in South Carolina? Did he learn red clover was used to enhance Timothy Hay production as well as re-invigorate the poor soils on the island? More likely, he may have learned the benefits of red clover while he tended slave vegetable gardens, growing melon, goobers, squash, greens, sweet potato, and calabash.[11] They may have used the year-round benefits from companion-crop management. Today it is well known growing red clover in an amongst cabbage promotes successful growth and volume of harvest. Red and white clover add nitrogen to the soil, keep out unwanted insects and promote beneficial insects that dine on cabbage worms.[12] *Everybody wins!*

If this is the story however, then why such a mystery voiced by those later storytellers? Seventy years had passed and they should have seen clover as a common crop enhancement and forage crop for livestock. Whereas here, they ponder the plant's foreign and nonnative status. Was it just foreign to 'islands' or was it and other plants that were seen, foreign to the whole province back then? They all ask, why was it here? – *just as they did with those mystery canopied-trees, flagstone rocks, and coconut coir fiber!*

Or can red clover be an anecdotal reference to *WHO* filled in the Money Pit. Red clover's agriculture utilization has its own well-documented historical timeline marching through the geography of the Middle East, Europe, Scandinavia, and the British kingdom. Could it add verification to the location from *WHERE* our ancient voyagers may have set sights for Oak Island? Did they bring it along as perhaps another marker for the hidden objects below? Was the uniqueness of red clover a simple contamination of the area by those ancient voyage diggers? Did they, or did Samuel Ball, simply empty their pockets or pant cuffs of red clover seeds which were imported much earlier than the other farmers? But why waste the seeds in the forest under massive oak trees? Why is it a mentioned mystery to our storytellers of the time?

The map below shows the migrating spread of red clover through the Agricultural Revolution of the 1500 – 1600s. With note that Nova Scotia missed migratory spread by over one hundred years.



Migration of Red Clover. Map created by David H. Neisen

Should we… *could we* match up the *trifecta* of aligning the age of the coconut fibers with the time sequences of soils settlement and of oak log decay along with where red clover was migrating from at those points in history? Could this not pinpoint *WHO* our ancient voyagers were? Appendix H*, "Dirty World of Detritus,"* discusses the relationship of red clover's advance through the world's agricultural reform, and its spread as a unique plant geographically.

> *It has been reported that Darwin "noticed that a particular village produced more hay than neighboring villages. He put forward the theory that as this village had more old ladies as well it all made sense. Old ladies keep cats, cats catch mice, mice are the main predators of wild bees. Wild bees are the main pollinators of red clover and red clover improves the yield of hay. So in this food chain we see that by increasing the wild bee population we increase the yield of hay."*
>
> This is due to the effects of red clover on the hay - ergo companion planting. Story revision by Thomas Henry Huxley, 1892.[13]

Depression

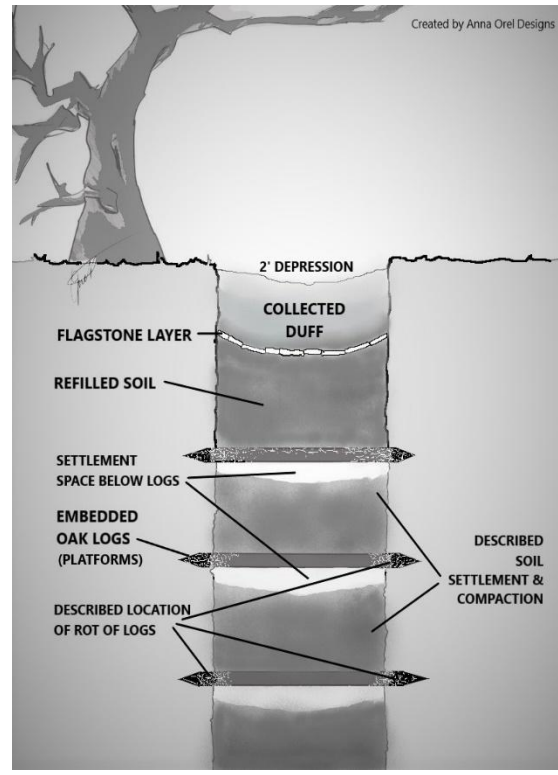
Quite clearly stated, the depression in the ground was a circular-shaped, deep hollow or sunken spot, lower than the surrounding surface level of the forest. Though the dimension varied, history shows agreement reached on it being 13 ft in diameter. There are four critical issues regarding the depression: 1) the entire depression was lower than ground level, and yet it had a saucer-shape to it. Implying the center was lower than the sides of the sunken hollow formed. 2) The dirt within the depression was loose, disturbed soil, which to many appeared to have been refilled into the pit after having been dug out. No mention of roots, acorns, rocks, and boulders within the digging of this depression! 3) There was red clover growing in the depression, and other foreign plants around the depression. All observers noted it was strange to see clover there (red or white). 4) After digging down two feet removing the duff, debris, and dirt out of the 13 ft diameter depression, they came to a layer of tightly-placed flagstones covering the depression. See the illustration of the following page.

The layer of flagstone found was not a naturally occurring formation there *in situ* and was later said to have been brought to this spot some two miles away at Gold River.

Had the Money Pit not been made up of multiple oak log platforms holding in place volumes of the refilled soil, the depth of the visible depression would easily be 20% of the total depth of the Money Pit. Most likely, appearing as a pond of approximately 20-30 ft in depth, it could be even deeper as the compaction and the consolidation of the refilled soil could have been greater with the additional weight of the collected rainwater towered above it.

