

G.S.C. O.I. 1868 PALYNOLOGICAL ANALYSIS OF THE INTERVAL 925-  
5735M, UNIAKE C-72 WELL, SCOTIAN SHELF

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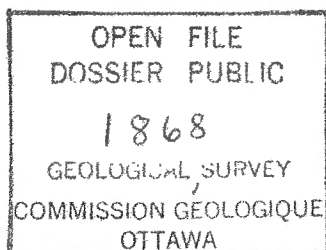
BUJAK DAVIES GROUP

PALYNOLOGICAL ANALYSIS OF THE  
INTERVAL 925-5735M, UNIACKE G-72 WELL,  
SCOTIAN SHELF

REPORT NO. 88-0008

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CALGARY, ALBERTA



BIOSTRATIGRAPHIC SUMMARY

925- 935m	<u>Palaeoperidinium pyrophorum</u> Zone (early Paleocene)
955-1055m	<u>Dinogymnium euclaense</u> Zone (Maastrichtian)
1075-1145m	<u>Odontochitina operculata</u> Zone (Campanian)
1165-1205m	<u>Pervosphaeridium truncigerum</u> Zone (Santonian)
1225-1235m	<u>Oligosphaeridium pulcherrimum</u> Zone and <u>Surculosphaeridium longifurcatum</u> Zone (Coniacian to Turonian)
1255-1295m	<u>Kiokansium polypes</u> Zone to <u>Surculosphaeridium</u> <u>longifurcatum</u> Zone (Cenomanian to Turonian)
1315-1950m	<u>Chichaouadinium vestitum</u> Zone (Albian)
1970-2140m	<u>Subtilisphaera perlucida</u> Zone (Aptian)
2160-2170m	<u>Subtilisphaera perlucida</u> Zone: <u>Pilososporites</u> <u>trichopapillosus</u> Subzone (early Aptian)
2190-2385m	<u>Subtilisphaera perlucida</u> Zone: <u>Cyclonephelium</u> <u>attadalicum</u> Subzone (early Aptian)
2405-2880m	<u>Aptea anaphrissa</u> Zone (Barremian)
2900-3000m	<u>Ctenidodinium elegantulum</u> Zone (Hauterivian)
3020-3630m	<u>Phoberocysta neocomica</u> Zone (Berriasian to Valanginian)

- 3650-3990m      Ctenidodinium panneum Zone (Portlandian)
- 4010-4110m      Hystrihogonyaulax cladophora Zone (Kimmeridgian)
- 4130-4625m      Adnatosphaeridium caulleryi Zone (Callovian to  
Oxfordian)
- 4645-5115m      Ctenidodinium sellwoodii Zone (Bathonian to early  
Callovian)
- 5135-5260m      Ctenidodinium sellwoodii Zone: Nummus #EZ Subzone  
(Bajocian)
- 5275-5735m      Dapcodinium semitabulatum Zone (Toarcian to  
Aalenian)

SELECTED PALYNOMORPHS

Listings show highest occurrences unless otherwise specified.

(+) indicates marker species.

925-935m: Palaeoperidinium pyrophorum Zone (early Paleocene)

Comment: Common caved Eocene.

925-935m      Areoligera senonensis (Caved)  
              Ceratiopsis pannucea  
              Ceratiopsis speciosa speciosa  
              Cordosphaeridium cantharellum (Caved)  
              Cordosphaeridium divergens (Caved)  
              Cordosphaeridium funiculatum (Caved)  
              Cribroperidinium giuseppei (Caved)  
              Deflandrea phosphoritica (Caved)  
              Glaphyrocysta exuberans  
              Isabelidinium cretaceum (Questionably present)  
              Palaeocystodinium gabonense  
              Phelodinium tricuspe (+)

955-1055m: Dinogymnium euclaense Zone (Maastrichtian)

955-965m      Cyclonephelium brevispinum (+)  
              Isabelidinium cooksoniae (+)  
              Isabelidinium cretaceum (+)  
              Palaeoperidinium pyrophorum (Abundant)

985-995m      Isabelidinium belfastense (+) (Common)

Trithyrodinium evittii

1015-1025m      Hystriosphæridium tubiferum  
Oligosphæridium complex

1045-1055m      Cyathidites minor

1075-1145m: Odontochitina operculata Zone (Campanian)

Comment: Coniacian if *C. oceanica* identification is correct.

1075-1085m      Ceratiopsis diebelii (Caved)  
Coronifera oceanica (Questionably present)  
Hystriosphæridium bowerbankii  
Odontochitina costata (+)  
Silicisphaera ferox (+)

1135-1145m      Chatangiella tripartita (+)  
Exochosphæridium bifidum  
Isabelidinium biaperturum

1165-1205m: Pervosphæridium truncigerum Zone (Santonian)

1165-1175m      Camarozonosporites insignis  
Cribroperidinium wetzelii  
Palynodinium grallator  
Surculosphaeridium longifurcatum (+)  
Triblastula utinensis

1195-1205m      Pterodinium cingulatus (+)

1225-1235m: O. pulcherrimum Zone and S. longifurcatum Zone (Coniacian and Turonian)

Comment: Possible condensed sequence at 1225-1235m.

