Palynological analysis of sidewall cores from Fenton Creek-1, Port Campbell Embayment Otway Basin.

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Summary

Twenty-five sidewall core samples were analysed in Fenton Creek-1 with the focus of the palynological investigation concentrated on the Upper Cretaceous Sherbrook Group. Only two samples of Albian age ~~was~~ were analysed from the underlying Eumeralla Formation. The palynological zones, their ages and suggested correlations to established stratigraphic units are summarised in the following Table 1.

Additional interpretative data on all samples including zone identification and Confidence Ratings are recorded in Table 2, whilst basic data on sidewall core lithologies, visual residue yields, preservation and species diversity are recorded on Table 3. Counts of the assemblages are presented on Table 4 and distribution of all identified palynomorphs are presented on the accompanying range chart.

Materials and Methods

The palynological slides were prepared in the Santos Ltd palynological laboratory and received by the author in two batches on the 7th and 13th May 1997. Provisional reports were submitted on the 8th and 15th May. For most samples the oxidised slides separated using 1.65 specific gravity zinc bromide were the only slides both scanned and counted. The counts were mostly made under a x40 objectives to be confident of picking up all specimens of the smaller palynomorphs. On some samples, where the residue were sparsely or unevenly distributed on the slides, it was necessary to partially count the slides using a x25 objective. The counts were all terminated when just over 100 specimens of spores and pollen had been counted. Only on the slides with the best preservation and concentration of specimens are significantly larger counts provided. The counts give a good approximation of the changes in the abundance of the major species groups in the assemblages but are only considered accurate to ±5%.

Although the calculated yield from processing was mostly low the ~~visual~~ visible yield of residue on the palynological slides was overall moderate to high, certainly sufficient to record high diversity spore-pollen assemblages and moderate diversity microplankton assemblages from most of the samples. Palynomorph preservation was somewhat variable but mostly fair. Recorded spore-pollen diversity ranged from 17 to 44 species and averaged 29+ species per sample over the whole section, while recorded microplankton diversity ranged 4 to 21 species and averaged 10+ species per sample through the Sherbrook Group (Table 3).

Table–1: Palynological summary for Fenton Creek–1

AGE	LITHOLOGICAL UNIT	SPORE–POLLEN ZONES (Subzones)	MICROPLANKTON ZONES (Subzones)
EARLY EOCENE TO LATE PALEOCENE	PEMBER MUDSTONE 799–832.5m	NOT SAMPLED	NOT SAMPLED
LATE PALEOCENE	PEBBLE POINT FORMATION 832.5–851.5m	NOT SAMPLED	NOT SAMPLED
DANIAN TO MAASTRICHTIAN	K/T BOUNDARY SHALE 851.5–862m	NOT SAMPLED	NOT SAMPLED
MAASTRICHTIAN	WIRIDJIL FORMATION 862–893.5m	NOT SAMPLED	NOT SAMPLED
MAASTRICHTIAN to CAMPANIAN	Undifferentiated TIMBOON SAND and PAARATTE FORMATION 893.5–1198.5m	*N. senectus* and *F. sabulosus* Subzone 1118m	*N. aceras* 1118m
SANTONIAN	SKULL CREEK MUDSTONE 1198.5–1324m	Upper *T. apoxyexinus* 1320m	*I. cretaceum* and *I. rotundatum* Subzone 1320m
SANTONIAN	NULLAWARRE GREENSAND 1324–1417m	NOT SAMPLED	NOT SAMPLED
SANTONIAN to CONIACIAN	BELFAST MUDSTONE 1417–1524.5m	Upper *T. apoxyexinus* 1422m *P. mawsonii* 1498.5-1520m	*I. cretaceum* 1422m *I. balmei* Subzone 1498.5-1520m
TURONIAN	FLAXMAN FORMATION 1524.5–1552.5m including Banoon Member 1524.5–1527m	*P. mawsonii* 1524–1549m *G. ancorus* Subzone 1524–1543m	*P. infusorioides* 1524–1549m *K. polypes* Subzone 1524–1549m
TURONIAN	WAARRE FORMATION 1552.5–1655m Subdivided into Unit C 1552.5m–1612.5m Unit B 1612.5–1624m Unit A 1624–1655m	*P. mawsonii* 1566–1654m *L. musa* Subzone 1566–1567m *H. trinalis* Subzone 1622–1654m	*P. infusorioides* 1566–1654m *I. evexus* Subzone 1566–1567m *C. edwardsii* Acme 1622–1654m
LATE ALBIAN	EUMERALLA FORMATION 1655–1840m	*P. pannosus* 1790.5–1810m	Indeterminate Non-marine

T.D. 1840m

Geological Comments

1. The sequence sampled in Fenton Creek-1, with minor modifications, can be readily assigned to the Mesozoic spore-pollen and microplankton zones defined by Helby *et al.* (1987) with further resolution provided by subzones recognised by McMinn (1988) and Partridge (1997). The time interval sampled is from the Late Albian to Early Campanian.

2. The spore-pollen zones identified conform to the succession in the Otway Basin first established by Dettmann & Playford (1969), and modified by Helby *et al.* (1987), except that the *P. mawsonii* Zone can now be demonstrated to extend to the base of the Waarre Formation. The *A. distocarinatus* Zone originally established by Dettmann & Playford (1969) and subsequently redefined by Helby *et al.* (1987) is considered to be absent at the unconformity between the Waarre and Eumeralla Formations. This latter result confirms recent review work in the Port Campbell Embayment where the index species *Clavifera triplex* and *Phyllocladidites mawsonii* have been found in all examined wells to range to the base of the Waarre Formation (Partridge, 1996a;1997).

   The implications of this discovery is that all sections assigned to the *A. distocarinatus* Zone in the Otway Basin actually belongs to the *P. mawsonii* Zone and consequently there are no sediments of proven Cenomanian age currently recognised in the Otway Basin. In manuscripts currently in preparation it is proposed to abandon the use of the *A. distocarinatus* Zone and replace it with the *Hoegisporis uniforma* Zone for the revised "Cenomanian" concept of the zone as redefined by Helby *et al.*, (1987).

   In many wells in the Otway Basin the top of *A. distocarinatus* Zone, which has usually been picked at the youngest occurrence of *Appendicisporites distocarinatus*, approximates the top of the new *H. trinalis* Subzone. This stratigraphic level corresponds to about the last or youngest **consistent**, frequent to common occurrences of *A. distocarinatus*. Unfortunately, sporadic, inconsistent and rare occurrences of *A. distocarinatus* are recorded as high as the top of the new *G. ancorus* Subzone as has been recorded in this well. These latter records are the reason why the previously recorded tops for the *A. distocarinatus* Zone is often irregular or time diachronous with respect to log correlations and stratigraphic units. Many of these younger records are believed to represent reworked specimens.

3. Marine microplankton first appear in Fenton Creek-1 in the basal sample analysed from the Waarre Formation and thereafter are found in all samples analysed from the Sherbrook Group. It is therefore reasonable to conclude (with the exception perhaps of some of the sands) that the entire Sherbrook Group was deposited in marine environments. Except for the low diversity microplankton assemblage recorded at 1200m all samples from the Sherbrook Group were successfully assigned to microplankton zones.

4. Commencing from total depth the oldest unit penetrated in Fenton Creek-1 is the Eumeralla Formation at the top of the Otway Group. The two deep sidewall cores at 1790m and 1810m both gave typical Eumeralla assemblages which are assigned to the *P. pannosus* Zone. As no microplankton were identified in either sample both are considered to represent deposition in fluviatile environments. The 12 sidewall cores recovered between 1790m and top of the formation were either barren or gave only low palynomorph recoveries and were not analysed for this report.

5. The log pick for the top of the Eumeralla Formation at 1655m lies immediately below the first good assemblage from the Waarre Formation at 1654m. The occurrence of marine dinoflagellates immediately above the top of Otway unconformity (in this case one metre above) is consistent with all other wells in the Otway Basin where there is close sampling across this unconformity. The final erosion on this surface, prior to deposition of the marine Waarre Formation, is therefore interpreted as a classic ***plain of marine denudation*** (Bates & Jackson, 1987; p.507).

6. The 102 metre thick Waarre Formation identified between 1552.5-1655m is subdivided into the three units recognised by Buffin (1989) using both electric logs and palynological data. Unit A, containing the basal sands is identified between 1624-1654m while Unit B is considered to be restricted to the shale between 1612.5-1624m. The palynomorph assemblages from these two units are dominated by spores with different species prominent in each of the samples. The samples also contain frequent to common marine dinoflagellate assemblages (average 7% of combined SP and MP counts) which are of low diversity. Overall the environment of deposition is marine but probably near shore and shallow water with possibly some lagoonal or estuarine environments near the base of the section. Units A and B belong to the new *H. trinalis* Subzone of the *P. mawsonii* spore-pollen Zone and the new *C. edwardsii* Acme of the *P. infusorioides* microplankton Zone both of which are assigned an early Turonian age.

7. A 60 metre thick Unit C of the Waarre Formation is identified between 1552.5–1612.5m but only the two closely spaced claystone sidewall core samples at 1566m and 1567m were analysed for palynology. The recorded assemblages are assigned to the new *L. musa* spore-pollen Subzone and *I. evexus* microplankton Subzone and both are dominated by the enigmatic microplankton or algal cyst *Amosopollis cruciformis* which averages 37% of total assemblage count. This cyst has been found in abundance associated with both marine dinoflagellates in the Otway Basin and with the endemic non-marine algal cyst assemblages found in the Turonian large lakes of the Gippsland and Bass Basins (Marshall, 1989; Partridge, 1996b). In Fenton Creek-1 deposition of the shale unit between 1564–1568m is interpreted to have occurred in a very shallow marine to brackish marginal marine environment. Relative to the underlying Units A and B, and the overlying Flaxman Formation, Unit C is more regressive in character. This is consistent with its higher sand ratio.

   It is also tentatively suggested that Unit C can be subdivided into Unit Ca between 1594–1612.5m and Unit Cb between 1552.5–1594m following Partridge (1997). If Fenton Creek-1 behaves like other wells the LAD of *Hoegisporis trinalis* n.sp. should occur in one or all of the thin shale beds at 1586m, 1603m and 1605m and a sequence boundary could be placed at 1585m.

