24. COCCOLITH ZONATION OF CORES FROM THE WESTERN INDIAN OCEAN AND THE GULF OF ADEN, DEEP SEA DRILLING PROJECT LEG 24[1]

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Leg 24 of the Deep Sea Drilling Project, May-June 1972, began at Djibouti, near the Gulf of Aden, and ended at Port Louis, east of Madagascar (Figure 1). This leg investigated the western Indian Ocean and recovered 337 cores at eight drilling sites (Table 1). Light-microscope techniques were used to study the coccoliths of 305 samples from these cores. The zonation employed in zonal assignments of core samples from Leg 24, summarized in Figure 2, is based on Bukry (1973). The sediment is primarily coccolithic chalk and marl (Fisher et al., 1972).

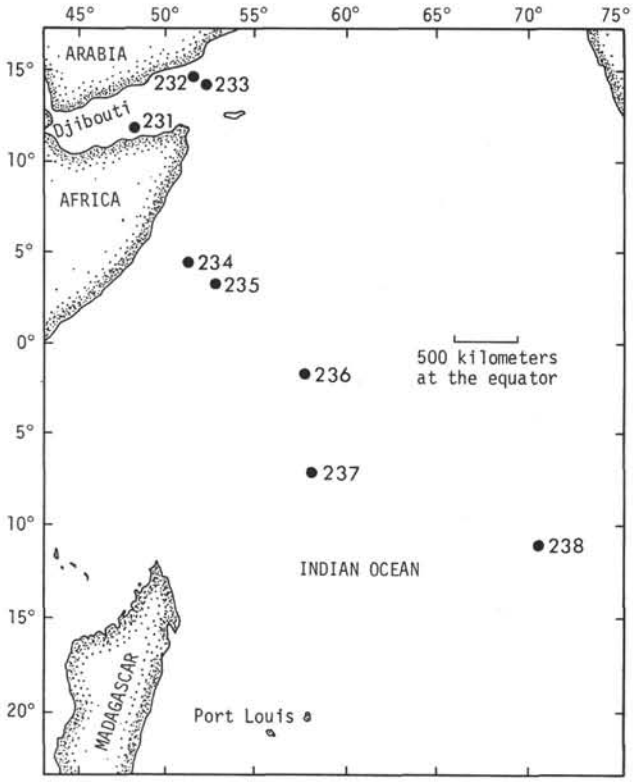

Figure 1. *Sketch map showing Leg 24 sites in the western Indian Ocean and the Gulf of Aden.*

[1]Publication authorized by the Director, U. S. Geological Survey.

REFERENCES

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TABLE 1
Location, Water Depth, Penetration, and Number of Cores Cut at Deep Sea Drilling Project Sites in the Gulf of Aden and Western Indian Ocean

Site	Latitude	Longitude	Water Depth (m)	Penetration (m)	Cores
Gulf of Aden					
231	11°53.41′N	48°14.71′E	2161	584	64
232	14°28.93′N	51°54.87′E	1758	434	49
233	14°19.68′N	52°08.11′E	1860	271	32
Western Indian Ocean					
234	04°28.96′N	51°13.48′E	4738	277	16
235	03°14.06′N	52°41.64′E	5146	684	20
236	01°40.62′S	57°38.85′E	4504	328	37
237	07°04.99′S	58°07.48′E	1640	694	67
238	11°09.21′S	70°31.56′E	2844	587	64