1225-1235m      Abiespollenites microreticulatus  
                 Caddasphaera halosa  
                 Cyclonephelium vannophorum (+)  
                 Hystriodinium pulchrum  
                 Odontochitina operculata  
                 Oligosphaeridium pulcherrimum (+)  
                 Plicatella bifurcata (?Reworked)  
                 Senoniasphaera rotundata (+)

1255-1295m: Kiokansium polypes Zone to Surculosphaeridium longifurcatum Zone (Cenomanian to Turonian)

Comment: Mixture of Cenomanian and Turonian forms.

1255-1265m      Apteodinium grande  
                 Cedripites canadensis  
                 Cerebropollenites #EC (+)  
                 Cyclonephelium vannophorum  
                 Oligosphaeridium totum minor (?Reworked)  
                 Parvisaccites hortenensis (?Reworked)  
                 Podocarpidites potomacensis  
                 Stiphrosphaeridium anthophorum

1285-1295m      Aequitriradites spinulosus  
                 Choanopollis #EA (+)  
                 Cicatricosisporites #EAM

Cupuliferopollenites psilatus  
Isabelidium magnum  
Kleithriasphaeridium loffrense  
Plicatella tricornitata  
Rouseisporites radiatus  
Surculosphaeridium longifurcatum (+)  
(Abundant)

1315-1950m: Chichaouadinium vestitum Zone (Albian)

- 1315-1325m     Ajatipollis sp. A  
                 Chichaouadinium #EB (+)  
                 Chichaouadinium vestitum (+)  
                 Oligosphaeridium totum totum (+)  
                 Senoniasphaera microreticulata (+)
- 1345-1355m     Balmeisporites holodictyus  
                 Biretisporites potoniae  
                 Cicatricosisporites #EAI  
                 (Questionably present)  
                 Cleistosphaeridium huguoniotii  
                 Epelidosphaeridia spinosa  
                 Kiokansium polypes (Common)  
                 Liliacidites dividuus
- 1375-1385m     Aptea polymorpha (+)  
                 Cicatricosisporites apicanalis  
                 Cicatricosisporites potomacensis  
                 Epelidosphaeridia spinosa (Common)  
                 Florentinia resex  
                 Luxadinium primulum (+)  
                 Luxadinium propatulum  
                 Surculosphaeridium longifurcatum (Abundant)



- 1405-1415m      Astrocysta cretacea (+) (Common)  
                     Corollina torosa (+)  
                     Cyclonephelium eisenackii (+)  
                     Ephedripites sulcatus  
                     Foveotrilletes subtriangularis  
                     Ischyosporites disjunctus (+)  
                     Oligosphaeridium totum totum (Common)  
                     Retitricolpites vulgaris (+)  
                     Rouseisporites reticulatus

Comment: Probable middle Albian at 1435m.

- 1435-1445m
- Aratrisporites ocellatus  
Asteropollis asteroides (+)  
Cupuliferopollenites minutus (+)  
Kiokansium williamsii  
Nyktericysta arachnion  
Penetetrapites mollis (+)  
Stellatopollis barghoorni (+)  
Subtilisphaera pirnaensis (kalyptra)  
(Questionably present)  
Vitreisporites pallidus

- 1465-1475m      Cicatricosisporites #EAI  
                  Clavatipollenites hughesii  
                  Clavatipollenites rotundus  
(Questionably present)  
  
                  Ctenidodinium #ES  
                  Lycopodiumsporites marginatus  
                  Trilobosporites humilis (+)

- 1495-1505m      Rugubivesiculites minimus

- 1525-1535m      Apteodinium granulatum  
                    Cicatricosisporites delicatus

Cribroperidinium episomum (+)  
Muderongia asymmetrica  
Oligosphaeridium totum totum  
Stiphrosphaeridium #EA

Comment: Possible early Albian at 1555m as inciated by ?Parvisaccites amplus.

1555-1565m      Aratrisporites #ES (spinate)  
                 Balmula tripenta  
                 Eucommiidites minor (+)  
                 Parvisaccites amplus (+)  
   (Questionably present)

1585-1595m      Parvisaccites amplus (Questionably present)  
                 Psilatricolpites parvus

1615-1625m      Neoraistrickia truncata  
                 Nodosisporites stellantis  
                 Plicatella bilateralis

1645-1655m      Gleicheniidites distalgranulatus

1675-1685m      Chichaouadinium davidsii (+)  
                 Cicatricosisporites subrotundus (+)  
                 Exesipollenites tumulus  
                 Nodosisporites costatus (+)  
                 Phyllocladites inchoatus  
                 Phyllocladites rugulatus  
                 Plicatella jansonius  
                 Plicatella potomacensis

Comment: Early Albian at 1700m as indicated by P. amplus and Cribroperidinium #EX.





Subtilisphaera terrula (Questionably present)

2160-2170m: Subtilisphaera perlucida Zone: Pilosisporites  
trichopapillosus Subzone (early Aptian)

2160-2170m      Pilosisporites crassangularis (+)  
                 Spongodinium sp. indet.

2190-2385m: Subtilisphaera perlucida Zone: Cyclonephelium  
attadalicum Subzone (early Aptian)

Comment: S. terrula may indicate an older Barremian age.

2190-2200m      Cyclonephelium attadalicum cf. (+)  
                 Subtilisphaera terrula (+)

2220-2230m      Cyclonephelium attadalicum (+) (Rare)

Comment: Possible Barremian at 2250m as indicated by corroded  
?P.pelliiferum.