The geologic community proffers the depression is caused by a larger existing sinkhole as described in Appendix A, *"Dissecting Dumbo Drumlin."* Personally, I do not believe the depression itself was a sinkhole, though I have no problem with the concept a pit was dug in an ancient sinkhole which was once filled with breccia during a flooding action some 6,000 years ago.[14]

This ‘original sinkhole’ had a ground level surface area of 55 ft by 72 ft.[15, 16] The Money Pit being 13 ft by 13 ft, is not going to form a sinkhole within a sinkhole, especially if there are one, two, or three large Oak trees with their emmeshed root systems throughout that hollowed depression.



Not wanting to poo-poo those detailed scientific interpretations and stated determinations, I do not think this book need prove sinkhole or depression, if we find any other proof that man had been down within the pit previously. Should it be seen as a filled-in pit with blue clay, coconut fibers, log platforms, charcoal, and rounded stones, one must simply realize why it cannot be a sinkhole on its own; but a depression caused from soil settlement and compaction - *yet perhaps in an ancient sinkhole*.

As I’ve stated in the related appendix, I “feel” this scientific narrative is the Occam’s Razor-type response to whitewash why the Oak Island mystery is in their opinions, simply a hyped hoax. All this hopeful hyperventilating hides the geological history that trounces any treasure tale.

Ironically, we goobers can now take glee and gloat as we watch the geoengineers explain the gobs of gold and silver down in that great sinkhole!

Digging Deep for Answers

Admittedly, burrowing down approximately +110 ft in the Money Pit, those ancient voyagers must have brought some pretty hefty miners to dig down through this cabal of roots, hard clays, gravel, cobbles, breccia, and sandy till. Was the island an island or perhaps a promontory or peninsula from the mainland at their arrival? Were there two islands or conjoined twin drumlins? So much to contemplate while thinking about this Oak Island Conundrum.

This section turns our attention to the forensic investigations performed within the depths of the *Money Pit*. The pits name was euphemistically given to mock the expense to which searchers have spent to reap the treasure presumed within the shaft. We will briefly discuss the art of excavation with which our original depositors would have been acquainted with. Though the Money Pit appears to have required tremendous effort and engineering technique, the tools and principals to carry out such a task was readily understood and available.

We will then discuss and announce the forensic outcome of applied modern scientific examination which have given this author an answer to *WHEN* was the Money Pit refilled.

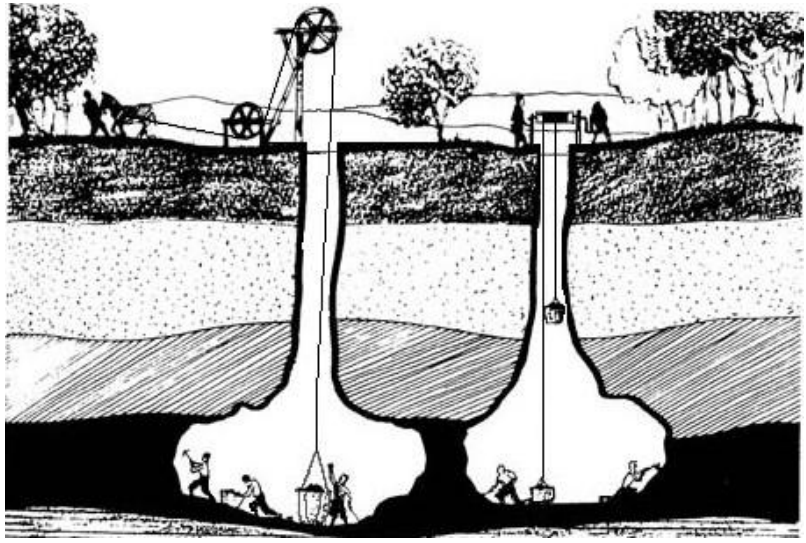
The full reports generated by Certified Professional Soil Scientists (CPSS) calculating the settlement, compaction, and consolidation of soils within and atop the Money Pit, as well as a similar report calculating the rate of rot and decay of the oak logs making up the platforms within the Money Pit; can be found in Appendix M, "*Experts Examine Evidence*." The summary of those reports await readers ahead.

Don't Pity the Pit Diggers

In 1556 Georgius Agricola wrote a series of twelve books covering all things dealing with mining and metallurgy of his day. The work is titled *"De Le Metallica."* We think of past peoples being naïve and ignorant and unable to solve the challenges of physics and engineering which we face in our lives today. Yet they did, and often their ingenious creations are the basis for our improvements we take credit for. As we look at the conundrum of Oak Island and the mystifying engineering feats found there, we should reflect on what those before us knew about the digging of vertical shafts and how they addressed the challenges. For they truly provide the answers to our questions today.

Is it a Pit, a Shaft, or a Hole?

Technically, the Money Pit is a shaft most commonly referred to as a "Bell" pit, due solely to the cross-section shape it reflects. The narrow, vertical shaft is excavated down to the coal, or other sought after minerals, where galleries (horizontal tunnelling) is conducted to obtain the ore.

