

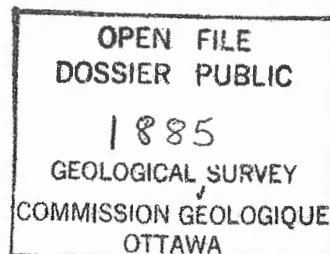
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PALYNOLOGICAL BIOSTRATIGRAPHY OF THE
INTERVAL 935-4625M,
WHITEROSE N-22, GRAND BANKS

REPORT NO. 87-0066
MARCH 1988

CALGARY, ALBERTA



BIOSTRATIGRAPHIC SUMMARY: WHITEROSE N-99

- 935-1155m Areosphaeridium arcuatum Zone (early Oligocene)
- 1175-1605m Diphyes colligerum Zone (late Eocene)
- 1625-1815m Adnatosphaeridium reticulense Zone (middle Eocene)
- 1835-1905m possible Areoligera senonensis Zone (possible early
Eocene)
- 1925-2325m Areoligera senonensis Zone: Subzone A (early Eocene)
- 2345-2355m possible Odontochitina operculata Zone (possible
Campanian)
- 2405-2415m possible Chichaouadinium #EA Zone (possible Albian)
- 2435-2445m Parvisaccites amplius Zone (Aptian)
- 2465-2715m Subtilisphaera terrula Zone (early Hauterivian to
Barremian undifferentiated)
- 2735-2775m Muderongia staurota Zone (late Valanginian to early
Hauterivian)
- 2825-2895m Pseudoceratium pelliferum Zone: Subzone 7C (middle
Valanginian)
- 2915-2925m Pseudoceratium pelliferum Zone: possible Subzone 7B
(early Valanginian)

- 2945-3135m Pseudoceratium pelliferum Zone: Subzone 7A (early Valanginian)
- 3155-3195m Ctenidodinium panneum Zone: Subzone 5B (early Berriasian)
- 3215-3225m Ctenidodinium panneum Zone: Subzone 5A (Portlandian to early Berriasian)
- 3245-3580m Subtilisphaera paeminosa Zone: Subzone 3C (late Kimmeridgian)
- 3575-3885m Subtilisphaera paeminosa Zone: Subzone 3B (late Kimmeridgian) -
- 3905-3945m Pilosisorites sp. A Zone: Subzone 2C (middle Kimmeridgian)
- 3965-4095m Pilosisorites sp. A Zone: Subzone 2B (early to middle Kimmeridgian)
- 4115-4245m Pilosisorites sp. A Zone: Subzone 2A (early Kimmeridgian)
- 4265-4625m Gonyaulacysta jurassica Zone (late Oxfordian)

SELECTED PALYNOMORPHS

Listings show highest occurrences unless otherwise specified.

(+) indicates marker species.

935-1155m: Areosphaeridium arcuatum Zone (early Oligocene)

- 935-945m Caryapollenites simplex
 Corylus #LA
 Gochtodinium simplex cf. (+)
 Lingulodinium machaerophorum
 Lycopodiumsporites annotinioides
 Osmundacites claytonites-
 Spiniferites ramosus
 Systematophora ancyrea
 Tsugaepolleniyes igniculus
 Wetzeliella sp. indet. (+)
- 965-975m Areosphaeridium arcuatum (large form) (+)
 Chiropteridium mespilanum
 Cribroperidinium giuseppeii
 Dapsilidinium pastielsii
 Deflandrea phosphoritica
 Membranophoridium aspinatum
 Micrhystridium fragile
 Quercoidites #LA
 Rouseisporites #LA
 Selaginellaites selaginoides
 Spiniferites pseudofurcatus
 Tectatodinium pellitum
 Tiliaepo lenites vespites
- 1025-1035m Hystriochokolpoma rigaudiae

Spiniferites crassipellis

1055-1065m Cordosphaeridium cantharellum

1085-1095m Dapsilidinium simplex
Deflandrea heterophlycta
Operculodinium centrocarpum
Pentadinium laticinctum granulatum
Reticulatosphaera actinocoronata

1115-1125m Kisselovia coleothrypta (+)
Paralecaniella indentata
Phthanoperidinium comatum

1145-1155m Camerozonosporites #LA
Dinopterygium cladoides
Pentadinium laticinctum laticinctum

1175-1605m: Diphyes colligerum Zone (late Eocene)

1175-1185m Areoligera undulata (+)
Chiropteridium #LS
Glaphyrocysta semitecta (Questionably present)
Glaphyrocysta sp. indet..
Heteraulacacysta porosa
Wetzeliella articulata

1265-1275m Areosphaeridium diktyoplokus (+)
(Questionably present)
Deflandrea eocenica (+)
Palaeocystodinium golzowense
Phthanoperidinium levimurum (+)

1295-1305m Glaphyrocysta intricata (small form) (+)
 Phthanoperidinium comatum
 Phthanoperidinium echinatum