8. A 28 metre thick Flaxman Formation is identified in Fenton Creek-1 between 1524.5–1552.5m. All samples gave palynological assemblages which are confidently assigned to the middle part of the *P. mawsonii* Zone and upper part of the *P. infusorioides* microplankton Zone. They can be more precisely assigned to the new *K. polypes* microplankton Subzone. The equivalent new *G. ancorus* spore-pollen Subzone is however only confidently identified between 1524–1543m. Both subzones provide confident biostratigraphic correlation to the recently reviewed and revised type section of the Flaxman Formation in Port Campbell-2 (Partridge, 1996a; Kelly & Partridge, 1997).

9. A 2.5 metre thick sandstone identified between 1524.5–1527m at the top of the Flaxman Formation, based on sidewall core lithology and the electric logs, is assigned to the Banoon Member recently proposed by Kelly & Partridge (1997). Palynology supports a correlation to the type section of the Banoon Member in Flaxman-1 based on the presence of the characteristic *Cupressacites* pollen spike (Kelly & Partridge, 1997). The sidewall cores at 1524m and 1526.5m which are described as "dark greenish

grey sandstone" will however need to be checked by petrology to confirm whether they contain authigenic chamosite and goethite considered diagnostic of this new member (Kelly & Partridge, 1997). The shallower sample at 1524m lies above the log pick for the top of the member. This may reflect a slight inaccuracy in the sampling depth or could be interpreted as reworking at the base the Belfast Mudstone. The latter is suggested by the mutual occurrence of *Kiokansium polypes* and *Valensiella griphus* in an assemblage dominated by *Trithyrodinium* sp., a species which is considered more typical of the overlying *I. balmei* Subzone.

10. A 107 metre thick Belfast Mudstone is identified between 1417–1524m based on biostratigraphic criteria established by Partridge (1996a). The three samples analysed confirm a Coniacian age at the base and a Late Santonian age at the top. In biostratigraphic terms the two deepest samples between 1498.5–1520m are assigned to the *I. balmei* Subzone of the *C. striatoconus* microplankton Zone as identified by McMinn (1988). Unfortunately the eponymous species for both the *C. striatoconus* Zone and the new *C. vultuosus* spore-pollen Subzone were not recorded in either sample. Above these two samples is a ~100m sampling gap before the sample at 1422m near the top of the formation which is assigned to the *I. cretaceum* microplankton Zone and Upper *T. apoxyexinus* spore-pollen Zone. The Upper subdivision of the latter zone is based on the increase in *Proteacidites* species abundance which is similar to that found in the type section of the Belfast Mudstone in Port Campbell-1 (Partridge, 1996a).

    The Belfast Mudstone could not be confidently subdivided on the limited palynological sampling available, however it possible that the gamma/sonic spike at 1458m could represent a significant boundary in the formation which may correlate to the sequence boundary at the top of the informal Morum Member recognised in the Gambier Embayment (Partridge, 1997). The sonic spike and more subtle gamma change at 1452m may also be significant.

11. A 93 metre thick Nullawarre Greensand is identified on the electric logs between 1324–1417m but unfortunately was not analysed. This is overlain by a 125 metre thick Skull Creek Mudstone (GSV, 1995) between 1198.5–1324m which is sampled near its base and top. The occurrence of the new *I. rotundatum* microplankton Subzone of the *I cretaceum* Zone at the base of the formation is consistent with current data in other wells. The base of the overlying *N. aceras* microplankton is also known from other wells to lie within the Skull Creek Mudstone but precisely where is uncertain. The

sample at 1200m unfortunately does not help as key species were not found in a moderate diversity spore-pollen assemblage. Overall very little detailed palynological work has been undertaken at this stratigraphic level in the Sherbrook Group within the Port Campbell Embayment because of a current emphasis on detailed sampling of the older formations.

12. The shallowest sample analysed in Fenton Creek-1 at 1118m is from within the Paaratte Formation and is Early Campanian in age (*N. senectus* and *N. aceras* Zones). Unfortunately lack of palynological control and the overall similarity in the electric log signature makes it difficult to distinguish the Paaratte Formation from the overlying Timboon Sand so therefore this interval is left undifferentiated.

Biostratigraphy

The zone and age determinations are based on the Australia wide Mesozoic spore-pollen and microplankton zonation schemes described by Helby *et al.* (1987) with further resolution provided by the subzones recognised by McMinn (1988) and Partridge (1997). Author citations for most spore-pollen species can be sourced from Helby *et al.* (1987), Dettmann (1963), Stover & Partridge (1973) or other references cited herein, whilst author citations for dinoflagellates can be found in the index of Lentin & Williams (1993). Species names followed by "ms" or "n.sp." are unpublished manuscript names.

SPORE-POLLEN ZONES

***Nothofagidites senectus* spore–pollen Zone**
***Forcipites sabulosus* spore-pollen Subzone**
Sample at: 1118.0 metres.
Age: Early Campanian.
This angiosperm dominated assemblage with abundant *Proteacidites* spp. (37%) is assigned to the *N. senectus* Zone on the frequent occurrence *Forcipites sabulosus* (~4%). The frequent to common occurrence of the latter species and absence of *Gambierina rudata* defines the *F. sabulosus* Subzone within the lower part of the *N. senectus* Zone.

The sample at 1200m unfortunately only gave a small residue yield. Although a moderate diversity spore-pollen assemblage was recorded the absence of key index species means the sample can only be assigned to the interval of the *N. senectus* to *T. apoxyexinus* Zones.

Environment of deposition of both samples is considered marine although probably shallow water and near-shore.

***Tricolporites apoxyexinus* spore-pollen Zone**
Interval: 1320.0–1422.0 metres.
Age: Late Santonian.
Two samples are assigned to this zone on the occurrence of *Tricolporites apoxyexinus* in both samples, presence of *Ornamentifera sentosa* in the shallower sample, and absence of younger index species. The significant abundance of *Proteacidites* spp. in both samples (average 10%) suggests a position high in the spore-pollen zone and this is confirmed by the associated microplankton which are assigned to the *I. cretaceum* microplankton Zone. Aside from being characterised by an overall increase in angiosperm pollen (average 25%) both samples have abundant bisaccate pollen assigned to *Podocarpidites/Alisporites* spp. (average 24%) and common *Gleicheniidites/Clavifera* spores (average 12%).

Both samples contain common microplankton of moderate diversity and are likely to have been deposited in an offshore marine environment in moderate water depths (~mid to outer shelf).

***Phyllocladidites mawsonii* spore-pollen Zone**
Interval: 1498.5-1654.0 metres.
Age: Coniacian–Turonian.
Nineteen samples over an interval of 155+ metres are assigned to the *P. mawsonii* Zone in the lower third of the Sherbrook Group in Fenton Creek-1. The index species *Phyllocladidites mawsonii* is very rare and recorded from only the lowest 2 of the 5 deepest samples, but is consistent, varying from rare to common, in the 14 shallowest samples. *Clavifera triplex* the index species originally proposed by Dettmann & Playford (1969) for this zone interval is also recorded from 2 of the 5 deepest samples and 9 of the next 14 samples. It tends to be rarer than *P. mawsonii* in the assemblages. Further details of these assemblages are discussed under the new subzones.

***Gleicheniidites ancorus* spore-pollen Subzone**
Interval: ?1498.5m to 1524.0–1543.0m to ?1549.0 metres.
Age: Late Turonian to Coniacian?.
The *G. ancorus* Subzone is the interval between the last consistent and frequent occurrence of *Laevigatosporites musa* n.sp. (which is also approximately the local FAD of *Gleicheniidites ancorus* n.sp.) to the FAD of *Clavifera vultuosus* n.sp. This new subzone is confidently recognised in the Flaxman Formation between 1524–1543m on the presence of the *Gleicheniidites ancorus* n.sp. The eponymous species was not found in the three deepest samples from the between 1544.5-1549m and

it is dubious whether the two samples from the basal Belfast Mudstone which contain *G. ancorus* but lack *Clavifera vultuosus* n.sp. should be assigned to this zone. The upper part of the subzone between 1524–1530m is also characterised by an common *Cupressacites* pollen (7% to 14%). The continued presence of *Rugulatisporites admirabilis* ms and rare specimens of *Appendicisporites distocarinatus* are considered as secondary features characteristic of this subzone. The rare occurrences of *Laevigatosporites musa* ms at 1533.5m, 1543m and 1548m are considered atypical.

The composition of all assemblages from the upper part of the *P. mawsonii* Zone between 1498.5m to 1549m is also distinctive. With exception of low yielding sample at 1538m all samples are dominated by gymnosperm pollen (average 64%). The most conspicuous increase is in the abundance of *Araucariacites* and *Dilwynites* pollen which combined average 26% of the spore-pollen count through this interval. Based on work in the Gippsland Basin were high counts of *Dilwynites* pollen correlate directly to high microplankton abundances (Partridge, 1989) it is empirically deduced that high *Dilwynites* and *Araucariacites* abundances in marine or lacustrine assemblages are a manifestation of a "Neves Effect" on the assemblages (Traverse, 1988: p.413). This suggests that the Flaxman Formation and basal Belfast Mudstone in Fenton Creek–1 have been deposited in distal offshore environments, which may also have been fairly deep. These observations are consistent with the higher microplankton abundances and species diversities over this interval in Fenton Creek–1.

Laevigatosporites musa spore–pollen Subzone

Interval: 1566–1567.0 metres.

Age: Mid? Turonian.

The *L. musa* Subzone is defined as the interval between the LAD for *H. trinalis* ms and the last consistent appearances of *Laevigatosporites musa* ms within the *P. mawsonii* Zone. In Fenton Creek–1 only the two closely spaced samples at 1566m and 1567m are assigned to the subzone. The assemblages are dominated by *Podocarpidites/Alisporites* spp. (~27%), *Cyathidites* spp. (19%) and *Gleicheniidites* spp. (11%). Contrast also the dominance of gymnosperm pollen in these two samples (average 57%) with the dominance of spores (average 68%) in the count of the samples from the underlying *H. trinalis* Subzone (Table 4).

In the Port Campbell Embayment this zone is found in the upper part of the Unit C of the Waarre Formation. Unfortunately definition of the top of the subzone is somewhat problematical as it is obscured by poor sampling associated with the unconformity and major facies change between the Waarre and Flaxman Formations.

Hoegisporis trinalis spore-pollen Subzone

Interval: 1622.0–1654.0 metres.

Age: Early? Turonian.

