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OBSERVATIONS ON THE FIELD RELATIONSHIPS AND CHARACTERISTICS OF THE RØDEØ CONGLOMERATE OF INNER SCORESBY SUND, EAST GREENLAND

(with notes on the Lower Permian sediments of the Schuchert Flod area)

J. D. Collinson

Introduction

In the summer of 1970, four weeks were spent in mapping and making sedimentological observations in the red conglomerates and sandstones (the Rødeø Conglomerate) of Rødefjord and Rypefjord area. A period of ten days was also spent looking at the Permian and (?) Carboniferous sediments of the Schuchert Flod area for comparative purposes. The fieldwork was carried out with the assistence of C. Bülow. The Rødeø Conglomerate had previously been briefly described by Bütler (1957, 1961) and the Schuchert Flod sequence in more detail by Kempter (1961).

Rødeø Conglomerate

Age of sediments

The sediments overlie the migmatites and granites of C. Hofmann Halvø and Storø with nonconformity and are intruded by dykes of presumed Tertiary age. They lack any diagnostic fossils. The only organic remains were badly preserved plant casts

found at one locality on the northern side of Harefjord. A search for spores in the fine-grained sediments is at present in progress.

Bütler (1957) first suggested a Carboniferous age but later, in the light of Kempter's description of the sediments of the Schuchert Flod area (1961), thought that a Permian age might be more appropriate (Bütler, 1961). In the absence of any palaeontological data, the age must remain conjectural.

Relationship of the sediments to the surrounding rocks

The Rødeø Conglomerate outcrops in an elongate, north-south orientated strip along the western side of Rødefjord and across C. Hofmann Halvø, between Harefjord and Rypefjord. Small areas also occur on Storø and Rødeø (fig. 2).

North of Harefjord, the conglomerate is faulted against migmatites which, from H. Rutishauser's mapping in the area to the west, appear to form a triangular horst. The western boundary fault of the migmatite horst throws the migmatites against metasediments and the line of this fault matches up with the western boundary fault of the conglomerates south of Harefjord, where the conglomerates are faulted against metasediments. At the northern end of the western boundary of the conglomerates, about 1 km from the Rypefjord coast, there is evidence that the conglomerates overlie the migmatites nonconformably. The nonconformity on the eastern boundary of the conglomerates is only exposed at one locality, on Storø, but the topography across C. Hofmann Halvø suggests that the contact there is similar. The observed exposure and the topographic features, particularly as seen on aerial photographs, suggest that the nonconformity surface dips at about 20° on Storø and at a somewhat lower angle on C. Hofmann Halvø, both to the west.

The sediments

Four major lithofacies associations were recognised in the formation. These are:–

1) Conglomeratic association.
2) Cross-bedded sandstone association.
3) Silty sandstone association.
4) Gypsiferous sandstone association.

In addition, one section of complexly interbedded lithofacies was found.

Conglomeratic association. This is confined to the western side of the outcrop area, against the western boundary fault, from which it extends for up to at least 6 km. It is quantitatively by far the most abundant lithofacies association and thicknesses of up to 1000 m can be demonstrated. Neither top nor bottom is seen. The conglomeratic association shows a gradational interbedding of lenticular coarser and finer conglomerate beds. Grain sizes vary from coarse conglomerates, with boulders up to 4 m in diameter, to coarse sandstones with pebbles. The sediments are all very poorly sorted and there are no obvious systematic vertical or lateral changes in clast

