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V D M E



THE FORAMINIFERAL SEQUENCE

IN WEST HALIBUT-1,

GIPPSLAND BASIN

by

David Taylor

Esso Australia Ltd

Palaeontology Report: 1979/9

April 9, 1979

FORAMINIFERAL SEQUENCE

- WEST HALIBUT # 1

by DAVID TAYLOR

March 26, 1979.

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for  
ESSO AUSTRALIA LTD.,  
Paleontology Report 1979/9

SUMMARY

*Precise biostratigraphic designations within this sequence was impossible. Mid Miocene to Pliocene planktonic foraminifera were poorly represented in this sequence due to the rapidity and high energy of canyon cut and fill mechanisms. Catastrophic slumping down canyon may account for muddled sample sequence of early and mid Miocene faunas between 2385 and 2075. Another explanation for this muddling, was that one or more guns of sidewall were misfired. This is by no means the only example of a muddled biostratigraphic sequence in the Gippsland Basin.*

## INTRODUCTION

Ninety two sidewall cores were processed and examined from HALIBUT WEST # 1. All sidewall core depths in metres listed were as labelled on sample containers.

Samples from 2385 to 2075 were muddled when compared to the established foraminiferal biostratigraphic sequence for the Gippsland Basin. Prior warning had been given of this possibility, but the extent was greater than was realized. No conclusions can be drawn because of this and only abstract data is presented in this report. Documentation accompanying the report is:-

Six sample data sheets with note of diagnostic planktonic species  
Distribution chart for Late Neogene planktonic foraminifera from  
240 to 860.

LATE NEOGENE - 240 to 860 (see distribution chart).

This interval contained generally poor planktonic faunas due to shallow water deposition at and above 425 and the rapidity and high energy of canyon cut and fill mechanisms below 425.

Poor quality Zone A-4 (=early Pliocene) faunas were recorded at 753.5 and 727.5. Between 557.5 and 309 the association of *Globorotalia puncticulata*, *G. inflata* and *G. crassaformis* in the absence of *G. tosaensis* and/or *G. truncatulinoides* indicates Zone A-3 (=mid Pliocene). The dominance of *G. crassaformis* over *G. inflata* is unusual and suggests a warm temperate surface water layer rather than the usual cool temperate surface layer above the Gippsland continental shelf.

LATE to MID MIOCENE - 880 to 2050.

No biostratigraphic control was possible due to recrystallization of the fine grained carbonate canyon fill of this section.

MUDDLED SEQUENCE of MID and EARLY MIOCENE - 2075 to 2385.

The biostratigraphic results from forty sidewall cores are listed on page 2 and briefly detailed on the sample data sheets.

SUMMARY OF MUDDLED SEQUENCE  
IN HALIBUT WEST # 1.

<u>Depth</u>	<u>SWC No.</u>	<u>Zone &amp; Quality</u>
2025*	SWC 103	?? canyon fill
2050	SWC 102	?? canyon fill
2075	SWC 132	D-2 (1)
2100	SWC 100	?? canyon fill
2125	SWC 99	?? canyon fill
2150	SWC 131	F- (1)
2175	SWC 97	D-1 (2) canyon fill
2220	SWC 96	D-1 (2) canyon fill
2277.5	SWC 93	D-2 (1)
2294	SWC 94	D-1 (2)
2299	SWC 129	E-2 (2) or F (2)
2325	SWC 91	D-1 (1) canyon fill
2350	SWC 90	D-2 (0)
2351	SWC 128	F (1)
2352	SWC 127	F (0)
2354	SWC 125	F (1)
2355	SWC 124	F (2)
2356	SWC 123	F (1)
2357	SWC 122	F (1)
2358	SWC 121	G/F (2)
2359	SWC 120	G/F (2)
2360	SWC 62	G/F (2)
2361	SWC 119	G/F (2)
2362	SWC 118	F (2)
2363	SWC 61	F (2)
2365	SWC 116	G/F (2)
2366	SWC 88	D-2 (1)
2367	SWC 115	F (1)
2368	SWC 60	F/D-2 (2)
2369	SWC 114	F/D-2 (2)
2370	SWC 59	high F(0)
2371	SWC 87	D-2 (0)
2372	SWC 58	E-2 (1)
2373	SWC 113	F (1)
2374	SWC 57	Indet
2375	SWC 85	D-2 (0)
2376	SWC 55	N.F.F.
2377.5	SWC 56	D-2 (0)
2385	SWC 82	D-2 (0)

\* SWCs above 2025 to 940 are recrystallised canyon fill carbonate with non-diagnostic and/or indeterminate planktonic foraminifera.

