

G.S.C. O.F. 1865 PALYNOLOGICAL ANALYSIS OF THE INTERVAL 440-
5905M, SOUTH GRIFFIN J-13 WELL, SCOTIAN SHELF

This document was produced
by scanning the original publication.

Ce document est le produit d'une
numérisation par balayage
de la publication originale.

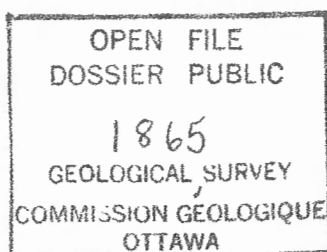
BUJAK DAVIES GROUP

PALYNOLOGICAL ANALYSIS OF THE
INTERVAL 440 5905m,
SOUTH GRIFFIN J-13 WELL, SCOTIAN SHELF

REPORT NO. 88-0008

March 1988

CALGARY, ALBERTA



BIOSTRATIGRAPHIC SUMMARY

440- 450m	<u>Cannosphaeropsis</u> sp. A Zone or older (late Miocene or older)
470- 480m	<u>Pentadinium laticinctum</u> Zone (middle Miocene)
500- 660m	<u>Apteodinium</u> sp. B Zone (early Miocene)
680- 720m	<u>Chiropteridium mespilanum</u> Zone (middle to late Oligocene)
740- 780m	<u>Deflandrea heterophlycta</u> Zone (early Oligocene)
800- 840m	<u>Diphyes colligerum</u> Zone (late Eocene)
860- 870m	<u>Adnatosphaeridium reticulense</u> Zone (middle Eocene)
890-1140m	<u>Areoligera senonensis</u> Zone (early Eocene)
1160-1230m	<u>Ceratiopsis speciosa</u> Zone (late Paleocene)
1250-1440m	<u>Palaeoperidinium pyrophorum</u> Zone (early Paleocene)
1460-1595m	<u>Dinogymnium euclaensis</u> Zone (Maastrichtian)
1615-1715m	<u>Odontochitina operculata</u> Zone (Campanian)
1735-1835m	<u>Oligosphaeridium pulcherrimum</u> Zone to <u>Pervosphaeridium truncigerum</u> Zone (Coniacian to Santonian)

1855-1865m	Possible <u>Surculosphaeridium longifurc. tum</u> Zone (possible Turonian)
1885-1895m	Possible <u>Kiokansium polypes</u> Zone (possible Cenomanian)
1915-2405m	<u>Chichaouadinium vestitum</u> Zone (Albian)
2425-2555m	Probable <u>Subtilisphaera perlucida</u> Zone (probable Aptian)
2575-2730m	<u>Subtilisphaera perlucida</u> Zone (Aptian)
2750-3030m	<u>Subtilisphaera perlucida</u> Zone: <u>Cyclonephelium</u> <u>attadalicum</u> Subzone (early Aptian)
3055-3335m	<u>Aptea anaphrissa</u> Zone (Barremian)
3355-3655m	<u>Ctenidodinium elegantulum</u> Zone (Hauterivian)
3675-4435m	Probable <u>Phoberocysta neocomica</u> Zone equivalent (probable Berriasian to Valanginian)
4455-4495m	<u>Ctenidodinium panneum</u> Zone (Portlandian)
4515-5455m	<u>Hystrihogonyaulax cladophora</u> Zone (Kimmeridgian)
5475-5485m	No zonal assignment (probable Oxfordian or older)
5505-5905m	No zonal assignment (undifferentiated Middle to Late Jurassic)

SELECTED PALYNOMORPHS

Listings show highest occurrences unless otherwise specified.

(+) indicates marker species.

440-450m: Cannosphaeropsis sp.A Zone or older (late Miocene or older)

440-450m Achomosphaera ramulifera
 Brigantedinium simplex
 Lingulodinium machaerophorum
 Operculodinium centrocarpum
 Sumatradinium hispidum (+)
 Tectatodinium pellitum
 Tsugaepollenites igniculus
 Tuberculodinium rossignoliae

470-480m: Pentadinium laticinctum Zone (middle Miocene)

470-480m Hemicystodinium #LA
 Hystrichosphaeridium parvum (+)
 Lejeunecysta hyalina
 Palaeocystodinium golzowense (+)
 Pentadinium laticinctum granulatum (+)
 Reticulatosphaera actinocoronata
 Spiniferites crassipellis
 Spiniferites pseudofurcatus
 Systematophora ancyrea

500-660m: Apteodinium sp.B Zone (early Miocene)

- 500-510m Distatodinium paradoxum (+)
 Filisphaera filifera
 Nematosphaeropsis lemniscata
 Thalassiphora delicata
- 530-540m Pentadinium laticinctum laticinctum
 Tuberculodinium vancampae
- 620-630m Cribroperidinium giuseppeii (+)
- 650-660m Hystriospheropsis ovum
 Multispinula quanta

680-720m: Chiropteridium mespilanum Zone (middle to late Oligocene)

- 680-690m Chiropteridium mespilanum (+)
 Paralecaniella indentata
 Tiliaepollenites vespites
- 710-720m Cordosphaeridium cantharellum
 Membranophoridium aspinatum (+)
 Selenopemphix nephroides

740-780m: Deflandrea heterophlycta Zone (early Oligocene)

- 740-750m Cyclonephelium sp. A, Will. & Brid. 1975 (+)

Apectodinium homomorphum (+) (Common)
Areoligera senonensis (+) (Common)
Areoligera undulata
Deflandrea oebisfeldensis (+)
Glaphyrocysta exuberans (+)
Hystriochokolpoma salacium
Lentinia serrata