The *H. trinalis* Subzone is defined as the interval from the LAD of *Hoegisporis uniforma* to the LAD of *H. trinalis* ms. It is recorded in the five deepest samples from the Sherbrook Group in Fenton Creek–1 over an interval of 32 metres. The zone is characterised by the rare but consistent occurrences of the eponymous species in each sample together with consistent occurrences of *Appendicisporites distocarinatus* (in all samples), *Rugulatisporites admirabilis* ms (in 4 of 5 samples) and *Laevigatosporites musa* ms (in 3 of 5 samples). The presence of very rare specimens of *Phyllocladidites mawsonii* at 1650.5m and 1654m and *Clavifera triplex* at 1650.5m and 1635m confirms that the interval still belongs to the *P. mawsonii* Zone.

The assemblages have similar compositions on counts being dominated by the species groups *Gleicheniidites* (average 20%), *Cyathidites* (average 18%), *Podocarpidites/Alisporites* (average 11%) and *Araucariacites/Dilwynites* (average ~9%). The consistent high abundance of *Gleicheniidites* (from 6% to 44%) is a key compositional feature which distinguishes assemblages from the basal Sherbrook Group from those of the underlying Eumeralla Formation. Average spore-pollen diversity in the subzone is 35+ species with a total species diversity of 50+ species.

The *H. trinalis* Subzone has previously been documented from Units A, B and basal part of Unit C of the Waarre Formation (Partridge, 1994).

Pimopollenites pannosus spore-pollen Zone.

Interval: 1790.5–1810.0 metres

Age: Late Albian.

The two sample analysed from the Eumeralla Formation gave very low yield, spore dominated residues in which *Cyathidites* spp. (34%), and *Baculatisporites/ Osmundacidites* spp. (25%) were the dominant species complexes. The gymnosperm pollen were dominated by *Alisporites/Podocarpidites* spp. (17%) with *Corollina* spp. showing a secondary but distinct abundance averaging ~4%. This latter species abundance has proved to be a key difference in distinguishing between assemblages from the Eumeralla and Waarre Formation even in spore dominated assemblages like those found near the base of the latter formation in Fenton Creek–1. In this well fortunately the samples can be confidently assigned to the *P. pannosus* Zone on the rare presence of the eponymous species.

MICROPLANKTON ZONES

Nelsoniella aceras microplankton Zone.

Sample at 1118 metres.

Age: Early Campanian.

The shallowest samples analysed can be assigned to the *N. aceras* Zone on the presence of a single specimen of the eponymous species. Other species in the low diversity microplankton assemblage are not considered zone diagnostic. The underlying sample at 1200m also contains a low diversity microplankton assemblage which potentially could belong to this zone.

Isabelidinium cretaceum microplankton Zone.

Interval: 1320.0–1422.0 metres. Sample [illegible] 1320m –

Age: Late Santonian.

Multiple specimens of the eponymous species recorded from both samples confirm the zone assignment. The samples also contain a variety of morphologically related types many of which have been assigned to new subspecies by Marshall (1984). Most significant is *Isabelidinium belfastense* subsp. *rotundatum* which is here considered to be a separate species whose FAD defines the base of the new *I. rotundatum* Subzone. This subzone has previously been recorded from the Nullawarre Greensand and base of the overlying Skull Creek Mudstone (eg. Partridge, 1994), as is the case in Fenton Creek-1. Other subspecies recorded were *I. cretaceum* subsp. *contractum* and *I. cretaceum* subsp. *elongatum*, which were both found in the deeper sample. Although the *Isabelidinium* species show the most diversity, *Heterosphaeridium* species tend to dominate the assemblages counts.

Isabelidinium balmei microplankton Subzone.

Interval: 1498.5–1520.0 metres.

Age: Coniacian.

The *Isabelidinium balmei* Interval Subzone was erected as a subzone of the *C. striatoconus* Zone by McMinn (1988) for the interval from the FAD for *I. balmei* to the FAD for *Gillinia hymenophora* and was considered to lie within the total range of *C. striatoconus*. In Fenton Creek-1 the two samples assigned to this zone contain *I. balmei* but lack *C. striatoconus* even though all slides from the two samples were searched. The samples may therefore be considered equivalent to the *C. striatoconus* Zone or may represent a previously unrecorded and slightly older interval in the Otway Basin between the FAD of *I. balmei* to the FAD *C. striatoconus*. Supporting the latter proposition is the lack of the spore *Clavifera vultuosus* n.sp. which on recent work in the Otway Basin appears to have a similar FAD to *C. striatoconus*. In Dunbar-1 the nearest well to Fenton Creek-1, containing the *C. striatoconus* Zone, the eponymous species of the latter zone occurs with both *C. vultuosus* and *I. balmei* in a lower sample but *I. balmei* is missing from the association in an upper sample (Partridge, 1995). These differences in species associations may represent real range differences, or may just reflect serendipidous factors of sampling and palynology processing. Because of this uncertainty it is considered best to refrain from assigning the two samples in Fenton Creek-1 to the *C. striatoconus* Zone.

Palaeohystrichophora infusorioides **microplankton Zone.**
Interval: 1524–1654.0 metres.
Age: Turonian.
Although the seventeen samples assigned to this zone only showed low diversity in the Waarre Formation (average 6+ species per sample) and moderate diversity in the Flaxman Formation (average 14+ species per sample) the total diversity over the interval is high with 40+ species recorded.

The zone was originally defined on negative criteria of the absence of the index species for the underlying and overlying zones (Helby *et al.*, 1987; p.62). In Fenton Creek-1, as in other wells in the Otway Basin, the characteristic species of the underlying Cenomanian *D. multispinum* Zone are not found. Such species looked for and not found included *Diconodinium multispinum, Pseudoceratium ludbrookiae, Litosphaeridium siphoniphorum* and *Canninginopsis denticulata*. The top of the zone is usually better defined as *Conosphaeridium striatoconus*, the index species for the overlying zone, has been recorded from wells in the Otway Basin, although not in this well. Within the *P. infusorioides* Zone in Fenton Creek-1 three subzones are recognised as described below:

Kiokansium polypes **microplankton Subzone.**
Interval: 1524.0m? to 1526.5m–1549.0 metres.
Age: Late? Turonian.
In the Otway Basin this subzone is defined as the interval between the FAD of *Valensiella griphus* to the LAD of *Kiokansium polypes* which is usually concurrent with the LAD of *V. griphus*. In the Port Campbell-2 well this zone conforms exactly with the type section of the Flaxman Formation (Partridge, 1996a) and therefore its identification is used as a key method for confirming the presence of that formation. The zone is recorded from ten samples in which the index species are usually prominent components of the microplankton assemblages. *Valensiella griphus* ranges in abundance from 4% to 17% (average ~17%), and *Kiokansium polypes* ranges in abundance from <1% to 14% (average ~10%) of MP count. The most abundant marine dinoflagellate however is *Heterosphaeridium* spp. ranging in abundance from 4% to 38% (average ~17%). Although overall the

microplankton are common to abundant through the zone (10% to 59%; average 39% of total SP and MP count) a significant component of this abundance is the algal cyst *Amosopollis cruciformis* which varies from <1% to a maximum of 37% (average ~12%) of total SP and MP count. In what are otherwise relatively homogeneous microplankton assemblages, through the Flaxman Formation, this variation in abundance of *A. cruciformis* is interpreted to reflect some type of cyclical phenomenon. As *A. cruciformis* has been observed to occur in abundance in both non-marine and marine environments the changes in abundance in this instance could be reflecting influxes of fresh or brackish water containing *A. cruciformis* into the basin.

The top sample at 1524m is described as a greenish grey sandstone. This contrasts with its log character which appears to indicate a shale or claystone. The samples also lies just half a metre above the top of the Banoon Member picked at 1524.5m. It is therefore possible the recorded depth at which this sidewall core was shot may be slightly in error. Alternatively, the sample may represent a reworking and mixing event at the flooding surface at the base of the Belfast Mudstone. Supporting this latter interpretation is the high abundance of *Trithyrodinium* sp. cf *T.* sp. A of Marshall 1990 which represents 50% of the microplankton count. This species is not recorded in the underlying samples but is common in younger samples and therefore is potentially indicating the sample at 1524m should be assigned to the Belfast Mudstone.

Overall the Flaxman Formation assemblages have the highest abundance and diversity of microplankton of all the stratigraphic units analysed in Fenton Creek-1. The marked change in both abundance and diversity of marine microplankton compared to the underlying Waarre Formation is the reason the formation is interpreted to represent the base of the major flooding event as well as the base of the regional seal within the Port Campbell Embayment (Partridge, 1997). The environment of deposition at Fenton Creek-1 is interpreted to be outer shelf in fairly deep water.

***Isabelidinium evexus* microplankton Subzone.**
Sample at: 1566.0 metres.
Age: Late? Turonian.
This subzone is defined as the interval between the FAD of *Isabelidinium evexus* n.sp. to the local Otway Basin FAD of *Valensiella griphus*. The zone represents the oldest appearance in the Sherbrook Group succession of a small *Isabelidinium* species with a faint but distinct intercalary archeopyle (Type 2I). In Fenton Creek-1 this species is recorded in the shallowest sample analysed from the Waarre Formation, and from a few samples in the Flaxman Formation. The zone

is thought to be partly equivalent to the *Ascodinium parvum* Zone of Evans (1966, 1971). *Ascodinium parvum* although having a similar outline, is distinguished by its characteristic combination archeopyle involving both intercalary and apical paraplates. Unfortunately, this latter species has not been identified in any palynological studies on new wells drilled in the Otway Basin during the last five years. It is therefore concluded that the early records of *A. parvum* in the Otway Basin are all misidentifications. Another morphologically similar species is *Isabelidinium acuminatum* which can be distinguished from *I. evexus* by the presence of a small but distinct apical horn on the endocyst. Although *I. acuminatum* has been recorded in the Otway Basin by various palynologists I have never seen, nor can I confirm that any of the previously identified specimens actually have this apical horn which is so characteristic of the type specimens of *I. acuminatum*. In the absence of this distinguishing characteristic the option followed here is to assign all similar but distinct specimens to the new species *Isabelidinium evexus*. The zone based on such morphological criteria may then be partly equivalent to the *Isabelidinium acuminatum* Interval Zone of McMinn (1988), because small specimens of *Isabelidinium*, without a distinct apical horn on the endocyst, are included within McMinn's (1985) concept of *Isabelidinium acuminatum*.

The low diversity and abundance of marine dinoflagellates associated with abundant *Amosopollis cruciformis* in the samples at 1566m and 1567m is interpreted to indicate a shallow marine inner-shelf depositional environment.