The established sequence of biostratigraphic events did not emerge from any logical re-arrangement of the sample depths or sidewall core numbers. Thus the muddling was not due to pure inversion of sample depths.

It could be concluded that the Gippsland foraminiferal biostratigraphic scheme is "busted". If this is so, then so are all other early to mid Miocene schemes proposed by Blow, Stainforth et al, Bolli, Jenkins etc. For instance Blow's well established *Orbulina* bioseries is completely out of order in Halibut West with the ultimate form (*Orbulina universa* in D-2) occurring before the penultimate morphotypes of *Praeorbulina* (in E-2), which in turn was recorded before the earlier forms of *Globigerinoides sicanus* and *G. trilobus* in F and G. Dismissing the above possibility, I put the following three explanations.

1. A catastrophic disturbance, such as a collapse of the continental shelf of early to mid Miocene sediments into a continental slope canyon during the mid Miocene. It is noted that a normal recrystallized canyon sequence was present above 2075. The sequence below could have been massive, rapid canyon fill.
2. The fatigued well site geologist incorrectly labelled the samples. Unlikely, as the depth muddling is far too great.
3. Mis-shooting of at least one and probably two guns of sidewall cores. This is by no means the first case of scrambled sidewall cores (e.g. Kingfish # 7, Paleontology Report, 1977/23).

If the catastrophic explanation is correct then it was of a scale described in *Psalms 46:2*, so that other geological and geophysical evidence should be very apparent. The possibility of mis-shooting cannot be dismissed, but if it were then the mid Miocene catastrophism was widespread. Obvious muddling of sequences are common in the Basin Deep portion of the Gippsland Basin and the biostratigraphy of a number of wells doesn't agree with other correlation methods (e.g. wells on the Kingfish structure).

As I have not been privy to any information or discussions that would throw further light on this problem, I remain ambivalent.

WEST HALIBUT # 1.

Side wall core depth in metres	240	264	283	309	336	357	371.5	401	425	445	468	485	506.5	525	542	557.5	581.5	597	620	640	660	685	704	727.5	753.5	769	802	825	842.5	860									
PLANKTONICS																																							
<i>Globigerina bulloides</i>	°		N		°	°	°		°		°		I		°	°	°			N	N	°	°	°	°	°	°	°	°	°	°								
<i>Globorotalia inflata</i>	cf	cf	O	°		°	°	°	cf	°			°		°	°				O	O																		
<i>Globigerinelloides aequilateralis</i>																																							
<i>Globorotalia crassaformis</i>			I	°	D		D	I	I	D	D	°	°							D	D																		
<i>Globorotalia cf. conomiozea</i>			P	°				°												I	I																		
<i>Globorotalia puncticulata</i>			A	°		°	°	°					I		°					A	A		°	°															
<i>G. crassaformis - tosaensis</i>			N				°	°												G	G																		
<i>Orbulina universa</i>			K				°	°	°	D		I		°	°	°	°	°	°	N	N	°		°	°	°	I	I	I										
<i>Globorotalia acostaensis</i>			T					°						°	°	°				O	O																		
<i>Globigerina decoraperta</i>			O					°												S	S	°		°	°	°													
<i>Globigerinoides</i>			N				°	°	?											T	T																		
<i>Globorotalia continua</i>			I					°												I	I																		
<i>G. tosaensis</i>			C												cf					C	C																		
<i>G. menardii</i>			S												°	°																							
<i>Globigerina falconensis</i>															°																								
<i>G. woodi</i>			F																	I	A	A										°							
<i>G. woodi connecta</i>			O																	°	U	U																	
<i>Globigerinoides subquadratus</i>			N																	°	N	N																	
<i>Globorotalia miotumida</i>			D																	°	A	A																	
<i>Globigerina quinqueloba</i>																				°																			
<i>Globorotalia cf. obesa</i>																																							
<i>G. miozea conoidea</i>																																°							
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th colspan="2">SYMBOLS</th> </tr> <tr> <td>°</td> <td>= 1-20 Specimens</td> </tr> <tr> <td>I</td> <td>= 20 specimens</td> </tr> <tr> <td>D</td> <td>= &gt; 60% of planktonics</td> </tr> </table>																																SYMBOLS		°	= 1-20 Specimens	I	= 20 specimens	D	= > 60% of planktonics
SYMBOLS																																							
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Depth in metres to base of ZONE														557.5						753.5																			
	?	A-3											?	?	?		A-4	?																					