1325-1335m Areoligera sentosa (Questionably present)
 Cordosphaeridium gracile (+)
 Spiniferites ramosus granosus
 Systematophora placacantha

1475-1485m Glaphyrocysta spineta (+)

1565-1575m Areosphaeridium arcuatum-(small form)

1625-1815m: Admatosphaeridium reticulense Zone (middle Eocene)

1625-1635m Dracodinium solidum (Questionably present)
 Glaphyrocysta #LH (+)
 Glaphyrocysta laciniiforme
 Phthanoperidinium alectrolophum

1685-1695m Achomosphaera alcicornu
 Hystriochokolpoma salacium
 Hystriochosphaeridium patulum
 Nyssapollenites krutzschii

1715-1725m Areoligera senonensis (Questionably present)
 Cicatricosisporites dorogensis
 Phthanoperidinium #LG

1745-1755m Concentricystis #LA
 Impagidinium californiense

1775-1785m Rhombodinium draco
 Thalassiphora pelagica

1835-1905m: possible Areoligera senonensis Zone (possible early Eocene)

1835-1845m Apectodinium homomorphum (+)
 Cribroperidinium giuseppi var.A
 Deflandrea #LR
 Eocladopyxis peniculatum
 Glaphyrocysta #LA
 Homotryblum pallidum
 Impletosphaeridium scalenfurcatum
 Pluricellaesporites spp.
 Thalassiphora patula
 Wetzeliella symmetrica

1865-1875m Areosphaeridium multicornutum (small)
 Cordosphaeridium inodes inodes
 Cordosphaeridium tiara (+)
 Impletosphaeridium scalenfurcatum (Abundant)
 Polysphaeridium subtile
 Wetzeliella ovalis

1895-1905m Achomosphaera #LF (+)
 Apectodinium hyperacanthum (+)
 Lentinia wetzelii

1925-2325m: Areoligera senonensis Zone (early Eocene)

1925-1935m	<u>Camarozonosporites</u> #LB <u>Wetzeliella meckelfeldensis</u> (+)
1955-1965m	<u>Araneosphaera araneosa</u> <u>Areoligera senonensis</u> (+) <u>Heteraulacacysta leptalea</u>
1985-1995m	<u>Azolla</u> spp.
2015-2025m	<u>Microfoveolatisporis</u> #LA <u>Systematophora</u> #LE (+) -
2045-2055m	<u>Distatodinium ellipticum</u> <u>Isabelidinium</u> #LP (+)
2075-2085m	<u>Areoligera tauloma</u> <u>Glaphyrocysta exuberans</u> <u>Systematophora</u> #LC (+)
2105-2115m	<u>Adnatosphaeridium multispinosum</u> <u>Cicatricosisporites paradorogensis</u> <u>Spiniferites monilis</u>
2135-2145m	<u>Hystrichokolpoma unispinum</u>
2165-2175m	<u>Hafniasphaera septata</u>

2225-2235m Areosphaeridium diktyoplokus

2255-2265m Adnatosphaeridium robustum
Dracodinium condylos (+)
Dracodinium solidum (+)

2285-2295m Cordosphaeridium inodes longipes (+)
Rottnestia borussica

2345-2385m: possible Odontochitina operculata Zone (possible Campanian)

2345-2355m Adnatosphaeridium vittatum
Areoligera senonensis (Abundant)
Ceratiopsis diebelii (Questionably present)
Ceratiopsis speciosa glabra
Cordosphaeridium multispinosum
Odontochitina operculata (+)

2375-2385m Chatangiella tripartita (+)
Chichaouadinium vestitum (Possibly reworked)
Oligosphaeridium complex
Palaeocystodinium lidiae
Palaeoperidinium pyrophorum
Pervosphaeridium pseudhystrichodinium
Spinidinium densispinatum ()

2405-2415m: possible Chichaouadinium #EA Zone (possible Albian)

2405-2415m Cicatricosisporites delicatus (+)
Gonyaulacysta cassidata (+)
(Questionably present)

Leiotriletes mecklenburgensis2435-2445m: Parvisaccites amplus Zone (Aptian)

Comment: Cicatricosisporites #EAJ may indicate a Valanginian age if not reworked.

2435-2445m Cicatricosisporites #EAJ (?Reworked)
 Corollina torosa
 Densoisporites microrugulatus
 Densoisporites perinatus
 Parvisaccites amplus (+)
 Platysaccus megasaccus (+)
 Spongodinium solidum (+)
 Striatella sp. indet.
 foraminiferal liners

2465-2715m: Subtilisphaera terrula Zone (early Hauterivian to Barremian undifferentiated)

Comment: Considerable pre-Valanginian reworking is evident in this interval.