Cribroperidinium edwardsii microplankton Acme Subzone.
Interval: 1622.0-1654.0 metres.
Age: Early? Turonian.

The *Cribroperidinium edwardsii* Acme Subzone was established for marine dinoflagellate assemblages found in the lower part of the Waarre Formation which are of relatively low diversity and low abundance, yet contain a dominance of the eponymous species (Partridge, 1994). In the five samples in Fenton Creek-1 referred to this zone average microplankton abundance is only ~7% and average diversity 7+ species per sample. In these assemblages *C. edwardsii* has an abundance ranging from 7% to 50% (average ~30%) of the total MP in what are very low assemblage counts (see Table 4). Although rarely dominant in the total palynomorph assemblages *C. edwardsii* is certainly the most conspicuous and often the dominant dinoflagellate, thereby justifying the use of the term Acme Zone. The LAD for *C. edwardsii* in the Port Campbell Embayment appears to be within or at the top of the Flaxman Formation, but as its occurrence in the latter formation is both rare and sporadic it is considered highly likely that most of these younger occurrences represent reworking. Because of this significant difference between total range versus dominance in the assemblages the weight given to the records of C. *edwardsii* in early palynological reports in the Otway Basin should be treated with extreme caution unless there is some indication of the relative abundance of the species.

Environment of deposition during this zone in Fenton Creek–1 is interpreted to be shallow marine to marginal marine. The low abundance and diversity of the microplankton associated with coaly laminations and unusual high abundances of *Gleicheniidites* spores suggest that some deposition occurred landward of the palaeoshoreline in lagoons or estuaries (eg. SWC at 1650.5m which is an interbedded coal and claystone with 44% *Gleicheniidites*).

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Table–2: Interpretative Palynological Data for Fenton Creek–1

Sample Type	Depth (m)	Spore-Pollen Zone (and Subzone)	CR	Microplankton Zone (and Subzone)	CR	MP%	Ac%	Key Species Present
SWC 48	1118.0	*N. senectus*	B2	*N. aceras*	B3	~4%	1%	FAD of *Forcipites sabulosus* at ~4% *Proteacidites* spp. abundant at 37%.
SWC 47	1200.0	*N. senectus* to *T. apoxyexinus*				~6%	NR	Low yield sample without key species. *Proteacidites* spp. common at 11%.
SWC 46	1320.0	*T. apoxyexinus* (Upper)	B1	*I. cretaceum* *(I. rotundatum)*	B2	7%	2%	FAD of *Isabelidinium rotundatum* ms. *Proteacidites* spp. common at 9%
SWC 45	1422.0	*T. apoxyexinus* (Upper)	B1	*I. cretaceum*	B2	13%	1%	FAD of *Tricolporites apoxyexinus* *Proteacidites* spp. common at 12%
SWC 44	1498.5	*P. mawsonii*	B1	*I. balmei*	B2	24%	14%	*Cupressacites* pollen decreasing at ~3% *Proteacidites* spp. rare at <1%.
SWC 43	1520.0	*P. mawsonii*	B1	*I. balmei*	B3	11%	9%	FAD of *Isabelidinium balmei* *Cupressacites* pollen spike of 14%
SWC 42	1524.0	*P. mawsonii* *(G. ancorus)*	B1	*P. infusorioides* *(K. polypes)*	B2	20%	<1%	LAD of *Kiokansium polypes* *Cupressacites* pollen spike of ~8%
SWC 41	1526.5	*P. mawsonii* *(G. ancorus)*	B2	*P. infusorioides* *(K. polypes)*	B2	10%	2%	*Cupressacites* pollen spike of 13% *Dilwynites* spp. abundant at 50%
SWC 40	1530.0	*P. mawsonii* *(G. ancorus)*	B1	*P. infusorioides* *(K. polypes)*	B3	12%	3%	FAD of *Tanyosphaeridium salpinx* *Cupressacites* pollen spike of 7%.
SWC 39	1533.5	*P. mawsonii* *(G. ancorus)*	B1	*P. infusorioides* *(K. polypes)*	B2	49%	23%	LAD of *Laevigatosporites musa* ms *Cupressacites* pollen increasing at ~3%
SWC 38	1535.5	*P. mawsonii* *(G. ancorus)*	B1	*P. infusorioides* *(K. polypes)*	B2	43%	15%	*Cupressacites* pollen not recorded in count.
SWC 37	1538.0	*P. mawsonii* *(G. ancorus)*	B2	*P. infusorioides* *(K. polypes)*	B3	44%	10%	Low yield sample with poor assemblage. LAD of *Rugulatisporites admirabilis* ms
SWC 36	1543.0	*P. mawsonii* *(G. ancorus)*	B1	*P. infusorioides* *(K. polypes)*	B2	52%	37%	FAD of *Gleicheniidites ancorus* ms
SWC 35	1544.5	*P. mawsonii*	B1	*P. infusorioides* *(K. polypes)*	B2	51%	19%	Maximum MP diversity of 21+ species. *Heterosphaeridium* spp. 24% of MP count.
SWC 34	1548.0	*P. mawsonii*	B1	*P. infusorioides* *(K. polypes)*	B2	58%	5%	Maximum MP diversity of 20+ species. *Heterosphaeridium* spp. 22% of MP count.

Table-2: Interpretative Palynological Data for Fenton Creek-1

Sample Type	Depth (m)	Spore-Pollen Zone (and Subzone)	CR	Microplankton Zone (and Subzone)	CR	MP%	Ac%	Key Species Present
SWC 33	1549.0	*P. mawsonii*	B1	*P. infusorioides* *(K. polypes)*	B2	46%	12%	*Heterosphaeridium* spp. 38% of MP count. Base of marine flooding event.
SWC 31	1566.0	*P. mawsonii (L. musa)*	B1	*P. infusorioides* *(I. evexus)*	B3	45%	40%	LAD of consistent *Laevigatosporites musa* ms FAD of *Isabelidinium evexus* ms.
SWC 30	1567.0	*P. mawsonii (L. musa)*	B1	*P. infusorioides*	B3	36%	33%	Oldest occurrence of *Phyllocladidites mawsonii* in count at ~4%.
SWC 22	1622.0	*P. mawsonii* *(H. trinalis)*	B1	*P. infusorioides* (*C. edwardsii* Acme)	B3	12%	1%	LAD of *Hoegisporis trinalis* ms LAD of consistent *A. distocarinatus*.
SWC 21	1635.0	*P. mawsonii* *(H. trinalis)*	B1	*P. infusorioides* (*C. edwardsii* Acme)	B3	9%	1%	Maximum SP diversity of 42+ species. LAD of *Paleoperidinium cretaceum*.
SWC 19	1646.0	*P. mawsonii* *(H. trinalis)*	B1	*P. infusorioides* (*C. edwardsii* Acme)	B3	~5%	NR	*Cyathidites* spp. dominant at 34%. *H. trinalis* ms frequent at ~3%.
SWC 18	1650.5	*P. mawsonii* *(H. trinalis)*	B1	*P. infusorioides* (*C. edwardsii* Acme)	B3	7%	1%	*Gleichniidites* spp. at 44% dominant. FAD of *Clavifera triplex*.
SWC 17	1654.0	*P. mawsonii* *(H. trinalis)*	B1	*P. infusorioides* (*C. edwardsii* Acme)	B3	~3%	NR	FADs of *P. mawsonii, Hoegisporis trinalis* ms and *Appendicisporites distocarinatus*.
SWC 4	1790.5	*P. pannosus*	B2			NR	NR	*Cyathidites* spp. dominant at ~30% Rare *Phimopollenites pannosus* present.
SWC 2	1810.0	*P. pannosus*	B2			NR	NR	FAD of *Phimopollenites pannosus*. *Corollina* spp. conspicuous at 6.5%.

Abbreviations:

CR = Confidence Ratings

MP% = Microplankton as percentage of total MP and SP count

Ac% = *Amosopollis cruciformis* as percentage of total SP and MP count.

FAD = First Appearance Datum

LAD = Last Appearance Datum

NR = Not Recorded

Confidence Ratings

The Confidence Ratings assigned to the zone identifications on Table 2 are quality codes used in the STRATDAT relational database developed by the Australian Geological Survey Organisation (AGSO) as a National Database for interpretive biostratigraphic data. Their purpose is to provide a simple relative comparison of the quality of the zone assignments. The alpha and numeric components of the codes have been assigned the following meanings:

Alpha codes: Linked to sample type

A	Core
B	Sidewall core
C	Coal cuttings
D	Ditch cuttings
E	Junk basket
F	Miscellaneous/unknown
G	Outcrop

Numeric codes: Linked to fossil assemblage

1	**Excellent confidence:**	High diversity assemblage recorded with key zone species.
2	**Good confidence:**	Moderately diverse assemblage recorded with key zone species.
3	**Fair confidence:**	Low diversity assemblage recorded with key zone species.
4	**Poor confidence:**	Moderate to high diversity assemblage recorded without key zone species.
5	**Very low confidence:**	Low diversity assemblage recorded without key zone species.