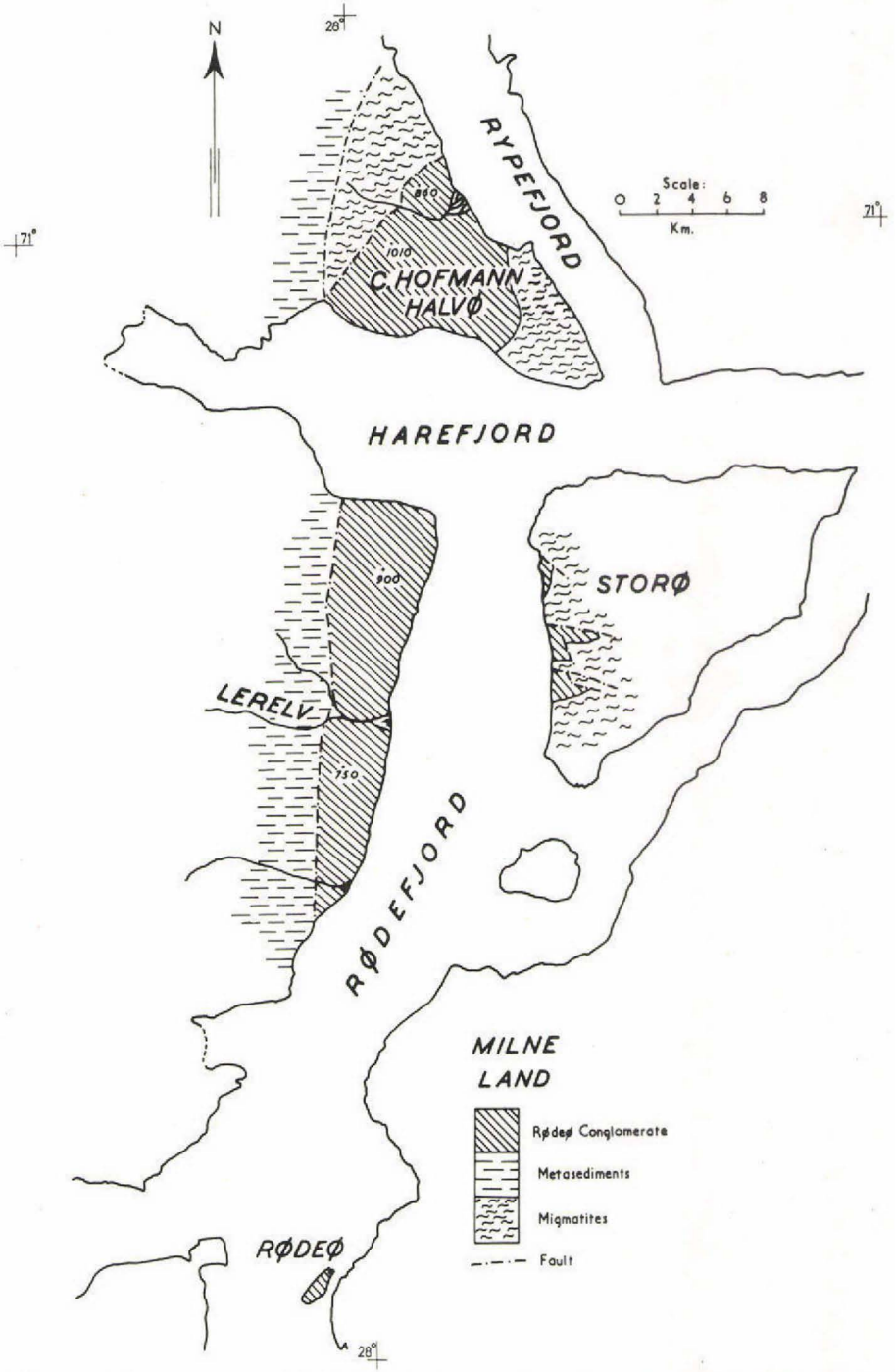

Fig. 2. Map of the outcrop area of the Rødeø Conglomerate in the inner Scoresby Sund region, showing its field relations with the surrounding rocks.

size or clast type throughout the outcrop area. All the clasts that are large enough to be described as rock types are metamorphic.

Occasional cross-bedding, primary current lineation, pebble fabric and imbrication are present in the sediments and these suggest an overall derivation of sediment from the west (fig. 3 A). The sedimentary characteristics of the association correspond closely with those of recent alluvial fans and it is suggested that the conglomerates represent the bajada deposit laid down at the foot of an actively rising fault scarp. It is suggested that the present western boundary fault was operating during the period of deposition to produce and maintain the relief necessary for the generation of the sediments.

