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Bulletin No. 139

Triassic lithostratigraphy of East Greenland between Scoresby Sund and Kejser Franz Josephs Fjord

by

Lars B. Clemmensen

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Abstract

The lithostratigraphic scheme currently in use for the Triassic rocks in Jameson Land and Scoresby Land (70°25'–72°N) is revised and extended to cover areas to the north of Kong Oscars Fjord, up to Kejser Franz Josephs Fjord (73°15'N). The Triassic sediments (1000–1700 m thick) belong to the Scoresby Land Group which is divided into two subgroups (redefined) and four formations: the marine Wordie Creek, and the mainly continental Pingo Dal (redefined), Gipsdalen (redefined) and Fleming Fjord Formations. These formations are here subdivided into a total of 12 members and 4 beds. Four members (the Svinhufvuds Bjerge, Ødepas, Kolledalen and Vega Sund Members) and four beds (Gråklint, Sporfjeld, Pingel Dal and Tait Bjerg Beds) are new. Three members (the Paradigmabjerg, Solfaldsdal and Kap Seaforth Members) are redefined. The lithostratigraphic succession and the Triassic depositional environments in East Greenland are briefly discussed and compared with other Triassic sequences in the North Sea area.

Author's address:
Institut for almen Geologi
University of Copenhagen
Øster Voldgade 10
DK-1350 Copenhagen K

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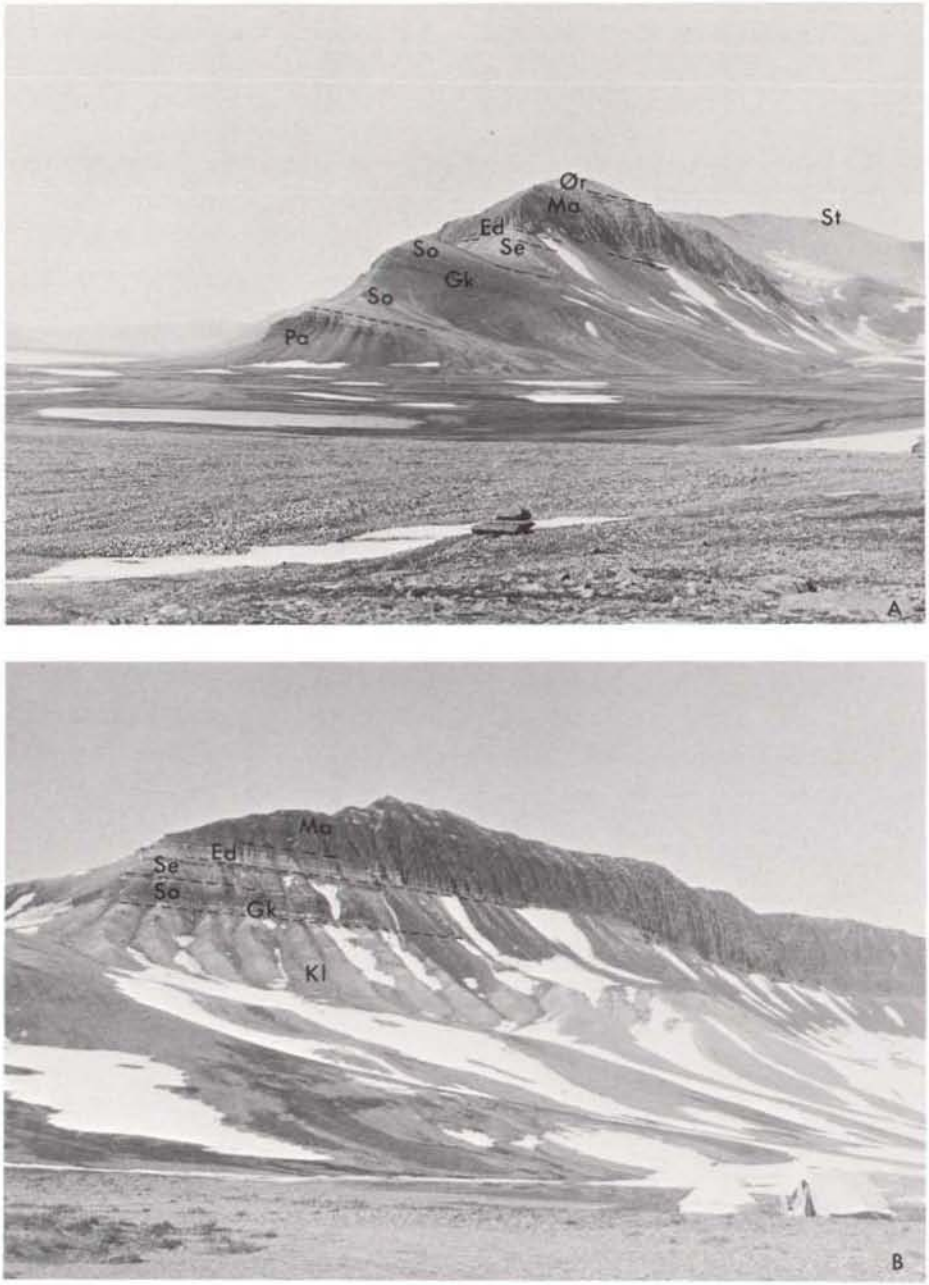


Frontispiece. Field appearance of upper? Scythian – Rhaetian Triassic stratigraphic units in the Jameson Land Basin, East Greenland. A. Sporfjeld at Kap Biot seen from the east. Pa = Paradigmabjerg Member, So = Solfaldsdal Member, Gk = Gråklint Beds, Se = Kap Seaforth Member, Ed = Edderfugledal Member, Ma = Malmros Klint Member, Ør = Ørsted Dal Member, St = Kap Stewart Formation. B. Nordenskiöld Bjerg seen from the east. Kl = Klitdal Member, for the rest of the abbreviations see above. Both mountains are *c.* 700 m high.

INTRODUCTION

The lithostratigraphical aspects of Triassic rocks of Jameson Land, Scoresby Land and Traill Ø (frontispiece, fig. 1) were investigated in 1975 and 1976 as part of a more detailed investigation of sedimentary facies and depositional environments. In 1975 the Triassic rocks in northeastern Jameson Land and nearby parts of Scoresby Land were studied (Clemmensen & Andresen, 1976), and in 1976 the sedimentological and stratigraphical studies were continued in Jameson Land and Scoresby Land, as well as Traill Ø (Clemmensen, 1977, 1980).

The lithostratigraphical scheme established by Perch-Nielsen *et al.* (1974) for the regions south of Kong Oscars Fjord was used during the first field-season. In the second field-season new data mainly from western Scoresby Land made it desirable to subdivide and revise parts of this scheme, and a new scheme is accordingly introduced here (fig. 2). Furthermore field-work on Traill Ø made it possible to extend the stratigraphy also to cover the regions north of Kong Oscars Fjord (fig. 1).

The Triassic rocks in question can be divided into two areas separated by a hypothetical cross-fault in Kong Oscars Fjord. The southern area comprises Jameson Land, Scoresby Land, Liverpool Land and Wegener Halvø (fig. 1). In the southern area all four Triassic formations are very well exposed (frontispiece, figs 1 & 3). The northern area comprises Traill Ø and Geographical Society Ø (fig. 1). Here mainly the basal Triassic Wordie Creek Formation is exposed (figs 1 & 3).

The stratigraphical aspects of the Triassic rocks in central East Greenland were described in detail by Stauber (1942). Since then many workers have added to the knowledge of the Triassic stratigraphy in the area. Previous work is e.g. summarized by Perch-Nielsen *et al.* (1974). Fig. 2 summarizes important earlier subdivisions of the Triassic succession and correlates them with the subdivision presented here. It should be noted that the present subdivision (fig. 2) differs from an earlier version by Clemmensen (1980) by suggesting a Late Triassic age for the uppermost Gipsdalen Formation.

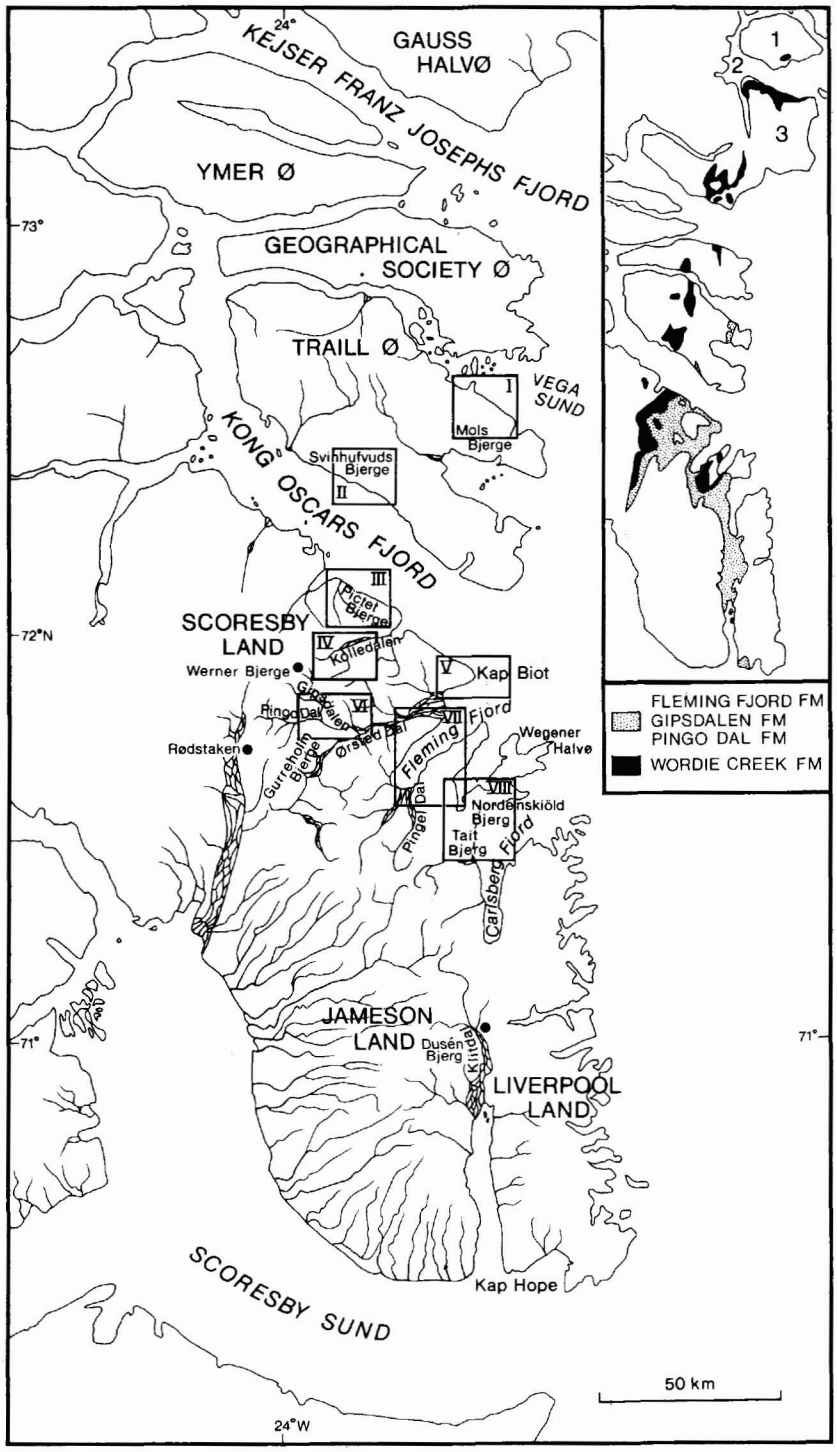


Fig. 1. Location map of central East Greenland with type localities of the Pingo Dal Formation (Werner Bjerge), Rødstaken Member and Klitdal Member (see Perch-Nielsen *et al.*, 1974 for details). Inset shows the distribution of outcropping Triassic sediments; source: Perch-Nielsen *et al.* (1974), Clemmensen (1977). 1. Clavering Ø, 2. Kap Stosch (with type locality of the Wordie Creek Formation), 3. Hold with Hope.

DEFINITIONS OF LITHOSTRATIGRAPHICAL UNITS

Scoresby Land Group

The Scoresby Land Group (Scythian to Early Rhaetian) was defined by Perch-Nielsen *et al.* (1974, p. 14) and consists of four formations: the Wordie Creek, Pingo Dal, Gipsdalen and Fleming Fjord Formations. The lower two formations are

GROUP	SUBGROUP	FORMATION	MEMBER	BEDS	STAGE
SCORESBY LAND	▲ Kap Biot	Fleming Fjord	Ørsted Dal	✱ Tait Bjerg	RHAETIAN
			Malmros Klint		NORIAN ?
			Edderfugledal	✱ Pingel Dal	CARNIAN ?
				✱ Sporfjeld	
		▲ Gipsdalen	▲ Kap Seaforth		LADINIAN ?
			✱ Vega Sund		
			✱ Kolledalen / ▲ Solfaldsdal	✱ Gråklint	ANISIAN ?
	▲ Nordenskiöld Bjerg	▲ Pingo Dal	▲ Paradigmabjerg / Klitdal		SCYTHIAN
			Rødstaken		
		Wordie Creek	✱ Ødepas		
			✱ Svinhufvuds Bjerge		

A ✱ New unit ▲ Redefined unit ☐ Undivided

STAUBER, 1942	GRASMÜCK & TRÜMPY, 1969		PERCH-NIELSEN ET AL., 1974			THIS PAPER	
	FORMATION	BEDS/MEMBER	FORMATION	MEMBER		FORMATION	MEMBER
Bunte Serie	Cape Biot	Ørsted Dal	Fleming Fjord	Ørsted Dal		Fleming Fjord	Ørsted Dal
		Fleming Fjord		Malmros Klint			Malmros Klint
		Kap Seaforth		Edderfugledal			Edderfugledal
Kontinentale Serie	Mount Nordenskiöld		Gipsdalen	Kap Seaforth		Gipsdalen	Kap Seaforth
		Solfaldsdal		Solfaldsdal			Vega Sund / Solfaldsdal / Kolledalen
		Paradigma	Pingo Dal	Sydkronen		Pingo Dal	Paradigmabjerg / Klitdal
				Paradigmabjerg	Klitdal		
		Rødstaken		Rødstaken			Rødstaken
Marine Serie	Wordie Creek		Wordie Creek			Wordie Creek	Ødepas
							Svinhufvuds Bjerge

B

Fig. 2. A. Lithostratigraphic subdivision of the Triassic rocks in central East Greenland. B. Correlation with earlier subdivisions of the Triassic rocks.

included in the Nordenskiöld Bjerg Subgroup, the upper two formations constitute the Kap Biot Subgroup. Sediments of the Scoresby Land Group occur in Jameson Land, Scoresby Land, Wegener Halvø, Traill Ø, Geographical Society Ø, Gauss Halvø, Hold with Hope and Clavering Ø (fig. 1). The thickness of the Scoresby Land Group varies from *c.* 1000 m to *c.* 1700 m.

