Regarding the Ground Line Evidence on the Kensington Rune Stone

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Foreword
I am posting this article at www.richardnielsen.org with the intent that it will be subsequently published for the written record in an applicable journal and also would be part of my book currently in progress.

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1. Introduction: The Kensington Rune Stone Ground Line Indicators.

I first wrote about the Kensington Rune Stone (KRS) ground line in “Theories of the Hooked X.” Nielsen (2009: Appendix D) www.richardnielsen.org, “…early published photographs show a clear ground line as seen in Figs. D2 and D3 following [Figure 1 and 2].

Figure 1: Undated Holand photo in Nielsen (2009: 124, Fig. D2). See Holand (1962: 132) and Holand (1956: 133).
Figure 3: City of Kensington photo (1938) adapted from MHS (1929). This photo is also shown in Nielsen (2009: Figure D3). Adapted to this 1938 City of Kensington photo from a Norton & Peel photo taken in 1929 and now part of the MHS Photograph Collection 9/7/1929 (Location no. Norton & Peel 77071; Negative no. NP77071).
2. Previous Studies

Figure 1. Holand photo in (Nielsen 2009: Fig. D2)
Figure 2. Wahlgren (1986: 99) photo in Nielsen (2009: Fig. D3)
Figure 3. City of Kensington photo (1938) adapted from MHS (1929).
Figure 4. Holand (1956: 133 and 1962: 132).

Winchell (1910: 233) stated, “It may be assumed that, if the stone was erected, as it claims, by explorers in 1362, it was set on end, and that the lower end, where no runes are engraved, was buried in the ground.”

Quoting Winchell (1910: 234), “The weathered surface [face] is somewhat lighter, and yet it is firm and wholly intact. It is evident that the surface color has been acquired since the glacier period, and therefore some 7,000 or 8,000 years may have elapsed since the face was first exposed to the elements.”

Quoting Weiblen (2001:10), “It must be concluded from the analyses, that the potassium layered silicate encountered in the transverse of 127 analyses is [the clay] illite rather than muscovite. Although the electron microprobe data indicate that no muscovite was intersected in the line transverse, this does not indicate that no muscovite was present in the rock. Further analyses are needed to establish this.” [R. Nielsen underlining].

In Nielsen and Wolter (2006: 234) the statement, “The Kensington Rune Stone does not exhibit any obvious weathering profile or boundary line that would indicate it was upright in the ground for a prolonged period of time (SFW)” is not supported by the evidence of the Holand ground line being a rune height below the last line of runes on the face of KRS as indicated by the red line.
line in Figure 4, Winchell (1910: 234) and Weiblen (2001: 10). The latter two indicate that the KRS would have been pre-weathered when it was carved. No written reports on an inspection for a ground line are recorded. The anecdotal accounts of inspection given in N&S (2006: 234) and Wolter (2009: 36) state that nothing could be seen, which is now seem to be far from the case.

Thus the only report on ground line evidence is by Nielsen (2009a: Appendix D) where Figures 1 and 2 were presented as evidence for a ground line.

3. Additional Photographic Evidence for a Ground and Rub Line:

Figure 5. 3D control photo of rub line and ground line from 2008.
Figure 6. Smithsonian (1948) photo with ground line.
Figure 7. Beecher (1937)-Holand (1927) comparison of ground line.
Figure 8. MHS (1929) rub line.
Figure 9. Beecher (1937) rub line.
Figure 10. Steward (1899)-MHS (1910) comparison of trace ground lines in the calcite.
Figure 11. MHS (1910) ground line trace in calcite in 1910.

Figure 5: 3D control photo of rub line and ground line from 2008. The blue arrows delineate the rub line. The red lines delineate the Holland ground line. The four green arrows show the Holland ground line groove. How this groove was created is a subject of future study.
Figure 6: Smithsonian (1948) photo with ground line. See Wahlgren (1958: Figures 1 and 3) and Gordon (1974: 31). The rub ground line is visible on the runic face shown to the left by the red arrow and perhaps on the runic side shown on the right by the green arrow. This photo was taken some seven years after the cleaning of the KRS reported in Landon (1954) to follow later. Anecdotal evidence indicates the stone was wire brushed and cleaned by the RSM before it was sent to the Smithsonian for display.
Figure 7: Beecher (1937)-Holand (1927) comparison of ground line. A Beecher cast photo (1937) is compared here to the chopped Holand ground line section (from Figure 4). The Holand ground line is clearly visible on the red line in the lower photo. The vertical red lines are the distance from the last row of runes to the Holand ground line shown in Figure 4 (Holand 1956: 133, 1962: 132). The red arrows trace the rub line below the Holand ground line in the upper photo. Based on this comparison, the Holand ground line photo was taken some time before the Beecher cast photo (1937). Note that the bold arrow shows that the Holand photo has a slightly clearer e-rune. Presumably the calcite deposit had grown by the time the 1937 photo was taken.
Figures 8 and 9: MHS (1929)-Beecher (1937) cutout for rub line comparison. See the obvious rub line above the red line.
The Steward Photo of 1899 has minimum calcite deposit. If found this way the KRS could have been in the atmosphere for 500 years. The runes appear to be embossed by photographic effect.