2465-2475m Cicatricosisporites (28 CICATR DG) (?Reworked)
 Cicatricosisporites hughesii
 Cicatricosisporites mohrioides
 Parvisaccites radiatus
 Scortea tecta (+)
 Striatella #EF (?Reworked)

2495-2505m Auritulinaspores deltaformis (?Reworked)
 Callialasporites monoalasporeus (+)

2735-2745m Achomosphaera neptunii (+)
Aequitriradites spinulosus
Costatoperforosporites #EC (?Reworked)
Cribroperidinium sepimentum
Gonyaulacysta diutina

2765-2775m Cicatricosisporites nankingensis
Cicatricosisporites venustus
Muderongia staurota
Occisucysta #EX
Occisucysta sp. A, Bujak and Wills. 1978

2825-2895m: Pseudoceratium pelliiferum Zone: Subzone 7C (middle Valanginian)

2825-2835m Cassiculosphaeridia magna
Gonyaulacysta fastigiata
Heslertonella heslertonense
Meiourogonaulax stoveri
Muderongia simplex
Pseudoceratium pelliiferum (+)
Systematophora complicata

2855-2865m Kleithriasphaeridium sp. A (+)
Spongodinium solidum

2885-2895m Kleithriasphaeridium fasciatum

2915-2925m: Pseudoceratium pelliiferum Zone: possibly Subzone 7B (early Valanginian)

2915-2925m Apotea anaphrissa
Callialasporites infrapunctatus (+)

Cicatricosisporites abacus
Cicatricosisporites purbeckensis
Cribroperidinium granuligerum
Densoisporites triradiatus cf.
Gardodinium eisenackii
Sentusidinium cuculliforme
(Questionably present)
Vitreisporites minor

3155-3195m: Ctenidodinium panneum Zone: Subzone 5B (early Berriasian)

3155-3165m Alisporites thomasii
 Muderongia sp. A, Davey 1978 (+)
 Plicatella #EQ
 Podocarpidites tricocca

3185-3195m Impardecispora apigranulosa

3215-3225m: Ctenidodinium panneum Zone: Subzone 5A (Portlandian to early Berriasian)

3215-3225m Araucariacites punctatus
 Concavissimisporites multituberculatus (+)
 Cribroperidinium ehrenbergii (+)
 Cribroperidinium globosum
 Imbatodinium pomum
 Lanterna sportula (+)
 Phoberocysta neocomica pteridia
 Sentusidinium cuculliforme

3245-3580m: Subtilisphaera paeminosa Zone: Subzone 3c (late Kimmeridgian)

- 3245-3255m Ctenidodinium schizoblatum (+)
 Pityosporites dividuus
- 3275-3285m Endoscrinium pharo (+)
 Meiourogonyaulax deflandrei (+)
 Muderongia #EA (+)
 Senoniasphaera jurassica (+)
- 3305-3315m Corollina echinata (+)
 Ctenidodinium culmulum (+)
- 3335-3345m Kraeuselisporites #EA
- 3365-3375m Hystrichodinium lanceatum
- 3378.5m Core Cicatricosisporites undatus
 Rubinella major
- 3391.5m Core Araucariacites punctatus (Common)
 Corollina vignollensis (Common)
- 3395-3405m Breodoxiella #EB (+)
 Cicatricosisporites #EY (+)
 Cribroperidinium #EZ (+)
 Tuberositriletes #EZ
- 3425-3435m Corollina chateauvovii

3455-3465m Cleistosphaeridium ehrenbergii
Glossodinium dimorphum
Leptodinium amabile
Meiourugonyaulax #ELD
Systematophora #EA (Questionably present)
Systematophora fasciculigera

3545-3555m Amphorula metaelliptica

Comment: Possible Early Cretaceous contaminants with the presence of P. pelliferum.

3570.30m Core Corollina vignollensis (Abundant)
Pseudoceratium pelliferum

3575-3885m: Subtilisphaera paeminosa Zone: Subzone 3B (late Kimmeridgian)

3575-3585m Cicatricosporites #EO
Muderongia #EG
Muderongia sp. A, Davey 1978 (Common)
Systematophora #EA
Systematophora #EDD
Systematophora areolata
Trilobosporites tuberculiformis

3605-3615m Occisucysta aculeata (+)
Podocarpidites herbstii
Tuberositriletes montuosus
Varirugosisporites #EK

3635-3645m Aequitriradites subverrucosus

3665-3675m Foraminisporis paucispinosa

3725-3735m Striatella #EE

3755-3765m Ctenidodinium panneum

3785-3795m Leptodinium aceras

3845-3855m Callialasporites obrutus
Epiplosphaera reticulospinosa
Leptodinium sp. G
Spheripollenites scabratus
Subtilisphaera inaffecta

3875-3885m Endoscrinium galeritum
Scrinocassis dictyota

3905-3945m: Pilosporites sp. A Zone: Subzone 2C (middle Kim-meridgian)