Nordenskiöld Bjerg Subgroup

The Nordenskiöld Bjerg Subgroup was erected by Perch-Nielsen *et al.* (1974, p. 14–18) and subdivided into the Wordie Creek Formation and the overlying Pingo Dal Formation, the latter being revised here. The uppermost member in the subgroup is therefore the Klitdal Member or the Paradigmabjerg Member (fig. 2). It occurs in the whole region from Scoresby Sund in the south to Clavering Ø in the north (fig. 1). The thickness of the subgroup reaches *c.* 1000 m.

Wordie Creek Formation

The Wordie Creek Formation (Early Scythian) is the lowermost formation in the Scoresby Land Group and was defined by Perch-Nielsen *et al.* (1974, p. 18–20). The reader is referred to this paper for name, type section, reference section and lithology and fauna. The formation occurs from Wegener Halvø and northern Jameson Land to Clavering Ø (fig. 1). The formation overlies the Upper Permian Foldvik Creek Formation and dominates the Triassic sequence north of Kong Oscars Fjord (Donovan, 1955; Perch-Nielsen *et al.*, 1974; K. Birkenmajer, pers. comm., 1976). The thickness of the formation varies from *c.* 70 m to *c.* 700 m at southern Traill Ø. Two new members, the Svinhufvuds Bjerge and Ødepas Members, are recognized within the Wordie Creek Formation, and these will now be considered in turn.

Svinhufvuds Bjerge Member

new member

General

Stauber (1942) included these sediments in his 'Kontinentale Serie' ~ Pingo Dal Formation of this paper, but later investigations have shown that the sediments belong to the Wordie Creek Formation (Putallaz, 1961; Clemmensen, 1977). The member corresponds to the Svinhufvuds Arkose of Trümpy (1961) and Grasmück & Trümpy (1969) and to the 'arkose de Mont Svinhufvud' of Putallaz (1961). Perch-Nielsen *et al.* (1974) did not subdivide the Wordie Creek Formation into members.

Name

From the mountain Svinhufvuds Bjerge, southern Traill Ø (fig. 3, II).

Type section

South slope of Svinhufvuds Bjerge (fig. 4).

Thickness

Between 60 and 125 m at Svinhufvuds Bjerge; much thinner at northern Traill Ø (K. Birkenmajer, pers. comm., 1976).

Dominant lithology

Yellowish grey, arkosic, pebbly sandstones and thin, matrix-supported conglomerates. Pebbles are well rounded granites and gneisses with a maximum size of *c.* 25 cm. Sedimentary structures include horizontal lamination and large-scale planar and trough-formed cross-bedding. The cross-bedding indicates that the palaeocurrents ran towards the east or southeast, in contrast to the view of Trümpy (1961).

Boundaries

The lower boundary is defined by the abrupt change from underlying, greenish grey, sandy siltstones of the basal Wordie Creek Formation to the coarse-grained, yellow weathering, clastic sediments of the Svinhufvuds Bjerge Member. The upper boundary is defined by a change to red and green, fine-grained, micaceous sandstones of the Ødepas Member (fig. 4).

Distribution

The member is exposed throughout the Svinhufvuds Bjerge area on southern Traill Ø and in the Rold Bjerge area of northern Traill Ø (K. Birkenmajer, pers. comm., 1976).

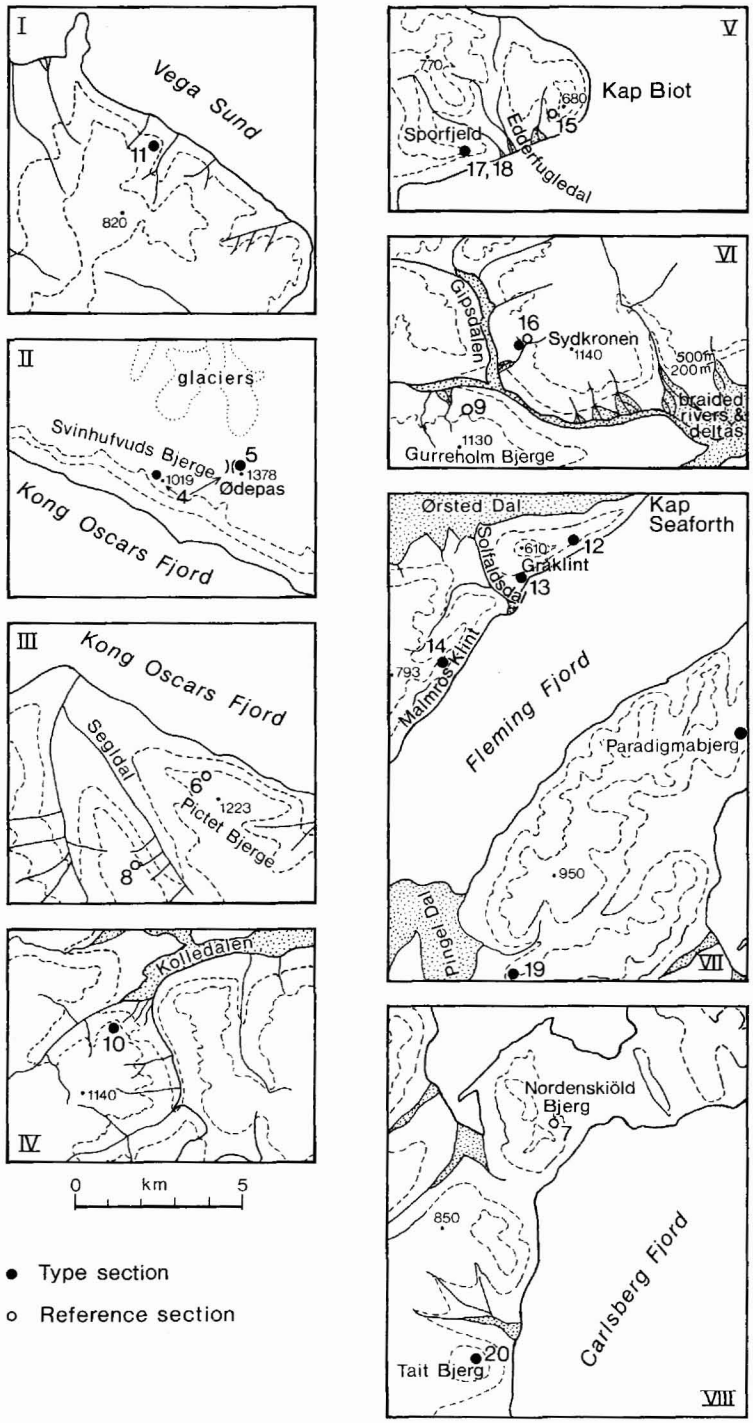


Fig. 3. Maps with location of type and reference sections described in the text. Sections are described by their figure number in the text. For type sections of the Pingo Dal Formation and Paradigmabjerg Member see Perch-Nielsen *et al.* (1974).

Geological age

The member is devoid of fossils, but is of Scythian age as underlying and overlying rocks contain Scythian fossils.

Ødepas Member

new member

General

Stauber (1942) included these sediments in his 'Bunte Serie' ~ Fleming Fjord Formation of this paper. Later Trümpy (1961), Putallaz (1961), Birkelund & Perch-Nielsen (1976) and Clemmensen (1977) placed these sediments in the upper part of the Wordie Creek Formation. Perch-Nielsen *et al.* (1974) did not describe the sediments of this unit as their paper mainly deals with the sediments south of the Kong Oscars Fjord.

Name

From the pass Ødepas (950 m above sea level) in Svinhufvuds Bjerge (fig. 3, II).

Type section

Mountain slope east of Ødepas towards mountain 1378 (figs 4 & 5).

Thickness

Approximately 325 m.

Dominant lithology

The member is initiated by reddish and greenish grey, micaceous sandstones and siltstones with brownish sandstone interbeds. Contorted bedding is very common in the basal part. The sandstones are overlain by cliff-forming, stromatolitic limestones and wavy bedded limestones, intimately associated with coquinoid sandstones and red, trough, cross-bedded sandstones. These are succeeded by reddish sandstones and siltstones with horizontal lamination and wave ripples.

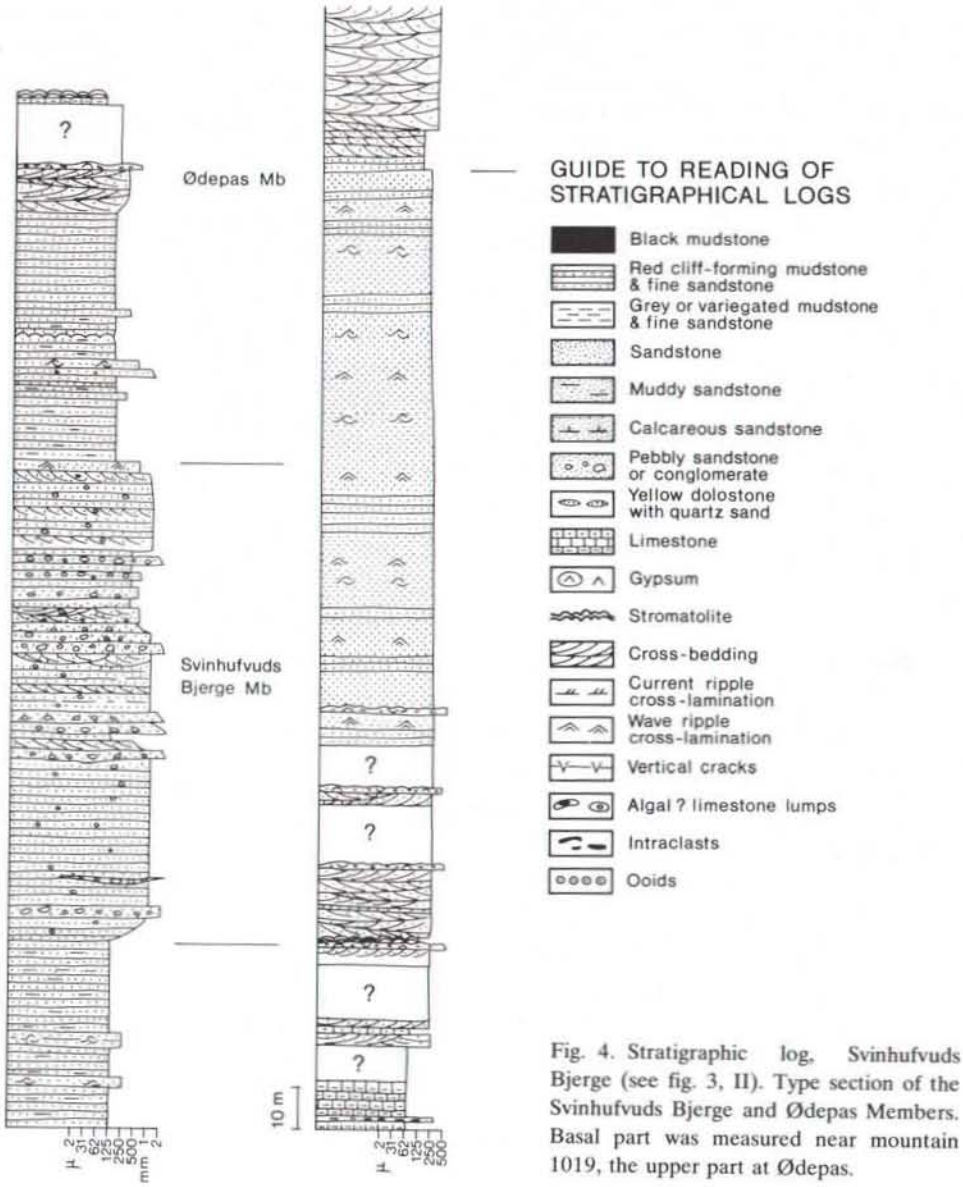


Fig. 4. Stratigraphic log, Svinhufvuds Bjerge (see fig. 3, II). Type section of the Svinhufvuds Bjerge and Ødepas Members. Basal part was measured near mountain 1019, the upper part at Ødepas.

Boundaries

The lower boundary is defined by a sharp change from yellow, pebbly sandstones to fine-grained, variegated sandstones. The upper boundary is defined by a change from red sandstones and siltstones to strikingly green, cross-bedded sandstones of the uppermost Wordie Creek Formation.

