Palaeontological fieldwork on Spitsbergen – in the footsteps of Erik Stensiö

Project leader

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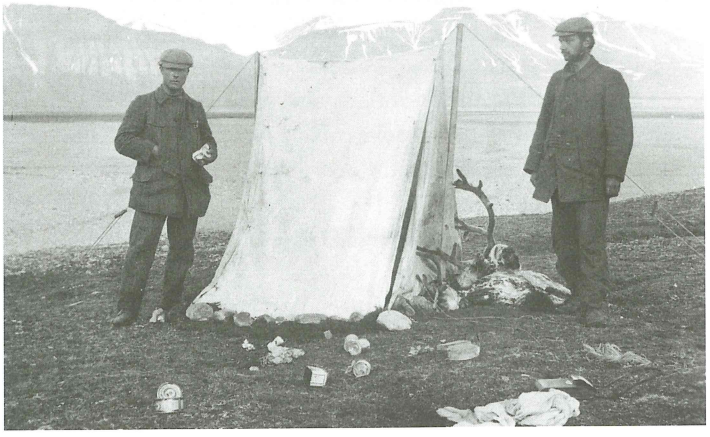
Background

For a long period (1923–1959) the Department of Palaeozoology at the Swedish Museum of Natural History was led by professor Erik Stensiö (1891–1984), at the time a world leading expert on the history of fishes. His interest in early vertebrates started at Uppsala University, where he began his scientific studies in 1910 at the age of 23. His chosen topics were zoology and geology. In the latter his teacher, professor Carl Wiman, made a strong impression on young Stensiö – or Andersson as was his name before 1917. Wiman had participated in de Geer's scientific expedition to Spitsbergen in 1908 to collect Triassic vertebrates. Driven by a desire for adventure and inspired by Wiman, Stensiö organized an expedition himself in 1912. The aim was to collect Triassic vertebrates in the Isfjorden area in central Spitsbergen. Stensiö and one of the three accompanying students paid the expenses. This was to be the first trip to the island in a series of six led by Stensiö between the years 1912–1918. Various coal companies for whom Stensiö did geological work usually provided the logistics. In the years 1912, 1913, 1915 and 1916 he worked in Sassendalen, situated in the inner part of Isfjorden. This beautiful valley is some 30 km long and 5 km wide with a flat valley floor where the sluggish, sediment laden Sassenelva River runs. The surrounding mountains consist of strata from the Permian, Triassic and Jurassic periods. In Triassic times, some 240 million years ago, the area was covered by sea, bordered in the west by land. The remains of several species of fish, amphibians and reptiles became embedded and later turned into fossils in the deltaic to coastal sediments. What caught Stensiö's attention was the large number of peculiar fishes, which would eventually lead to his thesis *Triassic fishes from Spitzbergen*, published in 1921.

One of the aims of the current project was to revisit some of the localities Stensiö sampled to fix their GPS-positions and search for fossils. Since Stensiö was affiliated to Uppsala University at the time of his fieldwork on Spitsbergen, all his collections were deposited there. Information on these

Figure 1
Left: Axel Stensiö and Erik Asplund at subcamp 15 km up Sassendalen Valley in 1913. Photo: Erik Stensiö.

Right: On bear watch at the darkest hour of night. Eskerdalen Valley. Photo: Jonas Hagström.



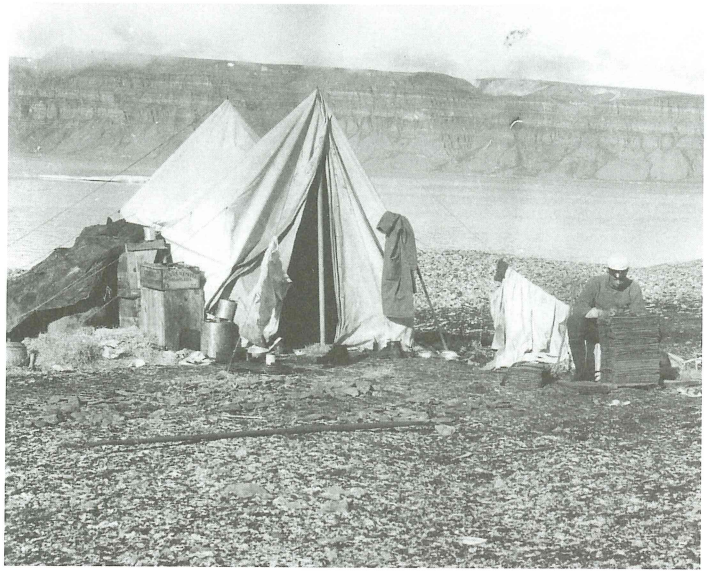


Figure 2
Left: Stensiös camp with Mount Templet and Sassenfjorden. Photo: unknown.