3905-3915m Exesipollenites scabratus (+)
Occisucysta balios (+)
Sentusidinium erythrocomum

3935-3945m Ctenidodinium #ER (+)
Epiplosphaera reticulospinosa
Exesiporites scabratus
Muderongia #ED
Muderongia sp. A, Davey 1978 (Common)
Tubotuberella irregularis

3965-3975m Amphorula #ED (+)
 Cedripites #EA
 Imbatodinium kondratjevii (+)
 Oligosphaeridium pulcherrimum cf. (+)

3995-4005m Cantulodinium #EA (+)
 Saxosporis variabilis (+)

4025-4035m *Apoteodinium nuciiforme*

Comment: Possibly Subzone 2A

4085-4095m Ctenidodinium chondrum (Questionably present)

4115-4245m: *Pilososporites* sp. A: Subzone 2A (early Kimmeridgian)

Comment: Increased thermal maturation inhibits positive identifications.

4115-4125m Ctenidodinium chondrum (+)

4145-4155m Inaperturopollenites #EA
 (Questionably present)
Sirmiodinium grossii (Questionably present)

4205-4215m Inaperturopollenites #EA
 Varirugosisporites granituberosus

4235-4245m Callialasporites crassilexinus

4265-4625m: Gonyaulacysta jurassica Zone (late Oxfordian)

Comment: High thermal maturation inhibits identifications throughout this interval.

4265-4275m Gonyaulacysta jurassica (+)

4315-4325m Diacanthum #EA

4345-4355m Atopodinium #EA
 Chasmatosporites #ER

4375-4385m Escharisphaeridia rudis

4495-4505m Acanthaulax senta (+) (Questionably present)
 Gonyaulacysta dualis (+)

APPENDIX AAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names	Index number	Taxon names
242	Acanthaulax senta	209	Cribrerodinium episomum
198	Acanthaulax sp. indet.	10	Cribrerodinium giuseppei
75	Achomosphaera #LF	61	Cribrerodinium giuseppei var.A
52	Achomosphaera allicornu	179	Cribrerodinium globosum
126	Achomosphaera neptunii	171	Cribrerodinium granuligerum
7	Achomosphaera ramulifera	127	Cribrerodinium sepimentum
90	Adnatosphaeridium multispinosum	109	Cribrerodinium sp. indet.
94	Adnatosphaeridium robustum	227	Ctenidodinium #ER
98	Adnatosphaeridium vittatum	234	Ctenidodinium chondrum
230	Amphorula #ED	193	Ctenidodinium culmulum
119	Amphorula metaelliptica	151	Ctenidodinium elegantulum
60	Apectodinium homomorphum	213	Ctenidodinium panneum
76	Apectodinium hyperacanthum	185	Ctenidodinium schizoblatum
148	Aptea anaphrissa	186	Ctenidodinium sp. indet.
183	Aptea polymorpha	116	Cyclonephelium attadalicum
195	Apteodinium granulatum	117	Cyclonephelium brevispinum
111	Apteodinium nuciforme	113	Cyclonephelium distinctum
81	Araneosphaera araneosa	123	Cyclonephelium vannophorum
55	Areoligera senonensis	210	Cymosphaeridium validum
41	Areoligera sentosa	11	Dapsilodinium pastielsii
87	Areoligera tauloma	19	Dapsilodinium simplex
29	Areoligera undulata	62	Deflandrea #LR
8	Areosphaeridium arcuatum (large form)	36	Deflandrea eocenica
46	Areosphaeridium arcuatum (small form)	20	Deflandrea heterophlycta
35	Areosphaeridium diktyoplopus	12	Deflandrea phosphoritica
70	Areosphaeridium multicornutum (small)	238	Diacanthum #EA
239	Atopodinium #EA	149	Dingodinium cerviculum
196	Breodoxiella #EB	219	Dingodinium jurassicum
212	Caddasphaera halosa	27	Dinopterygium cladoides
129	Canningia colliveri	83	Diphyes colligerum
130	Canningia ringnesiorum	85	Distatodinium ellipticum
233	Cantulodinium #EA	95	Dracodinium condylos
141	Cassiculosphaeridia magna	48	Dracodinium solidum
99	Ceratiopsis diebelii	220	Endoscrinium galeritum
100	Ceratiopsis speciosa glabra	188	Endoscrinium pharo
103	Chatangiella tripartita	63	Eocladopyxis peniculatum
104	Chichacuadinium vestitum	118	Epiplosphaera reticulospinosa
30	Chiropteridium #LS	240	Escharisphaeridia rudis
9	Chiropteridium mespilum	168	Exochosphaeridium bifidum
174	Chlamydothorella nyei	137	Exochosphaeridium scitulum
136	Cleistosphaeridium aciculare	114	Exochosphaeridium sp. indet.
164	Cleistosphaeridium ehrenbergii	122	Exochosphaeridium striolatum
112	Cleistosphaeridium sp. indet.	172	Gardodinium eisenackii
18	Cordosphaeridium cantharellum	64	Glaphyrocysta #LA
42	Cordosphaeridium gracile	49	Glaphyrocysta #LH ;
71	Cordosphaeridium inodes inodes	88	Glaphyrocysta exuberans
96	Cordosphaeridium inodes longipes	39	Glaphyrocysta intricata (small form)
101	Cordosphaeridium multispinosum	50	Glaphyrocysta laciniiforme
72	Cordosphaeridium tiara	31	Glaphyrocysta semitecta
197	Cribrerodinium #EZ	32	Glaphyrocysta sp. indet.
155	Cribrerodinium confusum	45	Glaphyrocysta spineta
178	Cribrerodinium ehrenbergii	200	Glossodinium dimorphum