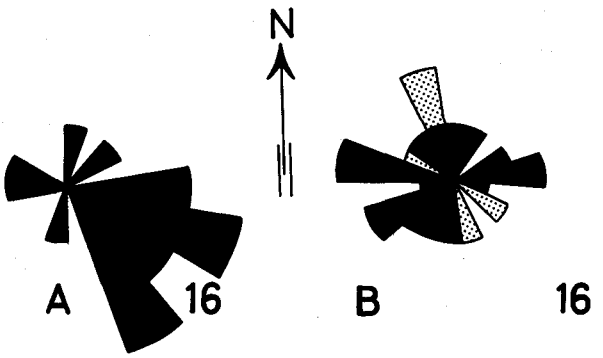

Fig. 3. Palaeocurrents measured in the Rødeø Conglomerate. A. From the conglomeratic association on C. Hofmann Halvø and west of Rødefjord. B. From the cross-bedded sandstone association of Storø. Solid decoration indicates that direction and sense of movement is known. Dotted decoration indicates direction only.

Cross-bedded sandstone association. This association is confined to Storø and immediately overlies the basal nonconformity. Up to about 50 m are exposed there in three faulted blocks. The association consists of sharp-based, cross-bedded sandstone units of wide lateral extent and interbedded finer sediments. The cross-bedding directions are widely dispersed, indicating currents to all directions except the southeast (fig. 3 B). The sharp bases to the units and the cross-bedding suggest an overall fluviatile environment, which was not obviously deriving its sediment from the same source as the conglomerate.

Silty sandstone association. This association is confined to a narrow strip of land immediately east of the conglomerates on C. Hofmann Halvø. Up to 130 m of the association can be found though again neither top nor bottom is seen. The silty sandstones are predominantly red with occasional green reduction patches and horizons. They are thinly bedded with occasional horizons of ripple cross-laminated sandstone.

Gypsiferous sandstone association. The gypsiferous sandstone outcrops in a parallel strip of country, immediately east of the silty sandstones. From the topography,

they would seem to nonconformably overlie the migmatites. The primary depositional characteristics of the sediments are similar to those of the silty sandstone association but the lithology is complicated by the abundant post-depositional growth of gypsum, in nodules up to 20 cm in diameter. There seems to be a crudely developed cyclicity to the occurrence of the gypsum with units 30-50 m thick, each showing an upwards reduction in nodule size, from nearly continuous horizons of large nodules to gypsum-free sandstone.

Relationships of the lithofacies associations

The conglomeratic, silty sandstone and gypsiferous sandstone associations have a simple lateral relation to one another. They are arranged from west to east in that order, away from the western boundary fault, across C. Hofmann Halvø (fig. 4). In one stream section, near the eastern margin of the conglomeratic association on the north side of Harefjord, there is a complex interbedding of conglomerate and finer sandstones and siltstones. The overall disposition of the three associations probably represents a distal passage from the alluvial fan environment, close to the fault, out into fine-grained environments, possibly comparable to present-day playa lakes. The cross-bedded sandstone association's relationship to the others is not demonstrable. It seems most likely that it is a further lateral equivalent, representing an independent fluviatile environment out in the basin.

Tectonics

The main tectonic event seems to have been the faulting along the western boundary associated with the actual deposition of the sediments. The occurrence of the migmatite horst in the northern part of the area raises the possibility of earlier movements along some of the faults. It seems a distinct possibility that the later movement, which gave rise to the present suite of sediments, could have been a reactivation of

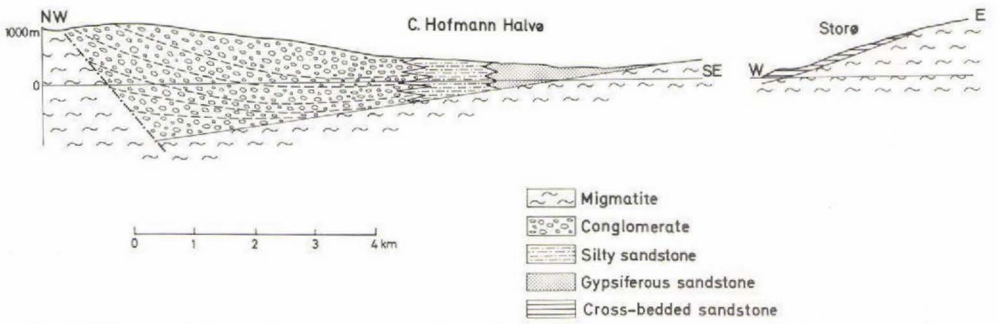

Fig. 4. Schematic time-scale cross-sections to show the lateral relationships of the lithofacies associations of the Rødeø Conglomerate.

earlier faults which had previously thrown in the opposite direction. The only demonstrably post-depositional faulting is on Storø. There is no evidence of faulting within the sediments, though this might be due to the absence of mappable horizons.