1010-1020m Cordosphaeridium fibrospinosum
Cordosphaeridium inodes inodes
Diphyes colligerum
Operculodinium tiara (+)

1070-1080m Achomosphaera alcicornu
Turbiosphaera filosa (+)

1100-1110m Lentinia wetzelii

1130-1140m Areoligera senonensis (+) (Abundant)
Normapolles #LA

1160-1230m: Ceratiopsis speciosa Zone (late Paleocene)

1160-1170m Ceratiopsis speciosa glabra (+)

1190-1200m Rugubivesiculites rugosus (+)

1250-1440m: Palaeoperidinium pyrophorum Zone (early Paleocene)

- 1250-1260m Cordosphaeridium inodes longipes
 Palaeoperidinium pyrophorum (+)
 Spinidinium densispinatum
- 1280-1290m Ceratiopsis pannucea
 Palaeocystodinium australinum (+)
 Rouseisporites reticulatus (Possible reworked)
- 1310-1320m Oligosphaeridium complex (+)
 Pervosphaeridium pseudhystrichodinium (+)
- 1340-1350m Hystrichosphaeridium tubiferum
- 1370-1380m Phelodinium #LA
- 1430-1440m Ceratiopsis speciosa speciosa
- 1460-1595m: Dinogymnium euclaensis Zone (Maastrichtian)
- 1460-1470m Cyclonephelium distinctum brevispinum (+)
 Deflandrea denticulata
- 1525-1535m Isabelidinium #LA (+)
 Isabelidinium cretaceum (+)
- 1555-1565m Ceratiopsis diebelii

Cribroperidinium wetzelii (+)
Exochosphaeridium bifidum (+)
Isabelidinium cooksoniae (+)
Palaeocystodinium gabbonense

1615-1715m: Odontochitina operculata Zone (Campanian)

1615-1625m Cyclonephelium distinctum
 Xenascus ceratioides (+)

1645-1655m Odontochitina operculata (+)
 Tanyosphaeridium variecalamum

1675-1685m Membranophoridium sp. Wilson 1971

Comment: Early Campanian at 1705m based on P. infusorioides.

1705-1715m Palaeohystrichophora infusorioides (+)

1735-1835m: Oligosphaeridium pulcherrimum Zone to Pervosphaeridium truncigerum Zone (Coniacian to Santonian)

1735-1745m Odontochitina porifera (+) (Abundant)

1765-1775m Chatangiella tripartita
 Pterodinium cornutum

Comment: Coniacian at 1795m based on O. pulcherrimum.

1795-1805m Cribroperidinium orthoceras
Dorocysta litotes (+)
Oligosphaeridium pulcherrimum (+)
Silicisphaera ferox
Trichodinium castaneum

1825-1835m Isabelidium magnum (Common)
Odontochitina costata

1855-1865m: Possible Surculosphaeridium longifurcatum Zone
(possible Turonian)

1855-1865m Canningia colliveri
Endoscrinium campanulum
Senoniasphaera protrusa
Surculosphaeridium longifurcatum

1885-1895m: Possible Kiokansium polypes Zone (possible Cenoma-
nian)

1885-1895m Cerebropollenites #EC (+)
Vitreisporites pallidus

1915-2405m: Chichauoadinium vestitum Zone (Albian)

1915-1925m Abiespollenites microreticulatus
Acritosporites excavatus (+)
Afropollis jadinus (+)
Aratrisporites ocellatus (+)
Astrocysta #EA (+)
Chichauoadinium #EA (+)
Cicatricosisporites australiensis (+)

Cicatricosisporites cocononiensis
Cicatricosisporites delicatus (+)
Cleistosphaeridium huquontionii
Cyclonephelium eisenackii (+)
Epelidosphaeridia spinosa
Kiokansium polypes
Litosphaeridium siphoniphorum
Monosulcites scabratus
Oligosphaeridium totum totum (+)
Parvisaccites hortensis (+)
Plicatella erdtmannii
Senoniasphaera microreticulata (+)
Tricolpopollenites micromunus (+)

1945-1955m

Chichaouadinium vestitum (+)
Corniculatisporites auritus cf.
Cribooperidinium episomum
Cupuliferopollenites minutus (+)
Cyclonephelium attadalicum cf.
Cyclonephelium vannophorum
Epelidosphaeridia spinosa (Common)
Eucommiidites minor (+)
Liliacidites dividius (+)
Luxadinium propatulum
Oligosphaeridium totum minor (+)
Parvisaccites hortensis (Common)
Phyllocladites rugulatus
Plicatella bifurcata
Plicatella macrorhyza
Rugubivesiculites minimus (Common)

Comment: Probable middle Albian at 1975m as indicated by Pene-tetrapites mollis.