APPENDIX A cont'dAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Index number	Taxon names	Index number	Taxon names
191	Muderongia #EA	77	Gochtodinium simplex
228	Muderongia #ED	1	Gochtodinium simplex cf.
205	Muderongia #EG	110	Gonyaulacysta cassidata
142	Muderongia simplex	128	Gonyaulacysta diutina
175	Muderongia sp. A, Davey 1978	243	Gonyaulacysta dualis
131	Muderongia staurota	138	Gonyaulacysta fastigiata
211	Occisucysta aculeata	237	Gonyaulacysta jurassica
224	Occisucysta balios	214	Gonyaulacysta sp. indet.
152	Occisucysta distincta	93	Hafniasphaera septata
125	Occisucysta evittii	139	Heslertonia heslertonense
132	Occisucysta sp. A, Bujak and Wills. 1978	82	Heteraulacacysta leptalea
176	Occisucysta sp. indet.	33	Heteraulacacysta porosa
130	Occisucysta sp. X	65	Homotryblium pallidum
162	Occisucysta tentoria	187	Hystrichodinium furcatum
102	Odontochitina operculata	194	Hystrichodinium lanceatum
157	Oligosphaeridium asterigerum	189	Hystrichodinium voigtii
105	Oligosphaeridium complex	165	Hystrichogonyaulax cladophora
153	Oligosphaeridium dividuum	16	Hystrichokolpoma rigaudiae
134	Oligosphaeridium pulcherrimum	53	Hystrichokolpoma salacium
232	Oligosphaeridium pulcherrimum cf.	92	Hystrichokolpoma unispinum
158	Oligosphaeridium sp. indet.	124	Hystrichosphaeridium difficile
21	Operculodinium centrocarpum	54	Hystrichosphaeridium patulum
37	Palaeocystodinium golzowense	231	Imbatodinium kondratjevii
106	Palaeocystodinium lidiae	156	Imbatodinium micropodium
150	Palaeohystrichophora infusorioides	180	Imbatodinium pomum
107	Palaeoperidinium pyrophorum	57	Impagidinium californiense
221	Paragonyaulacysta borealis	66	Impletosphaeridium scalenfurcatum
159	Pareodinia ceratophora	199	Impletosphaeridium whitei
241	Pareodinia sp. C	86	Isabelidinium #LP
22	Pentadinium laticinctum granulatum	78	Isabelidinium sp. indet.
28	Pentadinium laticinctum laticinctum	24	Kisselovia coleothrypta
108	Pervosphaeridium pseudhystrichodinium	161	Kleithriasphaeridium corrugatum
170	Phoberocysta neocomica cruciformis	147	Kleithriasphaeridium fasciatum
206	Phoberocysta neocomica neocomica	145	Kleithriasphaeridium loffreense
182	Phoberocysta neocomica pteridia	146	Kleithriasphaeridium sp. A
56	Phthanoperidinium #LG	216	Lanterna bulgarica
51	Phthanoperidinium alectrolophum	181	Lanterna sportula
26	Phthanoperidinium comatum	25	Lentinia serrata
40	Phthanoperidinium echinatum	79	Lentinia wetzelii
38	Phthanoperidinium levimurum	215	Leptodinium aceras
73	Polysphaeridium subtile	201	Leptodinium amabile
143	Pseudoceratium peldiferum	217	Leptodinium sp. G, Gitmez & Sarjant 72
23	Reticulatosphaera actinocoronata	235	Leptodinium spp.
58	Rhombodinium draco	2	Lingulodinium machaerophorum
97	Rottneusia borussica	120	Luxadinium #EA
222	Scrinioecassis dictyota	202	Meiourogonyaulax #ELD
225	Scriniodinium crystallinum	190	Meiourogonyaulax deflandrei
192	Senoniasphaera jurassica	169	Meiourogonyaulax pertusa
173	Sentusidinium cuculliforme	184	Meiourogonyaulax spp.
226	Sentusidinium erythrocomum	140	Meiourogonyaulax stoveri
166	Sentusidinium rioultii	13	Membranophoridium aspinatum
223	Sentusidinium sp. indet.	121	Micrhystridium stellatum

