About 100 kilometers to the southwest of Oslo (Figure 1) lies the Langesund, one of the beautiful fjords that encircle the coast of Norway (Figure 2). This area was home to Henrik Ibsen, the well-known nineteenth century playwright who lived in Skien at the northernmost reaches of this fjord. Hundreds of islands dot this inlet—measuring in size from a square kilometer to a mere boulder poking out of the water—rendering a boat necessary for a local traveler (Figure 3).

One fateful day in early 1829, the pastor of Brevik was rowing around the rocky islands of the Langesundfjord, hunting for ducks. As he drifted around Lovøya Island (see Figure 4), he noticed a black mineral in the pegmatite boulders. Curious, he eased his boat by the craggy shore and scrambled ashore. He chipped off some of the crystals and took them back to his parish. The glimmering mineral that the pastor collected would later be known as thorite, ThSiO$_4$ (Figure 5), and thereby begins the story of the discovery of a new element.

The curious pastor was Hans Morten Thrane Esmark (1801–1882), a true Renaissance Man, who like Reverend William Gregor' probed Nature in all disciplines to learn Her secrets. In addition to being a learned mineralogist, Esmark performed chemical analyses; he was an expert in potato diseases; he made a limestone kiln for the production of cement; he invented the exploding harpoon (but didn't get credit for it), and became the first mayor of Brevik. And as a man of the cloth he cared for his flock at the Brevik church (Figure 6).

Esmark showed the interesting mineral to his father, Jens Esmark, who earlier had been Professor at the famed Kongsvinger Academy. The mineral appeared unlike anything they had seen before, and the two Esmarks realized this might be something new. Esmark senior sent a sample to Jons Jakob Berzelius, the famous chemist in Stockholm, for a more complete analysis, who later that year discovered thorium in the mineral (note 1).

The Kongsvinger Mining Academy (Kongelige Norske Bergseminarium), the accompanying Norwegian Mining Museum (Norsk Bergverksmuseum), and Kongsvinger silver mines can be visited at Kongsvinger (Figure 2). The Academy where Jens Esmark taught still stands (note 2). In 1813 when the University of Christiana (note 3) was created, Jens Esmark joined that new university and the Kongsvinger Mining Academy shut down. Jens Esmark in the 1820's suggested that Scandinavia had once been covered with ice, but he was not taken seriously by his colleagues—extensive global glaciation was not recognized until Louis Agassiz's work in Switzerland twenty years later.

Mr. Alf Olav Larsen (Figure 7), the leading mineralogist of the Langesundfjord area, was
our host for our visit to Norway and led us on a retracing of Esmark’s discovery. There is no routine ferry service to Lovøya, and Alf took us in his outboard for a tour of the islands in the fjord. He headed from his home in Stathelle (Figure 8), through the Brevik harbor, and then straight to Lovøya (Figure 4). “Today we do not know exactly where Esmark discovered the mineral, Alf was telling us as we cruised through Brevik harbor.” Esmark mentioned in a letter to Berzelius that when he returned after the winter thaw, he assumed that ice had weathered out some of the minerals. That means it was close to the shore. “Alf told us that he had scoured the whole of Lovøya and had found only a few candidates, close to the shore where the ice would have formed. In the old days the locality was called the ‘thorite hole’ (Figure 9).” As Alf maneuvered the boat to dock at a mineralized headland, an eider hen scurried away with her brood.

Unfortunately no more thorite can be found: “After Auer von Welsbach invented his incandescent mantle which uses the refractory thorium oxide, there was a ‘gold rush’ in 1895-1896, which essentially cleaned out the thorite in the Langesundfjord islands.” (note 4).

In his boat, Alf toured us across the open water of the fjord to gain a larger view. The scenery in Langesundfjord displayed an ancient panorama of geological variety. From the middle of the fjord, we scanned the horizon and viewed almost a billion years of history, from preCambrian to Permian. The thorite itself was found in Permian pegmatites. To one side of the fjord an Ordovician limestone quarry lay, marked by a smokestack of an accompanying cement factory; to the other side a Permian cliff of blue syenite loomed over the horizon. “This is the famous blue schillerizing larvikite used in so many buildings of the world.” Alf told us (note 5).
The case of Esmark exemplifies the large network always responsible for important advances. Time blurs details, and history celebrates the discoverer but forgets the supporting cast. Hans Esmark, the pastor, was well known throughout Europe and supplied mineral samples to many scientists in other countries for their researches. He was the only amateur who has been granted honorary fellowship in the Mineralogical Society of England. A mineral species, esmarkite, was named in his honor (note 6). Upon his death his mineral collection was donated to the University of Tromsø, Norway.