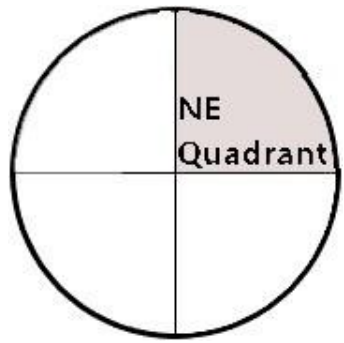


Courtesy: staffpastrack.org.uk. Coal mining in N. Staffordshire.[17]

Platform Arrangement

Many people speculate on how the log platforms would be built and arranged while hoisting up the dirt and then when refilling the pit. I have seen many purported diagrams which seem to lack the practicality and the functional purpose of platforms during those scenarios. The illustration on the next page gives you a more plausible and practical scenario of how the platforms would be initially arranged during the excavation phase. First however, I present a simple image to explain the terminology used in describing the pit going forward.

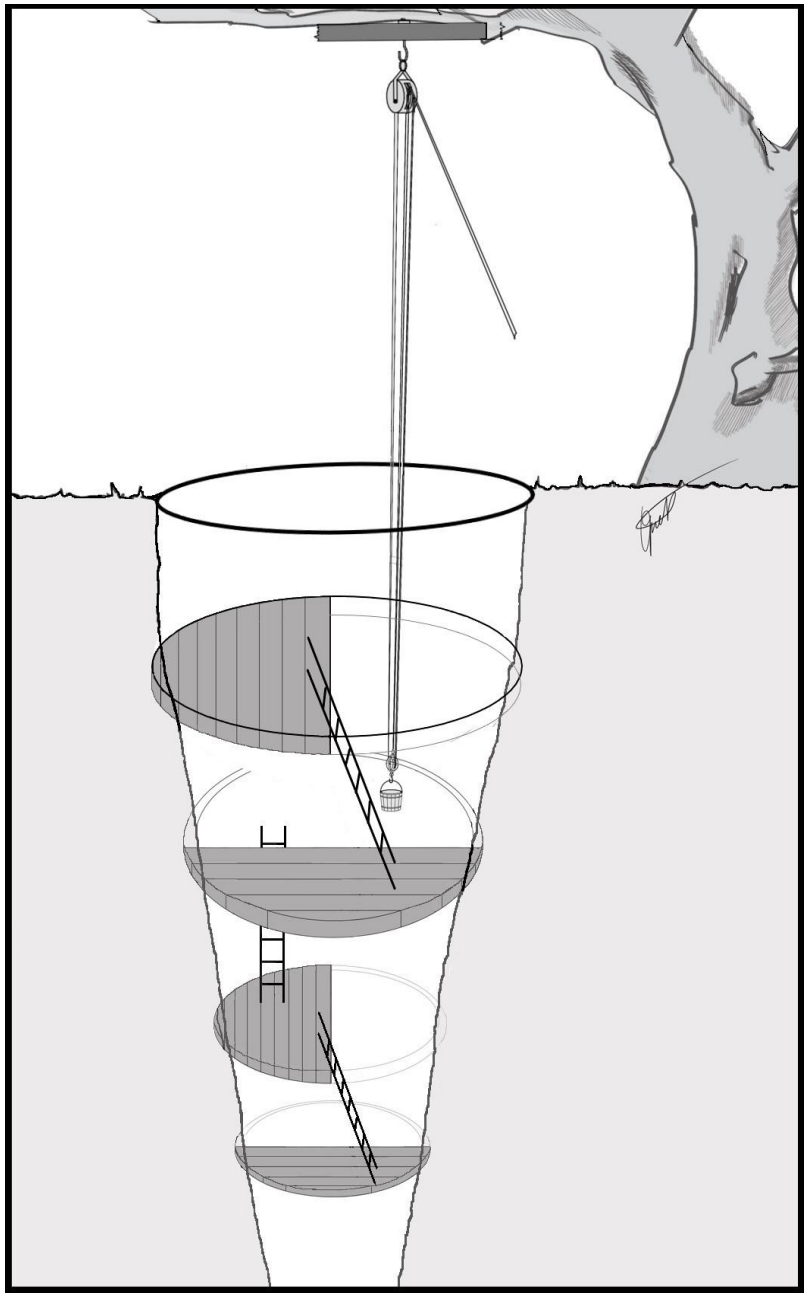
Looking directly down on the circular pit: Imagine the vertical pit is divided into quadrants. One of the quadrants is not to be obstructed, so the hoist/windlass and air duct apparatus has the clear space to function all the way down to the bottom. In the following graphic, the North-East Quadrant is the one left unobstructed by platform configuration and is superior for the excavation and operation of the dig.



When visualizing the platforms within the Money Pit on Oak Island, we conjure up platforms half-way built, opposite of the one before and the one after. Some envision the platforms as not completed on either side, with only a section in the middle. This plan has one side for the ladder and one side for the hoist system. Yet neither of these layouts provide the excavator the optimum construct for a major deep dig.

On the following page is an illustration of the concept best utilized for such a deep and arduous excavation. The platforms are repetitive like the other plans, but each platform frames off the platform in two of the four quadrants, while never using one of the four. Such a scenario would show on Platform 1, quadrants NW & SW. On Platform 2, quadrants SW & SE. On Platform 3, quadrants NW & SW, repeating the pattern and never using quadrant NE.

Optimum Platform Arrangement during Excavation



Created by 'Anna Orel Designs'

The image attempts to give depth perception to the pit and ladder arrangement, but the main purpose is to show the alternating arrangement of the platforms which keeps open one of the four quadrants. In this image, quadrant NE is left open. This frees up unobstructed space for hoist and air handling mechanisms.