APPENDIX A cont'dAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Index number	Taxon names
167	Silicisphaera sp. indet.
236	Sirmiodinium grossii
17	Spiniferites crassipellis
163	Spiniferites dentatus
67	Spiniferites membranaceus
91	Spiniferites monilis
135	Spiniferites nodosus
14	Spiniferites pseudofurcatus
3	Spiniferites ramosus
43	Spiniferites ramosus granosus
115	Spongodinium solidum
218	Subtilisphaera inaffecta
177	Subtilisphaera terrula
160	Surculosphaeridium sp. III
203	Systematophora #EA
207	Systematophora #EDD : low process-groups
89	Systematophora #LC
84	Systematophora #LE
4	Systematophora ancyrea
208	Systematophora areolata
144	Systematophora complicata
204	Systematophora fasciculigera
44	Systematophora placacantha
154	Systematophora schindewolfii
47	Systematophora sp. indet.
6	Taeniophora #ED
15	Tectatodinium pellitum
68	Thalassiphora patula
59	Thalassiphora pelagica
229	Tubotuberella irregularis
34	Wetzeliella articulata
80	Wetzeliella meckelfeldensis
74	Wetzeliella ovalis
5	Wetzeliella sp. indet.
69	Wetzeliella symmetrica

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Pollen and Spores

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names	Index number	Taxon names
87	<i>Abiespollenites microreticulatus</i>	119	<i>Cicatricosisporites notabilis</i>
32	<i>Acanthotriletes variespinosus</i>	25	<i>Cicatricosisporites paradorogensis</i>
135	<i>Aequitriradites</i> sp. indet.	98	<i>Cicatricosisporites purbeckensis</i>
76	<i>Aequitriradites spinulosus</i>	114	<i>Cicatricosisporites reticatricosus</i>
148	<i>Aequitriradites subverrucosus</i>	27	<i>Cicatricosisporites</i> sp. indet.
159	<i>Alisporites</i> #EG	122	<i>Cicatricosisporites undatus</i>
28	<i>Alisporites bilateralis</i>	82	<i>Cicatricosisporites venustus</i>
33	<i>Alisporites grandis</i>	111	<i>Concavissimisporites multituberculatus</i>
103	<i>Alisporites thomasi</i>	130	<i>Concavissimisporites variverrucatus</i>
16	<i>Alnipollenites verus</i>	125	<i>Concavissimisporites verrucatus</i>
34	<i>Araucariacites australis</i>	168	<i>Contignisporites cooksoniae</i>
96	<i>Araucariacites punctatus</i>	139	<i>Coptospora williamsii</i>
52	<i>Auritulinasporites deltaformis</i>	128	<i>Corollina chateaunovii</i>
23	<i>Azolla</i> sp. indet.	120	<i>Corollina echinata</i>
127	<i>Baculatisporites comaumensis</i>	55	<i>Corollina itunensis</i>
172	<i>Callialasporites crassixinus</i>	150	<i>Corollina mertonii</i>
65	<i>Callialasporites dampieri</i>	37	<i>Corollina torosa</i>
88	<i>Callialasporites infrapunctatus</i>	83	<i>Corollina vignollensis</i>
53	<i>Callialasporites monoaleporus</i>	91	<i>Coronatipora valdensis</i>
160	<i>Callialasporites obrutus</i>	2	<i>Corylus</i> #LA
110	<i>Callialasporites trilobatus</i>	77	<i>Costatoperforosporites</i> #EC
93	<i>Callialasporites turbatus</i>	89	<i>Costatoperforosporites</i> #ECH
17	<i>Camerozonosporites</i> #LA	26	<i>Cyathidites australis</i>
22	<i>Camerozonosporites</i> #LB :	3	<i>Cyathidites</i> sp. indet.
1	<i>Caryapollenites simplex</i>	38	<i>Deltoidospora hallii</i>
165	<i>Cedripites</i> #EA	39	<i>Densoisporites microrugulatus</i>
35	<i>Cedripites canadensis</i>	40	<i>Densoisporites perinatus</i>
67	<i>Cedripites cretaceus</i>	99	<i>Densoisporites triradiatus</i> cf.
54	<i>Cerebropollenites macroverrucosus</i>	62	<i>Distaltriangulisporites irregularis</i>
56	<i>Cerebropollenites macroverrucosus</i> cf.	157	<i>Distaltriangulisporites perplexus</i>
60	<i>Cerebropollenites mesozoicus</i>	151	<i>Ephedripites</i> sp. indet.
173	<i>Chasmatosporites</i> #ER	163	<i>Exesipollenites scabratus</i>
36	<i>Cicatricosisporites</i> #EAJ	63	<i>Exesipollenites tumulus</i>
72	<i>Cicatricosisporites</i> #EAL cf.	164	<i>Exesiporites scabratus</i>
78	<i>Cicatricosisporites</i> #ECE	140	<i>Foraminisporia dailyi</i>
79	<i>Cicatricosisporites</i> #EM	152	<i>Foraminisporia paucispinosa</i>
138	<i>Cicatricosisporites</i> #EO	153	<i>Foraminisporia wonthaggiensis</i>
80	<i>Cicatricosisporites</i> #EQ	118	<i>Foveosporites foveoreticulatus</i>
124	<i>Cicatricosisporites</i> #EY	84	<i>Foveotrilites subtriangularis</i>
46	<i>Cicatricosisporites</i> (28 CICATR DG)	133	<i>Gleicheneidites minor</i>
97	<i>Cicatricosisporites abacus</i>	68	<i>Gleicheneidites senonicus</i>
74	<i>Cicatricosisporites australiensis</i>	106	<i>Impardecispora apigranulosa</i>
29	<i>Cicatricosisporites delicatus</i>	170	<i>Inaperturopollenites</i> #EA
21	<i>Cicatricosisporites dorogensis</i>	112	<i>Inaperturopollenites dettmannii</i>
61	<i>Cicatricosisporites exilioides</i>	41	<i>Inaperturopollenites granulatus</i>
155	<i>Cicatricosisporites hannoverana</i>	94	<i>Klukisporites areolatus</i>
136	<i>Cicatricosisporites hannoverana</i> aff.	92	<i>Klukisporites foveolatus</i>
47	<i>Cicatricosisporites hughesii</i>	57	<i>Klukisporites pseudoreticulatus</i>
137	<i>Cicatricosisporites magnus</i>	115	<i>Klukisporites variegatus</i>
75	<i>Cicatricosisporites minor</i>	90	<i>Kraeuselisporites</i> #EA
48	<i>Cicatricosisporites mohrioides</i>	149	<i>Laevigatosporites mesozoicus</i>
81	<i>Cicatricosisporites nankingensis</i>	4	<i>Laevigatosporites ovatus</i>