Right: Our camp with Mount Templet and Sassenfjorden. Photo: Jonas Hagström.

localities will hopefully serve as a first step on a future expedition to collect specimens for the collections at the Swedish Museum of Natural History in Stockholm. Stensiö also took photos of the area but often neglected to note where they were taken. New pictures taken by us will aid in the identification of these historically interesting glass plates housed at the museum.

Another aim of the project was to get experience of how it is to do field work in arctic conditions, to establish contacts with the Norwegian Polar Institute on Spitsbergen and to see what range of logistics were available. Although the equipment has improved dramatically since Stensiö worked there almost a century ago, first hand experience is needed.

Fieldwork

Our original plan was to walk the whole length of Sassendalen before going back to Longyearbyen via Eskerdalen and Adventdalen. However, shortly after being put ashore at the mouth of Sassendalen it became evident that we would not make enough progress per day to reach the inner part of the valley within the time limit carrying all our equipment. The ground is to a large extent covered with rocks, tussocks and mires. There are also rivers to ford. The average distance covered to establish a new camp was therefore less than 7 km. As a test we established a base camp halfway up the valley, and carrying only daypacks we managed to walk more than twice the distance and reached the Vendomdalen Valley ("Turnback Valley").

Due to very active erosion the slopes are covered by scree in which the fossils lay scattered. Where the strata are more resistant, they form almost vertical cliffs to steep to climb. As a result of this we never saw the specimens *in situ* during our searches. The most productive stratum, the "Fish Horizon", was therefore only tentatively located. However, the specimens were easily spotted due to the original calcium phosphate of the bones being replaced by the bluish mineral vivianite. Most common were fragments of Ichtyosaur vertebrae and ribs. In addition a few labyrinthodont plates were found as well as specimens belonging to several invertebrate groups. We also located a Triassic "bone bed" with microvertebrate fauna.

In Enerdalen, south of Longyearbyen, we tried to reach the Tertiary strata where fossil plants could be found. Eventually we encountered well-preserved specimens of Palaeogene plants in the debris of a glacier. The genera are tentatively identified as *Ushia, Metasequoia, Phragmites* and *Equisetum*.

To ward off polar bear attacks during the night, one can either post a guard outside or surround the tent with tripwires. We chose the first option. This proved to be a mistake, since the 3-hour shifts disrupted our much needed sleep.

Preliminary results

Valuable information was obtained in relation to Stensiö's work in Sassendalen. The condition of the localities and their positions were noted. Photos of the valley were taken for comparison with the historical material. I also feel that I have come closer to both the scientist and the person Stensiö after my time in the valley.

For future expeditions covering large

areas, it is essential to leave the heavier equipment in a base camp and push further by establishing sub-camps. This is especially important if one plans to bring out heavy fossils. To use expensive helicopter transports is of course an alternative. A more economical way to bring out the collections could be to establish depots of collected material, determine the coordinates and then retrieve the material using snowmobiles the following winter. Stensiö had to go back and forth repeatedly to transport his fossils to the coast. Still he had to leave part of the collections behind. Half a century later, the French Palaeontological Expedition of 1969 retrieved these specimens with the help of helicopters.

The temperature during our stay in mid-July was between +6–8° C. The chill factor from the more or less constant wind should be added to this. It became evident that one needs absolutely windproof clothes for comfort. Other equipment that proved valuable were the cover boots used when fording and the hiking poles that gave extra support when passing rough terrain.

Contact was established with the Norwegian Polar Institute in Longyearbyen, which is essential for the organization of future expedition logistics.

The overall impression from the expedition is that there are no obstacles to reviving Swedish palaeontological fieldwork on Spitsbergen. The Swedish Museum of Natural History has great traditions in this scientific field to live up to. A century ago pioneers working or coming to work for the museum such as Sven Lovén, A.E. Nordenskiöld, A.G. Nathorst and of course Erik Stensiö brought large collections of fossils back to Sweden for the benefit of visiting scientist from all over the world.

And yes, there are mosquitoes on Spitsbergen, lots of them, contrary to what we were told before we left Sweden and our mosquito repellents!