There is another benefit to this setup. Digging without structural supports such as cribbing, like on Oak Island can be problematic. It has been stated the platforms were embedded into the hard clayey walls dug without the need of cribbing as the hardness and stability of the clay made such an effort unnecessary. In some forms of mining, this is extremely dangerous and disastrous. My understanding from engineers and digging professionals is the importance of making sure such embedded timbers were sufficiently deep enough into the wall of the pit to provide structural integrity. Having them embedded in less than a foot of the wall would be problematic, as this soil strata would be the most disturbed from the excavation of the pit and be susceptible to outward forces, which may cause sloughing or scaling of the thin veneer or wall surface.

Additionally, the rotation of the embedment of the oak timbers into the pit walls due to the alternating of the platforms, allows for a greater vertical distance between where the logs are dug into the wall surface. Each such breech adds strain and load to this strata. However, this additional spacing helps give a greater load strength to the thin face of the wall, holding the platforms weight. This detail is more important during the refill of the pit when the platform is completed and closed off. With the 10' of fill-weight on each platform being significant, the deeper the embedment of those oak logs into the walls, the more structurally sound is the platform. The image on the previous page attempts to depict the embedment of those platforms in alternating (direction) pattern.

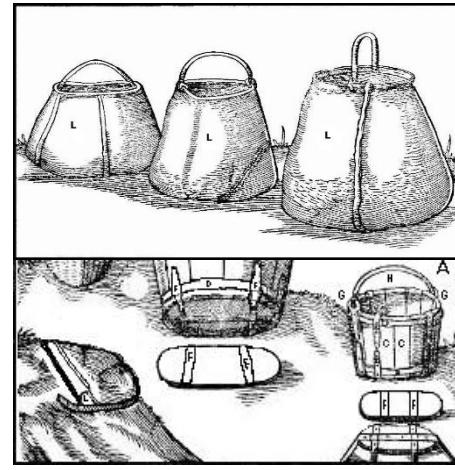
As we learned in the Oak Island story, over time and with many other shafts built in close proximity to the Money Pit, the hard clayey ground eventually gave way – even with the cribbing.

The following section contains extracts and images from Georgius Agricola's 1556, "*De Re Metallica*," as translated by Herbert C. Hoover and Lou H. Hoover. New York. Dover Publications, Inc. 1950.[18]

I assume our ancient travelers knew more about mining than those miners assembled on Oak Island, or at least those who were participants in spinning the treasure tale at the time.

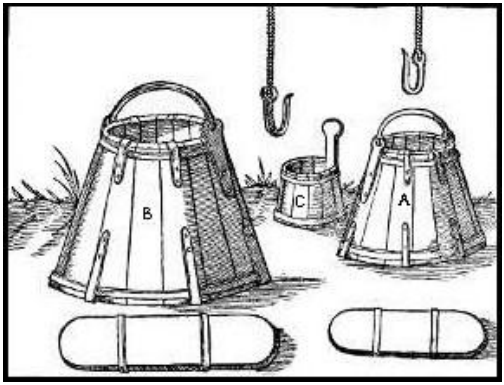
Taking it Out, Putting it Back

We have learned about the makeup of Oak Island's hard blue clayey soils speckled with boulders, rocks and cobbles – congealed like a cement which would be torture to attack. Yet they did, and apparently very successfully so. And also, those ancient travelers had a purpose in mind, and we are taking an educated guess on how they may have performed their task of mining down within.



I mentioned earlier the use of a kibble, which is a bucket used to haul up the "gangue" (waste rocks) or "spoils" materials broken up to be excavated and then removed from the deepening pit. Some of these terms are specific to certain mining operations like coal, gold, and silver; yet can be universal in their description and application. Here are a few images by Agricola of the specific buckets he describes to use to get the job done. The larger bucket has a measurement of 36" in dia. By 24" in height and was capable of carrying approximately 108 lbs.

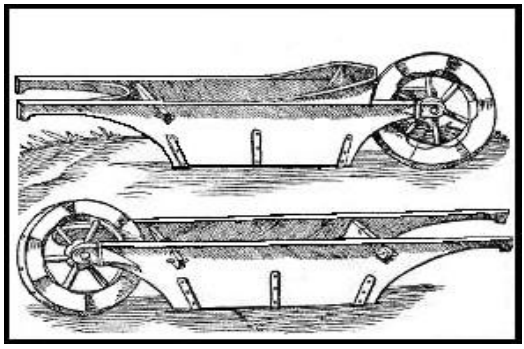
Legend: **A** - small bucket, **B** - large bucket, **C** - staves, **D** - iron hoops, **E** - iron straps, **F** - iron straps on the bottom, **G** - hafts, **H** - iron bale, **I** - hook of drawing rope, **K** -basket, **L** - hide bucket or sack.



Similar to the previous buckets, these water buckets have narrower tops to keep water from splashing while being raised up the rope.

In this illustration we see **A** – small water bucket, **B** – large water bucket and **C** – a dipper.

Transporting away the spoils could be by wheelbarrow, sledge, cart or wagon. The mode would depend upon where the materials were headed; such as to build the rock road, fill in the swamp, or dumped along the Serpent Mound. Most of the clayey soil minus rocks, boulders, and cobbles, would be kept separate so it may eventually be returned to fill in the pit.