2250-2260m      Cicatricosisporites angicanalis (?Reworked)  
                 Densoisporites triradiatus  
                 Pseudoceratium pelliiferum  
                 (Questionably present)

2305-2315m      Muderongia simplex  
                 Polystephanophorus schindewolfii

2375-2385m      Impardecispora splendida

2405-2880m: Aptea anaphrissa Zone (Barremian)

- 2405-2415m      Campenia #EA  
                 Pseudoceratium pelliiferum
- 2435-2445m      Callialasporites dampieri  
                 Systematophora turonica  
                 Taeniophora #EA
- 2465-2475m      Callialasporites monoalaspurus  
                 Callialasporites trilobatus  
                 Cometodinium #EA  
                 Trichodinium speetonense
- 2495-2505m      Aequitriradites conisimilis  
                 Aptea anaphrissa (+)  
                 Callialasporites turbatus  
                 Cicatricosisporites #EAL  
                 Cyclonephelium attadalicum (Common)  
                 Oligosphaeridium macrotubulum (+)
- 2525-2535m      Dapsilidinium chem
- 2555-2565m      Impardecispora apigranulosa  
                 Oligosphaeridium porosum  
                 Spiniferites dentatus
- 2585-2595m      Muderongia imparilis (Questionably present)
- 2615-2625m      Muderongia simplex microperforata (Common)

- 2645-2655m      Callialasporites monoalaspurus (Common)
- 2710-2720m      Plicatella #EP
- 2750-2760m      Aequitriradites verrucosus  
Cicatricosisporites sternum
- 2780-2790m      Muderongia simplex (Abundant)  
Occisucysta distincta (Questionably present)
- 2840-2850m      Callialasporites segmentatus  
Pareodinia ceratophora  
Triretilobata tribotrys
- 2870-2880m      Chasmatosporites major  
Cicatricosisporites exilioides Dorh '71  
Podocarpidites tricocca
- 2900-3000m: Ctenidodinium elegantulum Zone (Hauterivian)
- 2900-2910m      Alisporites thomasii (?Reworked)  
Muderongia staurota (+)  
Pseudoceratium gochtii (+)
- 2930-2940m      Cerebropollenites macroverrucosus  
(Questionably present)  
Muderongia tetracantha  
Pseudoceratium gochtii (Common)  
Rugubivesiculites #EA

Comment: Possible Valanginian at 2960m as indicated by C. macroverr. and C.globosus

2960-2970m      Cerebropollenites macroverrucosus (+)  
Cicatricosisporites #EAP  
Cicatricosisporites globosus (+)  
Endoceratium dettmanniae  
Muderongia mcWhaei (Questionably present)  
Surculosphaeridium sp. III

2990-3000m      Cassiculosphaeridia magna  
Occisucysta distincta (+)  
Occisucysta sp. indet. (+) (Present)  
Oligosphaeridium albertense  
Oligosphaeridium macrotubulum (Common)

3020-3630m: Phoberocysta neocomica Zone (Berriasian to Valanginian)

3020-3030m      Achomosphaera neptunii (+)  
Minerisporites #EA  
Oligosphaeridium djenn  
Oligosphaeridium heilongjianense  
Oligosphaeridium perforatum (+)  
Stiphrosphaeridium arbustum (+)  
Stiphrosphaeridium dictyophorum (+)

3050-3060m      Araucariacites punctatus  
Oligosphaeridium poculum  
Phoberocysta neocomica cruciformis (+)

3080-3090m      Alisporites thomasi  
Couperisporites complexus  
Dingodinium cerviculum  
Druggidinium sp. indet.



Impardecispora ivanoe (Questionably present)  
Kleithriasphaeridium #EA

3110-3120m      Phoberocysta neocomica convexa

Comment: Probable Berriasian at 3140m as indicated by Lanterna bulgarica.

3140-3150m      Lanterna bulgarica (+)  
                 Pilosisorites ericus (+)  
                 Podocarpidites herbtsii

3170-3180m      Gonyaulacysta diutina  
                 Hystriochodinium lanceatum  
   (Questionably present)

3200-3210m      Aequitriradites subverrucosus  
                 Breodoxiella #EB  
                 Corollina vignollensis  
                 Cribroperidinium granuligerum  
                 Lanterna sportula  
                 Leptodinium perforans (Questionably present)  
                 Muderongia sp. A (Questionably present)  
                 Occisucysta evittii  
                 Oligosphaeridium diluculum  
                 Striatella #EF

3220-3230m      Contignisorites cooksoniae  
                 Kleithriasphaeridium corrugatum  
                 Pityosporites #EA

3290-3300m      Cedripites #EA  
                 Cribroperidinium sepimentum  
                 Cymososphaeridium validum

Imbatodinium pomum  
Pseudoceratium pelliiferum (Common)

3320-3330m      Concavissimisporites #EL

Comment: Possible Portlandian at 3350m as indicated by C.  
globatum and P.dividuus.

3350-3360m      Cicatricosisporites reticicatricosus  
Cribroperidinium globatum (+)  
Hystriodinium lanceatum  
Imbatodinium micropodum  
Muderongia sp. A (+)  
Pityosporites dividuus (+)  
Tuberositriletes montuosus

3380-3390m      Cicatricosisporites purbeckensis  
(Questionably present)

3410-3420m      Couperisporites major

3440-3450m      Callialasporites infrapunctatus  
Cantulodinium speciosum (+)  
Endoscrinium pharo  
Millioudodinium jubaris (Questionably present)  
Sentusidinium cuculliiforme (+)

3470-3480m      Aequitriradites baculatus  
Cicatricosisporites grabowensis  
Cicatricosisporites undatus

3500-3510m      Rotverrusporites obscurilaesuratus  
Sentusidinium filiatum

3530-3540m      Hystrichogonyaulax cladophora (?Reworked)

Comment: Probable Portlandian at 3560m as indicated by M. deflandrei.