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Pollen and Spores

Index number	Taxon names	Index number	Taxon names
144	Leiotriletes equiexinus	45	Striatella sp. indet.
30	Leiotriletes mecklenburgensis	72	Taurocusporites reduncus
174	Leiotriletes sp. indet.	100	Taurocusporites segmentatus
143	Leptolepidites verrucatus	9	Taxodiaceapollenites hiatus
5	Lycopodiumsporites annotinioides	86	Tigrisporites scurrundus
58	Lycopodiumsporites austroclavitudites	15	Tiliaepollenites vespites
64	Matonisporites equiexinus	141	Trilobosporites tuberculiformis
134	Matonisporites phleboteroides	10	Tsugaepollenites igniculus
154	megaspore indet.	59	Tuberositriletes #EK
24	Microfoveolatisporis #LA	126	Tuberositriletes #EZ
20	Nyssapollenites krutzschii	158	Tuberositriletes major
42	Osmundacidites wellmannii	146	Tuberositriletes montuosus
6	Osmundacites claytonites	147	Varirugosisporites #EK
31	Parvisaccites #EA	171	Varirugosisporites granituberosus
43	Parvisaccites amplius	129	Varirugosisporites spp.
49	Parvisaccites radiatus	101	Verrucosporites #EA
85	Perinopollenites elatoides	102	Vitreisporites minor
7	Piceapollenites spp.	142	Vitreisporites pallidus
95	Pilosisorites crassangularis		
116	Pilosisorites ericus		
131	Pilosisorites trichopapillosus		
8	Pinuspollenites spp.		
70	Pityosporites #EA		
117	Pityosporites dividius		
44	Platysaccus megasaccus		
161	Platysaccus monosaccus		
104	Plicatella #EQ		
107	Plicatella #ES		
66	Plicatella distocarinata		
108	Plicatella jansonius		
69	Plicatella problematica		
71	Plicatella sp. indet.		
113	Plicatella tricornitata		
166	Podocarpidites canadensis		
109	Podocarpidites epistriatus		
132	Podocarpidites granulosus		
145	Podocarpidites herbstii		
121	Podocarpidites potomacensis		
105	Podocarpidites tricocca		
169	Polycingulatisporites segmentatus		
18	Pterocaryapollenites stellatus		
11	Quercoidites #LA		
19	Quercoidites #LG		
12	Rouseisporites #LA		
123	Rubinella major		
167	Saxosporis variabilis		
50	Scortea tecta		
13	Selaginellaites selaginoides		
162	Spheripollenites scabratus		
14	Stereisporites antiquasporites		
156	Striatella #EE		
51	Striatella #EF		