The MHS (1910) photo in Flom (1910) and MHS Collections (1915: Plate 2) with the calcite returned. The runes appear to be incised.

Figure 10: Steward (1899)-MHS (1910) comparison of the trace ground line in the calcite

Figure 11: MHS (1910) ground line trace in calcite in 1910
4. **Calcite Deposits Revisited.**

The calcite deposits are revisited in Figures 12-22:

- Figure 12. Comparison of Beecher (1937)-Holand (1927) calcite accumulations
- Figure 13. Comparison of MHS (1910)-Holand (1927) calcite accumulations
- Figure 14. Lack of calcite accumulations in Steward (1899) photo
- Figure 15. Montage of photos with calcite accumulations from 1899 to 2003
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- Figure 17. Pre-Stained KRS (Pugh ca. 1985)
- Figure 18. Pre-Staining in 2000
- Figure 19. Post-stained calcite with runes visible in calcite in 2003
- Figure 20. Ground line proof in the calcite.
- Figure 21. The Torsätra Stone U614 from Upland in Sweden
- Figure 22. Field stone calcite near Kensington in 2000

Quoting from Wikipedia (November 11, 2010), “*Calcite, like most carbonates, will dissolve with most forms of acid. Calcite can be either dissolved by groundwater or precipitated by groundwater, depending on several factors including the water temperature, pH, and dissolved ion concentrations. Although calcite is fairly insoluble in cold water, acidity can cause dissolution of calcite and release of carbon dioxide gas. Calcite exhibits an unusual characteristic called retrograde solubility in which it becomes less soluble in water as the temperature increases.*”

This infers that before the Industrial revolution much less week acid was in the rain water. It could well be that under Minnesota conditions the calcite could have lasted the four and a half centuries before 1800, after which time it would have been buried and protected from acid rain. There would be little solubility in water during the cold winter and even less under the warmer summer temperatures in Minnesota.

The Steward photos of 1899 in Figure 14 show a sparse calcite deposit, but the MHS (1910) photo already shows a considerable calcite deposit in the Figure 15 montage of photos and in Figure 10. This could have been acquired either while in the atmosphere, or face down in the mud while stored in the Ohman shed in Kensington from 1899 and subsequently in the Holand home in Door County, Wisconsin after 1907. The 1910 condition is essentially dormant until the Beecher cast and City of Kensington (1938) photo. The Smithsonian (1948) photo shows it clean of calcite again, but the Pugh (ca. 1985) photo and subsequent photos to 2003 show a stabilized calcite deposit similar to that found in the MHS (1910) photo.

Figure 22 shows that field stones still retain their calcite coating when exposed for long periods. This long lasting calcite indicates that the KRS could have been standing, perhaps, for hundreds of years. Winchell’s (1910: 236) estimate of 30-100 years seems to have too little duration.
Figure 12: Comparison of Beecher (1937) - Holand (1927) calcite accumulations. The **gold line** traces the rub line. The *red line* traces the Holand ground line.
Figure 13. Comparison of MHS (1910)-Holand (1927) calcite accumulations. The ground line below the face runes through the calcite is seen at the black arrow location in this photo in the calcite on the left side of the KRS (MHS (1915) and in Holand (1956: 133, from ca. 1927). Both the 1910 photo and the Holand photo are reproduced from a printed book. There are no extant negatives. This 1910 photo also appears in Flom (1910).
Figure 14: Lack of calcite accumulations in Steward (1899) photo. This Holland ground line trace appears below the black and white arrow in the Steward (1899). This photo appears almost free of calcite. The KRS is in its cleanest state relative to amount of the calcite that is seen later. Did John Steward and Prof. George Curme clean the calcite from the KRS before this photo or was it done by others before it left Kensington for rail passage to Chicago?
Wolter (2009: 6), “During my initial investigation of the Kensington Rune Stone ... I looked carefully for evidence of differential weathering in the area below the last line and didn’t see any. If the stone had been carved and set upright in the ground ... there should have been some evidence of a weathering ground line.” The montages in Figures 15 and 16 infer that calcite was deposited following Stewart (1899) and Smithsonian (1948). This action would have eliminated differential weathering evidence.
Figure 16: Montage of photos with calcite accumulations from 1980s to 2003. Note ground line in the calcite.