3560-3570m      Aequitriradites cooksonae  
Amphorula metaelliptica (+) (Common)  
Broomea simplex  
Dingodinium jurassicum  
Meiourogonyaulax deflandrei (+)  
Oligosphaeridium sp. I, Davey 1982 (Common)  
Pityosporites dividiuus (Common)  
Systematophora ovata  
Trilobosporites aequiverrucatus

3590-3600m      Cymososphaeridium #EA  
Subtilisphaera paeminosa  
(Questionably present)

3620-3630m      Varirugosisporites granituberosus

3650-3990m: Ctenidodinium panneum Zone (Portlandian)

3650-3660m      Cantulodinium #LA  
Exesipollenites scabratus  
Lanterna saturnalis  
Leptodinium mammiliferum (+)  
Polystephanophorus sarjeantii

3680-3690m      Ctenidodinium culmulum (+)  
(Questionably present)



4010-4110m: Hystrichogonyaulax cladophora Zone (Kimmeridgian)

4010-4020m      Cantulodinium #EA (+)  
                 Leptodinium aceras (+)  
                 Senoniasphaera jurassica (+)

4040-4050m      Saxosporis #EB

4070-4080m      Breodoxiella #EA  
                 Leptodinium hyalodermopsis  
                 Maculatisporites granulatus  
                 Mendicodinium groenlandicum

4100-4110m      Pilosporites sp. A (Questionably present)

4130-4625m: Adnatosphaeridium caulleryi Zone (Callovia to Oxfordian)

4130-4140m      Adnatosphaeridium caulleryi (+)  
                 Hystrichogonyaulax #EA (Questionably present)  
                 Hystrichogonyaulax cladophora  
                 Leptodinium aceras (+) (Common)  
                 Occisucysta aculeata (Questionably present)  
                 Varirugosisporites #EO

4160-4170m      Senoniasphaera jurassica (Common)

4190-4200m      Nummus #EX (Questionably present)

4250-4260m      Clavitriletes spp.

- 4280-4290m      Cometodinium #EB  
                 Ctenidodinium chondrum (Questionably present)  
                 Escharisphaeridia rudis (Common)  
                 Pilosisorites sp. A  
                 Systematophora areolata
- 4310-4320m      Polystephanophorus orbiferus (+)  
                 Saxosporis variabilis
- 4340-4350m      Klukisporites variegatus  
                 Occisucysta aculeata
- 4370-4380m      Systematophora fasciculigera
- 4400-4410m      Hystrichogonyaulax #EA (Questionably present)  
                 Lanterna spp. (Common)  
                 Leptodinium aceras (Common)
- 4460-4470m      Ctenidodinium chondrum
- Comment: Possible early Callovian at 4490m indicated by ?C. sellwoodii.
- 4490-4500m      Adnatosphaeridium caulleryi (Common)  
                 Ctenidodinium sellwoodii (?Reworked)  
                 Systematophora #EE
- 4555-4565m      Callialasporites obrutus  
                 Ctenidodinium pachydermum  
                 Leptodinium amabile  
                 Polystephanophorus orbiferus (+) (Common)

Sentusidinium erythrocomum

4585-4595m      Atopodinium prostratum (Questionably present)  
                 Diacanthum filapicatum (Questionably present)  
                 Epiplosphaera reticulospinosa  
                 Hystrichogonyaulax #EA

4645-5115m: Ctenidodinium sellwoodii Zone (Bathonian to early Callovian).

4645-4655m      Ctenidodinium sellwoodii  
                 Vastisporites vastiformis

4675-4685m      Senoniasphaera jurassica (Abundant)  
                 Systematophora #EB  
                 Tuberositriletes grossetuberculatus

4795-4805m      Varirugosisporites #EB

Comment: Below 4825m cavings, additives and corrosion inhibit precise age determination

Comment: Probable Bathonian as indicated by Diacanthum filapicatum at 4885m.

4885-4895m      Diacanthum filapicatum

4955-4965m      Ctenidodinium rotundum  
                 Limbodinium aspiatum  
                 Senoniasphaera jurassica (Common)

5015-5025m      Systematophora #EF





Comment: Possible Sinemurian at 5700m as indicated by ?Dapcodinium priscum.

5700-5710m      Dapcodinium priscum (+) (Questionably present)

5725-5735m      Dapcodinium coalitum (+)  
                 Dapcodinium semitabulatum (Common)