1975-1985m

Siretisporites potoniae (Common)
Cicatricosisporites annulatus
Clavatipollenites rotundus
Ischyosporites amoholkus

	<u>Oodnadattia tuberculata</u> <u>Penetetrapites mollis</u> (+) <u>Phyllocladites microreticulatus</u> <u>Plicatella problematica</u> <u>Retitricolpites vulgaris</u> <u>Senoniasphaera microreticulata</u> (Common)
2005-2015m	<u>Cedripites canadensis</u> (Dominant) <u>Cicatricosisporites</u> #EAM <u>Cicatricosisporites venustus</u> <u>Podocarpidites epistriatus</u> <u>Podocarpidites potomacensis</u> <u>Trilobosporites humilis</u> (+)
2035-2045m	<u>Aptea polymorpha</u> (+) <u>Ephedripites proceras</u> <u>Kiokansium polypes</u> (Abundant) <u>Plicatella potomacensis</u> <u>Tanyosphaeridium isocalamum</u>
2065-2075m	<u>Cicatricosisporites crassiterminatus</u> <u>Foraminisporis wonthaggiensis</u> <u>Plicatella matesovae</u>
2095-2105m	<u>Balmeisporites holodictyus</u> <u>Ischyosporites disjunctus</u> <u>Parvisaccites amplus</u> (?Reworked) <u>Plicatella baconensis</u> <u>Plicatella jansonius</u> (+) <u>Plicatella tricornitata</u>
2150-2160m	<u>Corollina torosa</u> (+) <u>Ovoidinium verrucosum</u> (+) <u>Podocarpidites granulatus</u>

2180-2190m Concavissimisporites variverrucatus
Exesipollenites tumulus
Stereisporites clavus

2210-2220m Cicatricosisporites #EA

Comment: Probable Aptian - early Albian at 2240m as indicated
by Parvisaccites amplus.

2240-2250m Aeguitriradites spinulosus
Impardecispora texensis
Oligosphaeridium asterigerum (+)
Oligosphaeridium verrucosum (+)
Ovoidinium scabrosum
Parvisaccites amplus (+)
Plicatella pseudomacrorhyza

2270-2280m Cicatricosisporites #EAI
Muderongia asymmetrica (+)
Triretilobata trioreticulosa

Comment: Possible Aptian at 2305 as indicated by ?Subtilisphaera perlucida.

2305-2315m Striamonoletes auritus
Subtilisphaera perlucida (+)
(Questionably present)
Tigrisporites scurrundus

2335-2345m Cerebropollenites mesozoicus
Kuylisporites waterbolkii
Plicatella #ES

2365-2375m Cicatricosisporites grabowensis (?Reworked)

Oligosphaeridium perforatum colum (Present)

Spongodinium #EA

Triretilobata marylandensis

2395-2405m

Nodosisporites spinosus

Wallogodinium luna

2425-2555m: Probable Subtilisphaera perlucida Zone (Aptian)

Comment: This age is based on the top of *S. pirnaensis* morphotype with a kalyptra.

2425-2435m

Cicatricosisporites #EAL cf.

Luxadinium primulum (Common)

Stiphrosphaeridium anthophorum

Subtilisphaera pirnaensis (kalyptra) (+)

2455-2465m

Cicatricosisporites mohrioides

Lycodiacidites asperatus

Oligosphaeridium reniforme

2485-2495m

Distaltriangulisporites irregularis

2520-2530m

Astrocysta #EA (Common)

Triretilobata tribotrys

2545-2555m

Impardecispora splendida

Parvisaccites amplus (Common)

2575-2730m: Definite Subtilisphaera perlucida Zone (Aptian)

2575-2585m Acanthotriletes varispinosus
Callialasporites monoalaspurus cf.
Endoceratium dettmanniae
Kleithriasphaeridium eoinodes
Stiphrosphaeridium #EA
Subtilisphaera perlucida (+)
Taeniophora #EA (Questionably present)

2600-2610m Spongodinium solidum

2630-2640m Diplofusa gearlensis
Podocarpidites canadensis
Taeniophora #EA

2690-2700m Oligosphaeridium dividuum

2750-3030m: Subtilisphaera perlucida Zone: Cyclonephelium attadalicum Subzone (early Aptian)

2750-2760m Cyclonephelium attadalicum (+)

2780-2790m Cicatricosisporites potomacensis

Comment: Possible Barremian at 2840m as indicated by Subtilisphaera terrula.

2840-2850m Cicatricosisporites exilioides Singh '71
Subtilisphaera terrula

2900-2910m Campenia #EA

2930-2940m Callialasporites monoalaspurus
Contignisporites glebulentus
(Questionably present)

2960-2970m Callialasporites turbatus
Cerebropollenites macroverrucosus (?Reworked)

2990-3000m Callialasporites trilobatus
Canningia reticulata

3020-3030m Contignisporites glebulentus

3055-3335m: Apteia anaphrissa Zone (Barremian)

3055-3065m Apteia anaphrissa (+)
Ephedripites virginiaensis
Sestrosporites pseudoalveolatus

3085-3095m Cicatricosisporites minutaestriatus
Coronatispora valdensis
Muderongia simplex (+)
Parvisaccites #EA
Pilosporites verus

3115-3125m Cicatricosisporites #EAL (+)
Dingodinium cerviculum
Polystephanophorus sarjeantii
Pseudoceratium pelliferum (+)

- 3175-3185m Aequitriradites conosimilis
Callialasporites monoalaspurus (Common)
- 3205-3215m Cicatricosisporites striatus
- 3265-3275m Oligosphaeridium macrotubulum
- 3295-3305m Aequitriradites verrucosus
Rugubivesiculites #EA
- 3325-3335m Cicatricosisporites tersus
Oligosphaeridium porosum
Pilosporites crassangularis
Trilobosporites tenuiparietalis
Uvaesporites glomeratus
- 3355-3655m: Ctenidodinium elegantulum Zone (Hauterivian)
- 3355-3365m Ctenidodinium elegantulum (+)
Cyclopsiella sp. A
- 3380-3390m Cymosphaeridium sp. I
- 3440-3450m Cassiculosphaeridia magna
Occisucysta #EX
Occisucysta distincta
- 3465-3475m Dapsilisinium warrenii
Polystephanophorus schindewolfii
Striatella #EF