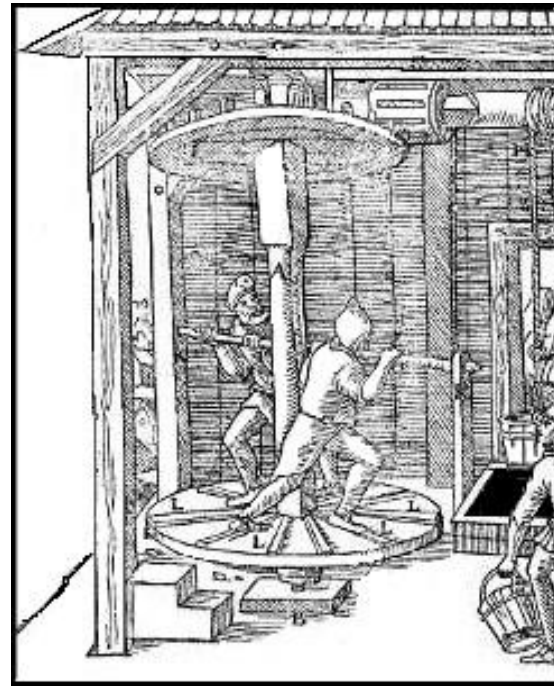


So is it possible that some of Gary Drayton's Oak Island metallic finds identified as straps for chests, were remnants from these buckets and barrows?

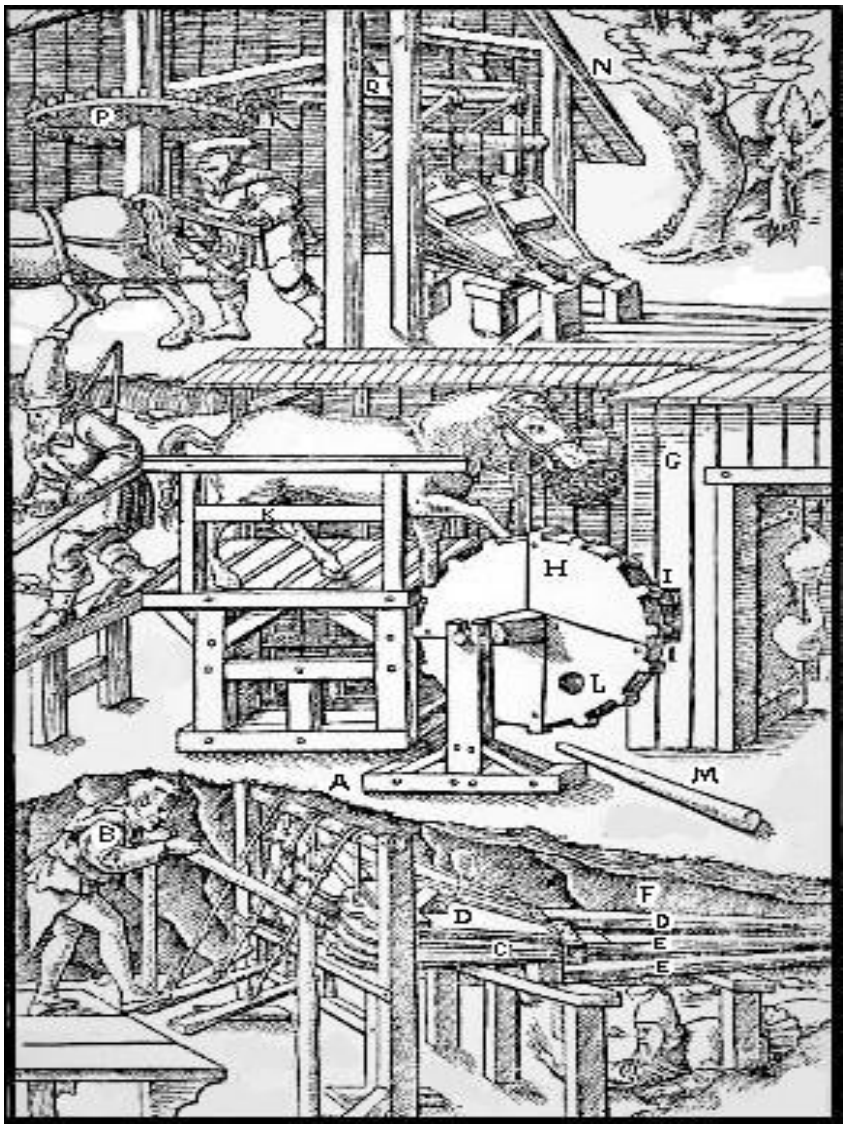
In Appendix H, *"Dirty World of Detritus,"* we look at the logistical work performed on Oak Island by our ancient travelers. There we calculated the volume of soils dug from the Money Pit at approximately 702 metric tons, or 1,547,645 pounds. Unless utilizing another mode of transport, this means those diggers moved 14,330 large kibbles of material! This assumes the volumes raised would fit in a kibble, though the breccia discussed elsewhere reflects large boulders which would require special hoisting. These larger boulders are evident in the Serpent Mound structure found on Oak Island as well.

To conclude this chapter we turn to the issue we addressed regarding the hanging 'block and tackle.' This was the compelling reason for McGinnis, Vaughan, and Smith to stop and ponder pirates plunder. Yet the scale of engineering to which the Money Pit and other constructs have been found, clearly raises questions and doubts of a simple block and pulley being the means by which our ancient voyagers did their digging. Most likely, a windlass seen below, would have been the better operation. if in fact so utilized, the block and pulley system were used to finish up the work in refilling the pit. They may have only been used in the last remaining processes of filling the pit and placing the flagstone atop the shaft.