Series or Subseries	Zone	Subzone	231	232	233	234	235	236	237	238
Holocene	*Emiliania huxleyi*							1-2	1-1	
Pleistocene	*Gephyrocapsa oceanica*		1-1/9-3	2-4/5-4	1-2		1-2		?2-1	1-1/1-4
	Crenalithus doronicoides	*Gephyrocapsa caribbeanica*	10-3	7-2/9-2	3-2/5-4		2-2/4-3			3-2
		Emiliania annula	11-2/12-3		7-5/9-2			3-2		6-2
Upper Pliocene	*Discoaster brouweri*	*Cyclococcolithina macintyrei*	13-3/15-2	10-2/11-3	10-2/13-2		5-2			7-2
		Discoaster pentaradiatus	17-3/19-3	13-1/15-3	15-2/5A-2	1-1				8-2
		Discoaster tamalis		16-3		1-3	7-3		4-2/4-5	10-5; 4-5
Lower Pliocene	*Reticulofenestra pseudoumbilica*	*Discoaster asymmetricus*	21-3/27-3	17-3/7A-2					5-5	4-2/5-2
		Sphenolithus neoabies							6-5/7-5	11-5/12-5
	Ceratolithus tricorniculatus	*Ceratolithus rugosus*					9-2	4-3	8-5	13-5
		Ceratolithus acutus	28-3	9A-5					9-2	15-5
		Triquetrorhabdulus rugosus	?29-3	?10A-4/19A-1				?5-4/6-2	?9-5	16-2
Upper Miocene	*Discoaster quinqueramus*	*Ceratolithus primus*	30-3/45-3	21A-2/24A-1			10-2/11-2	6-5/12-5	10-2/10-5	16-5/19-5
		Discoaster berggrenii						13-5	11-5/12-5	20-5/23-5
	Discoaster neohamatus	*Discoaster neorectus*	47-3/51-2					14-2/15-3	13-5	
		Discoaster bellus				1-5/2-2	12-3			24-2/29-5
Middle Miocene	*Discoaster hamatus*		53-2/55-2					15-6	14-5	30-2/30-6
	Catinaster coalitus		?56-2							
	Discoaster exilis	*Discoaster kugleri*	57-2/60-2				14-2		15-2/16-5	
		Coccolithus miopelagicus	61-4			4-2				32-1
	Sphenolithus heteromorphus		62-1				15-4	17-6	17-5	32-5/38-5
Lower Miocene	*Helicopontosphaera ampliaperta*								18-5	39-5/41-5
	Sphenolithus belemnos							?18-3	19-5	42-4
	Triquetrorhabdulus carinatus	*Discoaster druggii*						19-3	20-5	43-2/48-2
		Discoaster deflandrei								
		Cyclicargolithus abisectus				10-3		?20-2	21-2	
Oligocene	*Sphenolithus ciperoensis*					12-2		21-5	21-5/22-2	49-2/51-4
	Sphenolithus distentus							22-2/23-2		52-5/54-1
	Sphenolithus predistentus							24-2/25-2		
	Helicopontosphaera reticulata	*Reticulofenestra hillae*						26-2		
		Cyclococcolithina formosa						26-6/27-2	23-2	
		Coccolithus subdistichus								
Upper Eocene	*Discoaster barbadiensis*							28-1	23-3/23-6	
Middle Eocene	*Reticulofenestra umbilica*	*Discoaster saipanensis*							24-1/26-4	
		Discoaster bifax								
	Nannotetrina quadrata	*Coccolithus staurion*							27-1/29-2	
		Chiasmolithus gigas							29-5/31-1	
		Discoaster strictus							32-1/33-3	
	Discoaster sublodoensis	*Rhabdosphaera inflata*								
		Discoasteroides kuepperi						29-1	36-1	
Lower Eocene	*Discoaster lodoensis*							30-2/?32-2		
	Tribrachiatus orthostylus									
	Discoaster diastypus								37-2	
Paleocene	*Discoaster multiradiatus*	*Campylosphaera eodela*								
		Chiasmolithus bidens							41-2	
	Discoaster nobilis									
	Discoaster mohleri							33-3	42-1/43-1	
	Heliolithus kleinpellii								43-3/44-2	
	Fasciculithus tympaniformis								45-1/51-2	
	Cruciplacolithus tenuis								?64-2/?67-5	

Figure 2. *Coccolith zonation of core samples from Leg 24. Numbers assigned to zones represent the cores and their 1.5-meter sections. Where samples from several sections are assigned to a single zone, the highest and lowest sections are listed with a slash between. Poorly diagnostic samples are assigned to an interval of several zones or are queried. At Site 238, Core 1 shows massive reworking and Cores 4 and 5 contain anomalously old assemblages suggesting, together, that the upper five cores are disturbed and stratigraphically unreliable.*