- 3735-3745m Cicatricosisporites reticicaticosus (+)
- 3765-3775m Alisporites thomasi (+)
Araucariacites punctatus (+)
Cerebropollenites macroverrucosus
- 3795-3805m Cicatricosisporites purbeckensis
(Questionably present)
- 3825-3835m Achomosphaera neptunii (+)
(Questionably present)
Cicatricosisporites undatus
(Questionably present)
Couperisporites complexus
Gonyaulacysta fastigiata
Kleithriasphaeridium corrugatum
Muderongia simplex microperforata
Muderongia staurota (Questionably present)
Fodocarpidites herbtsii
- Comment: Probable Berriasian at 3885m as indicated by Trilobosporites obsitus.
- 3885-3895m Trilobosporites obsitus (+)
- 3915-3925m Densoisporites triradiatus cf.
Kleithriasphaeridium fasciatum
Pityosporites #EA
Stiphrosphaeridium arbustum (+)
Striatella imperfecta
Subtilisphaera #EA
- 3945-3955m Cicatricosisporites purbeckensis
(Questionably present)

Lanterna sportula (Questionably present)
Pityosporites #EA (Common)

3975-3985m Achomosphaera neptunii (Questionably present)
Matonisporites phleboteroides

4005-4015m Ctenidodinium rugulatum

4035-4045m Costatoperforosporites #EM
Oligosphaeridium diluculum (+)
Oligosphaeridium poculum

4065-4075m Araucariacites punctatus (Common)
Cribroperidinium globatum
(Questionably present)
Lanterna sportula (+)

4095-4105m Amphorula #EA (Questionably present)
Muderongia sp. A (+) (Present)

4125-4135m Deltoidospora hallii (Abundant)
Pityosporites #ER

Comment: Predominately black coaly material below 4140m.

4185-4195m Aequitriradites cooksoniae

4245-4255m Dapsilidinium chems

4275-4285m Systematophora fasciculigera
(Questionably present)

4335-4345m Cicatricosisporites purbeckensis
Muderongia californica (Questionably present)

4365-4375m Systematophora fasciculigera (+)

4395-4405m Cantulodinium #EA (?Reworked)
Hystrichodinium lanceatum
(Questionably present)

4455-4495m: Ctenidodinium panneum Zone (Portlandian)

4455-4465m Cribroperidinium globatum (+)
Cribroperidinium granuligerum
Ctenidodinium culmulum (+) (Common)
Hystrichodinium lanceatum
Lanterna bulgarica
Millioudodinium jubaris (+)
Phoberocysta #ED
Systematophora fasciculigera (Common)

4485-4495m Cleistosphaeridium ehrenbergii
Cometodinium #EB

4515-5455m: Hystrichogonyaulax cladophora Zone (Kimmeridgian)

4515-4525m Hystrichogonyaulax cladophora (+)

4545-4555m Alisporites #EG

Apteodinium nuciforme (+)
Tuberositriletes montuosus

4575-4585m Ctenidodinium schizoblatum
(Questionably present)
Endoscrinium pharo

4605-4615m Amphorula metaelliptica
Callialasporites infrapunctatus
Dingodinium jurassicum
Trilobosporites canadensis

4635-4645m Amphorula #EA
Callialasporites trilobatus cf.
Ctenidodinium panneum
Senoniasphaera jurassica (+)

4665-4675m Corollina chateaunovii (+)
Ctenidodinium schizoblatum
Muderongia #EH
Occisucysta balios (Questionably present)

4695-4705m Cedripites #EA
Pityosporites dividiuus (+)

4725-4735m Varirugosisporites granituberculatus

4755-4765m Adnatosphaeridium caulleryi (+)

4815-4825m Escharisphaeridia pocockii
Podocarpidites #ED

4845-4855m Cerebropollenites #Eepilargos
Leptodinium aceras (+)
Pareodinia sp. C (+)
Tuberositriletes major

4905-4915m Acanthaulax spp.
Cantulodinium #EA (+)

4935-4945m Lanterna bulgarica (Common)
Perisseiasphaeridium #EA

4965-4975m Breodoxiella #EB
Meiourogonyaulax dicrypta

Comment: Probable early Kimmeridgian at 5025m as indicated by
Ctenidodinium chondrum.

5025-5035m Ctenidodinium chondrum (+)

5055-5065m Imbatodinium kondratievii (+)
Lanterna bulgarica (Abundant)
Occisucysta aculeata (Questionably present)

5115-5125m Occisucysta aculeata

5145-5155m Exesipollenites scabratus

5205-5215m Escharisphaeridia rudis

5295-5305m Saxosporis tenerirugosus

5475-5485m: No zonal assignment (Probable Oxfordian or older)

5475-5485m

Energlynia acollaris

Meiourogonyaaulax strongylos

(Questionably present)

5505-5905m: No zonal assignment (undifferentiated Middle to Late Jurassic)

Comment: Very low palynomorph recovery due to high thermal maturation below 5505m.

5505-5515m

Saxosporis sp. indet.

5745-5755m

Sentusidinium erythrocomum

Comment: The lowest cuttings sample at 5895m has a Oxfordian - Kimmeridgian microflora.