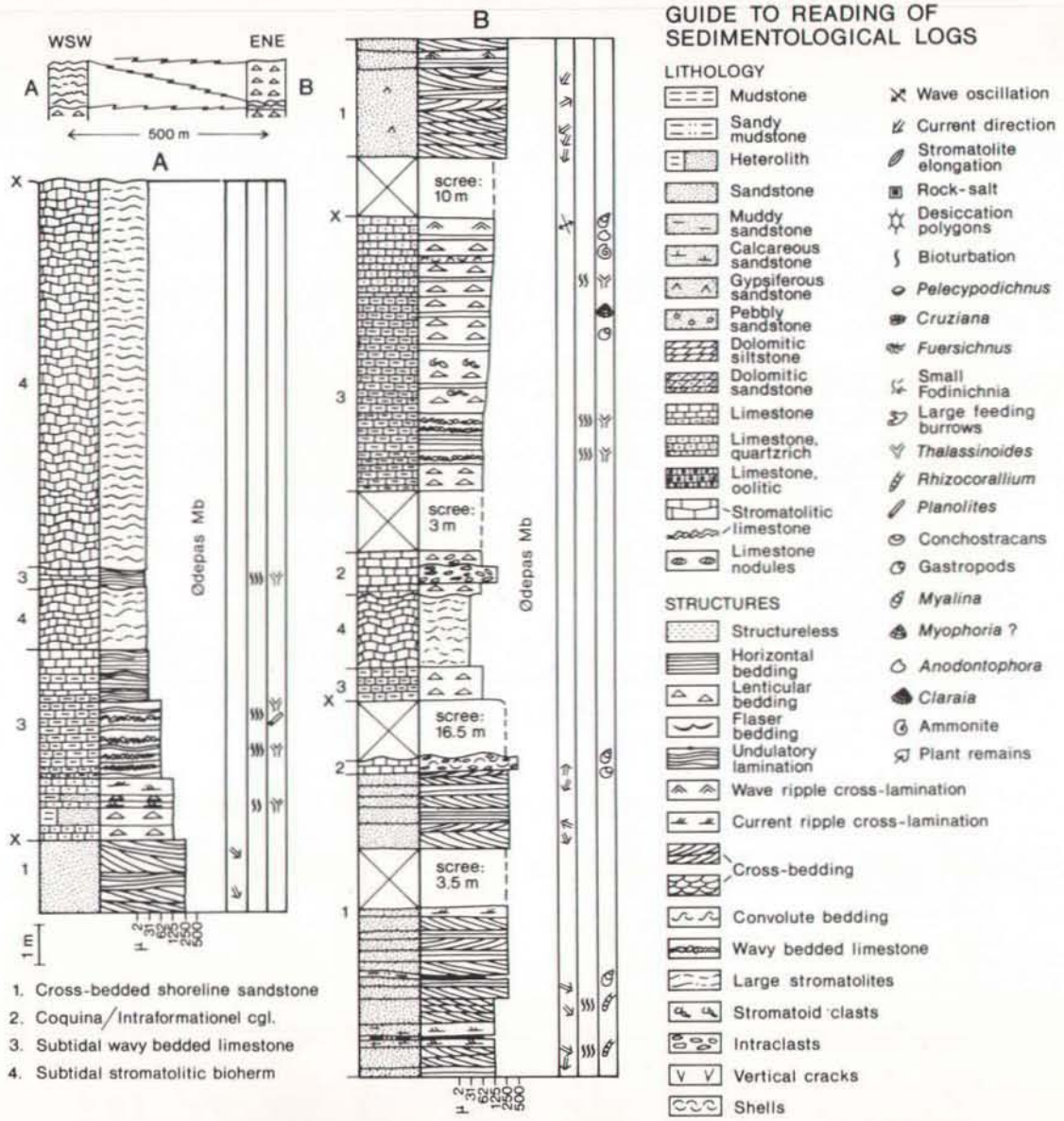


Fig. 5. Sedimentologic log of the Ødepas Member, Ødepas (see fig. 3, II).

Distribution

The characteristic limestones of this member are known from Svinhufvuds Bjerge and Rold Bjerge on Traill Ø and from Hold with Hope (cf. Birkelund & Perch-Nielsen, 1976). A 3 m thick algal limestone probably belonging to this member has also been described from northern Jameson Land (Perch-Nielsen *et al.*, 1972).

Geological age

Rare ammonites (*?Proptychites*) and common bivalves (*Myalina, Claraia, Anodontophora*) and gastropods (*Naticopsis*) indicate an Early Scythian age.

Pingo Dal Formation

General

Sediments of this formation were originally included in the 'Kontinentale Serie' of Stauber (1942). Grasmück & Trümpy (1969) referred the bulk of the sediments to their Mt. Nordenskiöld Formation. Perch-Nielsen *et al.* (1974) divided the Pingo Dal Formation into four members: the Rødstaken, Paradigmabjerg, Klitdal and Sydkronen Members. The Sydkronen Member described as the uppermost member within this formation was defined by Perch-Nielsen *et al.* (1974) as red or red-brown platy, often cross-bedded sandstones underlying evaporites of the Gipsdalen Formation. A restudy of the type section showed that the member possesses a well-defined boundary to the overlying Kolledalen Member of the Gipsdalen Formation, but is hard to distinguish from the underlying red sediments of the Paradigmabjerg Member. According to Perch-Nielsen *et al.* (1974) the Sydkronen Member is of very limited geographical distribution. As its maintenance serves no obvious stratigraphical purpose, it is suggested that the member is abandoned. Rocks of the Sydkronen Member are here included in the Paradigmabjerg Member. It is possible, however, that some rocks originally referred to the uppermost Sydkronen Member here have been included in the overlying Kolledalen Member.

Name

From Pingo Dal, Scoresby Land (fig. 1)

Type sections

Sydkronen in Bjergkronerne (Perch-Nielsen *et al.*, 1974, plate 17, fig. 10) and Werner Bjerge (Perch-Nielsen *et al.*, 1974, plate 17, fig. 8). Note that the Sydkronen Member of the former locality is here included in the Paradigmabjerg Member.

Reference sections

Pictet Bjerge, north slope (fig. 6); Nordenskiöld Bjerg, east slope (fig. 7).

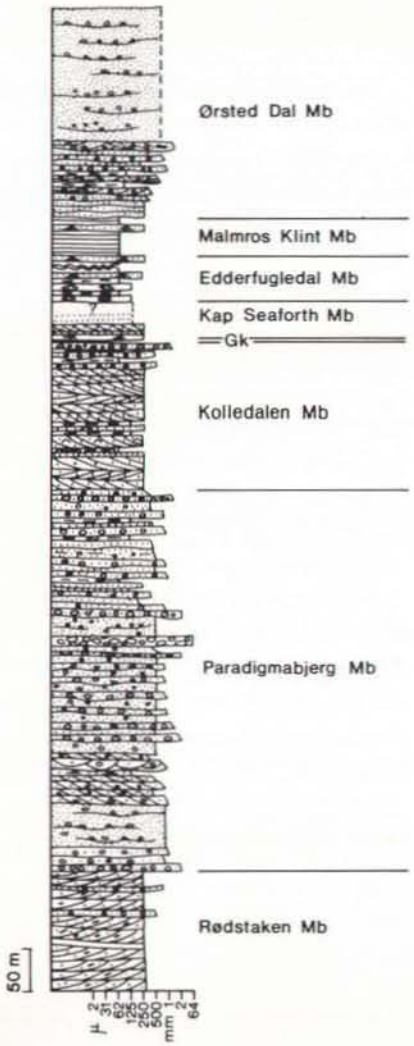


Fig. 6. Stratigraphic log at Pictet Bjerge (see fig. 3, III)

Thickness

Up to 700 m in Scoresby Land, 450 m on Wegener Halvø, *c.* 500 m at Nordenskiöld Bjerg and 70–90 m in Klitdal.

Dominant lithology

Red or greyish conglomerates, pebbly sandstones and arkoses. See individual members for details.

Boundaries

In eastern Jameson Land and on Liverpool Land the Klitdal Member is the basal member in the formation and commonly rests directly upon crystalline basement. Elsewhere in Jameson Land and Scoresby Land the Rødstaken Member initiates the formation. This latter member commonly shows a gradational contact to the

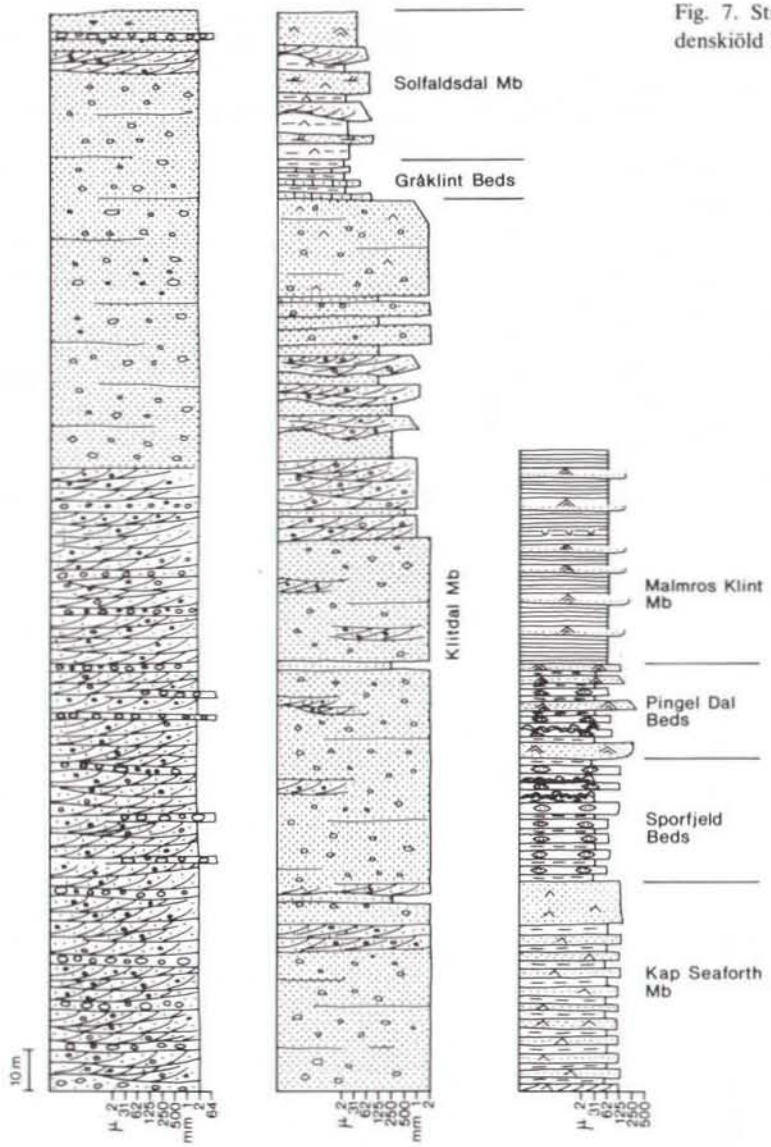


Fig. 7. Stratigraphic log at Nordenskiöld Bjerg (see fig. 3, VIII).

underlying Wordie Creek Formation (see Perch-Nielsen *et al.*, 1974 for further details). On Traill Ø only the Paradigmabjerg Member occurs, and the contact to the Wordie Creek Formation is not well exposed. The upper boundary is defined by the appearance of gypsiferous deposits.

Distribution

The formation occurs in Jameson Land, at Kap Hope, on Liverpool Land, on Wegener Halvø, in Scoresby Land and on northeastern Traill Ø (fig. 1).

Geological age

Possibly Scythian (?). Only poorly preserved bivalves have been found in the basal Rødstaken Member and therefore the age is very uncertain.

Subdivisions

The Pingo Dal Formation is subdivided into the Rødstaken, Paradigmabjerg and Klitdal Members.

Rødstaken Member

General

The Rødstaken Member was defined by Perch-Nielsen *et al.* (1974) as the lowermost member in the Pingo Dal Formation.

Name

From Rødstaken (1065 m) in Gurreholm Bjerge (fig. 1).

Type section

Rødstaken in Gurreholm Bjerge (see Perch-Nielsen *et al.*, 1974, plate 17, fig. 4).

Reference sections

Pictet Bjerge (fig. 6); Werner Bjerge and Paradigmabjerg (Perch-Nielsen *et al.*, 1974, plate 17, figs 8 and 17).

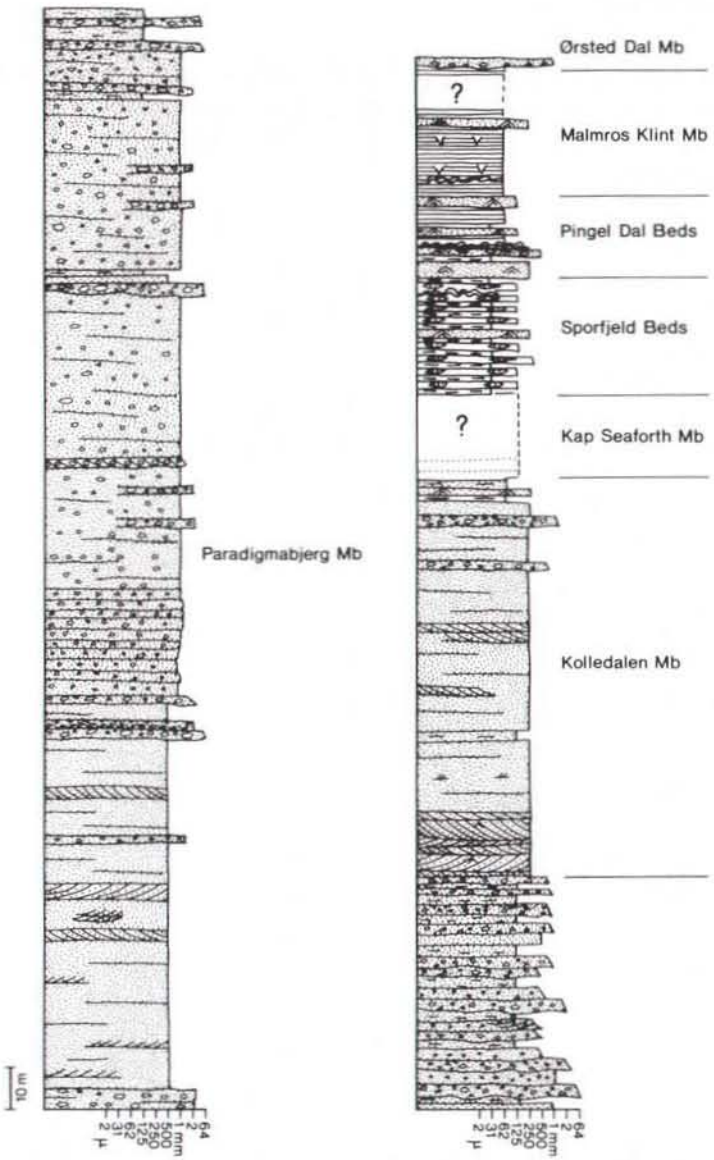


Fig. 8. Stratigraphic log at Segldal (see fig. 3, III).