## APPENDIX A

Alphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Loc. Location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names	Index number	Taxon names
196	Acantharia spp.	7	Cribroperidinium quinceper
141	Achomosphaera neptuni	163	Cribroperidinium globatum
36	Achomosphaera ramulifera	209	Cribroperidinium granulosum
200	Adnatosphaeridium caulleryi	157	Cribroperidinium granuliferum
229	Alderia sp. indet.	165	Cribroperidinium sepimentum
47	Alterbia acuminata	96	Cribroperidinium sp. indet.
257	Amphorula HLA	37	Cribroperidinium wetzelii
179	Amphorula metacelliptica	80	Ctenidodinium HES
211	Amphorula sp. indet.	213	Ctenidodinium chondium
120	Aptea anaphrissa	193	Ctenidodinium culmulum
66	Aptea polymorpha	226	Ctenidodinium pachydermum
48	Apteodinium grande	181	Ctenidodinium pannicum
92	Apteodinium granulatum	277	Ctenidodinium rotundum
1	Areoligera senonensis	223	Ctenidodinium sellwoodii
49	Astrocysta HBA	247	Ctenidodinium sp. indet.
71	Astrocysta crotacea	106	Cyclonephelium attadalicum
230	Atopodinium prostratum	111	Cyclonephelium attadalicum cf.
67	Balausta tripartita	13	Cyclonephelium brevispinum
241	Bradleyella sp. indet.	158	Cyclonephelium dist. #Duiganticum
204	Breodexiella HBA	53	Cyclonephelium distinctum
156	Breodexiella HEB	40	Cyclonephelium distinctum brevispinum
180	Broomia simplex	73	Cyclonephelium eisenackii
39	Caddasphaera halosa	41	Cyclonephelium vannophorum
72	Callaosphaeridium asymmetricum	185	Cymososphaeridium HBA
27	Canningia ringnesiorum	166	Cymososphaeridium validum
203	Cantulodinium HBA	230	Dapcodinium coalitum
198	Cantulodinium HLA	245	Dapcodinium holotabulatum
171	Cantulodinium speciosum	249	Dapcodinium priscum
138	Cassiculosphaeridia magna	242	Dapcodinium semitabulatum
24	Ceratiopsis diebelii	122	Dapsilodinium chem
2	Ceratiopsis pannacea	8	Deflandrea phosphorica
3	Ceratiopsis speciosa speciosa	231	Diacanthum filapicatum
29	Chatangiella tripartita	248	Diacanthum sp. indet.
56	Chichaequadinium HEB	189	Dictyopyxidia areolata
101	Chichaequadinium Heminutum	149	Dingodinium cerviculum
89	Chichaequadinium davidii	181	Dingodinium jurassicum
57	Chichaequadinium vestitum	26	Dinogymnium acuminatum
190	Chorate dinoflagellate HBA	150	Druggidinium sp. indet.
90	Cleistosphaeridium aciculare	135	Endoceratium dettmanniae
62	Cleistosphaeridium huguoniotii	172	Endoscrinium pharo
119	Cometodinium HBA	64	Epelidosphaeridia spinosa
212	Cometodinium HEB	232	Epiplosphaera reticulospinosa
4	Cordosphaeridium cantharellum	214	Eucharisphaeridia rudis
5	Cordosphaeridium divergens	123	Escharisphaeridia spp.
6	Cordosphaeridium funiculatum	30	Exochosphaeridium bifidum
25	Coronifera oceanica	34	Exochosphaeridium striolatum
129	Corrudinium spp.	91	Florentinia cooksoniae
90	Cribroperidinium HES	67	Florentinia rosea
63	Cribroperidinium edwardsii	108	Gardodinium eisenackii
199	Cribroperidinium ehrenbergii	2	Glaphyrocysta exuberans
83	Cribroperidinium episomum	154	Genyaulacysta diutina

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

Index number	Taxon names	Index number	Taxon names
21	Hafniasphaera septata	219	Mummu, HX
155	Hysterochodinium lanceatum	243	Mummu, HEZ
42	Hysterochodinium pulchrum	76	Nyctericysta arachnion
207	Hysterochonyaulax HEA	97	Nyctericysta sp. indet.
177	Hysterochonyaulax cladophora	208	Occisucysta aculeata
26	Hysterochonyaulax howerbankii	130	Occisucysta distincta
57	Hysterochonyaulax difficile	167	Occisucysta evittii
197	Hysterochonyaulax spp.	124	Occisucysta evittii cf.
22	Hysterochonyaulax tubiferum	132	Occisucysta sp. indet.
233	Imbatioidinium bondatjevi	27	Odontochitina costata
167	Imbatioidinium microphidum	43	Odontochitina operculata
167	Imbatioidinium pomum	140	Oligosphaeridium albertense
19	Isabelidium belfastense	90	Oligosphaeridium asterigerum
31	Isabelidium biaperturum	33	Oligosphaeridium complex
14	Isabelidium coolsoniae	163	Oligosphaeridium diluatum
16	Isabelidium eretacum	102	Oligosphaeridium dividuum
54	Isabelidium moquum	142	Oligosphaeridium djenn
65	Kiofanium polypes	99	Oligosphaeridium fenestratum
75	Kiofanium williamsii	143	Oligosphaeridium heilongjiangense
151	Kleithriasphaeridium HEA	121	Oligosphaeridium macrotubulum
164	Kleithriasphaeridium corrugatum	144	Oligosphaeridium perforatum
114	Kleithriasphaeridium cornodes	107	Oligosphaeridium perforatum colum
55	Kleithriasphaeridium leffrense	147	Oligosphaeridium poculum
153	Lanterna bulgarica	124	Oligosphaeridium porosum
170	Lanterna saturnalis	44	Oligosphaeridium pulcherrimum
159	Lanterna sportula	183	Oligosphaeridium sp. f, Davey 1982
186	Lanterna spp.	178	Oligosphaeridium spp.
202	Leptodinium aceris	51	Oligosphaeridium totum minor
227	Leptodinium amabile	60	Oligosphaeridium totum totum
205	Leptodinium hyalodermopsis	100	Oligosphaeridium vasiiforme
191	Leptodinium mammiliiferum	74	Oodnadattia tuberculata
160	Leptodinium perforans	15	Operculodinium centrocarpum
213	Leptodinium sp. indet.	18	Operculodinium tiara
238	Limbodinium aspiatum	11	Palaeocystodinium gabonense
68	Luxadinium primum	45	Palaeohysterochophora infusorioides
69	Luxadinium propatulum	16	Palaeoperidinium pyrophorum
70	Luxadinium spp.	92	Palaeostomocysta fragilis
182	Meisouronyaulax deflandrei	33	Palynodinium grillator
93	Meisouronyaulax spp.	131	Pareodinia ceratophora
170	Meisouronyaulax stoveri	233	Pareodinia sp. C
206	Mendicodinium groenlandicum	221	Perissosphaeridium involutum
172	Milliodinium jubaris	12	Phelodinium tricuspe
85	Muderongia asymmetria	152	Phoberocysta neocomica convexa
126	Muderongia imparilis	143	Phoberocysta neocomica cruciformis
136	Muderongia m. Whaei	216	Polystephanophorus orbiferus
117	Muderongia simplex	122	Polystephanophorus sajoantri
127	Muderongia simplex microporifera	113	Polystephanophorus schindewolfii
161	Muderongia sp. A	77	Protoellipsodinium sp.
132	Muderongia stauraka	133	Pseudoceratium gecktii
134	Muderongia tetraactia	94	Pseudoceratium pelliiferum
246	Norocysta HEA	37	Pterodinium cingulatus