SAMPLE DATA SHEETS  
MICROPALAEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1

DATE: 25/2/1979.

PREPARED BY: DAVID TAYLOR

SHEET NO. 1 of 6.

DRAW:

<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
240	SWC 30		?? - bio calcar, 25% moll, 25% bry, 10% forams. count 800, 98% benthos with D. <i>Elphidium</i> .
264	SWC 29		?? 90% c. moll. frags. count 400, 95% benthos. D. <i>Cibicides</i> .
283	SWC 28		?? 95% indet calcareous grains. 100% benthos. D. <i>Elphidium</i> .
309	SWC 27		A-3(1). 90% bry & moll frags. 2000 count 10% planks incl. <i>Globorotalia crassaformis</i> Dom. benthos = <i>Elphidium</i> .
336	SWC 26		A-3(1) - 60% calcareous grains, 30% forams, 10% ech. spines. Count 1200, 50% planks incl. <i>G. crassaformis</i> . Dom. benthos <i>Euuvigerina mata</i> + <i>Elphidium imperatrix</i> & <i>Cibicides cygnorum</i> .
357	SWC 25		A-3(1) - 40% calcareous grains, 40% forams, count 500, 30% planks. Dom. benthos. as above.
371.5	SWC 24		A-3(2) - 60% calcareous frags. 10% c. ang. qtz., 30% forams. Count 200, 20% planks. Dom benthos. = <i>Cibicides</i> .
401	SWC 23		A-3(1). 60% calcareous frags. 40% forams, r. ang. qtz. Count. 1000 40% planks with Dom. <i>G. crassaformis</i> . <i>E. mata</i> Dom. benth.
425	SWC 22		A-3 (0) 70% calcareous frags, 30% forams, count 2500 60% planks, shelf edge benthos incl. <i>E. mata</i> & <i>Cassidulina carinata</i> .
445	SWC 21		A-3(1), 99% limonite stained & sometimes infilled forams. r.f. ang. qtz. count 6000 60% planks. shelf edge benthos. Dom. <i>Cassidulina carinata</i> . ? top canyon fill
468	SWC 20		A-3(2), 90% forams, count 2000, 40% planks. Canyon fill.
485	SWC 19		?? poor pres. 95% forams + limonite grains, count 4000, 20% planks, shelf edge benthos, Dom. <i>Cassidulina carinata</i> .
506.5	SWC 18		A-3(1), 95% forams + limonite grains. Count 8000, 70% planks. Benthos Dom. <i>Bolivina</i> spp & large Polymorphinids = upwelling.

SAMPLE DATA SHEETS

MICROPALAEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1.

DATE: 28/2/1979.

PREPARED BY: DAVID TAYLOR.

SHEET NO.2 of 6.