Thickness

About 180 m at the type section, 150–330 m in Scoresby Land and 30 m on Wegener Halvø.

Dominant lithology

Dark red, fine-medium-grained, often large-scale, cross-bedded sandstone with some variegated mudstones and sandstones in the lower part. Intraformational clasts are numerous. Pebbly sandstones, arkoses and conglomerates are common in the uppermost part.

Boundaries

There is commonly a transitional boundary to the green or variegated sandstones of the underlying Wordie Creek Formation. The upper boundary is defined by a gradual change to pebbly sandstones and conglomerates of the overlying Paradigmabjerg Member (see Perch-Nielsen *et al.*, 1974, for further details).

Distribution

The member occurs in the western, northern and northeastern part of the Triassic basin of Jameson Land (Jameson Land Basin) and is lacking north of Kong Oscars Fjord.

Geological age

Perch-Nielsen *et al.* (1974) suggested a Scythian age on the basis of bivalves in the lower part of the member.

Paradigmabjerg Member

General

The Paradigmabjerg Member of Perch-Nielsen *et al.* (1974) is here revised to include the sediments of the overlying Sydkronen Member (abandoned).

Name

From Paradigmabjerg on Wegener Halvø (fig. 3, VII).

Type section

Paradigmabjerg, Wegener Halvø (see Perch-Nielsen *et al.*, 1974, plate 17, fig. 17).

Reference sections

Pictet Bjerge, north slope (fig. 6); Segldal (fig. 8); Werner Bjerge and Gurreholm Bjerge (see Perch-Nielsen *et al.*, 1974, plate 17, figs 8 and 6).

Thickness

Min. 150 m at the type section, 285–500 m in Scoresby Land and min. 100 m on northeastern Traill Ø.

Dominant lithology

Red, pink or greyish arkoses, sandstones (often pebbly) and conglomerates. The conglomerates are structureless or imbricated, while the pebbly sandstones and medium to coarse-grained sandstones display large-scale, trough-formed or planar cross-bedding. Small-scale, cross-lamination (current and wave origin), desiccation cracks and intraformational mud clasts characterize the more fine-grained sandstones, and incipient caliche is locally developed.

Boundaries

The coarse-grained, clastic sediments overlie the more fine-grained sediments of the Rødstaken Member with a transitional contact. The boundary is placed at the level where conglomerates or arkoses dominate the sequence. The upper boundary is defined by the first appearance of weakly gypsum-cemented, yellow or orange, well-sorted, large-scale, cross-bedded, medium sandstones of the Kolledalen Member (western part of basin), or by the income of thinly bedded, gypsum-bearing sediments of the Solfaldsdal Member (eastern part of the basin).

Distribution

The member occurs in the northeastern, northern and western part of the Jameson Land Basin and on northeastern Traill Ø.

Geological age

Only non-marine trace fossils have been found; Perch-Nielsen *et al.* (1974) inferred an Early Triassic age.

Klitdal Member

General

The Klitdal Member is here defined in accordance with Perch-Nielsen *et al.* (1974)

Name

From Klitdal between Jameson Land and Liverpool Land (fig. 1).

Type section

Klitdal (see Perch-Nielsen *et al.*, 1974, plate 17, fig. 21).

Reference sections

Nordenskiöld Bjerg (frontispiece, fig. 7); Dusén Bjerg (Perch-Nielsen *et al.*, 1974, fig. 22).

Thickness

70–90 m in the type area, 450 m on Nordenskiöld Bjerg, 20–30 m on Kap Hope.

Dominant lithology

Pink, feldspar-rich, pebbly sandstones with large-scale, cross-bedding and matrix supported, non-imbricated and unstratified conglomerates. Towards the top caliche and jasper horizons are common.

Boundaries

In the type area the Klitdal Member overlies crystalline basement; at Nordenskiöld Bjerg the member transitionally overlies sandstones of the Rødstaken Member. The upper boundary is normally characterized by the appearance of gypsiferous deposits of the Gipsdalen Formation, but on Kap Hope the member is overlain by red sandstones of the Ørsted Dal Member (Birkenmajer, 1976).

Distribution

The member occurs along the eastern border of the Jameson Land Basin.

Geological age

No fossils have been found, but an Early Triassic age was inferred by Perch-Nielsen *et al.* (1974).

Kap Biot Subgroup

The Kap Biot Subgroup was defined by Perch-Nielsen *et al.* (1974, p. 28–30) and is composed of the Gipsdalen Formation, which is revised here, and the overlying Fleming Fjord Formation. It occurs from Jameson Land in the south to northeastern Traill Ø in the north, but has not been recognized north of Vega Sund. Thickness is up to 700 m.

Gipsdalen Formation

General

Sediments of this formation were originally included in the 'Kontinentale Series' of Stauber (1942). Grasmück & Trümpy (1969) studied these sediments in the eastern part of the Jameson Land Basin and recognized a lower Solfaldsdal Member and an overlying Kap Seaforth Member. Perch-Nielsen *et al.* (1974)

divided the Gipsdalen Formation into the same two members as Grasmück & Trümpy, but redefined the boundary between the members. Clemmensen (1977, 1978a) established two new members, the Kolledalen and Vega Sund Members, in the Gipsdalen Formation and defined the boundary between the Solfaldsdal and Kap Seaforth Members in agreement with Grasmück & Trümpy (1979).

Name

From Gipsdalen, Scoresby Land (figs 1 & 3, VI).

Type section

Sydkronen in Bjergkronerne (see Clemmensen, 1980, fig. 5, section 3).

Reference section

Gurreholm Bjerge (fig. 9). Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6); Mols Bjerge on northeastern Traill Ø (fig. 11); coastal cliff southwest of Kap Seaforth, Fleming Fjord (fig. 12); Nordenskiöld Bjerg at northern Carlsberg Fjord (fig. 7); Triasdal in Klitdal (Perch-Nielsen *et al.*, 1974, plate 17, fig. 21).

Thickness

300 m at the type section, 375 m at Gurreholm Bjerge, 230 m in Kolledalen, 325 m at Fleming Fjord, *c.* 100 m at Nordenskiöld Bjerg, and in Klitdal, and 225 m in Mols Bjerge.

Dominant lithology

Variegated, gypsiferous sandstones and mudstones. Grey limestones and dark mudstones (Gråklint Beds) occur over large areas in the middle of the formation. See individual stratigraphical units for details on lithology.

Boundaries

The upper and lower boundaries of the formation correspond at most localities to the appearance and disappearance of gypsiferous deposits. At localities in

Scoresby Land, however, the basal sandstones of the Kolledalen Member lack gypsum and at other localities the basal part of the overlying Edderfugledal Member contains cavities after gypsum nodules.

Distribution

The formation occurs north of *c.* 71°N in Jameson Land to northeastern Traill Ø (fig. 1). The facies shows considerable changes throughout the area of distribution.

Geological age

Mainly Middle Triassic, but probably reaching into the Late Triassic. Marine fossils are known from the limestones in the Gråklint Beds in the middle of the formation (Grasmück & Trümpy, 1969; Clemmensen, 1980). They suggest a Middle Triassic (Anisian?) age. Palynomorphs from the uppermost Kap Seaforth Member possibly indicate a Late Triassic age (D. K. Goodman, pers. comm., 1979).

Subdivisions

The Gipsdalen Formation is subdivided into the Kolledalen (new member), Vega Sund (new member), Solfaldsdal and Kap Seaforth Members. Limestones and associated deposits within the Solfaldsdal Member are recognized as the Gråklint Beds (new unit).

Kolledalen Member

new member

General

Most of the yellow sandstones of this member were included in the Solfaldsdal Member by Perch-Nielsen *et al.* (1974). The sandstones in question, however, differ clearly in outcrop appearance, colour, lithology and sedimentary structures from the original mainly red Solfaldsdal Member of Grasmück & Trümpy (1969), which was defined only from the eastern part of the Jameson Land Basin. As the yellow sandstones furthermore appear spatially separated from the mainly red sediments towards the east it is suggested that the yellow sandstone unit and the original Solfaldsdal Member (*sensu* Grasmück & Trümpy, 1969) are best kept

separate both from mapping and sedimentological points of view. The yellow sandstones in the northwestern part of the Jameson Land Basin are therefore included in the new Kolledalen Member (cf. Clemmensen, 1977, 1978a).

Name

After Kolledalen, Scoresby Land (fig. 3, IV).

Type section

Kolledalen, Scoresby Land (fig. 10).

Reference sections

Gurreholm Bjerge, Gipsdalen (fig. 9); Segldal, Scoresby Land (fig. 8); Pictet Bjerge, Scoresby Land (fig. 6).

Thickness

160 m at the type section; elsewhere between 90 and 180 m; the member wedges out south and east of Gipsdalen.

Dominant lithology

The member comprises light yellowish or orange grey, well-sorted, medium, quartz sandstones with common gypsum nodules or gypsum cement. The sandstones are cross-bedded; planar sets dominate and set thicknesses commonly lie between 1 and 5 m. Associated facies include pebbly sandstones and conglomerates, red, fine-grained, sand- and siltstones, and rare thin stromatolitic limestones.

Boundaries

The lower boundary is defined by the first appearance of light yellowish or orange grey, well sorted, large-scale or giant-scale cross-bedded, medium sandstone of aeolian type. This basal sandstone is commonly weakly gypsum

cemented but not necessarily so. The upper boundary is defined by the abrupt change to either greyish cyclically bedded, gypsiferous deposits of the Kap Seaforth Member or to red, gypsiferous deposits of the Solfaldsdal Member.

Distribution

The member is confined to the northwestern part of the Jameson Land Basin; it wedges out towards south and east, where it is replaced by the basal part of the Solfaldsdal Member.

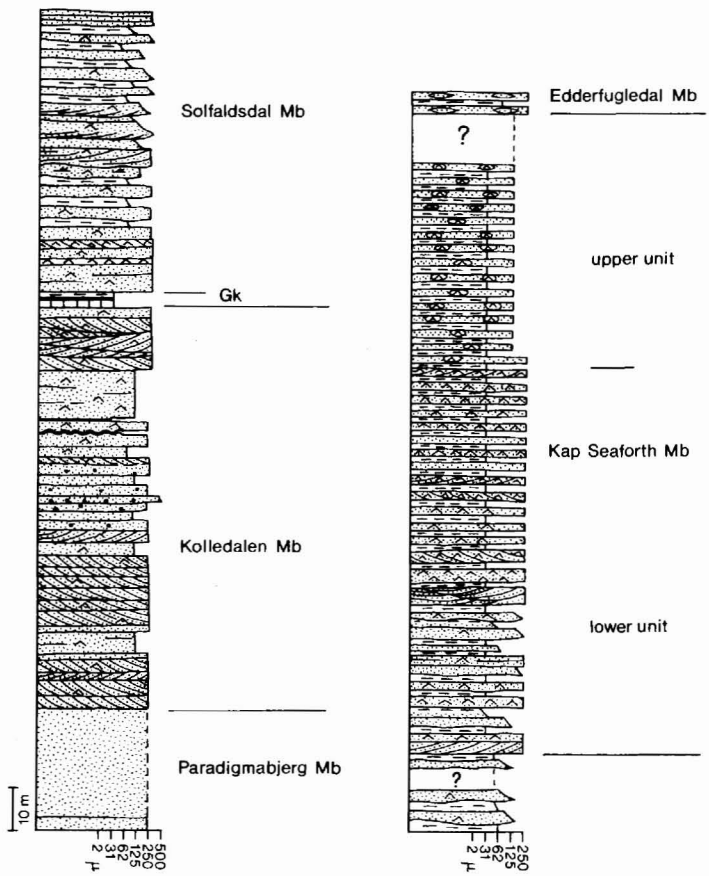


Fig. 9. Stratigraphic log at Gurreholm Bjerge (see fig. 3, VI). Well-exposed reference section of the Gipsdalen Formation.

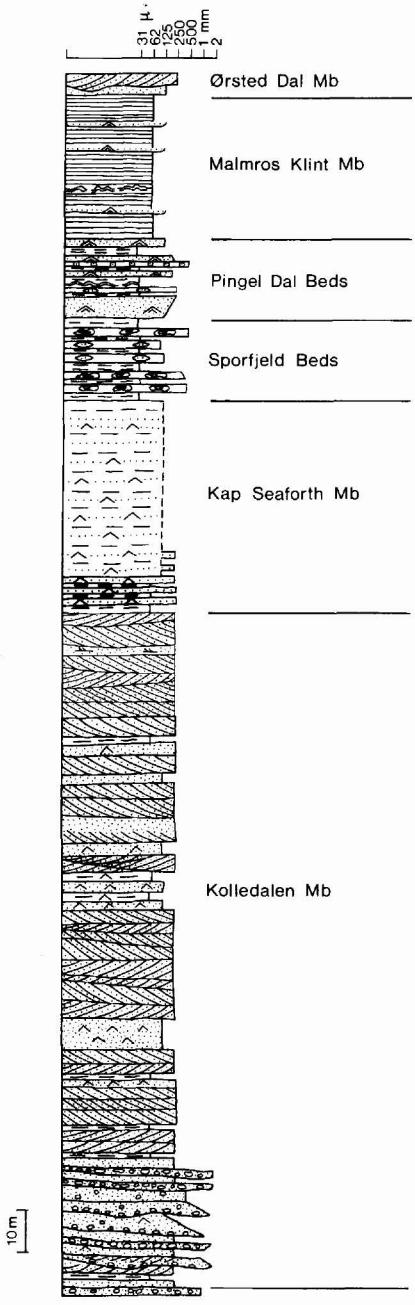


Fig. 10. Stratigraphic log at Kolledalen (see fig. 3, IV). Type section of the Kolledalen Member.