Figure 17. Pre-Stained KRS (Pugh ca. 1985). Figure 18. Post-Stained calcite with no visible runes in 2003.

Both photos indicate that the calcite deposit has occurred since the Smithsonian (1948) photo (Fig. 6). Both show the position of the ground line with black and white arrows in the calcite formation.

Figure 17 is from the 1980s before the silicon rubber black residue stained the KRS.

Figure 18 exhibits the stained KRS from the molding process in the spring of 2003 (Wolter 2003, 2004: Fig. 8).
Figure 19: Post-stained runes visible in the calcite in 2003. The line is the upper edge of the rub line trace seen below the line. Post-stained calcite with no visible runes in 2003.

Figure 20: Ground line proof in the calcite. The depiction to the left is also Figure 18 above. The right depiction from Wolter (2009: 36) has been chopped making it useless as evidence against a ground line presence.
Figure 21: The U614 Torsätra Stone from Upland in Sweden. I first viewed U 614 at the Swedish Historical Museum in Stockholm in October in 2003. I recall now that the dark area under the the stone in the foot and all along the left side edge seemed to be shadows and not evidence of conclusive differential weathering. Perhaps I am wrong, but the matter requires either additional photos or an inspection to establish the facts. I will see if Prof. Williams can arrange this in due course. I believe it is an over statement in N &W (2006: 234) that there is a clearly defined boundary. The U614 Torsätra Stone once stood alongside a small lane in Upland. Together with its mated monument U613 on the other side of the lane. It reads: Skule and Folke raised this stone in memory of their brother Husbjörn. He fell sick when they took debt in Gotland.

Figure 22: Field stone calcite near Kensington in 2000. A heavy calcite coating on a granite glacial boulder was found at Rune Stone Park in Kensington, Minnesota. Many glacial erratic boulders with calcite coatings were observed near the site and are consistent with coating observed on the KRS (Wolter 2004: 15).
5. Reported Weathering and Patina Removal by Dr. R. H. Landon. The cleaning just before World War II in 1941 of the KRS might have removed any evidence of patina and weathering according to Dr. R. H. Landon, Plant Physiologist of the University of Minnesota, who also had professional training in geology and petrology.

Quoting Wahlgren (1958: 66) on R. H. Landon (1954), “Landon reports that he had three replica casts of the Kensington stone made just before World War II by an artificer of the Minnesota Historical Society, in the course of which work the stone was thoroughly coated with engine oil.” Quoting Holand (1962: 67), “… and in examining the stone afterwards Dr. R. H. Landon says, ‘... several gallons of petroleum ether was used with the result that the stone was cleaner than it ever had been. The oil softened any adherent material, and the ether carried it away. A careful inspection of the inscription, including use of a microscope showed a complete absence of any trace of weathering or patina. ... The cuts were as fresh as if they had been made the day before ...’” [R. Nielsen underlining]

Perhaps this cleaning in circa 1941, with its removal of weathering evidence, is why no physical evidence of weathering was detected by N&W (2006: 234). However, we authors were greatly remiss and have no excuse for ignoring Dr. Landon’s report. The impact on patination has been superseded by the silicon rubber black residue staining of the KRS in 2003.

1. Planted in an upright position the KRS would not be expected to have a “weathered” ground line since the meta-graywacke muscovite could already have been initially weathered to its durable altered muscovite (illite) condition, as per Weiblen (2001: 10).

2. Winchell (1910: 234) states that, “The weathered surface [face] is somewhat lighter, and yet it is firm and wholly intact. It is evident that the surface color has been acquired since the glacier period, and therefore some 7,000 or 8,000 years may have elapsed since the face was first exposed to the elements.”

3. Now Reynolds (2008) has identified that Winchell (1913) was fooled by modern faked stone tools he classed to a Paleolithic age (circa 10,000 years) by patina comparisons. How Winchell’s patination studies on the KRS are different from his approach in Kansas must be discussed. However, the silicon rubber staining makes patina passé. Patination can no longer be seen.

4. Weiblen (2001: Appendix 3, Photo a.3.3) showed that on the Jeffers Petroglyphs the patina returned to its original state in about 50 years. The Holand “H” carved on the KRS was 80% restored in 96 years in indoor conditions before it was stained by the black silicon residue in 2003.
6. **Summary**

1. It seems obvious by the photos that the KRS was initially buried upright. The KRS when upright was likely supported by large stones. Some rubbing evidence is seen on the KRS.

