

## APPENDIX

**The structure of the Trygghamna-  
Vermlandsryggen area, Isfjorden**

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The Tertiary earth-movements, which produced such complex structure to both the north and south of Isfjorden, have at Trygghamna given rise to a comparatively simple area. NATHORST (1910) attributed the folding to what he described as the great coastal fault in the west, the fault being drawn at the boundary between the Hecla Hoek and Culm formations. Since Nathorst's day much evidence has been gathered supporting the view that strong pressure from the west was responsible for the Tertiary folding and that the faulting is somewhat younger. Overthrusting of the Hecla Hoek on to Carboniferous rocks occurs to the north and recumbent folds in the Carboniferous, overturning to the east, are known south of St. Jonsfjorden. Nevertheless, the structure at Trygghamna seems to remain comparatively simple.

On the western side of Trygghamna the Carboniferous rocks are bounded by a strong fault below Protektoraksla. There the Culm dips fairly steeply to the west, but becomes suddenly vertical and a crush breccia is developed adjacent to the Hecla Hoek rocks.

Vermlandryggen is a strike ridge, rising to about 550 m. On its crest the outcropping rocks are the cherts. The dip is generally very steep to the east, but locally it may be at high angles to the west. At the southern end of the ridge it is nearly vertical, northwards it rarely falls below 80°.

ORVIN's interpretation of the structure of the Trygghamna area is illustrated in a section (1934, p. 80, fig. 30, AB. This paper, fig. 4b). He regarded the Culm-Hecla Hoek junction as non-faulted and the succession to the east inverted. The dips observed on Vermlandryggen and Lovenryggen are, however, eastwards or vertical; nowhere were dips of 50 degrees to the west found. The presence of Culm dipping at low angles westwards on the nunatak and below the snout of

Kjerulfbreen is difficult to explain on ORVIN's section. It is equally difficult to account for the unconformable junction of the Culm and Hecla Hoek on Lovenryggen, dipping at 70–80 degrees to the east. The interpretation adopted here notes an uninverted sequence on Vermlandryggen and the existence of the fault. This is in agreement with HOLTEDAHL's account (1913) as can be seen by comparing figure 5 with HOLTEDAHL's sketch-section.

The difference in strike of the Carboniferous strata on opposite sides of Trygghamna was noted by Hortedahl, but it is not possible to say if this is due to the effects of the fault, deflecting the strike of the Culm on the western side of the fjord or whether a major fault running along the centre of Trygghamna explains this feature.

In view of the more complicated structure some kilometres to the north, e. g. just south of St. Jonsfjorden, it may be asked why the folding at Trygghamna is so open. No doubt several factors are responsible. Trygghamna is situated on the flank of the great southeasterly pitching Tertiary syncline which occupies most of southern Vestspitsbergen, whereas St. Jonsfjorden is nearer to the closure of this syncline. Minor structural influence may be exerted by the variation in the Carboniferous column from place to place with consequent changes in the competency of the beds, and by the varying weight of this column on the Hecla Hoek foundation below.

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