5895-5905m

Cerebropollenites macroverrucosus

Corollina vignollensis

Coronatispora valdensis

Ctenidodinium chondrum

Escharisphaeridia rudis

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
230	Acanthaulax sp. indet.	110	Cribroperidinium edwardsii
61	Achomosphaera aldicornu	119	Cribroperidinium episomum
184	Achomosphaera neptunii	24	Cribroperidinium giuseppi
1	Achomosphaera ramulifera	199	Cribroperidinium globatum
190	Achomosphaera sp. indet.	207	Cribroperidinium granuligerum
225	Adnatosphaeridium caulleryi	189	Cribroperidinium maderongense
50	Adnatosphaeridium multispinosum	95	Cribroperidinium orthoceras
51	Adnatosphaeridium vittatum	175	Cribroperidinium sepiamentum
200	Amphorula #EA	224	Cribroperidinium sp. indet.
218	Amphorula metaelliptica	81	Cribroperidinium wetzelii
38	Apectodinium homomorphum	237	Ctenidodinium chondrum
158	Aptea anaphrissa	208	Ctenidodinium culmulum
127	Aptea polymorpha	165	Ctenidodinium elegantulum
215	Apteodinium nuciforme	220	Ctenidodinium panneum
28	Apteodinium sp. indet.	216	Ctenidodinium schizoblatum
45	Areoligera senonensis	154	Cyclonephelium attadalicum
52	Areoligera undulata	120	Cyclonephelium attadalicum cf.
46	Aresphaeridium arcuatum (large form)	86	Cyclonephelium distinctum
39	Aresphaeridium multicornutum (small)	75	Cyclonephelium distinctum brevispinum
106	Astrocysta #EA	111	Cyclonephelium eisenackii
233	Breodoxiella #EB	32	Cyclonephelium sp. A, Wi&Br 1975
2	Brigantedinium simplex	121	Cyclonephelium vannophorum
124	Caddasphaera halosa	166	Cyclopsiella sp. A
102	Canningia colliveri	168	Cymososphaeridium sp. I
156	Canningia reticulata	202	Dapsilidinium chems
205	Cantulodinium #EA	172	Dapsilidinium warrenii
234	Cantulodinium speciosum	76	Deflandrea denticulata
169	Cassiculosphaeridia magna	33	Deflandrea heterophlycta
79	Ceratiopsis diebelii	53	Deflandrea oebisfeldensis
68	Ceratiopsis pannucea	34	Deflandrea phosphoritica
64	Ceratiopsis speciosa glabra	231	Dictyopyxidina areolata
74	Ceratiopsis speciosa speciosa	160	Dingodinium cerviculum
93	Chatangiella tripartita	219	Dingodinium jurassicum
107	Chichacuadinium #EA	59	Diphyes colligerum
146	Chichacuadinium sp. indet.	126	Diplofusa geariensis
117	Chichacuadinium vestitum	196	Discorsia nanna
27	Chiropteridium mesplanum	18	Distatodinium paradoxum
140	Chlamydothorella nyei	96	Dorocysta litotes
118	Cleistosphaeridium aciculare	147	Endoceratium dettmanniae
212	Cleistosphaeridium ehrenbergii	103	Endoscrinium campanulum
108	Cleistosphaeridium huguentionii	217	Endoscrinium pharo
174	Cleistosphaeridium sp. indet.	241	Energlynia acollaris
213	Cometodinium #EB	48	Eocladopyxis peniculatum
29	Cordosphaeridium cantharellum	112	Epelidosphaeridia spinosa
57	Cordosphaeridium fibrospinosum	226	Escharisphaeridia pocockii
47	Cordosphaeridium gracile	240	Escharisphaeridia rudis
58	Cordosphaeridium inodes inodes	82	Exochosphaeridium bifidum
65	Cordosphaeridium inodes longipes	19	Filisphaera filifera
80	Cordosphaeridium tiara	42	Glaphrocysta microfenestrata
109	Coronifera oceanica	54	Glaphrocysta exuberans