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

Index number	Taxon names
201	Senoniasphaera jurassica
61	Senoniasphaera microreticulata
46	Senoniasphaera rotundata
174	Sentusidinium cuculliforme
229	Sentusidinium erythronum
175	Sentusidinium filiatum
236	Sentusidinium sp. indet.
20	Silicisphaera ferox
78	Silicisphaera spp.
98	Spinidinium spp.
125	Spiniferites dentatus
17	Spiniferites ramosus ramosus
116	Spiniferites sp. indet.
110	Sponodinium sp. indet.
96	Stiphrosphaeridium #EA
52	Stiphrosphaeridium anthophorum
145	Stiphrosphaeridium arbustum
146	Stiphrosphaeridium dictyophorum
115	Stiphrosphaeridium sp. indet.
104	Subtilisphaera #EA
217	Subtilisphaera inaffecta
187	Subtilisphaera paucinos
102	Subtilisphaera per lucida
79	Subtilisphaera pirnaensis (Calyptra)
128	Subtilisphaera sp. indet.
109	Subtilisphaera terrella
54	Sarculosphaeridium longifurcatum
157	Sarculosphaeridium sp. III
176	Sarculosphaeridium sp. indet.
234	Systematophora #EB
224	Systematophora #EE
239	Systematophora #EF
215	Systematophora arcuolata
210	Systematophora fasciculigera
184	Systematophora ovata
225	Systematophora spp.
117	Systematophora tricornica
118	Tactiophora #EA
35	Triblastula utinensis
81	Trichodinium castaneum
105	Trichodinium speetonense
20	Trithyrodinium evittii
220	Tubotuberella rhombiformis
240	Valensiella vermiculata
244	Valvaodinium spp.
53	Xenascus ceratioides

## 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
5	Abiespollenites microreticulatus	57	Cicatricosisporites delicatus
142	Acanthotriletes varispinosus	144	Cicatricosisporites oxilioides Dorch '71
177	Aequitriradites baculatus	153	Cicatricosisporites globosus
126	Aequitriradites cognisimilis	179	Cicatricosisporites grabowensis
183	Aequitriradites cooksonae	192	Cicatricosisporites magnus
16	Aequitriradites spinulosus	91	Cicatricosisporites mohrioides
160	Aequitriradites subverrucosus	37	Cicatricosisporites potomacensis
125	Aequitriradites verrucosus	173	Cicatricosisporites purbeckensis
26	Ajatipollis sp. A	62	Cicatricosisporites purbeckensis cf.
190	Alisporites #EG	170	Cicatricosisporites reticatricosus
1	Alisporites bilateralis	67	Cicatricosisporites sp. indet.
27	Alisporites grandis	136	Cicatricosisporites sternum
146	Alisporites thomasi	70	Cicatricosisporites subrotundus
58	Aratrisporites #EG (spinate)	180	Cicatricosisporites undatus
46	Aratrisporites ocellatus	52	Clavatipollenites hughesii
6	Araucariacites australis	107	Clavatipollenites minutus
148	Araucariacites punctatus	53	Clavatipollenites rotundus
47	Asteropollis asteroides	208	Clavitriletes sp. indet.
178	Baculatisporites comamensis	168	Concavissimisporites #CL
31	Balmeisporites holodictyus	68	Concavissimisporites punctatus
32	Biretisporites potoniae	189	Concavissimisporites robustus
122	Callialasporites dampieri	137	Concavissimisporites variverrucatus
176	Callialasporites infrapunctatus	116	Concavissimisporites verrucatus
123	Callialasporites monolasporeus	163	Contignisporites cooksoniae
212	Callialasporites obrutus	216	Contignisporites dorsostriatus
140	Callialasporites segmentatus	202	Corollina chateaunovii
89	Callialasporites trilobatus	220	Corollina meyeriana
191	Callialasporites trilobatus cf.	38	Corollina torosa
127	Callialasporites turbatus	161	Corollina vignollensis
80	Camarozonosporites dakotensis	135	Coronatipora valdensis
3	Camarozonosporites insignis	130	Costatoperforosporites spp.
121	Campania #EA	155	Couperisporites complexus
167	Cedripites #EA	174	Couperisporites major
10	Cedripites canadensis	86	Crybelosporites pannucosus
11	Cerebropollenites #EC	48	Cupuliferopollenites minutus
149	Cerebropollenites macroverrucosus	19	Cupuliferopollenites psilatus
85	Cerebropollenites mesozoicus	4	Cyathidites australis
200	Chasmatosporites #EA	2	Cyathidites minor
143	Chasmatosporites major	91	Cycadopites carpentieri
17	Choanopollis #EA	39	Cycadopites nitidus
102	Cicatricosisporites #EA	20	Deltoidospora hallii
33	Cicatricosisporites #CAI	112	Densosporites microrugulatus
28	Cicatricosisporites #CAL	207	Densosporites sp. indet.
18	Cicatricosisporites #EAM	118	Densosporites triradiatus
152	Cicatricosisporites #EAP	101	Densosporites spp.
213	Cicatricosisporites #EO	82	Distaltriangulisporites irregularis
130	Cicatricosisporites abacus	103	Ephedripites sp. indet.
117	Cicatricosisporites angicanalis	40	Ephedripites sulcatus
129	Cicatricosisporites annulatus	59	Eucommiidites minor
36	Cicatricosisporites apicanalis	188	Exesipollenites scabratus
90	Cicatricosisporites australiensis	71	Exesipollenites tumulus

