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The Vinland Map: The Controversy Continues...

-Abstract-

The Vinland Map is believed to predate Christopher Columbus’ expedition by almost 50 years as it has realistic cartography of the island of Vinland, thought to be a part of Canada or even Northeastern America. The map could potentially provide evidence that the Norse explorers were the first Europeans to visit America and map it. However, there is doubt surrounding the origins and age of the map. These issues have divided scientists into two groups devoted to proving the authenticity or lack thereof of the map. Recent research has used several chemical analyses which have examined specifically the paper and the ink present on the map. The most recent methods used to test the map have been carbon dating and Raman spectroscopy. It is thought that the map was written on paper which has origins in pre-Columbus days. However, several analyses of the ink have revealed the presence of anatase, a form of TiO₂, which was not developed until the first part of the 20th Century. This clearly would contradict the evidence that the paper is authentic. However, these two claims do not necessarily contradict one another. A recent theory is that the parchment was recovered from an earlier work and then a forger used modern ink to draw a fake map. Carbon-14 dating has put the origins of the parchment to the mid 1400’s. It is very hard to come to a definitive conclusion from the available evidence as both sides offer strong arguments. In my own opinion, the map is more likely authentic than a forgery. However, the controversy surrounding the map has not yet been settled.

The Vinland Map has been at the center of controversy ever since it appeared around 1957. It depicts several islands in the Atlantic Ocean, but more importantly, an island called Vinland. This island is believed to be part of Canada or even Northeastern America. If the map is truly genuine, then it pre-dates Columbus’ discovery of America by more than 50 years (Gorman, 2002). However, there has been constant doubt surrounding its origins and authenticity. These issues have divided scientists into two camps which seem to ride circles around one another. As soon as new evidence arises, someone disputes it with counterarguments that are just as strong. The controversy has focused most recently on two issues: the ink used to draw the map, and the parchment that it is drawn upon. Both sides have used sophisticated chemical testing to try to discover new arguments on behalf of their stance. However, the controversy surrounding the map will almost certainly never be resolved. Each side has limitations in their arguments and only opinion can be formed based on the available evidence. Therefore I will present as much of the evidence from both sides as possible.

The origins of the Vinland Map are unclear. It showed up in 1957 when Yale University paid one million dollars for it from a private collector. It had been
rejected by the British Museum when they noticed that it had undergone a recent binding and the wormholes did not match the *Tartar Relation* from which it supposedly originated. It was not until Yale considered the map that it was noticed that another collector was selling a manuscript entitled *Speculum Historale* that showed wormholes which aligned perfectly with the Vinland Map (McCulloch, 2001). It was concluded that the map and the *Tartar Relation* must have been bound to the *Speculum* and then separated. The Map was immediately considered an invaluable artifact and was bought by Yale. It is now valued at around $25 million dollars. However, its European origins are still debated. It is thought that the Vinland Map was originally drawn in the Swiss Alps after someone discovered a lost Norse Journal (Gibbs, 2000). It then made its way to the Catholic Church’s Council of Basel, which convened between 1431 and 1449 (McCulloch, 2001). It is believed that the *Tartar Relation* and the Vinland Map were put together around this time. There is only speculation concerning the history of the map. Its true origins are still disputed.

Whether or not the origins of the map are known, it is still a very interesting artifact to be studied and analyzed. First of all, the Vinland Map is a possible proof that the Norse explorers reached North America long before Columbus did. The map would be the earliest cartographical representation of the Americas. This evidence potentially shows that Columbus knew about America before he set out on his voyage in 1492 A.D. A caption next to the image of Vinland would also challenge the belief that Leif Erickson and Bjarni Herjolfson made separate voyages to Vinland. It states that they both discovered Vinland together (Gibbs, 2000). In both instances, the Vinland Map presents new perspectives and theories about the discovery of North America.