DRAW:

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<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
525	SWC 17	A-3 (2), 85% forams - poor pres. - 15% ech. spines, count 1200, 20% planks Dom. <i>Globorotalia crassaformis</i> . Shelf edge benthos, Dom. <i>Cibicides subhaidingeri</i> with <i>E. mata</i> & <i>Siphouvigerina canariensis</i> .	
542	SWC 16	A-3 (2). 45% vien. calcite, 45% ech, 10% forams. Count 200, 50% planks.	
557.5	SWC 15	A-3 (0), 80% forams - good pres. 20% glauc. moulds. Count 3000, planks 50%. shelf edge benthos.	
581.5	SWC 14	? , 50% forams, 20% spics, 20% limonite, r. rd. qtz. NB. spiculite "balls". Count 400, 40% planks, Benthos. shelf edge + rafted adherent spp.	
597	SWC 13	?? forams, r. spics. r. ang. qtz. Count 300. 30% planks - most reworked.	
620	SWC 12	?? forams with adherent limonite, r. ang. qtz. r. ech. Count 1000, 20% planks, most reworked, shelf edge + rafted benthos.	
640	SWC 11	?? Dom. indet carb., r. forams. r. glauc, r. ech. Count 10.	
660	SWC 10	?? 50% c. bry. frags, 50% carb. count 50.	
685	SWC 9	?? 40% carb, 40% forams, 20% bry. frags. common ost. Count 300, planks 50%, canyon fill with inner shelf benthos. N.B. <i>Rosalina mitchelli</i> .	
704	SWC 8	?? Recrystallised carb.	
727.5	SWC 7	A-4 (2) 60% f. limonitic carb. sd., 30% indet carb. r. forams, r. bry, r. ech, r. ost. Count 150. Planks 5% inner shelf + rafted benthos. N.B. limonitic infilled miliolids - canyon fill.	
753.5	SWC 6	A-4 (2) <i>ibid</i>	
769	SWC 5	? ? <i>ibid</i>	
802	SWC 4	?? Dom forams & spics, limonite grains, Count 1000, 30% planks, displaced shelf benthos. Canyon fill.	
825	SWC 3	?? <i>ibid</i>	



SAMPLE DATA SHEETS

MICROPALAEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1.

DATE: 2/3/1979.

PREPARED BY: DAVID TAYLOR.

SHEET NO. 3 of 6.

DRAW:

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<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
842.5	SWC 2	?? Dom forams + common ost., limonite adhering. Count 1000, planks 30%. Displaced shelf + slope benthos. Dom. <i>Cassidulina carinata</i> .	
860	SWC 1	?? <i>ibid</i> + rads.	
880	SWC 81	?? Recrystallized canyon fill with poorly preserved indet planks & r. benthos. incl. <i>Cassidulina carinata</i> sponge spics. r. to abundant.	
940	SWC 80	<i>ibid</i>	
1000	SWC 79	<i>ibid</i>	
1060	SWC 78	<i>ibid</i>	
1180	SWC 76	<i>ibid</i>	
1240	SWC 75	<i>ibid</i>	
1305	SWC 74	<i>ibid</i>	
1365	SWC 73	<i>ibid</i>	
1425	SWC 72	<i>ibid</i>	
1485	SWC 71	<i>ibid</i>	
1605	SWC 69	<i>ibid</i>	
1665	SWC 68	<i>ibid</i>	
1698	SWC 67	<i>ibid</i>	
1725	SWC 66	<i>ibid</i>	
1750	SWC 65	<i>ibid</i>	
1775	SWC 64	<i>ibid</i>	
1800	SWC 63	<i>ibid</i>	
1875	SWC 109	<i>ibid</i>	
1900	SWC 108	<i>ibid</i>	
1950	SWC 106	<i>ibid</i>	
1975	SWC 105	<i>ibid</i>	
2025	SWC 103	<i>ibid</i>	
2050	SWC 102	<i>ibid</i>	

SAMPLE DATA SHEETS

MICROPALAEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1.

DATE: 2/3/1979.

PREPARED BY: DAVID TAYLOR.

SHEET NO. 4 of 6.