Acknowledgements

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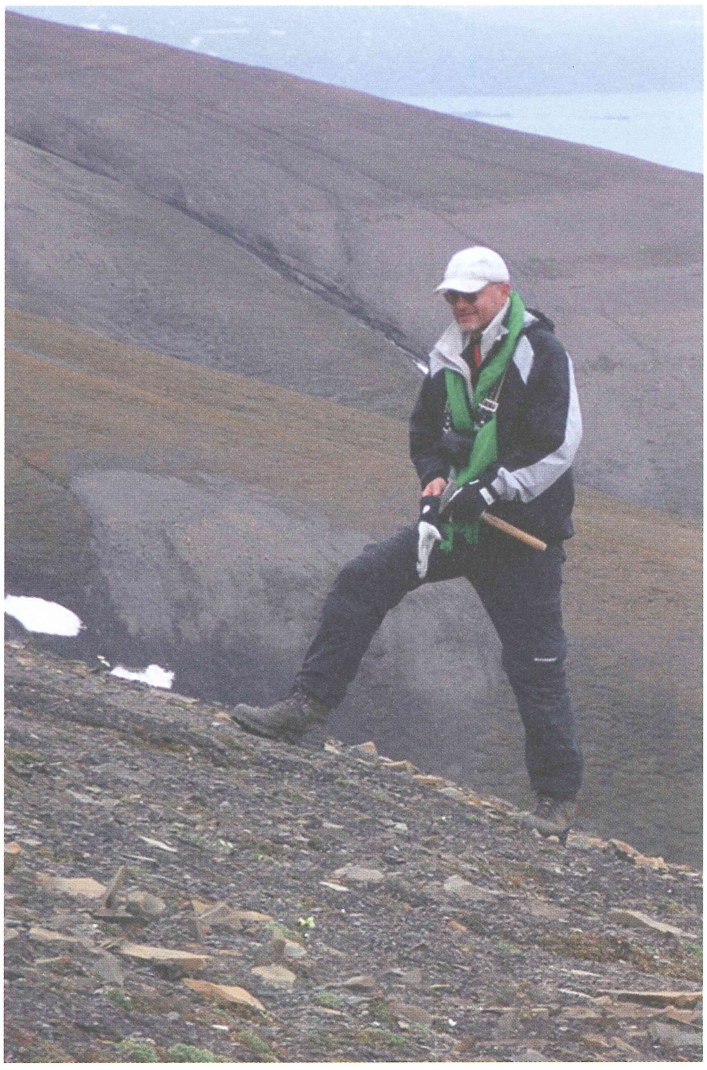

Figure 3
Left: Two members of Stensiö's expedition at the Triassic "Fish horizon" on Mount Trehøgdene, Sassendalen Valley. 1912. Photo: unkown.

Right: Fossil hunting on Mount Vikinghøgda, Sassendalen. Photo: Lars Hanning.

Figure 4
Left: Logistics at the beginning of the 20th century. One of Stensiö's expeditions with Sassenfjorden and Mount Templet in the background. Photo: unkown.

Right: Logistics at the beginning of the 21st century. Sassenfjorden and Von Postbreen Glacier in the background. Photo: Jonas Hagström.

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Paleontologiskt fältarbete på Spetsbergen – i Erik Stensiös fotspår

Under mitten av 1900-talet leddes den paleozoologiska avdelningen på Naturhistoriska Riksmuseet i Stockholm av professor Erik Stensiö – en då världsledande expert på fiskarnas tidiga historia. Han hade som ung student i Uppsala inspirerats att börja forska på fossila fiskar från Spetsbergen, eller Svalbard. Forskningsmaterialet samlades in under flera expeditioner ledda av honom själv under åren 1912–1918. Resultatet blev så småningom en avhandling om triassiska fiskar från ögruppen. Vårt projekt sommaren 2006 gick ut på att besöka ett av Stensiös insamlingsområden, Sassendalen, längst in i Isfjorden på Spetsbergen. Här lokaliserades och undersöktes några av hans fyndplatser. Dessutom togs foton av området som hjälp för identifiering av motiven på Stensiös gamla glasplåtar. Erfarenhet samlades om hur det är att arbeta i fält i ett arktiskt klimat samt vad som krävs av utrustningen. Kontakter togs även med Norsk Polarinstitutt på plats för samarbete vid framtida insamlingsresor.

Lärdomar för kommande expeditioner var bl.a. vikten av att ha absolut vindtäta kläder, att man bör arbeta utifrån basläger för att slippa bära både tung utrustning och fossil långa sträckor. För att få sova ut ordentligt bör man förlita sig på larmminor runt tältet för att skrämma bort eventuella isbjörnar, att turas om med vakthållning var alltför tröttande. Som slutsats kan dras att det finns inget som hindrar att Riksmuseet ånyo organiserar insamlingsresor till Spetsbergen i samma anda som då de stora polarfararna besökte ögruppen för ett sekel sedan. Men glöm inte myggmedel!