Species Diversity

The use of relative diversity terms equate to the following number of species. Both spore-pollen and microplankton diversity excludes reworked or caved species in the samples

Very low	=	1–5	species
Low	=	6–10	species
Moderate	=	11–25	species
High	=	26–74	species
Very high	=	75+	species

Table–3: Basic Sample and Palynomorph Data for Fenton Creek-1

Sample Type	Depth (m)	Lithology	Visual Yield	Palynomorph Concentration	Preservation	Number SP Species	Number MP Species
SWC 48	1118.0	SANDSTONE, light grey (60%) inter-bedded with dark grey CLAYSTONE (40%).	Moderate	Low	Fair-good	18	4
SWC 47	1200.0	SANDSTONE, light grey.	Very low	Very low	Poor-fair	25	4
SWC 46	1320.0	CLAYSTONE, dark brownish grey.	High	High	Poor-good	44	11
SWC 45	1422.0	CLAYSTONE, brownish black with common glauconitic.	High	High	Poor-fair	41	12
SWC 44	1498.5	CLAYSTONE, brownish black.	High	Low-high	Poor-fair	40	14
SWC 43	1520.0	CLAYSTONE, dark grey.	Moderate	Moderate	Poor-fair	34	9
SWC 42	1524.0	SANDSTONE, dark greenish grey.	High	Moderate	Poor-fair	30	16
SWC 41	1526.5	SANDSTONE, dark greenish grey.	Very low	High	Fair-good	19	10
SWC 40	1530.0	CLAYSTONE, dark grey.	Moderate	Low-moderate	Poor	21	8
SWC 39	1533.5	CLAYSTONE, dark grey.	High	Moderate	Poor-fair	28	19
SWC 38	1535.5	CLAYSTONE, dark grey.	High	High	Poor-fair	23	14
SWC 37	1538.0	CLAYSTONE, dark grey.	Very low	Low	Poor	14	8
SWC 36	1543.0	CLAYSTONE, dark grey.	High	High	Poor-fair	32	21
SWC 35	1544.5	CLAYSTONE, dark grey.	High	High	Poor-good	32	20
SWC 34	1548.0	CLAYSTONE, dark brownish grey.	High	High	Poor-good	33	17
SWC 33	1549.0	CLAYSTONE, dark brownish grey.	High	High	Fair	37	16
SWC 31	1566.0	CLAYSTONE, brownish black, carbonaceous.	Moderate	Moderate	Poor-fair	27	5
SWC 30	1567.0	CLAYSTONE, brownish black, carbonaceous.	Moderate	Moderate	Poor-fair	27	4
SWC 22	1622.0	CLAYSTONE, dark brownish grey.	Moderate	Low-Moderate	Fair-good	31	8
SWC 21	1635.0	CLAYSTONE, dark brownish grey with off-white SANDSTONE laminations.	Moderate	High	Fair-good	42	12
SWC 19	1646.0	CLAYSTONE, brownish black.	High	Low-high	Fair-good	41	5
SWC 18	1650.5	Interbedded COAL and brownish black CLAYSTONE.	High	High	Fair-good	31	8
SWC 17	1654.0	CLAYSTONE, brownish grey with COAL microlaminations.	High	Low-high	Fair-good	34	5
SWC 4	1790.5	SILTSTONE, medium green-grey.	Low	Moderate	Poor	25	NR
SWC 2	1810.0	SANDSTONE, very light grey.	Low	High	Poor	17	NR
					Averages:	**29.8**	**10.9**

Table–4: Fenton Creek-1								
Range and Abundance Chart for Palynomorphs	**SWC 48**	**SWC 47**	**SWC 46**	**SWC 45**	**SWC 44**	**SWC 43**	**SWC 42**	**SWC 41**
Sample Type & Depth (m)	**1118.0**	**1200.0**	**1320.0**	**1422.0**	**1498.5**	**1520.0**	**1524.0**	**1526.5**
SPORES								
Aequitriradites spp.								
Appendicisporites spp.								
Baculatisporites spp.		5.0%		0.9%	2.1%	0.9%		0.6%
Cicatricosisporites spp.			0.6%	0.9%	1.4%		1.9%	0.6%
Clavifera spp.		2.0%	1.7%	0.9%	2.8%			1.2%
Cyathidites (large) >40μm	1.8%	3.0%	1.1%	1.8%	2.1%	5.6%	1.9%	0.6%
Cyathidites (small) <40μm	1.8%	7.9%	3.4%	3.6%	4.9%	5.6%	2.9%	3.7%
Dictyophyllidites spp.		1.0%	1.7%	0.9%	3.5%			
Foveogleicheniidites confossus								
Gleicheniidites spp.	0.9%	6.9%	6.9%	14.5%	14.8%	5.6%	4.9%	4.3%
Herkosporites & Ceratosporites spp.			2.9%	1.8%			1.9%	
Laevigatosporites spp.	1.8%	2.0%	2.3%	3.6%	1.4%	1.9%		
Marratisporites scabratus						0.9%	1.9%	
Osmundacidites spp.		1.0%	1.1%	0.9%		0.9%	1.0%	
Peromonolites spp.								
Retitriletes spp.	1.8%	1.0%	0.6%		1.4%	0.9%	2.9%	0.6%
Rugulatisporites spp.								
Stereisporites spp.		1.0%				0.9%	1.0%	
Triletes undiff.	0.9%	3.0%	2.3%	0.9%	2.1%	3.7%	1.0%	0.6%
Triporoletes reticulatus								
Total Spores	**9%**	**34%**	**25%**	**31%**	**37%**	**27%**	**21%**	**12%**
GYMNOSPERMS								
Araucariacites australis		1.0%	1.1%	1.8%		1.9%	1.0%	1.2%
Corollina spp.						2.8%		
Cupressacites sp.			0.6%	0.9%	2.8%	13.9%	7.8%	13.4%
Dilwynites pusillus		1.0%	4.0%	2.7%	3.5%	9.3%	13.6%	15.9%
Dilwynites spp.		2.0%	0.6%	3.6%	4.9%	9.3%	24.3%	34.1%
Hoegisporis trinalis ms								
Lygistepollenites florinii		2.0%						
Microcachryidites antarcticus	4.5%	3.0%	6.3%	4.5%	15.5%	7.4%	11.7%	5.5%
Phyllocladidites eunuchus ms								
Phyllocladidites mawsonii	14.5%	6.9%	6.3%	2.7%	2.1%	4.6%	2.9%	2.4%
Podocarpidites spp.	20%	20%	26%	23%	27%	17%	12%	12%
Podosporites microsaccatus	2.7%	5.0%	1.7%	8.2%	5.6%	5.6%	2.9%	3.0%
Vitreisporites signatus			0.6%		0.7%		1.0%	0.6%
Total Gymnosperms	**42%**	**41%**	**47%**	**47%**	**62%**	**71%**	**77%**	**88%**
ANGIOSPERMS undiff.			1.7%	0.9%				
Asteropollis asteroides			1.7%					
Australopollis obscurus	0.9%	8.9%	10.3%	2.7%	0.7%		1.0%	
Forcipites sabulosus	3.6%	2.0%						
Forcipites spp.	2.7%	2.0%		0.9%				
Liliacidites spp.					0.7%			
Nothofagidites senectus								
Proteacidites spp.	37%	11%	9%	12%		0.9%		
Tricolpites/Tricolporites spp.	4.5%	3.0%	5.1%	4.5%		0.9%	1.0%	
Triporopollenites spp.		1.0%		0.9%				
Total Angiosperms	**49%**	**26%**	**28%**	**22%**	**1%**	**2%**	**2%**	
TOTAL SPORE-POLLEN COUNT:	**110**	**101**	**175**	**110**	**142**	**108**	**103**	**164**

Table–4: Fenton Creek-1								
Range and Abundance Chart for Palynomorphs	**SWC 48**	**SWC 47**	**SWC 46**	**SWC 45**	**SWC 44**	**SWC 43**	**SWC 42**	**SWC 41**
Sample Type & Depth (m)	**1118.0**	**1200.0**	**1320.0**	**1422.0**	**1498.5**	**1520.0**	**1524.0**	**1526.5**
MICROPLANKTON % of MP COUNT								
Microplankton undiff.	40%		23%	6%	11%	21%	31%	33%
Amosopollis cruciformis	20%		31%	6%	59%	7%		17%
Chatangiella spp./Isabelidinium spp.		14%		29%	7%			
Chlamydophorella nyei								
Cleistosphaeridium ancoriferum							4%	
Cribroperidinium edwardsii								
Cyclophelium spp.								
Heterosphaeridium spp.	40%	57%	8%	41%	23%	14%	8%	
Kallosphaeridium spp.								
Kiokansium polypes							4%	6%
Lecaniella spp.								
Microdinium spp.								17%
Nummus spp.		14%						
Odontochitina spp.		14%	8%	6%				
Oligosphaeridium spp.						7%		
Palaeohystrichophora infusorioides			23%					
Palambages spp.				12%				6%
Sigmopollis spp.								6%
Spiniferites spp.								
Trithyrodinium spp.			8%			50%	50%	
Valensiella griphus							4%	17%
TOTAL MICROPLANKTON COUNT:	**5**	**7**	**13**	**17**	**44**	**14**	**26**	**18**
Microplankton as % of total SP & MP	**4%**	**6%**	**7%**	**13%**	**24%**	**11%**	**20%**	**10%**
A. cruciformis as % of total SP & MP	1%		2%	1%	14%	1%		2%
TOTAL SP and MP COUNT:	**115**	**108**	**188**	**127**	**186**	**122**	**129**	**182**
Other fossils as % of Total Count								
Fungal fruiting bodies								
Fungal spores	1.7%		0.5%	0.8%		0.8%		
Fungal hyphae			1.0%	1.5%	0.5%	2.4%	3.0%	0.5%
Total Fungii	**2%**		**2%**	**2%**	**1%**	**3%**	**3%**	**1%**
Reworked Fossils			1.0%	3.0%	0.5%	0.8%		
TOTAL COUNT:	**115**	**108**	**192**	**133**	**188**	**126**	**133**	**183**