APPENDIX A (Cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Index number	Taxon names	Index number	Taxon names
43	Glaphyrocysta intricata (large form)	170	Occisucysta #EX
43	Glaphyrocysta intricata (small form)	239	Occisucysta aculeata
35	Gochtodinium simplex	223	Occisucysta balios
183	Gonyaulacysta fastigiata	171	Occisucysta distincta
9	Hemicystodinium #LA	182	Occisucysta sp. A, Williams 1973
44	Homotryblum floripes	227	Occisucysta sp. indet.
206	Hystrichodinium lanceatum	101	Odontochitina costata
214	Hystrichogonyaulax cladophora	88	Odontochitina operculata
40	Hystricholopoma rigaudiae	92	Odontochitina porifera
55	Hystricholopoma salacium	132	Oligosphaeridium asterigerum
10	Hystrichosphaeridium parvum	70	Oligosphaeridium complex
72	Hystrichosphaeridium tubiferum	197	Oligosphaeridium diluculum
25	Hystrichosphaeropsis ovum	133	Oligosphaeridium dividiuum
238	Imbatodinium kondratjevii	181	Oligosphaeridium heli longjaingense
77	Isabelidinium #LA	163	Oligosphaeridium macrotubulum
83	Isabelidinium cooksoniae	138	Oligosphaeridium perforatum colum
78	Isabelidinium cretaceum	198	Oligosphaeridium poculum
100	Isabelidinium magnum	164	Oligosphaeridium porosum
113	Kickansium polypes	97	Oligosphaeridium pulcherrimum
186	Kleithriasphaeridium corrugatum	145	Oligosphaeridium reniforme
148	Kleithriasphaeridium ecinodes	123	Oligosphaeridium totum minor
191	Kleithriasphaeridium fasciatum	115	Oligosphaeridium totum totum
129	Kleithriasphaeridium loffrense	133	Oligosphaeridium verrucosum
209	Lanterna bulgarica	125	Oodnadattia tuberculata
194	Lanterna sportula	4	Operculodinium centrocarpum
11	Lejeunecysta hyalina	60	Operculodinium tiara
56	Lentinia serrata	134	Ovoidinium scabrosus
63	Lentinia wetzelii	131	Ovoidinium verrucosus
228	Leptodinium aceras	69	Palaeocystodinium australinum
3	Lingulodinium machaerophorum	84	Palaeocystodinium gabonense
114	Litosphaeridium siphoniphorum	12	Palaeocystodinium golzowense
142	Luxadinium primum	91	Palaeohystrichophora infusorioides
122	Luxadinium propatulum	66	Palaeoperidinium pyrophorum
235	Meiourogonyaulax dicrypta	130	Palaeostomocysta fragilis
236	Meiourogonyaulax sp. indet.	183	Pareodinia ceratophora
242	Meiourogonyaulax strongylos	229	Pareodinia sp. C
30	Membranophoridium aspinatum	13	Pentadinium laticinctum granulatum
90	Membranophoridium sp. Wilson 1971	22	Pentadinium laticinctum laticinctum
203	Michrystidium stellatum	232	Perisseiasphaeridium #EA
210	Millioudodinium jubaris	71	Pervosphaeridium pseudhystrichodinium
222	Muderongia #EH	73	Phelodinium #LA
135	Muderongia asymmetrica	211	Phoberocysta #ED
204	Muderongia californica	161	Polystephanophorus sargeantii
159	Muderongia simplex	173	Polystephanophorus schindewolfii
187	Muderongia simplex microperforata	176	Pseudoceratium gochti
201	Muderongia sp. A	162	Pseudoceratium pelliiferum
149	Muderongia sp. indet.	94	Pterodinium cornutum
188	Muderongia staurota	167	Pterospermella helios
26	Multispinula quanta	14	Reticulatosphaera actinocoronata
20	Nematosphaeropsis lemniscata	31	Selenopemphix nephroides

APPENDIX A (Cont'd)

Alphabetical Listing of Species Shown on Occurrence Chart:

Marine Dinoflagellates

Index number	Taxon names
221	Senoniasphaera jurassica
116	Senoniasphaera microreticulata
104	Senoniasphaera protrusa
243	Sentusidinium erythrocomum
98	Silicisphaera ferox
67	Spinidinium densispinatum
15	Spiniferites crassipellis
16	Spiniferites pseudofurcatus
5	Spiniferites ramosus
85	Spiniferites ramosus granosus
157	Spiniferites ramosus ramosus
157	Spiniferites sp. indet.
139	Spongodinium #EA
152	Spongodinium solidum
150	Stiphrosphaeridium #EA
143	Stiphrosphaeridium anthophorum
192	Stiphrosphaeridium arbustum
177	Stiphrosphaeridium dictyophorum
193	Subtilisphaera #EA
136	Subtilisphaera perlucida
144	Subtilisphaera pirnaensis (kalytra)
155	Subtilisphaera terrula
6	Sumatradinium hispidum
105	Surculosphaeridium longifurcatum
195	Surculosphaeridium sp. III
17	Systematophora ancyrea
178	Systematophora complicata
180	Systematophora fasciculigera
41	Systematophora placacantha
179	Systematophora schindewolfii
151	Taeniophora #EA
128	Tanyosphaeridium isocalamum
89	Tanyosphaeridium variecalamum
7	Tectatodinium pellitum
21	Thalassiphora delicata
99	Trichodinium castaneum
8	Tuberculodinium rosignoliae
23	Tuberculodinium vancampoeae
62	Turbiosphaera filosa
141	Wallodinium luna
36	Wetzeliella ovalis
37	Wetzeliella symmetrica
67	Xenascus ceraticoides

