

Palynological framework of the youngest part of the Carolinefjellet Formation (Lower Cretaceous) at Schönrockfjellet, SE Spitsbergen

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The Carolinefjellet Formation is an Aptian–Albian marine succession on Spitsbergen (Svalbard, Arctic Norway). The formation comprises five intercalated sandstone and mudstone-dominated members, whereby the upper two have informal member status: the Zillerberget and the Schönrockfjellet members. Their informal member status is partly due to uncertainties in regards to their age, as well as their stratigraphic and lateral relationship to the underlying units. Previous palynological studies of these two units carried under the LoCrA consortium project, which were based on relatively few samples and was limited to the presence/absence of key species, suggests a middle Albian age¹. The aim of this study is thus to improve the stratigraphical framework of these two members, based on quantitative analysis of palynomorphs (dinoflagellate cysts (dinocysts) and acritarchs).

Eleven sedimentary rock samples were collected from a c. 160 m thick vertical section at Schönrockfjellet in SE Spitsbergen, thus spanning the upper part of the Zillerberget member and the entire Schönrockfjellet member. Palynological slides were prepared at the Geological Survey of Denmark¹. A single slide from each sample was scanned at the Norwegian Petroleum Directorate (the Avatara project) and analyzed using the CaseViewer digital microscopy application.

The samples vary in palynomorph preservation state as well as in dinocyst diversity. The palynomorph assemblage in the uppermost sample exhibited an excellent preservation and a high diversity. The two lowermost samples yielded poorly preserved palynomorphs and were of a lower dinocyst diversity. In the remaining samples the preservation of palynomorphs was moderate to good, and the diversity varied from low to moderate. We have recognised five key stratigraphic markers and applied the dinocyst zonation from the NE Greenland².

The palynological assemblages imply that both members belong to the *Rhombodella paucispina* Zone, thus confirming a middle Albian age for the investigated succession. The Zillerberget member and the lower part of the overlying Schönrockfjellet member belongs to the *Litosphaeridium arundum* Subzone, and the two uppermost samples from the Schönrockfjellet member belongs to the *Chichaouadinium vestitum* Subzone. Furthermore, our study provides a more precise position of the lower boundary for the *Chichaouadinium vestitum* Subzone, which is now positioned at least 20 meters higher in the succession than previously indicated¹. Our study provides the first quantitative palynological analysis of the youngest part of the Lower Cretaceous succession in Svalbard and may thus shed new light on the regional palaeo-geographic development of the area.

1. Hurum, J. H. *et al.* Bird or maniraptoran dinosaur? A femur from the Albian strata of Spitsbergen. *2015* **67**, 137–147.

2. Nøhr-Hansen, H., Piasecki, S. & Alsen, P. A Cretaceous dinoflagellate cyst zonation for NE Greenland. *Geol. Mag.* **157**, 1658–1692 (2020).