Geological age

No fossils are known from the member. The overlying Gråklint Beds have a Middle Triassic age, so the Kolledalen Member could be of Late Early or Middle Triassic age.

Vega Sund Member

new member

General

Stauber (1942) included these sediments in his 'Kontinentale Serie' ~ Pingo Dal and Gipsdalen Formations of this paper, and Putallaz (1961) suggested that these sediments could belong to his Mont Nordenskiöld Formation ~ Pingo Dal/basal Gipsdalen Formations of this paper. In contrast Perch-Nielsen *et al.* (1974) included these sediments in the Wordie Creek Formation. Investigations by Clemmensen (1977) showed clearly, however, that these poorly gypsiferous sediments belong to the basal part of the Gipsdalen Formation, as they are overlain by the Kap Seaforth and Edderfugledal Members and underlain by the Paradigmabjerg Member (fig. 11).

Name

After Vega Sund, the sound between Traill Ø and Geographical Society Ø (fig. 3, I).

Type section

The northeastern slopes of Mols Bjerge facing the Vega Sund (fig. 11).

Thickness

125 m at the type locality; so far the member has not been measured elsewhere.

Dominant lithology

The member is composed of light yellowish, mainly horizontally laminated, weakly gypsum-cemented medium-grained sandstones. The uppermost portion of the member is composed of wave-rippled, calcareous sandstones, thin limestones and dark mudstones (Gråklint Beds).

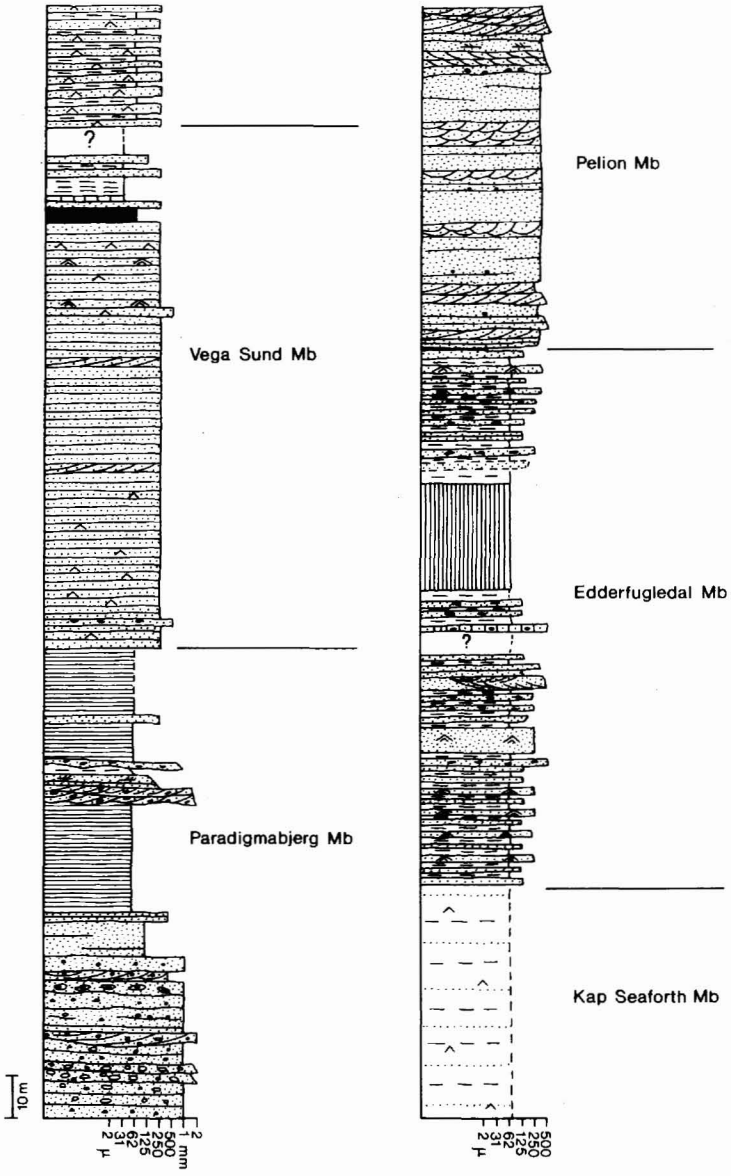


Fig. 11. Stratigraphic log at Mols Bjerge, near Vega Sund (see fig, 3, I). Type section of the Vega Sund Member.

Boundaries

The member overlies a characteristic red mudstone unit of the underlying Paradigmabjerg Member and is overlain by gypsiferous sandstone-mudstone cycles of the Kap Seaforth Member.

Distribution

In the Mols Bjerge region on northeastern Traill Ø.

Geological age

Stauber (1942) described a bone fragment from the upper part of the member. Otherwise fossils are absent and the age can only be estimated as Middle Triassic by correlation with the basal part of the Gipsdalen Formation in the Jameson Land Basin to the south.

Solfaldsdal Member

General

Grasmück & Trümpy (1969) originally used this name to describe the basal red and variegated gypsiferous sediments of the northeastern part of the Jameson Land Basin. Later Perch-Nielsen *et al.* (1974) changed the definition of the member and included brown-yellow or orange-brown arkoses and sandstones from the northwestern part of the Jameson Land Basin. As the later sediments are more naturally included in the new Kolledalen Member, the Solfaldsdal Member will be defined here in accordance with Grasmück & Trümpy (1969).

Name

From Solfaldsdal, between Fleming Fjord and Ørsted Dal, northern Jameson Land (fig. 3, VII).

Type section

The coastal cliff between Solfaldsdal and Kap Seaforth (fig. 12).

Reference sections

Kap Biot (Grasmück & Trümpy, 1969, plate 2, sections f and g); Gurreholm Bjerge; Gipsdalen (fig. 9); Nordenskiöld Bjerg (fig. 7), north of Devondal (Perch-Nielsen *et al.*, 1974, plate 17, fig. 15).

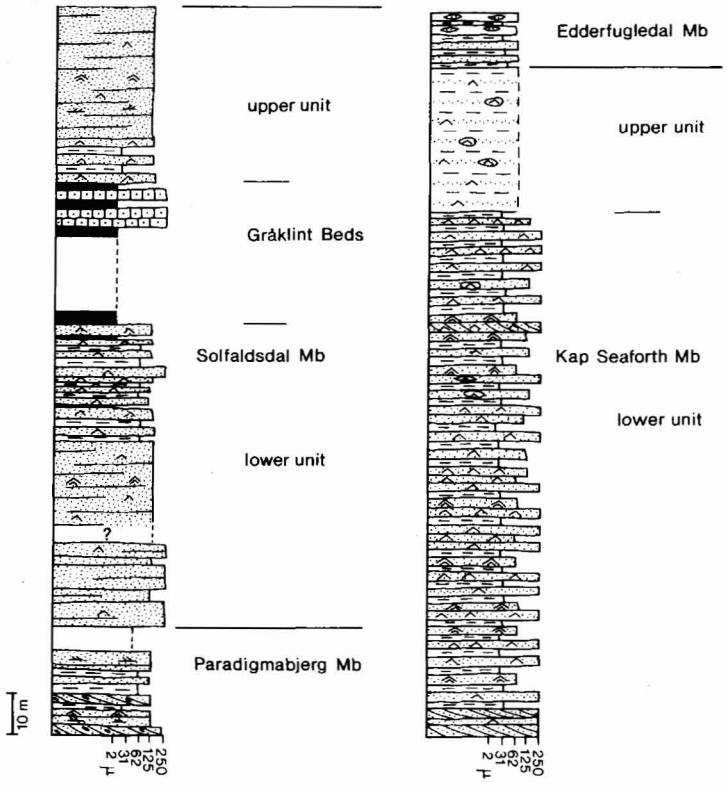


Fig. 12. Stratigraphic log southwest of Kap Seaforth (see fig. 3, VII). Type section of the Solfaldsdal and Kap Seaforth Members.

Thickness

About 150 m at the type area, up to 165 m at Kap Biot, *c.* 50 m in Gipsdalen, and 60 m at Nordenskiöld Bjerg.

Dominant lithology

The basal unit consists of cyclically bedded variegated sandstones and mudstones with gypsum, or locally of gypsum-bearing, coarse, pebbly sandstones and arkoses. A middle unit is composed of fossil-bearing limestones and associated sediments and will be described separately as the Gråklint Beds. The upper unit consists of red, gypsum-bearing sandstones and siltstones with small-scale, cross-lamination, common trace fossils and rare, large-scale, planar cross-bedding.

Boundaries

The lower boundary is placed where variegated and cyclically bedded gypsum-bearing sediments overlie red sandstones of the underlying Paradigmabjerg Member or where gypsiferous sandstones and arkoses with pebbles overlie non-gypsiferous coarse clastic sediments of the Klitdal Member. The upper boundary is defined by a change from red, gypsum-bearing sediments to variegated and cyclically bedded, gypsum-bearing sediments of the overlying Kap Seaforth Member (cf. Grasmück & Trümpy, 1969).

Distribution

The member occurs in the eastern part of the Jameson Land Basin and is thickest developed around Fleming Fjord. It thins from here towards south, west and north.

Geological age

Marine limestones in the middle part of the member contain fossils indicative of a Middle Triassic age, while the over- and underlying, gypsum-bearing sediments are devoid of fossils. Continental trace fossils (*Steinichnus*) are common in the upper, gypsum-bearing sediments.

Subdivisions

The member is divided into a lower gypsum-bearing unit (informal), a middle unit with limestones (the new Gråklint Beds) and an overlying gypsum-bearing unit (informal).

Gråklint Beds

new unit

General

The sediments of this unit were originally described informally as 'Myalina limestones' by Grasmück & Trümpy (1969). This name was also used by Perch-Nielsen *et al.* (1974). In a formal lithostratigraphic account, however, it is necessary to refer to a type locality and not to facies characteristics. The unit will therefore be designated the Gråklint Beds here.

Name

After Gråklint, a prominent small cliff at the lower slopes of the mountain northeast of Solfaldsdal, northeastern Jameson Land (fig. 3, VII).

Type section

Gråklint (fig. 13).

Reference sections

The coastal cliff 4 km SW of Kap Seaforth (fig. 12); Nordenskiöld Bjerg (fig. 7); Gurreholm Bjerge, Gipsdalen (fig. 9); Pictet Bjerge (fig. 6); Mols Bjerge, northeastern Traill Ø (fig. 11).

Thickness

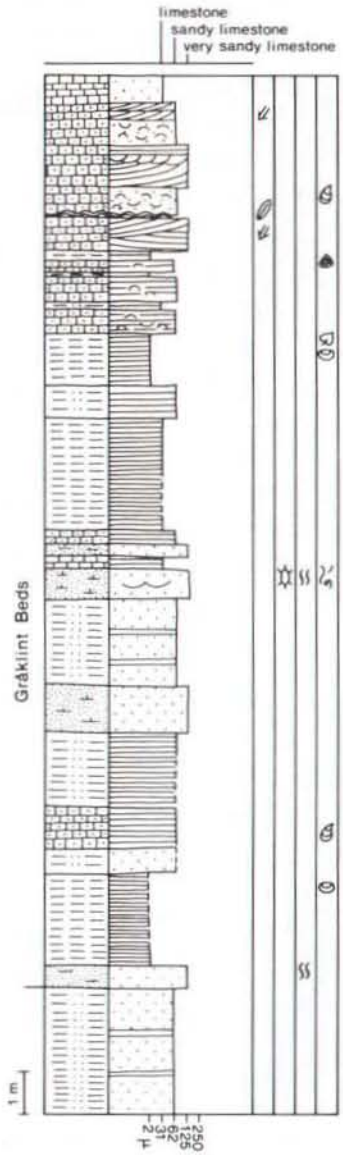
30 m at the type locality, *c.* 35 m near Kap Seaforth, 9 m at Nordenskiöld Bjerg, 3 m at Gurreholm Bjerge, 2 m at Pictet Bjerge, and *c.* 25 m at Mols Bjerge.

Dominant lithology

Grey, fossil-bearing, sandy calcarenites dominate the type section, elsewhere dark grey or black limestones and mudstones and locally calcareous sandstones are common. The calcarenites and calcareous sandstones are cliff-forming.

Boundaries

The lower boundary is defined by the appearance of dark grey or black mudstones or limestones; the upper boundary is defined by a change to red, or locally yellow, gypsiferous sandstones or siltstones. The lower boundary may be sharp or gradational, while the upper boundary is mostly very sharp. At a distance the unit is easily recognized by its dark grey colour, which contrasts with the surrounding sediments, and by its common cliff-forming appearance.



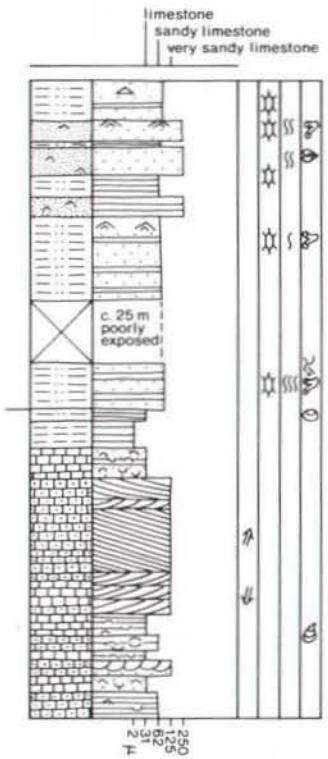


Fig. 13. Sedimentary log at Gråklint (see fig. 3, VII). Type section of the Gråklint Beds.