Agricola makes it abundantly clear the business of excavating a pit, shaft, or deep mine was well understood and a serious enterprise. This illustration from "*De Le Metallica"* circa 1556, shows what ancient diggers were capable of in meeting engineering challenges of their goals. It is apparent, if those ancient voyagers were able to acquire 1.5 metric tons of coconut coir fiber for their filtration system, a complex windlass or animal-driven whim was not out of the question.



In the next section we announce the findings of the rates of rot and decay with which oak logs would succumb in the environments of the Money Pit. Similarly, we examine the timeline created by soils settlements atop the depression, caused by the flagstone, and under the log platforms. These analyses are not based on witness statements, but the scientific formulations which dictate the natural world.



All Agricola images have been enhanced for clarity

Dating Decay & Displacement

A few years ago from the comfort of my couch, the thought came to me perhaps we could make determinations which would or could forward the finding of answers to the *WHO*, *WHAT*, *WHEN*, *WHY* and *HOW* of the Oak Island enigma. Heck, I've seen enough television to know 'they' can determine anything nowadays, *right?*

Lucky for me, I finally found just such a premier expert of experts on all things below me – *literally, below my feet*. He has such an impressive record of experience, expertise, and education, his entire 58-page resume is include in Appendix M, "*Experts Examine Evidence,*" along with the reports of his findings. Here, we will first announce his findings regarding the "*Rot and Decay of Oak Logs making up the Platforms Within the Money Pit*."

The Oak Island treasure story tells of the legend of searchers digging down within the depression, which would later be properly called the Money Pit. We are provided descriptive statements of what was seen and in what condition is was witnessed to be as they dug deeper and deeper. Like all other aspects of this enigma, we have forensically examined the commentary about the platforms within the Money Pit, and the descriptions of the oak logs which made up those platforms. Some of those reporting's are listed at the end of this chapter yet can also be viewed in their full context in Appendix C, "*On the Record*."

Be it known, the searchers said the oak logs making up the platforms within the pit, were rotten. Rotten enough a strong man could break them from their embedment into the hard clay walls with which they were wedged. Yet they were not decayed to the point where the weight of the refilled soil they supported, broke their hold into the wall.

So what exactly caused those logs to rot and decay and what does that have to do with finding out WHEN this all happened?

Wood decay or wood rot is the decomposition of wood by microorganisms, primarily by their enzymatic activity – 'feeding off the nutrients of the wood fiber.'[21] The suspect microorganism is fungus – *which is among us!* They are the only group which foments wood decay. There are other sources which can deteriorate wood or fibrous organic materials. To name just a few such as ultraviolet light, marine animals, insects, and others, but they are not causing decay or rot, and they do not create the volume of destruction of wood fiber as do those cute fibrous fungi feeders. Without them, we would have so much wood on Oak Island, Billy Gerhardt would be king of the island!

The funky fungi which feast of fibers, loves it when it is damp wood. They need it wet, they need oxygen to breath while eating, and they like it warm when at the food bar. Gee sounds vaguely familiar.

Brown Fungus is the primary culprit in consuming dead wood. Honey Fungus is big on attacking living trees and loves to move in and colonize before the Big Eat. Other fungi already live on the wood and slowly eat their own homes.[19] I believe it is these fungi that we are examining in the decay of the oak logs within the Money Pit.

But who would know for sure? *Easy Peasy*… a "Mycologist." No, not your *'collogist'*… a person who knows all about *mycology*. This is the field of fungi - pun always intended. It includes the study of their genetic and biochemical properties, their taxonomy, their use to humans as a source for tinder, traditional medicine, and for fungi food. It also studies the psychoactive substances which some of them funky fungi produce, as well as their ability to be toxic and cause infections.

Wow! Where do you get a degree in that? My son must be studying to be a mycologist, as his room definitely is a working lab! Does that make him….. *my mycologist?*

Most importantly, mycology can tell us how long it took for those foraging funky fiber-feasting fungi to fill up and decay a Northern Red Oak log, used to make a platform deep within our very own Money Pit on Oak Island! Our expert who is working his magic to determine how long it would take for the soils within and atop the Money Pit, to settle, compact and consolidate, has provided us here, a timeline to which the rate of rot and decay has been determined once the Money Pit was filled in and decay developed.

Rot and Decay of Oak Logs

Dr. Bryan G. Hopkins, Ph.D., CPSS, is an expert in soil science and currently a Full Professor in the Plant and Wildlife Sciences Department at Brigham Young University. His academic teaching focuses on environmental chemistry and plant, soil, and water science and management. Professor Hopkins has multiple degrees in Horticulture and Agronomy and is currently the Coordinator for the North American Proficiency Testing (NAPT) program for the Soil Science Society of America (SSSA), which oversees data quality for approximately 150 analytical laboratories from around the world.

In addition, Professor Hopkins is the active managing owner of Hopkins Scientific LLC, in Provo, Utah. He and his staff of scientists and researchers were enlisted to perform an examination and modeling of a blind scenario, descriptive of the Oak Island setting. This scenario provided geology and atmospheric and weather conditions of the island and surrounding area. It also provided redacted witness statements, abridged written reports, affidavits, and descriptive writings of searcher activities when discussing rot of wood, settling of soil, and moisture conditions within the Money Pit. As stated, those descriptive writings are reposted at the end of this chapter.