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Algae and Miscellaneous

Taxa location index
Index numbers are the columns in which the taxon appears

Index number	Taxon names
3	Concentricystis #LA
11	extruded hydrocarbons
7	foraminiferal liners
1	Microhystridium fragile
6	Microthallites sp. indet.
8	Palmbages sp. indet.
2	Paralecaniella indentata
4	Pectastrum boryanum
5	Pluricellaesporites sp. indet.
10	Pterospermella helios
9	Schizocystia laevigata
12	Schizosporis parvus

Reworked Palynomorphs

Taxa location index
Index numbers are the columns in which the taxon appears

Index number	Taxon names
1	*Acuilapollenites spp.
13	*Cerebropollenites macroverrucosus
2	*Chatangiella spp.
3	*Cicatricosisporites spp.
12	*Cyclonephelium distinctum
18	*Densosporites perinatus
6	*Densosporites spp.
10	*Diconodinium spp.
7	*Distaltriangulisporites perplexus
17	*Isabelidinium magnum
4	*Isabelidinium spp.
16	*Lycopodiumsporites austroclavitudites
19	*Mucronia asymmetrica
9	*Odontochitina spp.
5	*Oligosphaeridium spp.
15	*Palaeoperidinium pyrophorum
8	*Spinidinium vestitum
11	*Striatoabietites spp.
14	*Systematophora turonica

APPENDIX BExamined Samples: Whiterose N-22

935.00 : cuttings	2915.00 : cuttings
965.00 : cuttings	2945.00 : cuttings
995.00 : cuttings	2975.00 : cuttings
1025.00 : cuttings	3005.00 : cuttings
1055.00 : cuttings	3035.00 : cuttings
1085.00 : cuttings	3065.00 : cuttings
1115.00 : cuttings	3095.00 : cuttings
1145.00 : cuttings	3125.00 : cuttings
1175.00 : cuttings	3155.00 : cuttings
1205.00 : cuttings	3185.00 : cuttings
1235.00 : cuttings	3215.00 : cuttings
1265.00 : cuttings	3245.00 : cuttings
1295.00 : cuttings	3275.00 : cuttings
1325.00 : cuttings	3305.00 : cuttings
1355.00 : cuttings	3335.00 : cuttings
1385.00 : cuttings	3365.00 : cuttings
1415.00 : cuttings	3378.50 : core
1445.00 : cuttings	3391.50 : core
1475.00 : cuttings	3395.00 : cuttings
1505.00 : cuttings	3425.00 : cuttings
1535.00 : cuttings	3455.00 : cuttings
1565.00 : cuttings	3485.00 : cuttings
1595.00 : cuttings	3515.00 : cuttings
1625.00 : cuttings	3545.00 : cuttings
1655.00 : cuttings	3565.10 : core
1685.00 : cuttings	3570.30 : core
1715.00 : cuttings	3575.00 : cuttings
1745.00 : cuttings	3579.62 : core
1775.00 : cuttings	3605.00 : cuttings
1805.00 : cuttings	3635.00 : cuttings
1835.00 : cuttings	3665.00 : cuttings
1865.00 : cuttings	3695.00 : cuttings
1895.00 : cuttings	3725.00 : cuttings
1925.00 : cuttings	3755.00 : cuttings
1955.00 : cuttings	3785.00 : cuttings
1985.00 : cuttings	3815.00 : cuttings
2015.00 : cuttings	3845.00 : cuttings
2045.00 : cuttings	3875.00 : cuttings
2075.00 : cuttings	3905.00 : cuttings
2105.00 : cuttings	3935.00 : cuttings
2135.00 : cuttings	3965.00 : cuttings
2165.00 : cuttings	3995.00 : cuttings
2195.00 : cuttings	4025.00 : cuttings
2225.00 : cuttings	4055.00 : cuttings
2255.00 : cuttings	4085.00 : cuttings
2285.00 : cuttings	4115.00 : cuttings
2315.00 : cuttings	4145.00 : cuttings
2345.00 : cuttings	4175.00 : cuttings
2375.00 : cuttings	4205.00 : cuttings
2405.00 : cuttings	4235.00 : cuttings
2435.00 : cuttings	4265.00 : cuttings
2465.00 : cuttings	4295.00 : cuttings
2495.00 : cuttings	4315.00 : cuttings
2525.00 : cuttings	4345.00 : cuttings
2555.00 : cuttings	4375.00 : cuttings
2585.00 : cuttings	4405.00 : cuttings
2615.00 : cuttings	4435.00 : cuttings
2645.00 : cuttings	4465.00 : cuttings
2675.00 : cuttings	4495.00 : cuttings
2705.00 : cuttings	4525.00 : cuttings
2735.00 : cuttings	4555.00 : cuttings
2765.00 : cuttings	4585.00 : cuttings
2825.00 : cuttings	4615.00 : cuttings
2855.00 : cuttings	
2885.00 : cuttings	