Distribution

The unit is thickest and most characteristically developed between Kap Biot and Tait Bjerg at Carlsberg Fjord, but the unit can be traced westwards to Gurreholm Bjerge and further west before it wedges out completely. The occurrence to the north in Mols Bjerge seems to indicate that most of Traill Ø was originally covered by this unit.

Geological age

The unit is relatively fossiliferous and contains bivalves (*Halobia* cf. *moussoni* Merian, ?*Myalina* sp.,? *Myophoria* sp. and small mytilits), gastropods (*Omphalotycha* sp.), conchostracans (*Euestheria grasmücki* Defretin, *Euestheria* cf. *emmonsi* (Raymond)), bryozoans, ostracods and vertebrates (e.g. cf. *Borborophagus* wyomingensis, S. E. Bendix-Almgreen, pers. comm., 1976). According to Grasmück & Trümpy (1969) the bivalve *Halobia* indicates a Middle Triassic age (Anisian?).

Kap Seaforth Member

General

Grasmück & Trümpy (1969) defined the Kap Seaforth Member to include their 'upper gypsum shales' as well as the stromatolite-bearing sediments above. Perch-Nielsen *et al.* (1974) restricted the definition of the member to cover only the uppermost greenish or grey coloured part of 'the upper gypsum shales', and established a new member for the overlying stromatolite-bearing sediments. The lower boundary of the Kap Seaforth Member is here redefined to cover the whole of the 'upper gypsum shales' (*sensu* Grasmück & Trümpy, 1969) as this unit is easily recognizable in the field. The upper boundary of the member is defined in agreement with Perch-Nielsen *et al.* (1974).

Name

From Kap Seaforth, the coastal cliff between Fleming Fjord and Ørsted Dal, northern Jameson Land (fig. 3, VII).

Type section

At the coastal cliff 4 km SW of Kap Seaforth (fig. 12).

Reference sections

Nordenskiöld Bjerg (fig. 7); Gurreholm Bjerge (fig. 9); Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6); Mols Bjerge (fig. 11).

Thickness

160 m at the type section, 50 m at Nordenskiöld Bjerg, 100 m in Klitdal, up to 155 m in Gipsdalen, 50 in Kolledalen, *c.* 20 m around Pictet Bjerge, and 85 m in Mols Bjerge.

Dominant lithology

Variegated, gypsum-bearing sandstones and mudstones and thin rather pure gypsum layers in a cyclically bedded sequence. Sedimentary structures include large-scale, planar cross-bedding and wave ripples in the sandstones and desiccation cracks in the mudstones.

Boundaries

The lower boundary is placed where cyclic variegated gypsum-bearing sediments overlie red, gypsiferous sediments of the Solfaldsdal Member or where cyclic, greyish, gypsum-bearing sediments overlie yellow sandstones of the Kolledalen Member.

Distribution

The member occurs from Klitdal in southern Jameson Land to Mols Bjerge on northeastern Traill Ø.

Geological age

Only land-derived palynomorphs, including *Enzonalasporites* cf. *marginalis*, ?*Lagenella martinii, Nevesisporites bigranulatus, Ovalipollis* sp., (D. K. Goodman, pers. comm., 1979) have been found. These possibly indicate a Late Triassic age.

Fleming Fjord Formation

General

Stauber (1942) described these sediments as 'Bunte Serie', while Grasmück & Trümpy (1969) included the sediments in their Cape Biot Formation. Perch-Niel-

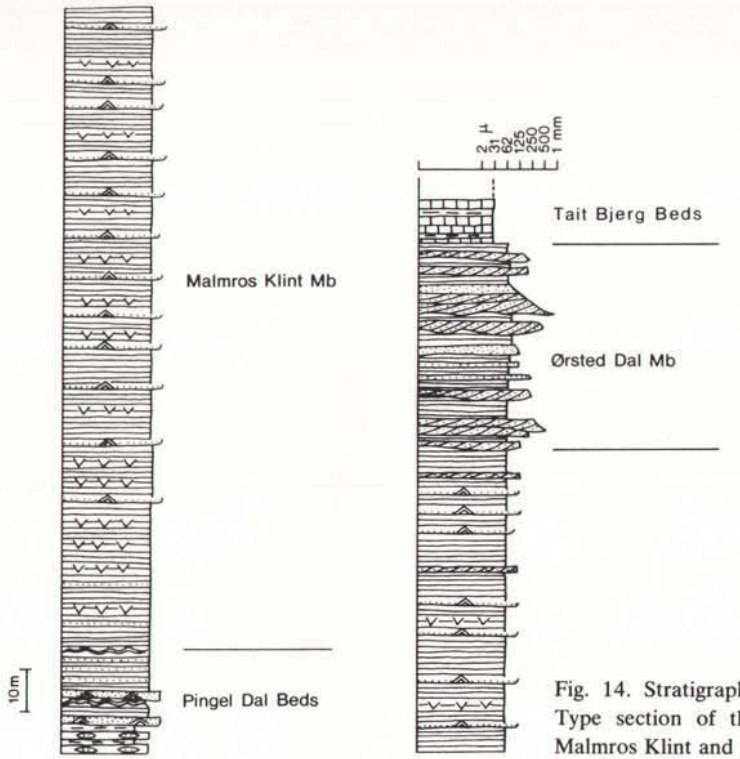


Fig. 14. Stratigraphic log at Malmros Klint (see fig. 3, VII). Type section of the Fleming Fjord Formation and the Malmros Klint and Ørsted Dal Members.

sen *et al.* (1974) divided the formation into three members; their definitions are followed here.

Name

From Fleming Fjord, northeastern Jameson Land and southeastern Scoresby Land (fig. 3, VII).

Type section

Malmros Klint at Fleming Fjord (fig. 14).

Reference sections

Kap Biot (fig. 15); Nordenskiöld Bjerg (fig. 7); Sydkronen, Gipsdalen (fig. 16); Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6); Mols Bjerge (fig. 11).

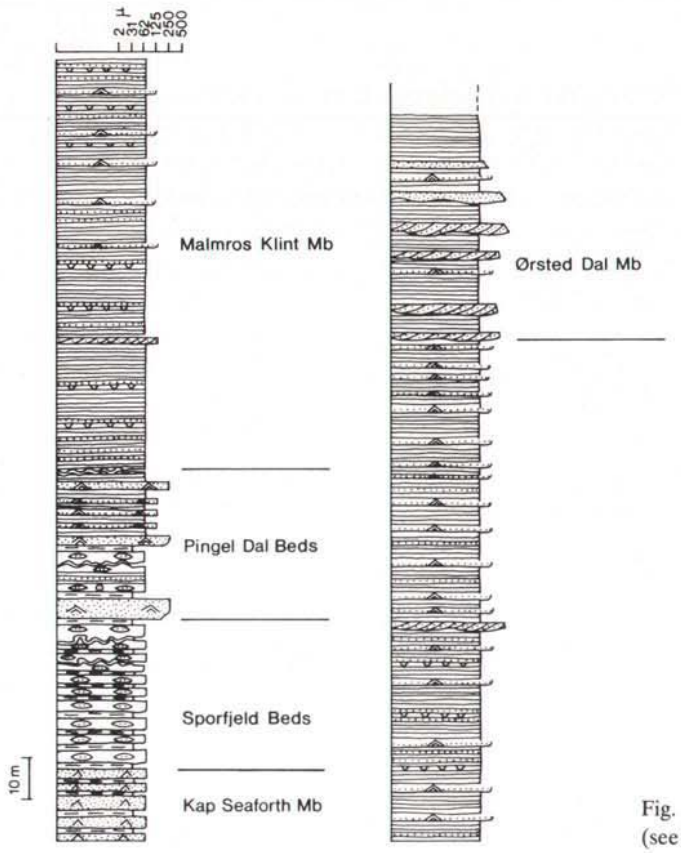


Fig. 15. Stratigraphic log at Kap Biot (see fig. 3, V).

Thickness

About 400 m at the type section, *c*. 350 m around Kap Biot, 370 m along the west coast of Carlsberg Fjord, 230–250 m in Klitdal, 50 m at Kap Hope, 285–300 m in Gipsdalen, *c*. 225 m in Kolledalen, *c*. 350 m around Pictet Bjerge and 130 m in Mols Bjerge, where only the basal member exists.

Dominant lithology

Stromatolite-bearing dolostones, sandstones and mudstones at the bottom, and red, fine sandstones and mudstones in the middle are followed by grey sandstones and red mudstones and light grey carbonate rocks at the top. See individual units for details.

Boundaries

The lower boundary is defined by the sharp change from gypsiferous sediments to yellow weathering dolomites and associated sediments. In Klitdal dolomites are missing and the lower boundary is therefore defined by the first appearance of variegated non-gypsiferous sediments. At the upper boundary yellowish grey, coarse sandstone and black mudstone of the Kap Stewart Formation (Rhaetian-Liassic) overlie grey carbonate rocks with vertebrate remains or lie directly upon variegated sandstones and mudstones.

Distribution

The formation occurs over the whole Jameson Land Basin, on southeastern Traill Ø (Morris Bjerg) and on northeastern Traill Ø (Mols Bjerge, fig. 1).

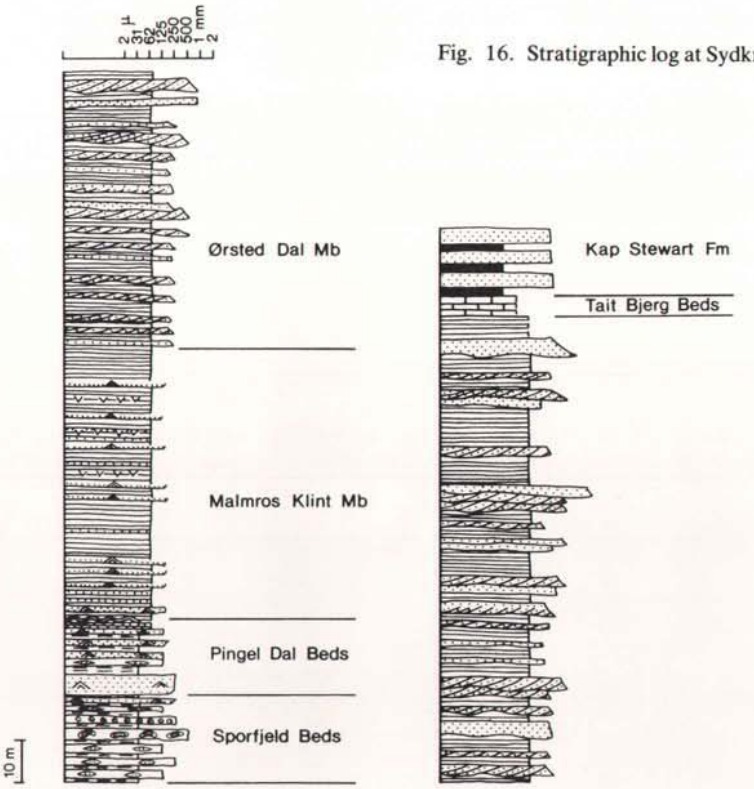


Fig. 16. Stratigraphic log at Sydkronen (see fig. 3, VI).

Geological age

A Late Triassic (? Carnian to Rhaetian) age is suggested on the basis of the conchostracans (*Euestheria minuta* (von Zieten)) from the middle part of the formation, and ostracods (*Darwinula* sp.) in the upper part of the formation (cf. Grasmück & Trümpy, 1969).

Subdivisions

The Fleming Fjord Formation is subdivided into the basal Edderfugledal Member, the Middle Malmros Klint Member and the overlying Ørsted Dal Member, which are described in the following.

Edderfugledal Member

General

The member is here defined in accordance with Perch-Nielsen *et al.* (1974).

Name

From Edderfugledal near Kap Biot, eastern Scoresby Land (fig. 3, V).

Type section

Edderfugledal, west of Kap Biot (figs 17 & 18).

Reference sections

Kap Biot (fig. 15); Nordenskiöld Bjerg (fig. 7); Malmros Klint (fig. 14); Sydkronen (fig. 16); Pictet Bjerge (fig. 6); Segldal (fig. 8); Kolledalen (fig. 10); Mols Bjerge (fig. 11).

Thickness

70 m at the type locality, *c.* 70 m at Kap Biot, 55 m at Nordenskiöld Bjerge, 60 m at Malmros Klint, 40 m at Sydkronen, 48–55 m at Pictet Bjerge and Segldal, 38 m in Kolledalen and 130 m in Mols Bjerge.

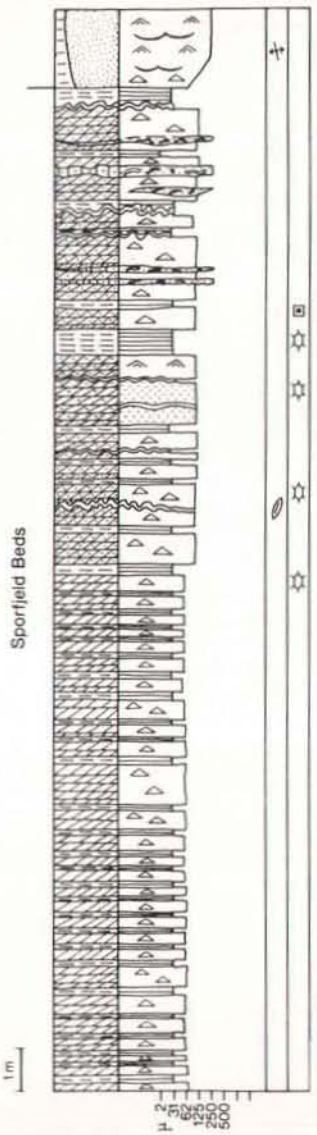


Fig. 17. Sedimentologic log at Sporfjeld (see fig. 3, V). Type section of the Edderfugledal Member and Sporfjeld Beds. Log continues in fig. 18.

Dominant lithology

Cyclically bedded yellow dolostones, green mudstones, flat pebble conglomerates and stromatolitic limestones occur in the lower part of the member. In the upper part grey, quartz sandstones and reddish sandstones and mudstones also occur. Wave ripples and desiccation cracks are the most common physical sedimentary structures; many beds in the upper portion contain trace fossils.