Table–4: Fenton Creek-1								
Range and Abundance Chart for Palynomorphs	SWC 40	SWC 39	SWC 38	SWC 37	SWC 36	SWC 35	SWC 34	SWC 33
Sample Type & Depth (m)	1530.0	1533.5	1535.5	1538.0	1543.0	1544.5	1548.0	1549.0
SPORES								
Aequitriradites spp.								
Appendicisporites spp.								
Baculatisporites spp.	3.8%	2.7%		4.3%	1.9%	3.7%	1.8%	1.0%
Cicatricosisporites spp.		0.9%	3.8%	2.9%	2.9%	2.8%		1.9%
Clavifera spp.				1.4%	1.0%			1.0%
Cyathidites (large) >40μm	1.9%	4.5%	3.8%	18.8%	3.8%	5.6%	4.5%	
Cyathidites (small) <40μm	9.6%	13.4%	10.5%	8.7%	12.5%	11.2%	13.6%	11.7%
Dictyophyllidites spp.	1.9%	0.9%	1.0%	2.9%		1.9%	3.6%	
Foveogleicheniidites confossus								
Gleicheniidites spp.	1.0%	6.3%	10.5%	10.1%	6.7%	5.6%	5.5%	10.7%
Herkosporites & Ceratosporites spp.								
Laevigatosporites spp.	1.9%	4.5%	3.8%		2.9%	1.9%	5.5%	3.9%
Marratisporites scabratus								
Osmundacidites spp.	1.9%		1.0%	2.9%			0.9%	1.0%
Peromonolites spp.								
Retitriletes spp.	1.9%		1.9%			1.9%	1.8%	1.0%
Rugulatisporites spp.				1.4%	2.9%	0.9%		
Stereisporites spp.		1.8%			1.0%	0.9%	0.9%	1.0%
Triletes undiff.	6.7%	5.4%	2.9%	4.3%	1.0%	5.6%	7.3%	4.9%
Triporoletes reticulatus			1.0%				0.9%	
Total Spores	**31%**	**40%**	**40%**	**58%**	**37%**	**42%**	**46%**	**38%**
GYMNOSPERMS								
Araucariacites australis	3.8%	6.3%	2.9%	5.8%	1.9%	6.5%		1.9%
Corollina spp.						1.9%	1.8%	
Cupressacites sp.	6.7%	2.7%						2.9%
Dilwynites pusillus	9.6%	4.5%	4.8%		12.5%	8.4%		5.8%
Dilwynites spp.	17.3%	21.4%	23.8%	10.1%	22.1%	8.4%	11.8%	10.7%
Hoegisporis trinalis ms								
Lygistepollenites florinii								
Microcachryidites antarcticus	6.7%	7.1%	8.6%	4.3%	5.8%	14.0%	14.5%	18.4%
Phyllocladidites eunuchus ms								
Phyllocladidites mawsonii	1.0%	1.8%	1.0%	4.3%	1.0%	0.9%	3.6%	1.9%
Podocarpidites spp.	13%	13%	14%	17%	13%	16%	14%	16%
Podosporites microsaccatus	5.8%		1.9%		3.8%	0.9%	1.8%	2.9%
Vitreisporites signatus		0.9%			1.0%			
Total Gymnosperms	**64%**	**57%**	**57%**	**42%**	**62%**	**57%**	**47%**	**60%**
ANGIOSPERMS undiff.	1.0%							
Asteropollis asteroides								
Australopollis obscurus	1.9%	1.8%	1.9%		1.9%		0.9%	
Forcipites sabulosus								
Forcipites spp.								
Liliacidites spp.	1.9%		1.0%			0.9%		
Nothofagidites senectus							0.9%	
Proteacidites spp.							0.9%	
Tricolpites/Tricolporites spp.		0.9%					3.6%	1.9%
Triporopollenites spp.								
Total Angiosperms	**5%**	**3%**	**3%**		**2%**	**1%**	**6%**	**2%**
TOTAL SPORE-POLLEN COUNT:	**104**	**112**	**105**	**69**	**104**	**107**	**110**	**103**

Table–4: Fenton Creek-1								
Range and Abundance Chart for Palynomorphs	**SWC 40**	**SWC 39**	**SWC 38**	**SWC 37**	**SWC 36**	**SWC 35**	**SWC 34**	**SWC 33**
Sample Type & Depth (m)	1530.0	1533.5	1535.5	1538.0	1543.0	1544.5	1548.0	1549.0
MICROPLANKTON % of MP COUNT								
Microplankton undiff.	21%	10%	8%	15%	6%	12%	14%	12%
Amosopollis cruciformis	21%	47%	34%	22%	71%	38%	8%	27%
Chatangiella spp./Isabelidinium spp.		5%	13%		1%			
Chlamydophorella nyei		2%	6%			2%	3%	6%
Cleistosphaeridium ancoriferum		5%				5%		
Cribroperidinium edwardsii								
Cyclophelium spp.						1%		
Heterosphaeridium spp.	21%	8%	6%	36%	4%	24%	22%	38%
Kallosphaeridium spp.		1%	1%				31%	
Kiokansium polypes	14%	8%	4%	5%		3%	4%	6%
Lecaniella spp.								
Microdinium spp.								
Nummus spp.								
Odontochitina spp.			3%	4%	1%	1%	6%	2%
Oligosphaeridium spp.								
Palaeohystrichophora infusorioides		8%	10%		2%	3%		
Palambages spp.		1%	4%		1%			
Sigmopollis spp.				2%				
Spiniferites spp.			10%		1%			
Trithyrodinium spp.								
Valensiella griphus	21%	5%	3%	16%	13%	12%	12%	9%
TOTAL MICROPLANKTON COUNT:	**14**	**108**	**80**	**55**	**113**	**110**	**154**	**86**
Microplankton as % of total SP & MP	**12%**	**49%**	**43%**	**44%**	**52%**	**51%**	**58%**	**46%**
A. cruciformis as % of total SP & MP	3%	23%	15%	10%	37%	19%	5%	12%
TOTAL SP and MP COUNT:	**118**	**220**	**185**	**124**	**217**	**217**	**264**	**189**
Other fossils as % of Total Count								
Fungal fruiting bodies		0.4%						
Fungal spores					0.5%		0.4%	
Fungal hyphae	0.8%	3.9%	1.1%	0.8%		0.5%	0.4%	0.5%
Total Fungli	**1%**	**4%**	**1%**	**1%**	**0%**	**0%**	**1%**	**1%**
Reworked Fossils		0.4%	0.5%	0.8%	0.5%		0.7%	
TOTAL COUNT:	**119**	**230**	**188**	**126**	**218**	**218**	**267**	**190**

Table-4: Fenton Creek-1 **Range and Abundance Chart for Palynomorphs**	SWC 31	SWC 30	SWC 22	SWC 21	SWC 19	SWC 18	SWC 17	SWC 4	SWC 2
Sample Type & Depth (m)	1566.0	1567.0	1622.0	1635.0	1646.0	1650.5	1654.0	1790.5	1810.0
SPORES									
Aequitriradites spp.							7.1%		
Appendicisporites spp.		0.9%	1.9%	2.0%	1.7%	0.8%			
Baculatisporites spp.	0.9%	3.8%	2.8%	2.0%	0.9%	3.4%	0.8%	16.8%	20.1%
Cicatricosisporites spp.			0.9%	3.3%	1.7%	0.8%	12.7%	2.0%	1.4%
Clavifera spp.	0.9%			0.7%					
Cyathidites (large) >40μm	4.7%	3.8%	4.7%	5.3%	8.7%	2.5%	4.0%	3.0%	6.5%
Cyathidites (small) <40μm	8.4%	11.3%	18.9%	10.0%	25.2%	3.4%	4.0%	26.7%	31.7%
Dictyophyllidites spp.	0.9%	4.7%	6.6%	2.7%	1.7%	1.7%	0.8%		
Foveogleicheniidites confossus	1.9%		0.9%	0.7%					
Gleicheniidites spp.	10.3%	12.3%	18.9%	17.3%	6.1%	44.1%	11.1%	5.0%	1.4%
Herkosporites & Ceratosporites spp.				1.3%		0.8%			0.7%
Laevigatosporites spp.	0.9%	1.9%		3.3%	2.6%	13.6%	12.7%		
Marratisporites scabratus				0.7%					
Osmundacidites spp.		0.9%	1.9%		1.7%			6.9%	6.5%
Peromonolites spp.						0.8%			
Retitriletes spp.				0.7%	3.5%		0.8%	4.0%	
Rugulatisporites spp.	6.5%	0.9%	0.9%	1.3%	6.1%	0.8%			
Stereisporites spp.				1.3%	0.9%	0.8%		2.0%	
Triletes undiff.	0.9%	3.8%	8.5%	7.3%	8.7%	5.1%	4.0%	3.0%	4.3%
Triporoletes reticulatus					0.9%		4.8%		
Total Spores	**36%**	**44%**	**67%**	**60%**	**70%**	**79%**	**63%**	**69%**	**73%**
GYMNOSPERMS									
Araucariacites australis	9.3%	6.6%	4.7%	6.0%	6.1%	0.8%	4.8%	3.0%	3.6%
Corollina spp.	0.9%				0.9%		0.8%	2.0%	6.5%
Cupressacites sp.	1.9%	3.8%	2.8%	2.0%					
Dilwynites pusillus	4.7%	2.8%	9.4%	6.7%		0.8%	0.8%		
Dilwynites spp.	4.7%	2.8%	0.9%	6.0%					
Hoegisporis trinalis ms			0.9%	1.3%	2.6%	0.8%	0.8%		
Lygistepollenites florinii									
Microcachryidites antarcticus	7.5%	4.7%	0.9%	5.3%	2.6%	3.4%	6.3%	5.9%	1.4%
Phyllocladidites eunuchus ms					0.9%				
Phyllocladidites mawsonii	2.8%	3.8%							
Podocarpidites spp.	28%	27%	13%	9%	15%	11%	8%	20%	14%
Podosporites microsaccatus		0.9%		1.3%	0.9%	3.4%	15.9%		1.4%
Vitreisporites signatus	0.9%					0.8%			
Total Gymnosperms	**61%**	**53%**	**33%**	**38%**	**29%**	**21%**	**37%**	**31%**	**27%**
ANGIOSPERMS undiff.		1.9%							
Asteropollis asteroides					0.9%				
Australopollis obscurus	1.9%								
Forcipites sabulosus									
Forcipites spp.									
Liliacidites spp.				2.0%					
Nothofagidites senectus									
Proteacidites spp.									
Tricolpites/Tricolporites spp.	0.9%	0.9%							0.7%
Triporopollenites spp.									
Total Angiosperms	**3%**	**3%**		**2%**	**1%**				**1%**
TOTAL SPORE-POLLEN COUNT:	**107**	**106**	**106**	**150**	**115**	**118**	**126**	**101**	**139**

Table-4: Fenton Creek-1 **Range and Abundance Chart for Palynomorphs**	SWC 31	SWC 30	SWC 22	SWC 21	SWC 19	SWC 18	SWC 17	SWC 4	SWC 2
Sample Type & Depth (m)	1566.0	1567.0	1622.0	1635.0	1646.0	1650.5	1654.0	1790.5	1810.0
MICROPLANKTON % of MP COUNT									
Microplankton undiff.	3%	3%	36%	43%		22%	25%		
Amosopollis cruciformis	90%	90%	7%	7%		11%			
Chatangiella spp./Isabelidinium spp.	1%								
Chlamydophorella nyei									
Cleistosphaeridium ancoriferum									
Cribroperidinium edwardsii			14%	7%	50%	33%	50%		
Cyclophelium spp.		2%			50%				
Heterosphaeridium spp.	5%	5%	7%						
Kallosphaeridium spp.									
Kiokansium polypes			7%						
Lecaniella spp.	1%						25%		
Microdinium spp.									
Nummus spp.									
Odontochitina spp.						22%			
Oligosphaeridium spp.			21%	43%		11%			
Palaeohystrichophora infusorioides									
Palambages spp.									
Sigmopollis spp.									
Spiniferites spp.			7%						
Trithyrodinium spp.									
Valensiella griphus									
TOTAL MICROPLANKTON COUNT:	**87**	**60**	**14**	**14**	**6**	**9**	**4**		
Microplankton as % of total SP & MP	**45%**	**36%**	**12%**	**9%**	**5%**	**7%**	**3%**		
A. cruciformis as % of total SP & MP	40%	33%	1%	1%		1%			
TOTAL SP and MP COUNT:	**194**	**166**	**120**	**164**	**121**	**127**	**130**	**101**	**139**
Other fossils as % of Total Count									
Fungal fruiting bodies	1.0%								
Fungal spores	0.5%	1.7%		0.6%					
Fungal hyphae	2.5%	3.5%	0.8%	0.6%			0.8%	1.0%	
Total Fungii	**4%**	**5%**	**1%**	**1%**			**1%**	**1%**	
Reworked Fossils				1.2%	4.0%	0.8%		1.0%	0.7%
TOTAL COUNT:	**199**	**172**	**121**	**167**	**126**	**128**	**131**	**103**	**140**

PALYNOMORPH RANGE CHART FOR FENTON CREEK-1, OTWAY BASIN.