2. It is unlikely a modern carver would have planted the KRS upright in a wood lot reserved for the people of Kensington. Ohman acquired this particular land in about 1896.

3. The two small root marks would indicate that the KRS was buried for a short time; otherwise we would expect many more root indications if there had been a longer buried period. If buried initially in the period after 1867 when the first settlers arrived, this is what would be expected.

4. Evidence of line markers in the calcite is seen in photos taken from 1899 to 2003. This is what would likely be expected if the KRS would have been buried upright initially and remained in the atmosphere for four and one half centuries.

5. The ground and rub line markers, as seen on the photos need to be discussed and their origin determined. These photos show a presence of both a ground line and a rub line. These lines are supporting the geological need to have the weathering needed to convert muscovite to illite in 500 years.

6. The KRS would have to remain mainly in the atmosphere to weather muscovite in 534 years for the theories on the age of weathering on the KRS to be confirmed.

7. Weiblen (2000: 10) shows that the muscovite could have been illite to begin with due to its transformation during the metamorphic phase of the KRS. Thus only slight weathering could occur on the KRS face, side or back surfaces.

8. Prof. Horace Newton Winchell (1910: 233) assumed that the KRS was initially placed upright and that the KRS face was initially weathered at the time of carving. This would not then be expected to show a “weathering ground line.”


10. The calcite weathering rate needs determination by tests to reconcile with required time in the atmosphere to weather muscovite.

11. I see no evidence today that can support the KRS initial burial supposition and the theory we co-authors suggested for this in N&W (2006: 234).
7. References

Oddly, this ground line became a subject for disinformation as seen in Adam (2010) in Appendix 1, “you [Nielsen]...use a 1915 photo as evidence of a ground line (pages 124-125). Since the photo you site [cite] appears to have a fold at that location you say is a ground line and the
geological reports rendered on the KRS have never identified such a line.” Nothing in this statement is either correct or true except that “the geological reports rendered on the KRS have never identified such a line.” The fact the line was not identified is proof enough that no thorough inspection by a geologist or anyone else was ever carried out. It is easy to claim that a detailed inspection was made and that nothing was found, but the sure proof that nothing was observed was the lack of any written report on this subject to the RSM in Wolter (2001) or in later reports.

The RSM Information Committee, an ad hoc group set up this year, have obviously utilized outside support from either uninformed people or those with an agenda to construct the question posed in Table A1.

<table>
<thead>
<tr>
<th>Quotations from Adam (2010)</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>[a] “In…’Theories on the hooked X’ presented in ESOP Papers Vol. 26 [27] you document you use the presence of a ground line on the stone and use a 1915 photo as evidence of a ground line (pages 124-125).”</td>
<td>On pages 124-125 I depict the photos in both Holand (1956 and 1962) and Wahlgren (1986). These two photos are reproduced as Figure 1 and 2 in this article. The 1915 photo with a crease is shown in Figure 23. It is a well known photo, from MHS (1915), but was not used.</td>
</tr>
<tr>
<td>[b] “Since the photo you site [cite] appears to have a fold at that location you say is a ground line …”</td>
<td>The two photos I cited did not have a fold at the ground line location and this should be obvious to anyone on the Information Committee upon reading Nielsen (2009). Did anyone even study my article is a question that I have.</td>
</tr>
<tr>
<td>[c] “the geological reports rendered on the KRS have never identified such a line,”</td>
<td>The geological reports, Wolter (2001, 2003 and 2004), have no record of any inspection.</td>
</tr>
<tr>
<td>[d] “it seems your conclusion may be worthy of further investigation by a qualified Geologist.”</td>
<td>The Information Committee forgets I am a Doctor of Technology. The ground line is more of a Material Science and Engineering issue. A geologist has no particular skill in this matter superior to that of an Engineer skilled in Material Science.</td>
</tr>
<tr>
<td>[e] “Do you have other evidence other than the 1915 photo that supports the ground line”</td>
<td>Figure 2 is the other evidence that supports the ground line already presented in Nielsen (2009) and this article has much more additional evidence.</td>
</tr>
<tr>
<td>[f] “that could be used by a Geologist.”</td>
<td>Obviously, a geologist, if even needed, would have to be carefully chosen and be totally impartial. Wolter (2010), a geologist who would have looked at photos 1 and 2 has simply concocted the story that the 1915 photo and its fold was used by me instead.</td>
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