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
24	Abiespollenites microreticulatus	161	Cicatricosisporites grabowensis
113	Acanthotriletes varispinosus	175	Cicatricosisporites magnus
25	Acritosporites excavatus	130	Cicatricosisporites minutaestriatus
136	Aequitriradites conosimilis	106	Cicatricosisporites mohrioides
172	Aequitriradites coolsoniae	118	Cicatricosisporites potomacensis
194	Aequitriradites sp. indet.	160	Cicatricosisporites purbeckensis
90	Aequitriradites spinulosus	157	Cicatricosisporites reticicatricosus
138	Aequitriradites verrucosus	107	Cicatricosisporites sp. indet.
26	Afropollis jadinus	137	Cicatricosisporites striatus
176	Alisporites #EG	141	Cicatricosisporites tersus
16	Alisporites bilateralis	161	Cicatricosisporites undatus
27	Alisporites grandis	62	Cicatricosisporites venustus
158	Alisporites thomasi	53	Clavatipollenites rotundus
28	Aratrisporites ocellatus	131	Concavissimisporites minor
29	Araucariacites australis	149	Concavissimisporites multituberculatus
159	Araucariacites punctatus	83	Concavissimisporites punctatus
105	Baculatisporites comaumensis	108	Concavissimisporites sp. indet.
74	Balmeisporites holodictyus	84	Concavissimisporites variverrucatus
1	Betulaceipollenites betuloides	155	Contignisporites dorsostriatus
51	Biretisporites potoniae	123	Contignisporites glebulentus
139	Callialasporites dampieri	40	Corniculatisporites auritus cf.
178	Callialasporites infrapunctatus	182	Corollina chateauvillii
122	Callialasporites monoalasporeus	81	Corollina torosa
114	Callialasporites monoalasporeus cf.	156	Corollina vignollensis
127	Callialasporites trilobatus	132	Coronatispora valdensis
180	Callialasporites trilobatus cf.	2	Corylus #LA
124	Callialasporites turbatus	170	Costatoperforosporites #EM
87	Camazonosporites insignis	162	Couperisporites complexus
121	Campania #EA	169	Ctenidodinium rugulatum
125	Cardianguilina sp. indet.	41	Cupuliferopollenites minutus
9	Caryapollenites simplex	18	Cyathidites australis
183	Cedripites #EA	17	Cyathidites minor
60	Cedripites canadensis	3	Cyathidites sp. indet.
20	Cerebropollenites #EC	42	Cycadopites nitidus
189	Cerebropollenites #Eepilargos	33	Deltoidospora hallii
126	Cerebropollenites macroverrucosus	174	Densoisporites #EA
98	Cerebropollenites mesozoicus	154	Densoisporites microrugulatus
88	Cicatricosisporites #EA	165	Densoisporites triradiatus cf.
151	Cicatricosisporites #EAE	187	Densoisporites velatus
93	Cicatricosisporites #EAI	110	Distaltriangulisporites irregularis
135	Cicatricosisporites #EAL	67	Ephedripites proceras
104	Cicatricosisporites #EAL cf.	128	Ephedripites virginiaensis
61	Cicatricosisporites #EAM	173	Eucommiidites troedssonii
52	Cicatricosisporites annulatus	43	Eucommiidites minor
30	Cicatricosisporites australiensis	191	Exesipollenites scabratus
31	Cicatricosisporites cocononiensis	85	Exesipollenites tumulus
70	Cicatricosisporites crassiterminatus	71	Flagellisporites sp. indet.
32	Cicatricosisporites delicatus	72	Foraminisporis wonthaggiensis
153	Cicatricosisporites exilioides Dorn '71	54	Foveosporites foveoreticulatus
120	Cicatricosisporites exilioides Singh '71	34	Gleicheniidites distalgranulatus

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

Index number	Taxon names	Index number	Taxon names
119	Gleicheniidites minor	92	Plicatella pseudomacrorhyza
21	Gleicheniidites senonicus	60	Plicatella tricornitata
115	Impardecispora apiverrucata	188	Podocarpidites #ED
112	Impardecispora splendida	117	Podocarpidites canadensis
91	Impardecispora texensis	64	Podocarpidites epistriatus
55	Ischyosporites amoholkus	82	Podocarpidites granulosis
75	Ischyosporites disjunctus	163	Podocarpidites herbtsii
142	Klukisporites areolatus	65	Podocarpidites potomacensis
76	Klukisporites pseudoreticulatus	6	Quercoidites #LA
181	Klukisporites variegatus	59	Retitricolpites vulgaris
99	Kuylisporites waterbolkii	152	Retverrusporites obscurilaesuratus
10	Laevigatosporites ovatus	144	Retverrusporites sp. indet.
89	Laricoidites magnus	147	Rouseisporites radiatus
35	Leiotriletes mecklenburgensis	15	Rouseisporites reticulatus
44	Liliacidites dividiuus	140	Rugubivesiculites #EA
109	Lycodiadites asperatus	49	Rugubivesiculites minimus
63	Lycopodiumsporites austroclavitudites	50	Rugubivesiculites reductus
168	Matonisporites phlebopteroides	14	Rugubivesiculites rugosus
116	Microreticulatisporites diatretus	193	Saxosporis sp. indet.
36	Monosulcites scabratus	192	Saxosporis tenerirugosus
103	Nodosisporites spinosus	129	Sestrosporites pseudoalveolatus
13	Normapollis #LA	22	Stereisporites antiquasporites
8	Osmundacidites claytonites	86	Stereisporites clavus
19	Osmundacidites wellmannii	96	Striamonoletes auritus
133	Parvisaccites #EA	148	Striatella #EF
77	Parvisaccites amplus	167	Striatella imperfecta
37	Parvisaccites hortensis	186	Taurocusporites reduncus
94	Parvisaccites radiatus	12	Taxodiaceapollenites hiatus
56	Penetetrapites mollis	97	Tigrisporites scurrundus
45	Perinopollenites elatoides	11	Tiliaepollenites vespipites
68	Phyllocladites inchoatus	39	Tricolpopollenites micromunus
57	Phyllocladites microreticulatus	179	Trilobosporites canadensis
46	Phyllocladites rugulatus	66	Trilobosporites humilis
4	Piceapollenites sp. indet.	164	Trilobosporites obsitus
143	Pilosisporites crassangularis	145	Trilobosporites tenuiparietalis
150	Pilosisporites ericus	102	Triretilobata marylandensis
134	Pilosisporites verus	111	Triretilobata tribotrys
5	Pinuspollenites sp. indet.	95	Triretilobata trioreticulosa
166	Pityosporites #EA	7	Tsugaepollenites igniculus
171	Pityosporites #ER	190	Tuberositriletes major
184	Pityosporites dividiuus	177	Tuberositriletes montuosus
100	Plicatella #ES	146	Uvaeosporites glomeratus
78	Plicatella baconensis	185	Varirugosisporites granituberculatus
47	Plicatella bifurcata	23	Vitreisporites pallidus
38	Plicatella erdtmannii		
79	Plicatella jansonius		
48	Plicatella macrorhyza		
73	Plicatella matesovae		
69	Plicatella potomacensis		
58	Plicatella problematica		

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

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names
8	Extruded hydrocarbons
5	foraminiferal liners
2	Microthallites sp. indet.
3	Paralecaniella indentata
4	Pediastrum boryanum
6	Schizosporis parvus
7	Schizosporis reticulatus
1	Tesmanites globosus
9	Verhachium sp. indet.