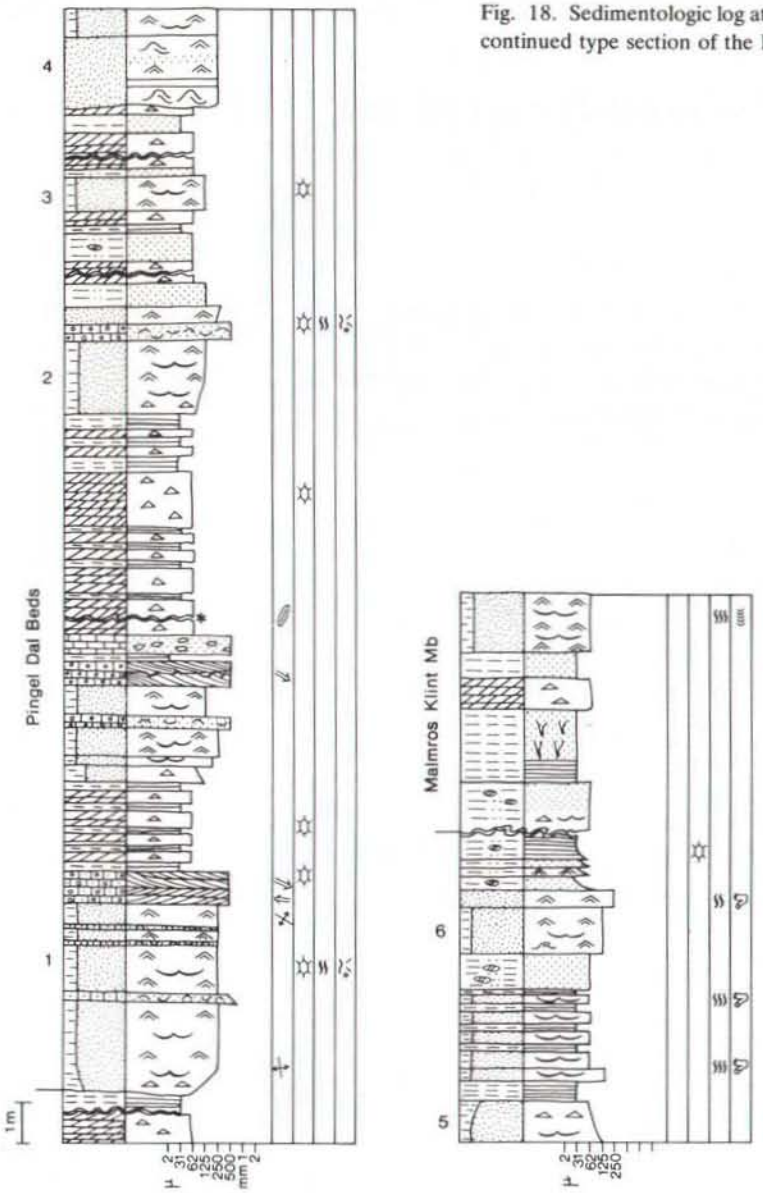


Fig. 18. Sedimentologic log at Sporfjeld (see fig. 3, V), continued type section of the Edderfugledal Member.

Boundaries

The lower boundary is identical to the lower boundary of the Fleming Fjord Formation and at most localities characterized by the appearance of yellow dolostones. The upper boundary is drawn just above the last grey sandstone or yellow, stromatolitic limestone. At a distance this upper boundary is recognized by a change from variegated to red colours.

Distribution

This member occurs in northern Jameson Land, Scoresby Land on northeastern Traill Ø.

Geological age

Only poorly preserved bivalves (?*Trigonodus* sp. and ?*Myophoria* sp., ?*Myophoriopsis* sp. or ?*Eotrapezium* sp.), common conchostracans (e.g. *Eustheria forbesii* Jones), amphibian remains and non-marine trace fossils (cf. Clemmensen, 1978b) occur. The age is probably Late Triassic (Carnian?).

Subdivisions

The Edderfugledal Member is subdivided into two new units the basal Sporfjeld Beds and the overlying Pingel Dal Beds, which are described in the following.

Sporfjeld Beds

new unit

General

The sediments of this unit were defined by Clemmensen (1977) and include the basal, yellowish-greenish part of the Edderfugledal Member. Perch-Nielsen *et al.* (1974) did not treat this unit separately.

Name

From Sporfjeld, west of Edderfugledal, eastern Scoresby Land (fig. 3, V).

Type locality

Sporfjeld at Edderfugledal (frontispiece & fig. 17).

Reference sections

Nordenskiöld Bjerg (fig. 7); Sydkronen (fig. 16); Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6); Mols Bjerge (fig. 11).

Thickness

35 m at the type locality and Nordenskiöld Bjerg, 21 m at Sydkronen, 19 m in Kolledalen, 28 m in Segldal, 30 m at Pictet Bjerge and *c.* 110 m at Mols Bjerge, where the upper boundary is difficult to place.

Dominant lithology

Cyclically bedded, green mudstones and yellow dolostones with rare, flat pebble conglomerates and stromatolitic limestones near the top. The number of well-developed stromatolite horizons in this upper portion varies between 1 and 8.

Boundaries

The lower boundary of the unit corresponds to that of the Edderfugledal Member. The upper boundary is set at the bottom of characteristic cliff-forming 4–5 m thick quartz sandstones. This upper boundary is recognized at a distance by a change from yellowish-greenish to variegated sediments.

Distribution

The unit has the same distribution as the Edderfugledal Member.

Geological age

Probably Late Triassic (? Carnian) age; only conchostracans and non-marine trace fossils (cf. Clemmensen, 1978b) have been found.

Pingel Dal Beds

new unit

General

The sediments of this unit were described by Clemmensen (1977) and include the upper variegated part of the Edderfugledal Member. Perch-Nielsen *et al.* (1974) did not treat this unit separately.

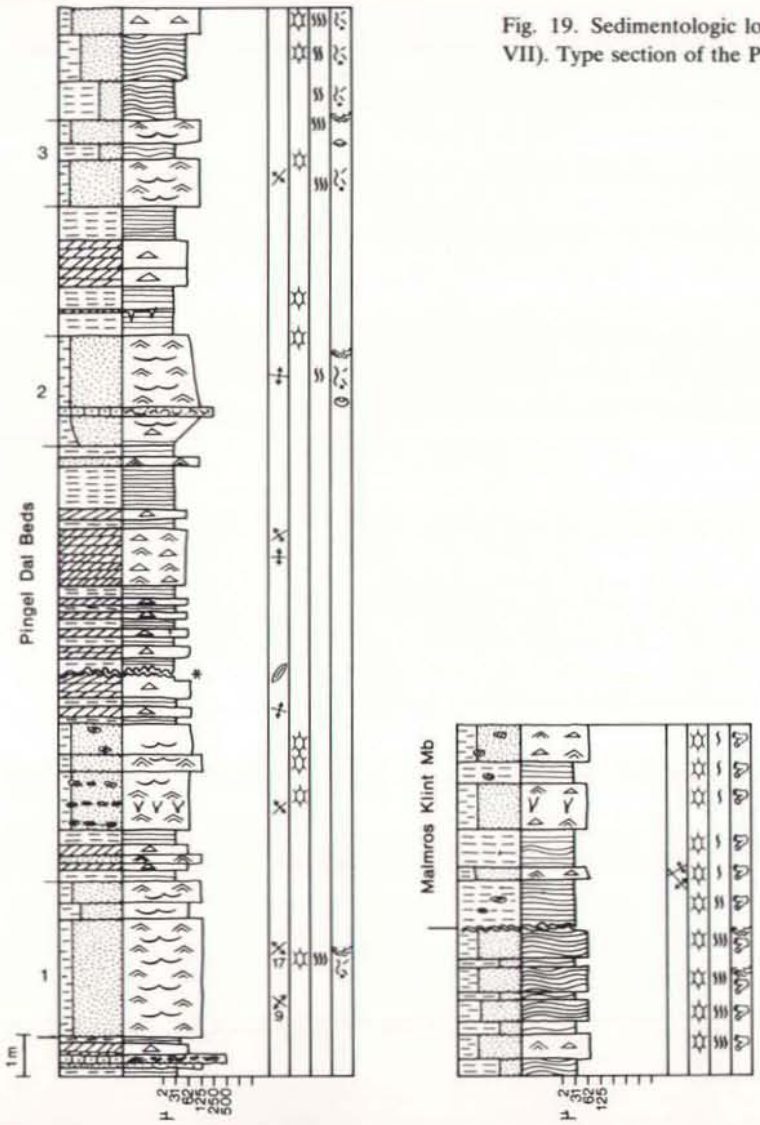


Fig. 19. Sedimentologic log at Pingel Dal (see fig. 3, VII). Type section of the Pingel Dal Beds.

Name

From Pingel Dal in northeastern Jameson Land (fig. 3, VII).

Type section

Pingel Dal at the head of the northernmost side valley (fig. 19).

Reference sections

Nordenskiöld Bjerg (fig. 7); Sporfjeld (fig. 18); Kap Biot (fig. 15); Malmros Klint (fig. 14); Sydkronen (fig. 16); Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6).

Thickness

28 m at the type locality, between 19 and 24 m at northern Carlsberg Fjord, 34 m around Edderfugledal, 40 m at Malmros Klint, *c.* 20 m in Gipsdalen, Kolledalen and Segldal and 24 m at Pictet Bjerge. On Mols Bjerge the unit is *c.* 20 m but is not characteristically developed.

Dominant lithology

Cyclically bedded, grey, quartz sandstones, red sandstones and siltstones, yellow dolostones, green mudstones, flat pebble conglomerates and stromatolitic limestones. The grey, quartz sandstones form small cliffs and are four to six in number. Both stromatolitic limestones and quartz sandstones can be traced throughout the basin.

Boundaries

The lower boundary is defined by the first cliff-forming, grey, quartz sandstones and the upper boundary is defined by the last appearance of grey sandstone or yellow, stromatolitic limestone.

Distribution

This unit has the same distribution as the Edderfugledal Member and it is thickest developed around central Fleming Fjord. The unit wedges out towards south at *c.* 71°N.

Geological age

Probably Late Triassic (Carnian?); only bivalves (e.g. ?*Trigonudus* sp.), conchostracans (*Euestheria forbesii* Jones) and non-marine trace fossils occur (cf. Clemmensen, 1978b).

Malmros Klint Member

General

This unit was described as the Fleming Fjord Member by Grasmück & Trümpy (1969). Later Perch-Nielsen *et al.* (1974) defined the Malmros Klint Member as a middle member of the Fleming Fjord Formation.

Name

From Malmros Klint, cliff north of Fleming Fjord, northern Jameson Land (fig. 3, VII).

Type section

Malmros Klint (fig. 14).

Reference sections

Kap Biot (fig. 15); Sydkronen (fig. 16); Kolledalen (fig. 10); Segldal (fig. 8); Pictet Bjerge (fig. 6).

Thickness

225 m at the type locality, 220 m around Kap Biot, 200 m along northern Carlsberg Fjord, 75 m at Sydkronen, 30 m at Kolledalen and Segldal, and 45 m at Pictet Bjerge.

Dominant lithology

Red mudstones and fine-grained sandstones with subordinate light grey, more coarse-grained sandstones especially in the uppermost portion. Non-marine trace fossils are common. Wave ripples and desiccation cracks are ubiquitous, large-scale, planar cross-bedding occurs in some of the more coarse-grained sandstones.

Boundaries

The red sediments of the Malmros Klint Member overlies the variegated sediments of the Pingel Dal Beds with a transitional boundary. In the upper part of the member thin, medium to coarse-grained, light grey, sandstones gradually appear and the upper boundary is placed where these sandstones become a conspicuous part of the rock sequence.

Distribution

The Malmros Klint Member occurs in northern Jameson Land and Scoresby Land. The member possibly occurs in the subsurface on southeastern Traill Ø near Morris Bjerg.

Geological age

Fossils in the Malmros Klint Member are restricted to conchostracans (*Euestheria minuta* (von Zieten)) and vertebrates. Non-marine trace fossils are common (cf. Clemmensen, 1980; Bromley & Asgaard, 1979). A Late Triassic (?Carnian to ?Norian) age was suggested by Grasmück & Trümpy (1969) on the basis of *Euestheria minuta* (von Zieten).

Ørsted Dal Member

General

The Ørsted Dal Member was defined by Grasmück & Trümpy (1969) and by Perch-Nielsen *et al.* (1974).

Name

From Ørsted Dal a prominent valley at the boundary between Jameson Land and Scoresby Land (fig. 3, VII).

Type section

Malmros Klint (fig. 14).

Reference sections

Sydkronen (fig. 16); Pictet Bjerge (fig. 6); Kap Biot (fig. 15); Tait Bjerg (fig. 20).

Thickness

130 m at the type locality, 185 m at Sydkronen, *c.* 250 m at Pictet Bjerge, 130 m at Kap Biot and 125 m at Tait Bjerg.

Dominant lithology

A lower, clastic, terrigenous sequence consists of interbedded red or occasionally green mudstones and light grey, fine to coarse-grained sandstones. Towards the top pebbly or conglomeratic sandstones appear especially in northwestern Scoresby Land. The mudstones are horizontally laminated and contain desiccation cracks; The sandstones are most often large-scale trough cross-bedded, but wave-rippled horizons also appear. The basal clastic sequence is overlain by a light coloured, carbonate rock association, which will be described in the following as the Tait Bjerg Beds.

Boundaries

The lower boundary is placed at the first thick sandstone horizon above the red cliff-forming mudstones of the Malmros Klint Member. The upper boundary is set at the top of the last dolomitic limestone beds (which often contain bone fragments, cf. Grasmück & Trümpy, 1969), or at the change from red sediments to light grey sandstones and dark mudstones of the Kap Stewart Formation (Rhaetian-Liassic).