The actual age of the parchment is one piece of evidence that would support the authenticity of the map. Both sides of the argument have debated the actual age of the parchment for years. A team of scientists in 1995 used the National Science Foundation-University of Arizona Accelerator Mass Spectrometer to date the parchment using Carbon-14 isotopes. Brookhaven chemist Garman Harbottle and his associates traveled to New Haven Connecticut to collect samples from the map to carbon date it. They cut a small strip from the bottom and took it back to the University of Arizona where they prepared the samples. The process involves several steps. They first weighed the sample to keep records for consistency throughout the experiment. Next they cut the sample into smaller samples to use several different sampling methods. Five different procedures were used to prepare the samples for testing. The comparison of each of the five results is important for discovering and accounting for many of the variables that could distort the results. The first procedure involved an acid-base-acid treatment using hydrochloric acid, dilute sodium hydroxide, and hydrochloric acid again. During the second process, the sample was washed in an acetone solution before undergoing the acid-base-acid treatment. Processes three and four were the same as process two except the acetone wash was performed twice and then three times respectively. In the last process, collagen was extracted by washing the sample in 0.25 HCl and then in hot 0.01 HCl. The
The ink that was used to draw the Vinland Map has been tested and retested over the past few decades. New techniques and technologies reveal new suggestions concerning the authenticity of the map almost every few years. The major argument against authenticity has centered on the presence of anatase in the ink. Anatase is a crystalline form of titanium dioxide (TiO₂) and is believed to be the rarest form it can take. In 1972, Yale commissioned Walter McCrone to test the ink on the Vinland Map. His studies discovered two layers of ink; one that was yellow and one that was black. He discovered heavy concentrations of anatase in the yellow layer which he believes that the forger used to create a fading effect that a genuine map would exhibit. He argues that anatase was only commercially available to the world after 1920 and thus, the map is an obvious forgery. However, scientists on the other side of the debate point out that anatase can be prepared from iron/titanium ores (FeTiO₃) (McCulloch, 2001). The resulting anatase could then be integrated into the pigment. McCrone disputes this possibility on the basis that the chemistry to prepare such an ink is much too complex for fifteenth century cartographers. This claim is also supported Katherine Brown and Robin Clark in their analysis of the map’s ink (Brown, 2002). One would have to dissolve iron titanate (FeTiO₃) in
concentrated sulfuric acid, hydrolyzing the result into an amorphous gel and then calcining it into anatase crystals at up to 800° Centigrade (McCrone, 2002). As well, one should know that TiO₂ is white in coloration. It is important to ask the question of why an ink maker would use a white chemical to make black ink. Such complexity would be impractical for a medieval ink maker who simply wanted black ink. However, it is believed that these metallurgical temperatures were known to medieval chemists and alchemists and even prehistoric bronze smiths around 3000 B.C.E (McCulloch 2001). Titanium slags have been discovered in L’Anse-aux-Meadows where the Norse were believed to have lived in North America (McCulloch, 2001). Analysis of the slags has shown that the furnace temperatures of 1200° Centigrade had been reached. As well, some medieval ink recipes call for reducing the green vitriol to a powder which calcinations could facilitate (McCulloch, 2001). A Swedish map expert, Per Lilliestrom, actually set out to prove that anatase ink could be made from materials and technologies available in 1400. He traveled to the Swiss Alps where the map is thought to have been drawn and made ink from natural anatase crystals according to a fifteenth century German ink book. The resulting ink was identical in chemical and crystalline form to the ink present on the Vinland Map (Gibbs, 2000). This evidence is strongly in favor of the authenticity of the map. The possibility that there was a recipe for an anatase based ink in a fifteenth century German ink book disputes Walter McCrone’s claim that anatase inks were unavailable then. McCrone and other critics of the map claimed that the reproduction was unlikely to have used the same methods that a medieval ink maker would have used. They point out that Lilliestrom’s approach was biased due to their previous knowledge of inks and their composition. Another point that the supporters of the map bring up is that McCrone’s study might have exaggerated the amount of anatase present on the map. A re-evaluation of the map showed only trace amounts of titanium (Wilford, 1996). These amounts are supposedly consistent with other medieval documents like the Gutenberg Bible (Wilford, 1996). This point might be valid but new studies have shown that the anatase present on the parchment still provides a strong basis for an argument against authenticity. Critics of the map claim that the presence of anatase in genuine medieval maps has been unheard of prior to the discovery of the Vinland Map (“Fresh Doubt”, 2002). Supporters of the map argue that the presence of anatase could be a result of the deterioration of the ink over time (Wilford, 2000). As well, the metals in the ink could have been a byproduct of cleaning the map with bleach. It is accepted that although it deteriorates maps, medieval cartographers would apply bleach to clean the parchment (Wilford, 1996). However, several analyses of the map have looked at where the anatase is located on the map. The distribution of the anatase can tell whether or not the map was bleached or forged. The idea is that bleach will distribute the anatase equally across the map while a forging will leave the anatase just in the ink. The University College London Study found that the distribution of anatase was almost completely contained in the ink. It was concluded that the anatase had to be part of the yellow line and the map was thus a forgery (“Fresh Doubt”, 2002). Another interesting point made by the critics of the map is the ink’s unusual
behavior under ultraviolet light. Most medieval inks are iron based and iron
compounds will quench ultraviolet light. The ink on the Vinland map does not do
this. It instead fluoresces which is unprecedented in any other medieval maps
(Brown, 2002). This supports the idea that the ink did not originate from the
medieval period. It is then believed that the ink also contains organic matter
which commonly behaves similarly under ultraviolet light (Brown, 2002). All the
arguments concerning the ink are based on strong evidence but it is not yet
conclusive whether or not the ink is from the fifteenth century or sometime after
1920.

The Vinland Map is indeed a mysterious artifact. How is it possible to tell whether
or nor it is real or fake? Many scientists have pondered this same question. The
parchment itself has provided some very useful information to help figure out the
mystery of the map. Both sides of the debate have accepted a date around the
mid 1400's for the parchment, but this does not prove the authenticity of the map.
The ink is the part of the map that has provided the most recent controversy.
Anatase has been in question since Walter McCrone conducted his research on
the map in 1972. Supporters of the map believe that the ink containing anatase
could have been produced using medieval chemistry while critics say that it is
highly unlikely. The presence of anatase in ink is unprecedented before the
appearance of the Vinland Map. Both sides clearly make convincing arguments. I
believe that there is a reasonable possibility that the map is authentic. To reject
the possibility that medieval chemists and alchemists were capable of the
chemical techniques needed to make ink with anatase would be closed minded,
in my opinion. I point to the reproduction of the ink by Per Lilliestrom and the
actual date of the parchment as two very strong reasons that the map could be
authentic. The presence of anatase in the ink does not show that the map is a
forgery conclusively. However, I am basing these conclusions on what little
knowledge I have of the Vinland Map. Perhaps the controversy will never be
settled. It is impossible to prove something is truly authentic. The controversy
continues...

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