Reworked Palynomorphs

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names
1	+Cicatricosisporites spp.
2	+Plicatella spp.
3	+Reistrickia spp.

APPENDIX BExamined Samples: South Griffin J-13 Well

440.00 : Cuttings	1825.00 : Cuttings	3205.00 : cuttings	4545.00 : cuttings
470.00 : Cuttings	1855.00 : Cuttings	3235.00 : cuttings	4575.00 : cuttings
500.00 : Cuttings	1885.00 : Cuttings	3265.00 : cuttings	4605.00 : cuttings
530.00 : Cuttings	1915.00 : Cuttings	3295.00 : cuttings	4635.00 : cuttings
560.00 : Cuttings	1945.00 : Cuttings	3325.00 : cuttings	4665.00 : cuttings
590.00 : Cuttings	1975.00 : cuttings	3355.00 : cuttings	4695.00 : cuttings
620.00 : Cuttings	2005.00 : cuttings	3380.00 : cuttings	4725.00 : cuttings
650.00 : Cuttings	2035.00 : cuttings	3410.00 : cuttings	4755.00 : cuttings
680.00 : Cuttings	2065.00 : cuttings	3440.00 : cuttings	4785.00 : cuttings
710.00 : Cuttings	2095.00 : cuttings	3465.00 : cuttings	4815.00 : cuttings
740.00 : Cuttings	2125.00 : cuttings	3495.00 : cuttings	4845.00 : cuttings
770.00 : Cuttings	2150.00 : cuttings	3525.00 : cuttings	4875.00 : cuttings
800.00 : Cuttings	2180.00 : cuttings	3555.00 : cuttings	4905.00 : cuttings
830.00 : Cuttings	2210.00 : cuttings	3585.00 : cuttings	4935.00 : cuttings
860.00 : Cuttings	2240.00 : cuttings	3615.00 : cuttings	4965.00 : cuttings
890.00 : Cuttings	2270.00 : cuttings	3645.00 : cuttings	4995.00 : cuttings
920.00 : Cuttings	2305.00 : cuttings	3675.00 : cuttings	5025.00 : cuttings
950.00 : Cuttings	2335.00 : cuttings	3705.00 : cuttings	5055.00 : cuttings
980.00 : Cuttings	2365.00 : cuttings	3735.00 : cuttings	5085.00 : cuttings
1010.00 : Cuttings	2395.00 : cuttings	3765.00 : cuttings	5115.00 : cuttings
1040.00 : Cuttings	2425.00 : cuttings	3795.00 : cuttings	5145.00 : cuttings
1070.00 : Cuttings	2455.00 : cuttings	3825.00 : cuttings	5175.00 : cuttings
1100.00 : Cuttings	2485.00 : cuttings	3855.00 : cuttings	5205.00 : cuttings
1130.00 : Cuttings	2520.00 : cuttings	3885.00 : cuttings	5235.00 : cuttings
1160.00 : Cuttings	2545.00 : cuttings	3915.00 : cuttings	5265.00 : cuttings
1190.00 : Cuttings	2575.00 : cuttings	3945.00 : cuttings	5295.00 : cuttings
1220.00 : Cuttings	2600.00 : cuttings	3975.00 : cuttings	5325.00 : cuttings
1250.00 : Cuttings	2630.00 : cuttings	4005.00 : cuttings	5355.00 : cuttings
1280.00 : Cuttings	2660.00 : cuttings	4035.00 : cuttings	5385.00 : cuttings
1310.00 : Cuttings	2690.00 : cuttings	4065.00 : cuttings	5415.00 : cuttings
1340.00 : Cuttings	2720.00 : cuttings	4095.00 : cuttings	5445.00 : cuttings
1370.00 : Cuttings	2750.00 : cuttings	4125.00 : cuttings	5475.00 : cuttings
1400.00 : Cuttings	2780.00 : cuttings	4140.29 : core	5505.00 : cuttings
1430.00 : Cuttings	2810.00 : cuttings	4155.00 : cuttings	5535.00 : cuttings
1460.00 : Cuttings	2840.00 : cuttings	4185.00 : cuttings	5565.00 : cuttings
1495.00 : Cuttings	2870.00 : cuttings	4215.00 : cuttings	5595.00 : cuttings
1525.00 : Cuttings	2900.00 : cuttings	4245.00 : cuttings	5625.00 : cuttings
1555.00 : Cuttings	2930.00 : cuttings	4275.00 : cuttings	5655.00 : cuttings
1585.00 : Cuttings	2960.00 : cuttings	4305.00 : cuttings	5685.00 : cuttings
1615.00 : Cuttings	2990.00 : cuttings	4335.00 : cuttings	5715.00 : cuttings
1645.00 : Cuttings	3020.00 : cuttings	4365.00 : cuttings	5745.00 : cuttings
1675.00 : Cuttings	3055.00 : cuttings	4395.00 : cuttings	5775.00 : cuttings
1705.00 : Cuttings	3085.00 : cuttings	4425.00 : cuttings	5805.00 : cuttings
1735.00 : Cuttings	3115.00 : cuttings	4455.00 : cuttings	5835.00 : cuttings
1765.00 : Cuttings	3145.00 : cuttings	4485.00 : cuttings	5865.00 : cuttings
1795.00 : Cuttings	3175.00 : cuttings	4515.00 : cuttings	5895.00 : cuttings