Format: Relative Abundance by Lowest Appearance

Key to Symbols

D = CONTAMINATION
W = REWORKING
X = PRESENT
I = SINGLE SPECIMEN
R = RARE <1%
F = FREQUENT >1% TO <5%
C = COMMON >5% TO <20%
A = ABUNDANT >20%
H = VERY ABUNDANT >33%
? = Questionably Present
. = Not Present

		ARAUCARIACITES *AUSTRALIS* 1	BACULATISPORITES SPP. 2	CERATOSPORITES *EQUALIS* 3	CICATRICOSISPORITES *AUSTRALIENSIS* 4	CICATRICOSISPORITES SPP. 5	COROLLINA *TOROSA* 6	CYATHIDITES SPP. large >45 microns 7	CYATHIDITES SPP. small <45 microns 8	GLEICHENIIDITES *CIRCINIDITES* 9	LEPTOLEPIDITES *VERRUCOSUS* 10	MICROCACHRYIDITES *ANTARTICUS* 11	OSMUNDACIDITES *WELLMANII* 12	PHIMOPOLLENITES *PANNOSUS* 13	PODOCARPIDITES SPP. 14	PODOSPORITES *MICROSACCATUS* 15	RETITRILETES SPP. 16	VELOSPORITES *TRIQUETRUS* 17	AEQUITRIRADITES *VERRUCOSUS* 18	CRYBELOSPORITES *STRIATUS* 19	FO!EOSPORITES *CANALIS* 20	ISCHYOSPORITES *PUNCTATUS* 21	PEROTRILITES *MAJUS* 22	RETITRILETES *AUSTROCLAVATIDITES* 23	TRICOLPITES SPP. 24	TRIPOROLETES *RETICULATUS* 25	AEQUITRIRADITES *SPINULOSUS* 26	APPENDICISPORITES *DISTOCARINATUS* 27	BALMEISPORITES *HOLODICTYUS* 28	BALMEISPORITES *TRIDICTYUS* 29	CICATRICOSISPORITES *CUNEIFORMIS* 30	CICATRICOSISPORITES *HUGHESII* 31	COPTOSPORA *PILEOLUS* MS 32	DICTYOPHYLLIDITES SPP. 33	DICTYOTOSPORITES *COMPLEX* 34	DILWYNITES *PUSILLUS* MS 35	FORAMINISPORIS *ASYMMETRICUS* 36	HOEGISPORIS *TRINALIS* MS 37	LAEVIGATOSPORITES *OVATUS* 38	LILLACIDITES SPP. 39	PHYLLOCLADIDITES *MAWSONII* 40	STOVERISPORITES *MICROVERRUCATUS* 41	TRILOBOSPORITES *PURVERULENTUS* 42	TRILOBOSPORITES *TRIORETICULOSUS* 43	VITREISPORITES *SIGNATUS* 44
1118.0 M	SWC 48	.	.	.	.	.	.	F	F	F	.	C	R	.	A	F	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	I	.	.	.	.	.	F	.	C	.	.	.	.
1200.0 M	SWC 47	F	F	.	.	.	.	F	C	C	.	F	F	.	A	C	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	F	.	R	.	.	C	.	C	.	.	.	.
1320.0 M	SWC 46	F	R	.	.	F	.	F	C	C	.	C	.	.	A	F	R	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	I	F	.	C	R	.	F	.	C	.	.	.	R
1422.0 M	SWC 45	F	R	?	.	R	R	F	F	C	.	C	R	.	A	C	R	.	.	.	.	.	R	.	C	.	.	.	.	.	.	.	R	F	.	F	.	.	F	.	F	.	.	.	.
1498.5 M	SWC 44	R	F	.	R	F	R	F	C	C	.	C	.	.	A	C	F	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	R	F	.	F	.	.	F	R	F	R	.	.	R
1520.0 M	SWC 43	F	R	.	R	R	F	C	C	C	.	C	R	.	C	C	R	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	C	R	.	F	.	F	.	.	.	.
1524.0 M	SWC 42	R	R	.	.	F	.	R	F	F	.	C	R	.	C	F	F	.	.	.	.	W	.	.	R	.	.	W	.	.	.	.	.	.	.	C	.	.	.	R	F	.	.	.	R
1526.5 M	SWC 41	R	R	.	.	.	.	R	F	F	.	C	.	.	C	F	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	C	.	.	R	R	F	.	.	.	R
1530.0 M	SWC 40	F	F	?	.	.	.	F	C	F	.	C	F	.	C	F	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.	.	F	R	R	.	.	.	.
1533.5 M	SWC 39	C	F	?	R	R	.	F	C	C	.	C	.	.	C	.	R	.	.	.	.	.	R	.	R	R	R	.	.	.	.	.	.	R	.	C	.	.	F	.	F	.	.	.	R
1535.5 M	SWC 38	F	.	.	R	F	.	F	C	C	.	C	R	.	C	F	R	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	.	C	R	.	R	.	R	.	.	.	.
1538.0 M	SWC 37	F	F	.	R	F	.	C	F	C	.	F	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.	F	.	.	.	.
1543.0 M	SWC 36	F	F	.	.	F	.	F	C	C	W	C	R	.	C	F	R	.	.	W	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	F	R	.	F	.	F	.	.	.	R
1544.5 M	SWC 35	C	F	.	R	F	F	F	C	F	.	C	F	.	C	R	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	F	.	C	.	.	F	F	R	.	.	.	.
1548.0 M	SWC 34	F	F	.	.	R	R	F	C	C	.	C	R	.	C	F	R	.	.	W	.	.	.	.	R	.	.	R	R	.	R	.	.	.	.	R	.	.	F	.	F	.	.	.	C
1549.0 M	SWC 33	F	F	.	R	F	.	R	C	C	.	A	R	.	C	F	.	.	.	.	.	.	.	.	F	.	.	I	.	.	.	.	.	R	.	F	.	.	C	.	F	.	.	.	.
1566.0 M	SWC 31	C	R	R	.	F	R	R	C	C	.	C	R	.	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	C	.	.	R	.	F	.	.	.	R
1567.0 M	SWC 30	C	F	.	.	.	.	C	C	C	.	F	R	.	A	R	.	.	.	.	.	.	.	.	R	R	.	I	.	.	.	.	.	F	.	F	.	.	F	.	F	.	.	.	.
1622.0 M	SWC 22	.	F	R	.	R	.	A	A	A	.	R	F	.	C	.	R	.	R	.	.	.	R	.	.	.	.	F	.	.	.	.	.	C	.	C	.	R	R	R	.	.	.	.	.
1635.0 M	SWC 21	C	F	R	.	F	.	F	C	A	W	C	.	.	C	F	R	.	R	.	.	.	.	.	.	R	R	F	.	.	R	.	.	F	.	F	R	F	F	F	.	.	.	R	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	103	*CIBOTIUMSPORA JURIENENSIS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	104	*ORNAMENTIFERA SENTOSA*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	?	.	105	*PENINSULAPOLLIS GILLII*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	F	106	*FORCIPITES SABULOSUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	107	*LYGISTEPOLLENITES FLORINII*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	108	*PEROMONOLITES BOWENII*
.	.	C	C	C	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	.	.	.	109	*CRIBROPERIDINIUM EDWARDSII*
.	.	R	.	.	.	.	R	.	.	.	.	.	R	.	.	R	.	.	.	R	.	.	.	.	110	*CYCLONEPHELIUM DISTINCTUM*
.	.	R	.	R	.	R	.	R	.	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	111	*LECANIELLA SPP.*
.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	112	*SCHIZOSPORIS RETICULATUS*
.	.	R	.	.	.	.	.	.	.	.	.	R	R	.	.	.	R	.	.	.	.	.	.	.	113	*SIGMOPOLLIS CARBONIS*
.	.	.	R	.	R	R	A	H	A	C	A	A	C	A	A	C	F	R	R	A	F	F	.	F	114	*AMOSOPOLLIS CRUCIFORMIS*
.	.	.	R	.	.	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	115	*MICRHYSTRIDIUM SPP.*
.	.	.	F	R	.	.	.	.	F	C	R	R	F	F	.	.	.	R	.	.	F	F	R	.	116	*ODONTOCHITINA COSTATA*
.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	117	*ODONTOCHITINA OPERCULATA*
.	.	.	R	.	R	R	.	.	.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	118	*OLIGOSPHAERIDINIUM COMPLEX*
.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	119	*RIMOSICYSTA SPP.*
.	.	.	.	C	R	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	120	*CYCLONEPHELIUM COMPACTUM*
.	.	.	.	R	R	R	R	.	.	.	R	F	.	C	R	R	.	R	.	R	R	R	.	.	121	*SPINIFERITES SPP.*
.	.	.	.	.	R	.	.	.	C	F	F	.	R	F	F	.	.	R	.	.	.	.	.	.	122	*CHLAMYDOPHORELLA NYEI*