Distribution

The member occurs at Kap Hope (Birkenmajer, 1976) in Jameson Land and Scoresby Land and at Morris Bjerg on southeastern Traill Ø (Clemmensen, 1977).

Geological age

Perch-Nielsen *et al.* (1974) suggested a Late Triassic (?Norian – Early Rhaetian) age for this member. The basal clastic interval only contains non-marine trace fossils (cf. Bromley & Asgaard, 1979), but the uppermost Tait Bjerg Beds contain a relatively rich fauna.

Subdivisions

The Ørsted Dal Member is divided into a lower informal clastic sequence and an overlying sequence of carbonate rocks, the Tait Bjerg Beds.

Tait Bjerg Beds

new unit

General

The carbonate rocks of this unit were described in some detail by Grasmück & Trümpy (1969) as the upper part of the Ørsted Dal Member. Because of their special lithology and characteristic cliff-forming field appearance the beds are here formally designated as a separate unit. The sediments form the uppermost unit of the Triassic Scoresby Land Group.

Name

From Tait Bjerg at northern Carlsberg Fjord (fig. 3, VIII).

Type section

Tait Bjerg (fig. 20).

Reference sections

Malmros Klint (fig. 14); Sydkronen (fig. 16).

Thickness

65 m at the type locality, 45 m at Malmros Klint and up to 12 m at Gipsdalen.

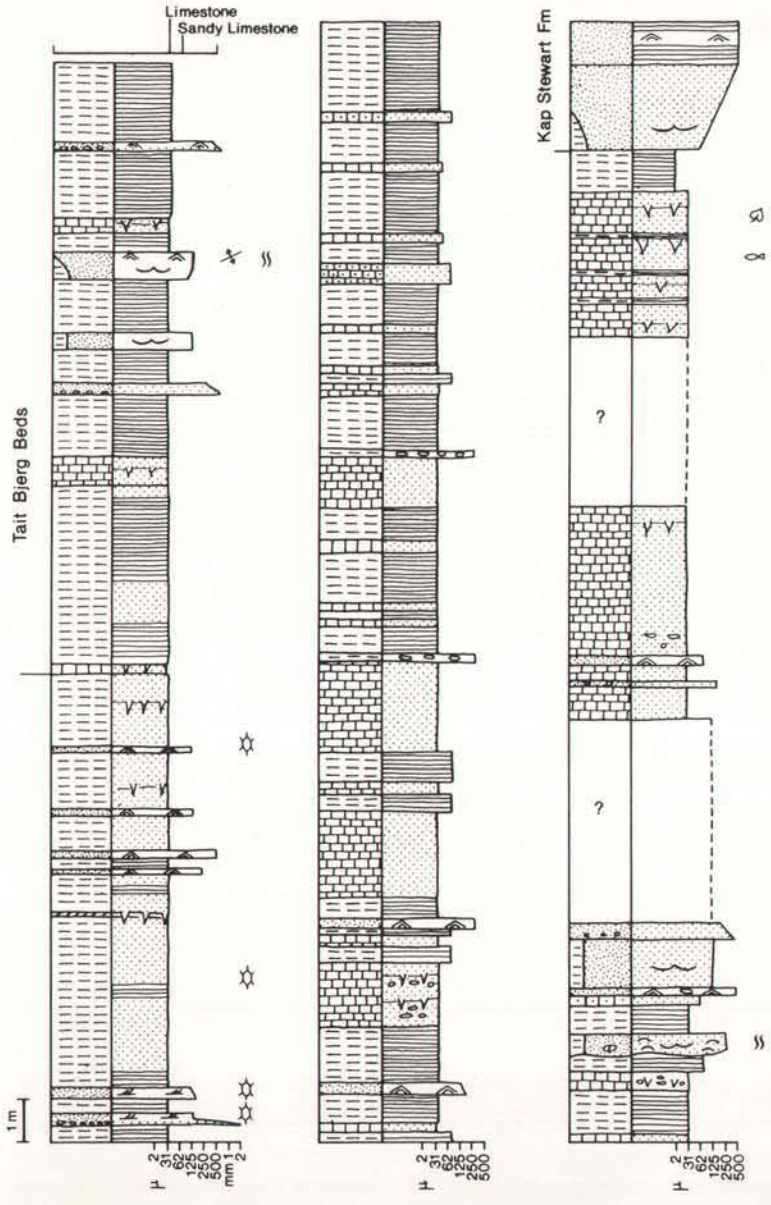


Fig. 20. Sedimentologic log at Tait Bjerg (see fig. 3, VIII). Type section of the Tait Bjerg Beds.

Dominant lithology

The lower part of the unit is composed of red or variegated, horizontally laminated mudstones and 0.2–2.0 m thick impure limestones. On top of this follow yellowish, dolomitic limestones, limestone conglomerates and dark mudstones. The limestone conglomerates contain bone fragments and other fossils and compare closely in appearance to the Rhaetian bone-beds of England (cf. Grasmück & Trümpy, 1969; Clemmensen, 1980).

Boundaries

The lower boundary is defined by the first appearance of impure limestones and the upper boundary by the last occurrence of yellow dolomitic limestone. On top of the unit follow coarse-grained sandstones and black mudstones of the Rhaetian-Liassic Kap Stewart Formation. There is no apparent sedimentary unconformity at the contact between the Tait Bjerg Beds and the Kap Stewart Formation, but the continuous sedimentation of the Scoresby Land Group was followed by a hiatus in the Early Rhaetian as suggested by Perch-Nielsen *et al.* (1974).

Distribution

The unit occurs in northeastern Jameson Land and the nearby parts of Scoresby Land. The unit is thickest developed between Fleming Fjord and Tait Bjerg and wedges out westwards and northwards. Its southern and eastern limits so far remain unknown, but the unit is only 30 m at the easternmost exposure at Kap Biot.

Geological age

The beds are of probably Early Rhaetian age (Grasmück & Trümpy, 1969; Perch-Nielsen *et al.*, 1974). Age-diagnostic fossils include ostracods (*Darwinula* sp.) and pelecypods (*Cardinia* sp.) and land-derived palynomorphs (*Brachysaccus* sp. *Circulina/Paracirculina* group, *Deltoidaspora* sp., *Eucommiidites* sp., *Microchacrydites* sp., D. K. Goodman, pers. comm., 1979). Other fossils include gastropods, fish remains (*Gyrolepis* and *Wimania? multistriata* Stensiö, det. S. E. Bendix-Almgreen and C. Patterson) and plesiosaur teeth.

LITHOSTRATIGRAPHICAL SUCCESSION AND DEPOSITIONAL ENVIRONMENTS

The Triassic Scoresby Land Group formed in a fault-bounded basin in central East Greenland (70°30'N – maximum 74°30'N) with uplifted borderlands to the east and west and from the Late Scythian onwards, also northwards. Rifting took place in Early Triassic, Late Triassic and in the Rhaetian-Liassic as shown by fluvial conglomeratic sequences in the Wordie Creek Formation, in the Klitdal, Paradigmabjerg and Ørsted Dal Members (Clemmensen, 1980) (fig. 21), and in the Kap Stewart Formation (Clemmensen, 1976).

The Triassic sediments overlie the Upper Permian Foldvik Creek Formation

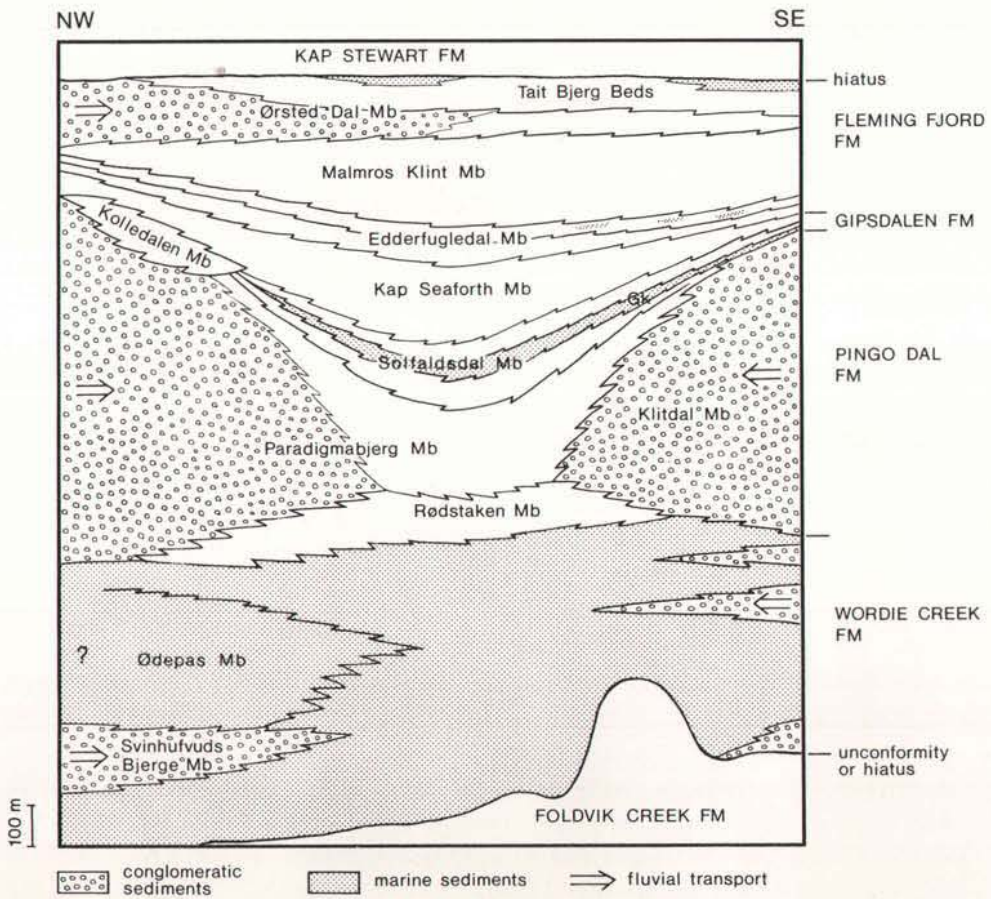


Fig. 21. Stratigraphic relationship of the Triassic deposits in the Scoresby Land Group. The Triassic sediments overlie the Upper Permian Foldvik Creek Formation, and are overlain by the Rhaetian-Liassic Kap Stewart Formation. The Kolledalen and Solfaldsdal Members are replaced by the Vega Sund Member towards the north.

with a hiatus or locally with an erosional unconformity (Birkenmajer, 1977). Reef limestones of the Foldvik Creek Formation on Wegener Halvø formed palaeohighs in Early Triassic times, and the Wordie Creek Formation thins markedly over the reefs. The Wordie Creek Formation was deposited in a marine bay, which was connected with the Boreal sea toward the north (Perch-Nielsen *et al.*, 1974).

The Rødstaken Member of the Early Triassic Pingo Dal Formation gradually overlies the Wordie Creek Formation and was deposited in flood-plain or coastal plain environments; later conglomeratic semiarid-type alluvial fan sequences of the Klitdal and Paradigmabjerg Members were built out into the basin from the eastern and western borderlands.

Less coarse material was transported into the basin during deposition of the Middle–early Late Triassic gypsum-bearing Gipsdalen Formation, and aeolian, fluvial and lacustrine sediments were deposited under a semiarid climate during the time span of the Kolledalen, Vega Sund, Solfaldsdal and Kap Seaforth Members. A brief but widespread marine transgression from the northeast affected the basin in the ?Anisian (Gråklint Beds).

Increasing amounts of coarse clastic material were transported into the basin during deposition of the Late Triassic Fleming Fjord Formation. At the same time the climate gradually became more humid. Marine incursions were rare to absent until the Early Rhaetian (Tait Bjerg Beds), and the lacustrine Edderfugledal and Malmros Klint Members are overlain by the fluvial Ørsted Dal Member.

The Scoresby Land Group is overlain conformably by the Rhaetian-Liassic Kap Stewart Formation. Perch-Nielsen *et al.* (1974) suggested that there was a break in sedimentation at this boundary.

Stratigraphical correlations southwards with the Triassic of the North Sea area is still problematic owing to lack of age-diagnostic fossils in both areas. The marine Early Triassic Wordie Creek Formation has no apparent analogue to the south. The alluvial fan sediments of the Early Triassic Klitdal and Paradigmabjerg Members, however, can be compared with the Bunter Sandstone Formation (Rhys, 1974; Brennand, 1975) of the southern North Sea and the basal portion of the Skagerak Formation (Deegan & Scull, 1977) of the northern North Sea. The marine Middle Triassic Gråklint Beds furthermore occur in a stratigraphical and sedimentological context comparable to the Muschelkalk sediments of the southern North Sea. It should be stressed, however, that the Gråklint Beds unlike the Muschelkalk originated from a Boreal sea. The Late Triassic Kap Seaforth Member with gypsum and halite pseudomorphs is comparable with parts of the Dudgeon Saliferous Formation (Rhys, 1974) to the south, although the Kap Seaforth Member is lacking true halite beds. The Late Triassic stromatolite-bearing Edderfugledal Member has no apparent analogue to the south, while the continental red-beds of the Late Triassic Malmros Klint and Ørsted Dal Members are comparable to the upper portion of the Cormorant and Skagerak Formations (Deegan & Scull, 1977) of the northern North Sea. The marine influenced Early

Rhaetian Tait Bjerg Beds with carbonate rocks show similarities to the Vinding Formation (Berthelsen, 1978) of the Norwegian – Danish Basin. There was, however, no direct connection between the two basins, and the Jameson Land Basin was probably transgressed from the northeast.

Practically nothing is known about the Triassic sediments offshore East Greenland. Preliminary aeromagnetic investigations seem to indicate the existence of N–S trending graben-like structures north of 72°N (Larsen, 1980), and comparison with the Norwegian continental shelf north of 62°N suggests the occurrence of Triassic sediments in the deeper part of these basins.

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