Dr Hopkins and his team have submitted their initial draft report on the decay-based degradation of the logs within the pit, in an effort to attempt to determine an approximate window of time as to when the pit was refilled.[20]

This report is shown in full in Appendix M, "*Experts Examine Evidence,*" and the summary findings are provided below.

> *"The parameters of our model have now been sufficiently outlined that we can provide a reasonable window of time in which these red oak logs could have been buried in the soil. We have set the decomposition mass ration to between 30% and 70%, We know that the cooler subsoil temperature (44 degrees F) increases the microbial growth rate by a factor of 3-4, we have set it at 3.5 for this model. We also know that the rate of decay for the sapwood and outer bark is roughly 16% annually while the rate of decay for the heartwood is approximately 1% annually. The diameter of the red oak logs is 7.5 inches, the total 2 dimensional surface area is calculated at approximately 139 cm2. It's also established that the composition of red oak logs is typically 10% sapwood and 90% heartwood (Brown 2019). 10% of the total surface area is 13.9 cm2 and 90% of the of total surface area is 125.8 cm2. When all the outlined variables are input into this rate of decay model, we can then calculate a window.*[20]
>
> *Beginning with shorter end of the window, 70% original oak log mass remaining would take **175 years** to occur. For 50% of the original oak log mass to remain would take **273 years** to occur. For 30% of the original oak log mass to remain would take **420 years** to occur (Figure 1). While that range of 175 to 420 years is a significantly wide estimate of time, that is the best that can be derived given the information provided within the scenarios.*

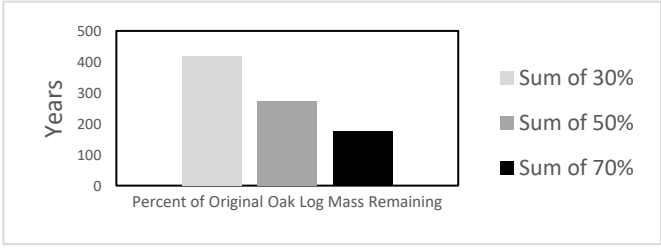


Figure 1: The amount of time it would take, given the inputs, to have a percentage of the original oak log mass remaining undecomposed.[20]

This forensic report provides for us the duration of elapsed time, based on the calculations of how much mass of the oak log was remaining undecomposed within the platform structure, in that pit environment. Wooden logs with only 30% of their mass being decomposed, would have been within the MP environment for 175 years. Logs with 50% of their mass being decomposed, would have been within the MP environment for 273 years. the logs with 70% of their mass being decomposed, would have been within the MP environment for 420 years! The latter is the conservative choice.

Assuming therefore the depression/Money Pit was discovered and partially excavated in 1795 or as late as 1804, would indicate the 175 years of degradation would date the filling of the Money Pit to around **1620-1629 AD**. The 273 years of degradation would date the filling of the Money Pit to around **1522-1531 AD**. And the 420 years of degradation would date the filling of the Money Pit to around **1375-1384 AD**. Below are some quick references applying this data:

> Coincidentally, it initially appears our *175 years* decay degradation of 30% of oak logs, aligns quite well with James A. McQuiston's ***"1632"*** theory dealing with Sir William Alexander and the Knights Baronet of Nova Scotia.
>
> Then again, the *273 years* of decay degradation at 50% of the oak logs within the MP, falls within the window of a bevy of radiocarbon-dated wooden swamp artefacts dated within 1474-1575.
>
> And still, never to be undercut, the *420 years* of decay degradation at 70% of the oak logs, does ironically fit with the varied radiocarbon datings of the mountains of coconut coir fiber found within the island! Around **1375 AD**.

Keep in mind, these scientific calculations are not based in any way on what searchers, storytellers, or historians have said about those logs which made up any platforms within the MP. This forensic answer is what would actually happen with wood in such a scenario underground with the known makeup of the soil and weather of Oak Island. This is evidence which can be used and not dismissed.

Soil Settlement, Compaction and Consolidation

Now the forensic investigation and calculations turn to the settling, compaction, and consolidation of soils below the layer of flagstone found above the first 10 ft oak platform, as well as formulate the rate-of-time elapsed for soil settlement below the various oak log platforms within the Money Pit. This too is a scientific calculation which needs not rely on the testimony of any witness or promoter. Soil settlement, the forces of compaction and the scenario of consolidation only require the correct description of the soil, which is settling, the surrounding soil profile of the pit walls, and the weather, *à la* water and temperature introduction to both. The formulary calculates the rate of time elapsed, to equal a description to compare.

- ENTER SOILS SETTLEMENT REPORT SUMMARY HERE -

[2nd Report has been postponed due to authors' serious surgical operation and post-operative convalescence. The Report, when received, will be posted online]

Reflectively, was I correct in believing forensic examinations on soil and the rot and decay of wood could calculate an answer? Definitely. Would I really like to see the answer dovetail along with the age of the coconut fibers carbon-dating? *HELL YES!* But in the end, it is not what I want, but what the evidence tells us. So, before the Lagina's join Gary Drayton dancing the "*gold coin jig*," I would like to provide this treasure hunt with these answers to one part of this enigmatic tale of 227 years. It may need to come from other specialists, but it can be determined, and I urge the Lagina Brothers to seek out such a scientist, should this effort not prove fruitful.