Igneous intrusions

The only igneous intrusions are dolerite dykes with north-east – south-west trends in the southern part of the area west of Rødefjord. These are normally up to 10 m thick but one is at least 40 m.

Carboniferous (?) and Lower Permian sediments of the Schuchert Flod area

These observations can only be regarded as slight amplifications of Kempter's description (1961). His Bjørnbos-Corner Formation is undoubtedly different in aspect and petrography from the Gurreholmsdal Formation though whether this justifies giving it a suggested Carboniferous age must await further information. Very sparse palaeocurrent data from the Bjørnbos-Corner Formation suggest a southerly directed current.

The Gurreholmsdal Formation, which is of demonstrable Lower Permian age, is a complex of lithologies which Kempter divided into four members. These are of limited stratigraphical significance and are to some extent laterally equivalent facies. The Snekuppel Member occurs in the east of the outcrop area and is a sequence of complexly interbedded, fine, micaceous sandstones, siltstones and mudstones, with

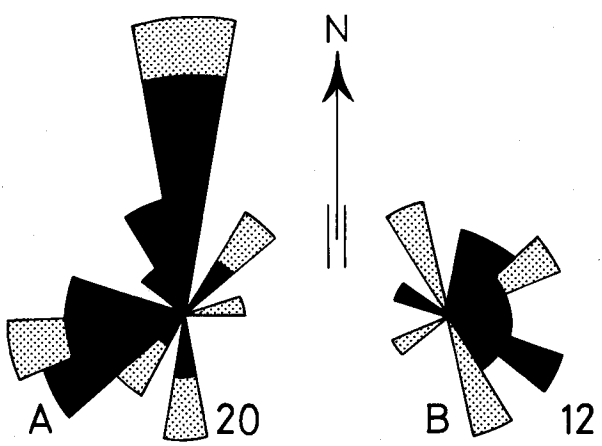

Fig. 5. Palaeocurrents measured in the Gurreholmsdal Formation, west of the Schuchert Flod. A. From fine-grained micaceous sandstones, mainly in the east of the area. B. From coarser pink arkoses, mainly to the west. Solid decoration indicates that direction and sence of movement is known. Dotted decoration indicates direction only.

palaeocurrents directed to the north and south-west (fig. 5 A). A rich fish fauna was collected from a mudstone unit in this member. To the west, towards the Stauning Alper fault, the arkoses of the Arkosedal and Ødemarksdal Members occur. The arkoses of the Arkosedal Member interfinger with the sediments of the Snekuppel Member and have palaeocurrents directed to the east (fig. 5 B). Further west, against the Stauning Alper fault, the Konglomeratpas Member is a conglomerate lithology, rather similar to the conglomeratic association of the Rødeø Conglomerate.

The overall environmental picture of the Gureholmsdal Formation is similar to that of the Rødeø Conglomerate. An active fault line on the west of the basin was generating coarse clastic sediments which were carried out into the basin either on alluvial fans or by flash floods. In the east of the basin, an independent sediment dispersion system was distributing micaceous sands, probably in a broad, fluviatile flood plain.

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PRELIMINARY ACCOUNT OF THE MAPPING OF THE MESOZOIC FORMATIONS OF SOUTH-EAST JAMESON LAND

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Introduction

In the 1970 field season, the programme of mapping Jameson Land (Birkelund & Perch-Nielsen, 1969; Bromley *et al.*, 1970) was continued with a study of the Hurry Fjord region and the area between Mønselv and Raukelv on the south coast (fig. 6).

The geology of the west coast of Hurry Fjord has been studied previously by Hartz (1896), Harris (1926, 1937), Rosenkrantz (1934) and Aldinger (1935), and certain parts of the succession are known in detail. During the 1970 field season, however, special study was made of the phytopalaeontology of the Kap Stewart Formation