DRAW:

<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
2075	SWC 132	D-2 (1)	fairly complete fauna.
2100	SWC 100	??	recrystallized lst + r. planks & <i>Cassidulina carinata</i> .
2125	SWC 99	??	<i>ibid</i>
2150	SWC 131	F(1)	- <i>Globigerinoides sicanus</i> & <i>G. trilobus</i> .
2175	SWC 97	D-1 (2)	recrystallized lst + <i>Orbulina universa</i> & <i>Globorotalia miozea conoidea</i> .
2220	SWC 96	D-1 (2)	<i>ibid</i>
2277.5	SWC 93	D-2 (1)	- <i>Orbulina universa</i> , <i>Globigerinoides sicanus</i> , <i>G. trilobus</i> , <i>Globorotalia miozea miozea</i> . Good pres.
2294	SWC 94	D-1(2)	- recrystallized lst + <i>Orbulina universa</i> & <i>Globorotalia miozea conoidea</i> .
2299	SWC 129	E-2 (2)	- ? <i>Praeorbulina glomerosa</i> , <i>G. sicanus</i> , <i>G. trilobus</i> .
2325	SWC 91	D-1(1)	rare <i>Orbulina universa</i> , <i>Globorotalia miozea conoidea</i> , otherwise poor fauna.
2350	SWC 90	D-2 (0)	almost complete association.
2351	SWC 128	F (1)	<i>Globigerinoides ruber</i> & <i>G. trilobus</i> <u>without</u> <i>G. bisphericus</i> & <i>Praeorbulina/Orbulina</i> .
2352	SWC 127	F (0)	Good preservation diverse association with <i>Globigerinoides ruber</i> & <i>Catapsydras dissimilis</i> but <u>no</u> <i>G. bisphericus</i> or <i>Orbulina</i> . Presence of <i>C. dissimilis</i> definitely implies sample below <i>Orbulina Datum</i> (i.e. below Zone E-1).
2353	SWC 126	F (1)	with <i>Globigerinoides bisphericus</i> but low diversity and no globorotalids.
2354	SWC 125	F (1)	<i>ibid</i>
2355	SWC 124	F (2)	poor fauna with <i>G. ? bisphericus</i> & <i>Catapsydrax dissimilis</i> .
2356	SWC 123	F (1)	<i>Globigerinoides bisphericus</i> & <i>G. ruber</i> but poor globorotalids.
2357	SWC 122	F (1)	<i>ibid</i> + <i>Catapsydrax dissimilis</i> .
2358	SWC 121	G/F (2)	<i>C. dissimilis</i> , <i>C. unicavus</i> , <i>Globigerinoides ? ruber</i> ; <u>no</u> <i>G. bisphericus</i> .

SAMPLE DATA SHEETS

MICROPALEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1.

DATE: 5/2/1979.

PREPARED BY: DAVID TAYLOR.

SHEET NO. 5 of 6.

DRAW:

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<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
2359	SWC 120	<i>ibid</i>	
2360	SWC 62	G.F (2) poor fauna and preservation with <i>G. trilobus</i> but no other zonal indicators.	
2361	SWC 119	<i>ibid</i>	
2362	SWC 118	F (2) poor fauna & preservation with <i>G. ? ruber</i> & <i>Catapsydrax dissimilis</i> .	
2363	SWC 61	F (2) poor fauna & preservation with <i>G. ? bisphericus</i> .	
2365	SWC 116	G/F (2) poor fauna & preservation with <i>G. trilobus</i> & <i>C. dissimilis</i> . Thus definitely early Miocene (= pre Zone E-1).	
2366	SWC 88	D-2 (1) <i>Orbulina universa</i> , <i>Globigerinoides trilobus</i> , <i>G. bisphericus</i> , <i>Globorotalia miozea conoidea</i> etc.	
2367	SWC 115	F (1) <i>G. bisphericus</i> & <i>G. ? ruber</i> , poor preservation.	
2368	SWC 60	F/D-2 (2) poor fauna & preservation <i>G. ruber</i> <u>no</u> <i>G. bisphericus</i> , <i>Praeorbulina/Orbulina</i> .	
2369	SWC 114	<i>ibid</i>	
2370	SWC 59	high F(0) <i>Globigerinoides bisphericus</i> , <i>G. ruber</i> , <i>G. trilobus</i> , <i>Catapsydrax dissimilis</i> , <i>Globorotalia miozea/praescitula</i> group.	
2371	SWC 87	D-2 (0) Small sample but diverse association including <i>Orbulina universa</i> , <i>Globigerinoides bisphericus</i> , <i>G. ruber</i> , <i>G. trilobus</i> , <i>Globorotalia miozea miozea</i> , <i>G. miozea conoidea</i> , <i>G. panda</i> , <i>G. peripheroronda</i> , <i>G. conia</i> .	
2372	SWC 58	E-2(1) Preservation poor. ? <i>Praeorbulina glomerosa</i> (indet morphotype), <i>Globigerinoides ? bisphericus</i> , <i>G. ruber</i> , <i>G. trilobus</i> , <i>Globoquadrina dehiscens</i> (S.S.) <i>G. altispira</i> and on presence of <i>Catapsydrax dissimilis</i> and absence of <i>Orbulina</i> assumed to be early Miocene (i.e. pre. E-1).	
2373	SWC 113	F (1) <i>Globigerinoides ? bisphericus</i> , <i>G. ruber</i> , <i>Globoquadrina dehiscens</i> (S.S.), <i>Catapsydrax dissimilis</i> , <i>Globorotalia continua</i> . Definitely early Miocene.	