Footnotes Referenced

1. "*Natural Slate – Flagstone*." Provided by Perry Hutts, Owner/Operator, Hutts Quarry, 3280 Hwy 202, East Gore, Hants County, Nova Scotia. https://www.huttsnaturalstone.com/about-us.

2. "*Men and Methods of the Early Days of Mining in Cape Breton."* Annual Meeting, Mining Society of Nova Scotia, Sydney, May 1922. Info: Henry C. Poole Esq. https://www.Mininghistory.ns.ca/cim/c1922001.htm.

3. "*Terry J. Deveau Bio*." Senior Ocean-Acoustics Scientist, author, software engineer, Curse of Oak Island guest expert, Mi` Kmaw Heritage Research and Restoration Association. Herring Cove, Nova Scotia.

4. "*A Plant that Changed the World: the rise and fall of clover 1000-2000*." by Thorkild Kjaergaard. Pages 1-14. https://thorkildkjaergaaed.com/a-plant-that-changed-the-world-the-rise-and-fall-of-clover-1000-2000/. (Accessed 11-26-21).

5. "*Ecological Imperialism: The Biological Expansion of Europe, 900-1900*." By Alfred W. Crosby, University of Texas, Austin. New Edition, Page 152-158. Cambridge University Press, 2006.

6. "*Atlantic Forage Guide*." 2010. Forage and Corn Valley Evaluation Task Force, Atlantic Canada. http://www.gov.pe.ca/photos/original/ag_atlforaguide.pdf.

7. "*Straw and Hay*." by Bob Wood. https://goschenhoppen.org/clover-part-1/. (Accessed 11-29-21).

8. "*Letter to Gideon White*." by Nicholas Ogden. 03-25-1792, Shelbourne. "Bring clover seed when you come to Halifax. Nova Scotia National Archives. MG 1 Vol. 950, #546.

9. *"Forests of Nova Scotia: A History."* Nova Scotia Department of Lands and Forests. Four East Publications, Halifax, Nova Scotia. P. 404-410.

10. "*Exciting a Spirit of Emulation Among the 'Plodholes': Agricultural Reform in Pre-confederation Nova Scotia*." by Graeme Wynn. *Acadiensis*, Vol. 20 No.1, Autumn, 1990. Pages 5-51. https://www.Journals.lib.unb.ca.

11. "*The Enduring Journey of Samuel Ball, From Slavery to Freedom: Part One, 1761-1783*." by Chipp Reid. 2020. Pages 15-21.

12. "*Growing Guides – Companion Planting Clover*." Growing Guides of The United Kingdom, 04-26-2019. https://growing-guides.co.uk/companion-planting-clover/. (Accessed 09-20-20).

13. "*Charles Darwin, Cats, Mice, Bumblebees and [Red] Clover*." by Norman Carreck NDB, Toby Beasley and Randal Keynes, 2009. 4 pages. Enhanced quotation by Thomas Henry Huxley's publication Collected Essays Volume 2: Darwinia. 1892. https://www.researchgate.net/publication/259358642_Charles_Darwin_cats_mice_bumble_bees_and_clover.

14. "*Surficial geology, Halifax Harbour, Nova Scotia*." by G.B.J. Fader and R.O. Miller (2008). *Geological Survey of Canada, Bulletin 590*; Natural Resources Canada; Geological Survey of Canada (Atlantic); Bedford Institute of Oceanography. https://doi.org/10.4095/224797.

15. "*The Windsor Group of the Mahone Bay Area, Nova Scotia*." by P.S. Giles (1981). Nova Scotia Department of Mines and Energy, Paper 81-3, 1981. https://novascotia.ca/natr/meb/pdf/81pap03.asp.

16. "*The Carboniferous evolution of Nova Scotia*." by J.H. Calder (1998). Geological Society, London, Special Publications, 143, 261-302. https://doi.org/10.1144/GSL.SP.1998.143.01.19.

17. "*Bell Pits of Street Gate (NZ210592)*," by Michael Southwick, Sep. 2013. Newcastle History blog & North-East History Tour blog. Alternately image from www.Staffpastrack.org.uk. Coal Mining in North Staffordshire. http://northeasthistorytour.blogspot.com/2013/09/bell-pits-of-street-gate-nz210592.html.

18. "*De Re Metallica*," by Georgius Agricola, 1556. Translated by Herbert Clark Hoover and Lou Henry Hoover, 1st Latin Edition. The Project Gutenberg eBook. Released date 11-14-11. https://www.gutenberg.org/files/38015//38015-h/38015-h.htm. (Accessed on 01-01-22).

19. "*Wood Decay / Forest Pathology*." by James J. Worrall. USDA Forest Service. kworrall@forestpathology.org. Online @ https://forestpathology.org/general/wood-decay/.

22. "*Machiasport, Maine: Cold Case for David Neisen*." by Bryan G. Hopkins Ph.D., CPSS, Certified Professional Soils Scientist, 2021. Turfgrass Producers International. National Association of Landscape Professionals. Golf Course Superintendents Association of America. Professor, Brigham Young University, Department of Plant and Wildlife Sciences. Officer, Soil Science Society of America, North American Proficiency Testing. C.E.O. Hopkins Scientific, LLC. Expert Witness Report, January 17, 2022. 8 pages.