

"POTHoles" IN A MOD-BIT ROOF MEMBRANE

- LICHEN ATTACK

BY HARVEY FREEMAN, MNSAA, MRAIC

This photo shows the selective nature of lichens. The amount of moisture on the vertical surface is just right to satisfy the requirements of the lichen. The top flat surface is either too wet or too dry.

INTRODUCTION

This article describes the interaction between a naturally occurring lichen and a modified-bituminous (mod-bit) roof membrane. I have not found this topic discussed by anyone in roofing literature. The growth of this lichen is very slow in relation to the expected life span of a mod-bit roof membrane. As a result, the roof will have reached the end of its useful life and been replaced or been coated or given a cap sheet re-cover before the lichen has advanced to the point of causing a membrane failure. The only routine maintenance that may be required would be patching potholes.

INITIAL OBSERVATIONS

Several years ago we were asked by the owners of a condominium to do a visual condition assessment of a mod-bit roof, which was then about seven years old. They required this report as part of the documentation for their reserve fund so that they could predict when they would need to replace the roof. The roof was not leaking and had not leaked since the original construction.

Figure 1 - This "pothole," where granules and the top layer of asphalt are missing, started the investigation.



The roof surface showed no wrinkles, blisters, alligatoring, or degranulation. We recommended that sometime in the future the roof might be a good candidate for a mod-bit cap sheet re-cover. We suggested a reinspection of the roof every two years. Four years later, when we did an inspection, we observed a few patches of missing granules.

The largest patches of missing granules were about four centimeters in diameter and did not resemble any kind of damage we had previously seen. This investigation was done in the early spring when Nova Scotia was in the middle of pothole season on the highways, and I decided to call these “potholes” because they were flat-bottomed depressions with straight sides. See *Figure 1*.

We consulted the local representatives for two membrane manufacturers, and neither could provide any explanation. They did not look like depressions that would occur if someone stepped on warm cap sheet and left a footprint.

One person observed there were some random spots of very thin “vegetation” on the roof, and he pulled up some of this material. The granules and the top layer of the cap sheet asphalt came up with the vegetation. *Figures 2 and 3* show the before

Figures 2 and 3 – These photos were contributed by Tim Wrigley of IKO Industries. He lifted the lichen shown in the immediate right, and the granules and top layer of asphalt came away with the lichen, leaving the pothole shown in the far right.



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Figure 4 – David Richardson identified nine varieties of lichen in this patch.

and after conditions where this removal was done. The photos are not of excellent quality because he took them just to show me that it looked like the depressions were not a manufacturing defect.

Some people thought what we had was a form of moss, and others thought it was a lichen. We consulted with people at the Nova Scotia Museum of Natural History, who said the material was a lichen. A lichen is the result of a symbiotic association between a fungus and an alga. The algae provide sugars to the fungus, which in return provides minerals and protection to the algae. Moss is a primitive plant with tiny green leaves that lies on the evolutionary scale between algae and ferns.

We had these potholes patched, and at the next several yearly inspections, no new potholes were observed.

THE LICHENOLOGIST

A few more years passed, and I happened to read a book containing an article about a local “mystery wall” out in the woods on the edge of Halifax where a lichenologist had said the stones might not have been disturbed in at least 200 years. I had been interested in this dry stone wall and did a Google search for details on lichenologists. I ended up sending a message to the secretary of the British Lichen Society in England. I received a reply from the secretary of the society, Dr. Alexandra Coppins, and in her e-mail she copied

David Richardson, a local member of this worldwide organization.

Richardson took an interest in my quest for information and came to look at the roof and took samples. He reported that he found nine species of lichen in the area he sampled (Figure 4). Figure 5 is a close-up of one lichen. Richardson loaned me a book he had written some years ago, entitled *The Vanishing Lichens – Their History, Biology and Importance*. From the book I learned that there are more than 18,000 species of lichen in the world. Their rate of growth varies. The diameter of a lichen may grow from

about 2 mm to 10 mm each year. Richardson said the species found on the roof probably increase by 3 to 5 mm per year. Observations made elsewhere show that once a tiny lichen spore lands on a roof, it takes three to five years for the lichen to develop to a size that is visible to the naked eye.

A drawing (Figure 6) with the descriptive caption from Richardson’s book details, in a general way, what I believe happened on our roof. The lichen pried up the top layer of asphalt and granules to the point that it separated from the roof surface, and the lichen was then blown away, leaving a cavity (pothole).

