

19. DATA REPORT: NO SIGNIFICANT OCCURRENCES OF DIATOMS, SILICOFLAGELLATES, OR EBRIDIANS IN LOWER EOCENE THROUGH LOWER MIOCENE SEDIMENTS OF THE SOUTHEAST GREENLAND MARGIN¹

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INTRODUCTION

Sediments recovered at Deep Sea Drilling Project (DSDP) Leg 38 Sites 336–340, and 342 established that the Norwegian-Greenland Sea, north of the Greenland-Scotland Ridge, was host to rich diatom, silicoflagellate, and ebridian communities during much of the middle to late Paleogene (Dzinoridze et al., 1978; Schrader and Fenner, 1976; Martini and Müller, 1976). Recent studies by Scherer and Koç (1996) and Locker (1996), which resulted from drilling in the northern Norwegian-Greenland Sea during Ocean Drilling Program (ODP) Leg 151, contributed significant new data toward the development of a regional late Paleogene biosiliceous phytoplankton biostratigraphy, although the recovered stratigraphic record remains incomplete.

High Paleogene diatom productivity in relatively shallow waters in the high northern latitudes is evident from diatomaceous sediments known from outcrop (Benda, 1972; Homann, 1991) and borehole studies (Fenner, 1994) on Jutland (Denmark) and from outcrop studies in western Kazakhstan and the Urals (e.g., Gleser and Posnova, 1964; Krotov and Shibkova, 1959; Gleser et al., 1974; 1992). Diatomaceous Eocene sediments were recovered in a single short core from the Alpha Ridge in the central Arctic Ocean (Dell'Agnesse and Clark, 1994). Lower Paleogene diatoms that occur in the Russian and Danish deposits have been documented as reworked specimens in glacial sediments in northern Scandinavia (Cleve-Euler, 1941; Tynni, 1982) and in glacial-marine sediments of the northern Barents Sea (Grunow, 1884; Polyakova et al., 1992; Myhre, Thiede, Firth, et al., 1995; Scherer and Koç, 1996). These occurrences suggest that diatomaceous sediments were deposited across the broad, shallow seas that covered the northern European lowlands during Paleogene highstands of sea level. These deposits were subsequently eroded, transported and redeposited during Pleistocene glacial events in Fennoscandia, in most cases leaving no trace of the original strata.

Paleogene biosiliceous phytoplankton microfossils also have been documented in the high latitude North Atlantic region, south of the Greenland-Scotland Ridge. Sporadic occurrences of Eocene diatom-bearing sediments have been reported, including those from DSDP drilling at Sites 553 (Leg 81) (Baldauf, 1984; Palmer, 1984) and 405 (Leg 48) on the Rockall Plateau, Sites 400 and 402 (Leg 48) in the Bay of Biscay, and Site 384 (Leg 43) on the North American continental margin, south of the Grand Banks (all in Palmer, 1984). Upper upper Eocene to lower lower Oligocene diatomaceous sediments were recovered from the Labrador Sea at DSDP Site 112 (Leg 12; Burckle, 1972) and ODP Site 647 (Leg 105) (Baldauf and Monjanel, 1989).

METHODS AND MATERIALS

During ODP Leg 152, drilling along the East Greenland Margin recovered shallow-water Paleogene sediments from Holes 914B, 915A, 916A, and 917A, and relatively deep-water Paleogene sediments from Hole 918D. Five samples from Hole 914B, 12 samples from Hole 915A, and 81 samples from Hole 918D were received for biostratigraphic and paleoenvironmental analysis of diatoms in Eocene, Oligocene, and lower Miocene sediments (Table 1). Samples from Hole 914B include lower Oligocene massive sandy silts with nearshore macrofossil debris (Larsen, Saunders, Clift, et al., 1994). Samples from Hole 915A include middle to upper Eocene shallow marine silts and clays, containing variable concentrations of biogenic carbonate. Samples from Hole 918D include lower Miocene to lower Eocene calcareous nannofossil-bearing mudstones. This sedimentary section was very poorly recovered; nevertheless, there is strong evidence from calcareous nannofossil biostratigraphy for a major unconformity between middle Eocene and upper Oligocene sediments between Cores 152-918D-88R and 86R (Larsen, Saunders, Clift, et al., 1994). Smear slides were prepared from all samples for initial evaluation of diatom occurrence, abundance, and preservation. Table 1 is a list of samples examined.