## APPENDIX A (cont'd)

Alphabetical Listing of Species Shown on Occurrence Chart:Pollen and Spores

Index number	Taxon names	Index number	Taxon names
133	Foveosporites foveoreticulatus	158	Pilososporites ericus
41	Foveotrilletes cubitriangularis	165	Pilososporites sp. A
63	Gleichmildites distalgranulatus	164	Pilososporites trichopapillosus
71	Gleichmildites geniculatus	150	Pilososporites verus
131	Impardecispora apigranulosa	7	Pinuspollenites spp.
87	Impardecispora apiverrucata	165	Pityosporites HEA
156	Impardecispora ivanovi	171	Pityosporites dividius
209	Impardecispora sp. indet.	177	Platysaccus megasaccus
120	Impardecispora splendida	217	Plicatella HEA
88	Ischyosporites amoebolus	134	Plicatella HEA
42	Ischyosporites disjunctus	8	Plicatella bifurcata
77	Ischyosporites estherae	66	Plicatella bilateralis
83	Klukisporites foveolatus	127	Plicatella cristata
186	Klukisporites pseudoreticulatus	98	Plicatella erdtmannii
211	Klukisporites variegatus	75	Plicatella jansonius
196	Kraeuselisporites HEA	128	Plicatella matesovae
147	Kraeuselisporites linearis	76	Plicatella potomacensis
157	Kraeuselisporites reisingeri	96	Plicatella problematica
29	Laevigatosporites ovatus	99	Plicatella pseudomacrorhiza
34	Laricoidites magnus	12	Plicatella sp. indet.
139	Leiotrilletes equicinus	23	Plicatella tricornitata
63	Leiotrilletes mecklenburgensis	100	Podocarpidites canadensis
169	Leiotrilletes spp.	109	Podocarpidites epistriatus
35	Liliacidites dividius	94	Podocarpidites granulatus
92	Liliacidites peroreticulatus	159	Podocarpidites herbstii
95	Liliacidites sp. indet.	14	Podocarpidites potomacensis
132	Lycopodiumsporites austroclavitudines	166	Podocarpidites sp. indet.
104	Lycopodiumsporites columenensis	145	Podocarpidites tricoeca
54	Lycopodiumsporites marginatus	79	Polycingulatisporites triangularis
197	Lycopodiumsporites singhii	61	Psilatricolpites parvus
174	Maculatisporites dangardtensis	43	Retitricolpites vulgaris
204	Maculatisporites granulatus	182	Retiverrusporites obscurilaesuratus
154	Minerisporites HEA	101	Rouseisporites euskirchenoides
222	Moesidinium raileanui	24	Rouseisporites radiatus
64	Neoraistrickia truncata	44	Rouseisporites reticulatus
72	Nodosisporites costatus	151	Rugubivesiculites HEA
65	Nodosisporites stellantis	56	Rugubivesiculites minimus
124	Nummus spp.	9	Rugubivesiculites reductus
84	Ornamentifera echinata	15	Rugubivesiculites rugosus
119	Osmundacidites major	203	Saxosporites HEA
78	Osmundacidites wellmannii	210	Saxosporites variabilis
105	Ovoidinium scabrosum	173	Scortea tecta
125	Parvisaccites HEA	111	Sestrosporites pseudoalveolatus
60	Parvisaccites amplius	221	spore indet.
12	Parvisaccites hortensis	108	Stellatopollis HEA
93	Parvisaccites radiatus	50	Stellatopollis barghoorni
49	Penetetrapites mollis	45	Stereosporites antiquasporites
22	Perinopollenites elatoides	30	Stereosporites clavus
73	Phyllocladites inchoatus	162	Striatella HEA
74	Phyllocladites rugulatus	175	Taurocusporites reduncus
115	Pilososporites crassangularis	25	Taxodiaceapollenites hiatus