The Brevik Bymuseum (City Museum) resides in the old city hall, about 100 meters downhill from Esmark's old church (Figure 10). Inside are beautiful montages, antiques, paintings, and photographs that describe the history of the area. And on the wall arc the past thirty mayors of Brevik—the first, at the top, being Hans Morten Thune Esmark (Figure 11). Loved by his people, his memory lives on with his community, which celebrated his 200th birthday on August 21, 2001. ☘

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Gratitude is extended to Alf Olav Larsen of Stathelle, Norway, recognized as the foremost mineralogist of the Langesundfjord area, who extended his hospitality and expertise to the authors—not only for the Langesundfjord area, but also Kragem (original source of hafnium), Karlshus (original source of helium-bearing cleveite), and Evje (original source of the first naturally occurring scandium mineral). We are also grateful to Alf for helping with the translations of various references.

**Notes**

1. Berzelius analyzed the mineral by using his classical procedures and established its composition as a new earth silicate: his analysis revealed small amounts of known elements (Ca, Fe, Mn, U, Pb, Sn, K, Al, Na) but an abundance of a new earth (58%, thorium oxide), as well as silica (19%). He subsequently prepared metallic thorium by reacting the tetrachloride with elemental potassium. In a subsequent article we shall deal more fully with this "Father of Modern Chemistry" when we vicariously visit Sweden.

2. These attractions of Kongsberg may be found by leaving the main highway E134 from Oslo, crossing the Lågen River at the waterfall in Kongsberg (intersection is N 59° 39.95, E 09° 39.24). The Academy stands in the Kikrovet (N 59° 39.95, E 09° 38.72). Within 250 meters, the museum (N 59° 39.97, E 09° 38.97) highlights the silver mining history of the area, including elaborate exhibits on old mining methods and an elegant silver coin collection. Interestingly, the crossed hammers of Germany which were described in a previous Rediscovery article were seen here. Whereas Sweden devel-
oped its own mining technology, Norway imported German expertise with the accompanying traditions. Whereas the crossed hammers were called “Eisen und Schlagel” in Germany, in Norway they are named “hammer og berghjem.” The crossed hammers can be seen on Norwegian coins as the trade mark for the Kongensberg Norwegian Coinage.

3. The original name of the university was “Det Kongelige Norske Frederiks Universitet” (The Royal Norwegian Frederik University - Frederik being the name of the contemporary Danish-Norwegian king). The cognomen of the university became “Universitet i Christiana” (University of Christiana)—Christiana being the name of Oslo until 1924. The modern name is “Universitet i Oslo” (University of Oslo).

4. A new museum in Althofen, Austria, is devoted totally to Auer von Welsbach (discoverer of praseodymium, neodymium, and casseopeium), and includes beautiful exhibits and displays. A trip to this site will be the subject of the next Rediscovery article.

5. “Schillerizing” refers to a metallic luster caused by microinclusions in feldspar. Buildings made of larvikite include Liberty Place in Philadelphia, PA, the Corporex Office Building of Atlanta, GA, and the Canterra Tower of Calgary, Canada. In Larvik (15 kilometers west of Brevik) stands a larvikite statue of Thor Heyerdahl, the famous scientist and explorer, who was born and reared in Larvik. The statue exhibits the long, tapered motif of the Moai of Easter Island, and like the Moai his statue faces inland toward the village.

6. “Esmarkite” is now recognized as a modification of corderie. A crystal of corderite (Mg₂₆Al₄₂Si₅₀O₁₈) was known as “Norsemens’s compass,” because of its ability to tell the sun’s position when below the horizon; this was accomplished by its different transparent colors, varying from violet to gray, as the angle of the crystal was rotated through the polarizing light of the sky. A modern use of corderie is as a refractory ceramic, because of its low expansion coefficient and its thermal shock resistance.


Figure 10. This view is from the environs of the church on Sylтемa, looking across to the mainland and Brevik. This historical harbor used to teem with boats loading timber and ice. Today the harbor is the site where a visitor may hire a boat to tour the various islands on the Langesundfjord.