

Paper Number: 2845

## **Verifying the Silurian: Murchison's 1845 field campaign in Sweden**

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On 8 August 1845, Roderick Murchison and Edouard de Verneuil arrived in St. Petersburg to deliver the newly published book *The Geology of Russia in Europe and the Ural Mountains* to their sponsor, Czar Nicholas I. A geologic map of western Russia and parts of Europe including Scandinavia accompanied the book. During their three-week visit, Murchison and de Verneuil had several opportunities to meet with the Czar and his ministers to discuss the significance of their geological discoveries. On 29 August 1845, Murchison and de Verneuil left St. Petersburg, having been awarded for their services the Great Cross of St. Stanislaus and the Second Cross of St. Anne, respectively.

Despite having already published *The Geology of Russia*, which made a strong case for the validity and extent of Paleozoic systems in Russia and Scandinavia, Murchison wanted to verify some of his interpretations concerning the lowest part of the Paleozoic strata. Because many of those interpretations were made in Sweden where he mapped the Silurian resting unconformably on crystalline basement rocks, and because his interpretations were based in part on fossils, Murchison had arranged for his paleontologist coadjutor, Edouard de Verneuil, to travel with him to Sweden.

The collaborators arrived in Stockholm (probably on Friday 5 September) where they spent a day or two inspecting the fossil collections and maps of Hisinger and Dalman, and planning their campaign route. On Monday 8 September, they traveled to Uppsala where they examined the fossil collection of a Mr. Macklin, including specimens from Gotland and Scania. They then set off for Lake Siljan in Dalecarlia, arriving at Mora on 11 September. They spent about a week in the Dalecarlia region, before heading south once more along the coast of the Gulf of Bothnia. Because of the chaotic outcrops in the Lake Siljan area (it is now interpreted as a bolide impact structure), Murchison was not able to make any sweeping claims about the Paleozoic stratigraphy in the region.

On 26 September 1845, Murchison and de Verneuil took a steamboat to Wisby on the island of Gotland. They spent about a week on Gotland, visiting museums and traveling around the island to observe outcrops and collect fossils. Based on earlier reports, Murchison expected to find upper Silurian fossils on Gotland. He quickly verified that there was an ascending section from north to south. The dip to the south was slight, but Murchison already knew there were Wenlock-age fossils at the north end grading up into Aymestry fossils in the central part of the island based on work by Hisinger and Helmersson. He suspected that Ludlow fossils could be found at the south end of the island, and indeed they were able to verify that occurrence. They left Gotland on 5 October and were back in Westervik on 6 October. There they purchased a carriage and continued southwestward along the Baltic coast. By 13 October they were in Scania in search of a lower Paleozoic section reported by Forchhammer. On 14 October they were in Lund, visiting the craniologist Nilsson, who requested that Murchison, upon dying, provide Nilsson with the cranium of a Highlander. The next day they made the two-hour crossing from Malmö to Copenhagen, where Murchison visited museums and met with Forchhammer, and was persuaded by him that the red sandstones of Scania were in fact Silurian in age.

Thus, Murchison's month-long 1845 fieldwork campaign is an example of his verifying the occurrence of Silurian rocks in three parts of Sweden: Dalecarlia, Gotland and Scania. He was able to accomplish his goal efficiently by utilizing his well-honed fieldwork methodology. That methodology included prior correspondence with experts with local knowledge, assembling pertinent documents including papers and geologic maps during the planning of a campaign, visiting museums to inspect fossil collections, and traveling with other established geologists who could confirm the validity of his interpretations. While Murchison did not tarry over detailed fieldwork, he was able to apply successfully newly established stratigraphic nomenclature to large regions.