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

Index number	Taxon names
110	Tricolpopollenites micromunus
184	Trilobosporites acquiverrucatus
193	Trilobosporites acornatus
55	Trilobosporites humilis
114	Trilobosporites humilis, f.
106	Trilobosporites waylandii
97	Triretilobata marylandensis
141	Triretilobata tribotrys
213	Tuberositriletes grossetuberculatus
201	Tuberositriletes major
172	Tuberositriletes montuosus
113	Tuberositriletes sp. indet.
218	Varirugosisporites HED
200	Varirugosisporites HED
187	Varirugosisporites granituberosus

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
1	foraminiferal liners
4	Microthallites spp.
2	Schizosporis parvus
3	Schizosporis reticulatus

Reworked Palynomorphs

## Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names
3	*Adnatosphaeridium caulleryi
1	*Cicatricosisporites spp.
2	*Subtilisphaera pirnaensis (kalyptra)



APPENDIX BExamined Samples: Uniacke G-72

925.00 : cuttings	2615.00 : cuttings	4310.00 : cuttings
955.00 : cuttings	2645.00 : cuttings	4340.00 : cuttings
985.00 : cuttings	2675.00 : cuttings	4370.00 : cuttings
1015.00 : cuttings	2710.00 : cuttings	4400.00 : cuttings
1045.00 : cuttings	2750.00 : cuttings	4430.00 : cuttings
1075.00 : cuttings	2780.00 : cuttings	4460.00 : cuttings
1105.00 : cuttings	2810.00 : cuttings	4490.00 : cuttings
1135.00 : cuttings	2840.00 : cuttings	4520.00 : cuttings
1165.00 : cuttings	2870.00 : cuttings	4555.00 : cuttings
1195.00 : cuttings	2900.00 : cuttings	4585.00 : cuttings
1225.00 : cuttings	2930.00 : cuttings	4615.00 : cuttings
1255.00 : cuttings	2960.00 : cuttings	4645.00 : cuttings
1285.00 : cuttings	2990.00 : cuttings	4675.00 : cuttings
1315.00 : cuttings	3020.00 : cuttings	4705.00 : cuttings
1345.00 : cuttings	3050.00 : cuttings	4735.00 : cuttings
1375.00 : cuttings	3080.00 : cuttings	4765.00 : cuttings
1405.00 : cuttings	3110.00 : cuttings	4795.00 : cuttings
1435.00 : cuttings	3140.00 : cuttings	4825.00 : cuttings
1465.00 : cuttings	3170.00 : cuttings	4855.00 : cuttings
1495.00 : cuttings	3200.00 : cuttings	4885.00 : cuttings
1525.00 : cuttings	3220.00 : cuttings	4925.00 : cuttings
1555.00 : cuttings	3260.00 : cuttings	4955.00 : cuttings
1585.00 : cuttings	3290.00 : cuttings	4985.00 : cuttings
1615.00 : cuttings	3320.00 : cuttings	5015.00 : cuttings
1645.00 : cuttings	3350.00 : cuttings	5045.00 : cuttings
1675.00 : cuttings	3380.00 : cuttings	5075.00 : cuttings
1700.00 : cuttings	3410.00 : cuttings	5105.00 : cuttings
1730.00 : cuttings	3440.00 : cuttings	5135.00 : cuttings
1760.00 : cuttings	3470.00 : cuttings	5165.00 : cuttings
1790.00 : cuttings	3500.00 : cuttings	5195.00 : cuttings
1820.00 : cuttings	3530.00 : cuttings	5215.00 : cuttings
1850.00 : cuttings	3560.00 : cuttings	5229.29 : core
1880.00 : cuttings	3590.00 : cuttings	5235.29 : core
1910.00 : cuttings	3620.00 : cuttings	5241.60 : core
1940.00 : cuttings	3650.00 : cuttings	5248.00 : core
1970.00 : cuttings	3680.00 : cuttings	5250.00 : cuttings
2000.00 : cuttings	3710.00 : cuttings	5275.00 : cuttings
2030.00 : cuttings	3740.00 : cuttings	5305.00 : cuttings
2070.00 : cuttings	3770.00 : cuttings	5335.00 : cuttings
2100.00 : cuttings	3800.00 : cuttings	5365.00 : cuttings
2130.00 : cuttings	3830.00 : cuttings	5400.00 : cuttings
2160.00 : cuttings	3860.00 : cuttings	5430.00 : cuttings
2190.00 : cuttings	3890.00 : cuttings	5465.00 : cuttings
2220.00 : cuttings	3920.00 : cuttings	5495.00 : cuttings
2250.00 : cuttings	3950.00 : cuttings	5525.00 : cuttings
2275.00 : cuttings	3980.00 : cuttings	5550.00 : cuttings
2305.00 : cuttings	4010.00 : cuttings	5580.00 : cuttings
2335.00 : cuttings	4040.00 : cuttings	5610.00 : cuttings
2375.00 : cuttings	4070.00 : cuttings	5640.00 : cuttings
2405.00 : cuttings	4100.00 : cuttings	5670.00 : cuttings
2435.00 : cuttings	4130.00 : cuttings	5700.00 : cuttings
2465.00 : cuttings	4160.00 : cuttings	5725.00 : cuttings
2495.00 : cuttings	4190.00 : cuttings	
2525.00 : cuttings	4220.00 : cuttings	
2555.00 : cuttings	4250.00 : cuttings	
2585.00 : cuttings	4280.00 : cuttings	