The good news is that it seems to take about seven years before the lichens gain a significant foothold on the roof. With the life of a mod-bit roof being in the order of 20 years, the roof will likely be re-covered or replaced before the lichen has progressed to the point of affecting the integrity of the roof.

Lichens need moisture, light, and a suitable substratum on which to grow. Shade from other buildings or from trees, if not too dense, slows drying of the roof and enhances the growth and abundance of the colonizing lichens. North-facing parapets on a roof are also more colonized. Our roof is in a sunny area and not too close to Halifax Harbor, and increased fog would provide another factor that encourages more lichen colonization.



Figure 5 – A close-up of one patch of lichen. It does not look anything like moss.

Soils, Stonework and Stained Glass

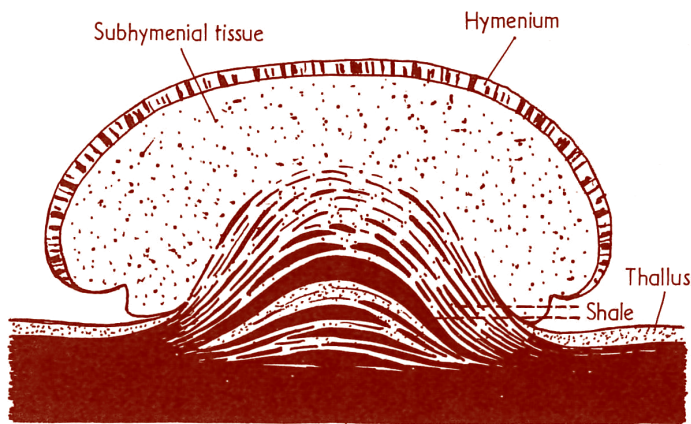



FIGURE 11. The action of lichens on rock. A semi-diagrammatic representation of a vertical section through a fruit body of *Lecidea* sp. This shows arching of the shale lamina beneath the lichen. The dotted mass represents the dense brown hyphal tissue

Figure 6 – This drawing and caption of a lichen acting on the surface of a stone is from David Richardson’s book.

This roof was recovered in the summer of 2019 with a new cap sheet after being primed with asphalt primer. Richardson said the primer would kill any lichen so there would not be a concern for any continued growth below the new cap sheet.

CONCLUSION

Lichens can grow on virtually any surface. Sandy Coppins said she had a project in England where two acres of fiberglass glazing had a lichen problem. Lichens

even grow on glass and leave microscopic pits in the surface. We probably should consider it fortunate that the impact of lichen on mod-bit roofing is relatively minor. 



Harvey Freeman

Harvey Freeman is a registered architect who has worked for Fowler Bauld & Mitchell Ltd. in Halifax, Nova Scotia, Canada, since 1970. He became deeply involved with roofing after attending a course sponsored by the

Roofing Contractors Association of Nova Scotia and put on by RCI (now IIBEC). He retired at the end of 2019, after 49.5 years with the same firm, and he can now be reached at harvey.freeman@eastlink.ca.

Traditional Danish Thatching Was Done With Seaweed



Old eelgrass-thatched roof in Laesø. Photo by Adam Schnack.

On the Danish island of Laesø, once known for its salt industry, there still exist dwellings thatched with seaweed, also known as eelgrass. The walls of the homes were made of driftwood. Since both the seaweed and the driftwood were saturated with salt water, they survived for centuries. The seaweed houses still standing there have been declared as one of North Jutland’s seven wonders.

Eelgrass was traditionally dried, bundled, and twisted into thick ropes that were then woven through the rafters of homes to form roofs. Such roofs typically last 200 years, with some surviving up to 400 years. But in the 1930s, the eelgrasses natural to the area were attacked by a disease that made it challenging to maintain the roofs. The number

of remaining eelgrass roofs dwindled to just a few by the 21st century.

Recently, the Modern Seaweed House, a \$360,000 vacation home, was built in Laesø, incorporating seaweed-stuffed “pillows” on the building’s façade in the place of traditional shingles or clapboard. The algae was also stuffed into the light pine walls and serves as a replacement for mineral wool insulation. The ceiling is also padded with the same insulation. It was a collaboration between architectural firm Vandkunsten and Readania Byg, an organization that preserves Denmark’s historical properties. Designers estimate the exterior pillows could last 100 years or more.

Watch a presentation by Marcele Meier about the conservation of an eelgrass seaweed building: https://www.youtube.com/watch?time_continue=1220&v=LEDN1k7oHF0&feature=emb_logo.

– *Vintage News and other sources*

Modern Seaweed House. Photo by Helene Hoyer Mikkelsen.