SAMPLE DATA SHEETS

MICROPALAEONTOLOGICAL MATERIAL

WELL NAME AND NO. HALIBUT WEST # 1.

DATE: 8/3/1979.

PREPARED BY: DAVID TAYLOR.

SHEET NO. 6 of 6.

DRAW:

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<u>DEPTH</u>	<u>SAMPLE TYPE</u>	<u>SLIDE</u>	<u>ADDITIONAL INFORMATION</u>
2374	SWC 57	Indet - iron stained recrystallized 1st. with py. Indet "ghosts" of planks. Could be below "Cobia unconformity", thus J or older.	
2375	SWC 85	D-2 (0) Excellent preservation <i>Orbulina universa</i> abundant with <i>G. bisphericus</i> , <i>G. ruber</i> , <i>G. trilobus</i> , <i>Globorotalia</i> diverse including <i>G. miozea miozea</i> , <i>G. miozea conoidea</i> , <i>G. menardii</i> group, <i>G.</i> <i>peripheroronda</i> , <i>G. praescitula</i> , <i>G. obesa</i> , <i>G. mayeri</i> , <i>G. conica</i> .	
2376	SWC 55	N.F.F. f. qtz. sand.	
2376	SWC 56	D-2(0) as for 2375 (SWC 85)	
2377.5	SWC 84	D-2(0) <i>ibid</i>	
2385	SWC 82	D-2 (0) as for 2377.5 (SWC 56) and 2375 (SWC 85).	

ABBREVIATION KEY used by David Taylor on summary  
date sheets.

R.C.	= rotary cuttings
S.W.C.	= side wall core
C.C.	= conventional core
U.C.	= unable to clean sample of drilling mud before washing, thus result may be spurious.
N.F.F.	= no fauna found
indet	= specifically indeterminate and/or biostratigraphically non diagnostic
J-2 (0)	= Zone J-2 planktonic fauna present and identification is of highest level of confidence.
B-1 (4)	= Zone B-1 suspected but lowest confidence indicated
Dom	= Dominant grain type - at least 90% of washed sample
r	= rare - less than 10 grains
60-40	= proportion of components
qtz	= quartz
py	= pyrite
glauc	= glauconite
lim	= limonite
sdst	= sandstone
siltst	= siltstone
mdst	= mudstone
calc sh	= calcareous shale
lst	= limestone
mic	= micritic limestone
calcar	= calcarenite
bio	= biogenic
bry	= bryozoa
moll	= molluscan fragments
plank	= planktonic foraminifera
calc benth	= calcareous benthonic foraminifera
aren	= arenaceous foraminifera
ost	= ostracods
spic	= siliceous sponge spicules
ech	= echnioid spines

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f	= fine grade
m	= medium grade
c	= coarse grade
f-c	= whole spectrum of grades
ang	= angular shape
subrd	= subround shape
rd	= round shape
ibid	= sample identical to that listed immediately above.