RESULTS AND DISCUSSION

This investigation showed an absence of identifiable diatom, silicoflagellate, and ebridian debris in all samples examined. The only example of these microfossil groups noted includes trace quantities of biosiliceous debris replaced by pyrite, in Sample 152-918D-92R-2, 34–36 cm. None of these rare fragments can be identified. The absence of biosiliceous microfossils in these sediments obviously prevented application of any biostratigraphic scheme. It can be assumed that the lack of these fossils is a result of some combination of low biosiliceous productivity relative to the sediment accumulation rate, and a water column and pore waters that were corrosive to opaline silica. Some combination of these conditions prevailed despite the high abundance of biosiliceous debris of these ages on the northern side of the Greenland-Scotland Ridge, in the Norwegian-Greenland Sea.

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¹Saunders, A.D., Larsen, H.C., and Wise, S.W., Jr. (Eds.), 1998. *Proc. ODP, Sci. Results*, 152: College Station, TX (Ocean Drilling Program).

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Table 1. Samples examined for Paleogene and lower Miocene diatoms and siliceous flagellates.

152-914B-	40R-3, 109–112 cm	55R-5, 14–16 cm
17R-1, 37–39 cm	40R-4, 39–41 cm	55R-6, 25–27 cm
17R-2, 25–27 cm	40R-5, 24–26 cm	57R-1, 72–74 cm
17R-3, 29–32 cm	40R-6, 32–34 cm	57R-2, 69–71 cm
17R-4, 31–33 cm	41R-1, 110–112 cm	57R-3, 66–68 cm
17R-5, 31–34 cm	41R-2, 115–117 cm	62R-1, 35–37 cm
152-915A-	41R-3, 118–120 cm	62R-2, 40–42 cm
18R-1, 27–29 cm	41R-4, 106–108 cm	63R-1, 40–44 cm
18R-2, 29–31 cm	41R-5, 104–106 cm	63R-2, 46–48 cm
18R-3, 16–18 cm	41R-6, 25–27 cm	68R-1, 16–18 cm
18R-3, 29–31 cm	44R-1, 91–93 cm	68R-1, 16–18 cm
19R-1, 28–30 cm	44R-2, 89–91 cm	72R-1, 56–58 cm
19R-2, 36–38 cm	44R-3, 91–93 cm	74R-1, 32–34 cm
19R-3, 24–26 cm	44R-4, 88–92 cm	75R-1, 31–33 cm
19R-4, 26–28 cm	44R-5, 117–120 cm	75R-2, 110–112 cm
20R-1, 33–35 cm	51R-1, 17–18 cm	75R-4, 28–30 cm
22R-1, 40–42 cm	51R-4, 27–28 cm	76R-1, 23–25 cm
22R-2, 3–5 cm	51R-5, 20–22 cm	84R-1, 68–70 cm
22R-3, 30–32 cm	51R-6, 34–36 cm	86R-1, 11–13 cm
152-918D-	52R-1, 99–101 cm	88R-1, 53–55 cm
37R-1, 58–60 cm	52R-2, 66–68 cm	88R-1, 53–55 cm
37R-2, 105–107 cm	52R-3, 124–127 cm	89R-1, 43–44 cm
37R-2, 105–107 cm	52R-4, 126–128 cm	89R-2, 41–43 cm
37R-3, 47–49 cm	52R-5, 29–31 cm	89R-3, 42–44 cm
37R-4, 51–53 cm	53R-1, 59–61 cm	89R-4, 15–17 cm
37R-5, 53–55 cm	53R-2, 98–100 cm	90R-3, 62–64 cm
39R-1, 131–133 cm	53R-3, 109–111 cm	90R-3, 68–70 cm
39R-2, 110–112 cm	53R-4, 97–99 cm	91R-1, 65–67 cm
39R-3, 109–111 cm	53R-5, 53–55 cm	92R-1, 36–38 cm
39R-4, 97–99 cm	53R-6, 32–35 cm	92R-2, 34–36 cm
39R-5, 131–133 cm	53R-7, 98–100 cm	93R-1, 86–88 cm
39R-6, 58–60 cm	55R-1, 39–41 cm	96R-3, 82–84 cm
40R-1, 110–112 cm	55R-2, 86–88 cm	96R-7, 89–91 cm
40R-2, 108–110 cm	55R-3, 112–114 cm	
	55R-3, 31–33 cm	