								[illegible]	.	[illegible]	[illegible]	.	.	.	.	.	.	.	.	.	.	.	.	.	[illegible]	*FOVEOTRILETES N.SP.*
.	.	.	.	.	.	.	R	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	79	*TRICOLPITES VARIVERRUCATUS MS*
.	.	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	80	*BALMEISPORITES GLENELGENSIS*
.	.	.	.	.	.	.	.	R	R	R	F	R	.	R	R	.	.	.	.	R	R	.	.	.	81	*DILWYNITES ECHINATUS MS*
.	.	.	.	.	.	.	.	.	I	.	.	.	.	R	.	.	.	.	.	.	.	R	.	.	82	*CAMAROZONOSPORITES BULLATUS*
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	R	F	.	.	.	.	83	*CYATHEACIDITES TECTIFERA*
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	84	*RETITRILETES CIRCOLUMENUS*
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	85	*SENECTOTETRADITES SP.*
.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	R	.	R	.	.	86	*FOVEOTRILETES BALTEUS*
.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	R	.	.	87	*RETITRILETES NODOSUS*
.	.	.	.	.	.	.	.	.	.	.	.	R	.	R	.	.	R	R	R	F	.	.	.	.	88	*GLEICHENIIDITES ANCORUS MS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	R	R	F	F	89	*FORCIPITES SPP.*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	90	*CRYBELOSPORITES BERBEROIDES*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	R	F	F	.	.	91	*HERKOSPORITES ELLIOTTII*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	R	R	R	.	92	*LATROBOSPORITES OHAIENSIS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	93	*POLYCINGULATISPORITES CLAVUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	94	*STEREISPORITES VIRIOSUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	R	.	.	95	*CLAVIFERA VULTUOSUS MS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	96	*DICTYOPHYLLIDITES CRENATUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	97	*ILEXPOLLENITES PRIMUS MS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	98	*LATROBOSPORITES AMPLUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	99	*PHYLLOCLADIDITES VERRUCOSUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	F	100	*TRICOLPITES CONFESSUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	101	*TRICOLPORITES APOXYEXINUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.	102	*TRIPOROPOLLENITES SPP.*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	103	*CIBOTIUMSPORA JURIENENSIS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	104	*ORNAMENTIFERA SENTOSA*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	?	.	105	*PENINSULAPOLLIS GILLII*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	F	106	*FORCIPITES SABULOSUS*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	107	*LYGISTEPOLLENITES FLORINII*
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	108	*PEROMONOLITES BOWENII*
.	.	C	C	C	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	.	.	.	109	*CRIBROPERIDINIUM EDWARDSII*
.	.	R	.	.	.	.	R	.	.	.	.	.	R	.	.	R	.	.	.	R	.	.	.	.	110	*CYCLONEPHELIUM DISTINCTUM*
.	.	R	.	R	.	R	.	R	.	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	111	*LECANIELLA SPP.*
.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	112	*SCHIZOSPORIS RETICULATUS*
.	.	R	.	.	.	.	.	.	.	.	.	R	R	.	.	.	R	.	.	.	.	.	.	.	113	*SIGMOPOLLIS CARBONIS*
.	.	.	R	.	R	R	A	H	A	C	A	A	C	A	A	C	F	R	R	A	F	F	.	F	114	*AMOSOPOLLIS CRUCIFORMIS*
.	.	.	R	.	.	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	115	*MICRHYSTRIDIUM SPP.*
.	.	.	F	R	.	.	.	.	F	C	R	R	F	F	.	.	.	R	.	.	F	F	R	.	116	*ODONTOCHITINA COSTATA*
.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	117	*ODONTOCHITINA OPERCULATA*
.	.	.	R	.	R	R	.	.	.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	118	*OLIGOSPHAERIDINIUM COMPLEX*
.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	119	*RIMOSICYSTA SPP.*
.	.	.	.	C	R	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	120	*CYCLONEPHELIUM COMPACTUM*
.	.	.	.	R	R	R	R	.	.	.	R	F	.	C	R	R	.	R	.	R	R	R	.	.	121	*SPINIFERITES SPP.*
.	.	.	.	.	R	.	.	.	C	F	F	.	R	F	F	.	.	R	.	.	.	.	.	.	122	*CHLAMYDOPHORELLA NYEI*
.	.	.	.	.	R	.	.	.	.	R	.	.	.	.	.	.	R	.	.	R	.	.	.	.	123	*CRIBROPERIDINIUM SP.*
.	.	.	.	.	R	F	F	C	A	A	A	C	A	C	C	F	.	R	F	C	C	F	F	F	124	*HETEROSPHAERIDIUM HETERACANTHUM*
.	.	.	.	.	R	R	.	.	C	F	F	F	F	F	C	F	F	R	.	.	.	.	.	.	125	*KIOKANSIUM POLYPES*
.	.	.	.	.	R	F	.	.	R	R	R	R	.	.	R	R	.	.	.	.	.	.	.	.	126	*OLIGOSPHAERIDIUM PULCHERRIMUM*
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	127	*OLIGOSPHAERIDIUM SP. (short processes)*
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	128	*PALAEOPERIDINIUM CRETACEUM*
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	129	*TRICHODINIUM CASTANEA*
.	.	.	.	.	.	.	.	R	R	F	.	F	.	C	F	.	.	.	.	.	.	.	.	.	130	*ISABELIDINIUM EVEXUS MS*
.	.	.	.	.	.	.	.	.	R	R	C	R	.	F	F	.	R	R	.	.	.	.	.	.	131	*CLEISTOSPHAERIDIUM ANCORIFERUM*
.	.	.	.	.	.	.	.	.	R	R	R	R	.	R	R	.	.	.	.	.	.	.	.	.	132	*CYCLONEPHELIUM VANNOPHORUM*
.	.	.	.	.	.	.	.	.	R	.	R	R	R	.	R	.	.	R	.	R	.	.	.	.	133	*EXOCHOSPHAERIDIUM SPP.*
.	.	.	.	.	.	.	.	.	R	F	F	R	.	.	.	.	.	R	.	R	.	.	.	.	134	*HETEROSPHAERIDIUM CONJUNCTUM*
.	.	.	.	.	.	.	.	.	F	A	F	.	.	F	.	.	.	.	.	.	.	.	.	.	135	*KALLOSPHAERIDIUM SP.*
.	.	.	.	.	.	.	.	.	R	R	R	.	.	.	R	.	R	R	.	R	.	.	F	.	136	*NUMMUS SPP.*
.	.	.	.	.	.	.	.	.	R	R	F	F	.	C	C	.	.	R	.	.	.	F	.	.	137	*PALAEOHYSTRICHOPHORA INFUSORIOIDES*
.	.	.	.	.	.	.	.	.	C	C	C	C	C	F	C	C	F	R	.	.	.	.	.	.	138	*VALENSIELLA GRIPHUS*
.	.	.	.	.	.	.	.	.	.	?	.	?	.	.	.	.	.	.	.	.	.	.	.	.	139	*CORONIFERA OCEANICA*

146	HYSTRICHODINIUM PULCHRUM
147	HYSTRICHOSPHAERIDIUM RECURVATUM
148	HYSTRICHOSPHAERIDIUM TUBIFERUM
97	ILEXPOLLENITES PRIMUS MS
60	INTERULOBITES INTRAVERRUCATUS
140	ISABELIDINIUM BALMEI
152	ISABELIDINIUM BELFASTENSE
153	ISABELIDINIUM CONTRACTUM MS
154	ISABELIDINIUM CRETACEUM
155	ISABELIDINIUM ELONGATUM MS
130	ISABELIDINIUM EVEXUS MS
160	ISABELIDINIUM ROTUNDATUM MS
156	ISABELIDINIUM SPP.
21	ISCHYOSPORITES PUNCTATUS
135	KALLOSPHAERIDIUM SP.
125	KIOKANSIUM POLYPES
61	KLUKISPORITES SCABERIS
50	LAEVIGATOSPORITES MUSA MS
38	LAEVIGATOSPORITES OVATUS
98	LATROBOSPORITES AMPLUS
92	LATROBOSPORITES OHAIENSIS
111	LECANIELLA SPP.
10	LEPTOLEPIDITES VERRUCOSUS
39	LILIACIDITES SPP.
107	LYGISTEPOLLENITES FLORINII
72	MARRATISPORITES SCABRATUS
176	MATONISPORITES COOKSONIAE
115	MICRHYSTRIDIUM SPP.
171	MICROBACULISPORA SPP.
11	MICROCACHRYIDITES ANTARTICUS
162	NELSONIELLA ACERAS
62	NEORAISTRICKIA TRUNCATA
136	NUMMUS SPP.
63	NYSSAPOLLENITES LANOSUS
116	ODONTOCHITINA COSTATA
117	ODONTOCHITINA OPERCULATA
157	ODONTOCHITINA PORIFERA
118	OLIGOSPHAERIDINIUM COMPLEX
126	OLIGOSPHAERIDIUM PULCHERRIMUM
127	OLIGOSPHAERIDIUM SP. (short processes)
104	ORNAMENTIFERA SENTOSA
12	OSMUNDACIDITES WELLMANII
137	PALAEOHYSTRICHOPHORA INFUSORIOIDES
128	PALAEOPERIDINIUM CRETACEUM
143	PALAMBAGES SPP.
105	PENINSULAPOLLIS GILLII
108	PEROMONOLITES BOWENII
51	PEROMONOLITES SPP.
52	PEROTRILITES JUBATUS
22	PEROTRILITES MAJUS
13	PHIMOPOLLENITES PANNOSUS
64	PHYLLOCLADIDITES EUNUCHUS MS
40	PHYLLOCLADIDITES MAWSONII
99	PHYLLOCLADIDITES VERRUCOSUS
172	PLICATIPOLLENITES SPP.
14	PODOCARPIDITES SPP.
15	PODOSPORITES MICROSACCATUS
93	POLYCINGULATISPORITES CLAVUS
65	PROTEACIDITES SPP.
173	PROTOHAPLOXYPINUS SPP.
174	PSEUDORETICULATISPORA PSEUDORETICULATA
23	RETITRILETES AUSTROCLAVATIDITES
84	RETITRILETES CIRCOLUMENUS
73	RETITRILETES EMINULUS
66	RETITRILETES FACETUS
87	RETITRILETES NODOSUS
16	RETITRILETES SPP.
119	RIMOSICYSTA SPP.
53	RUGULATISPORITES ADMIRABILIS MS
77	RUGULATISPORITES MALLATUS
74	RUGULATISPORITES N.SP. (large)
144	SCHIZOCYSTIA LAEVIGATA
112	SCHIZOSPORIS RETICULATUS
85	SENECTOTETRADITES SP.

ANALYSIS BY: Alan D. Partri

105	PENINSULAPOLLIS GILLII
108	PEROMONOLITES BOWENII
51	PEROMONOLITES SPP.
52	PEROTRILITES JUBATUS
22	PEROTRILITES MAJUS
13	PHIMOPOLLENITES PANNOSUS
64	PHYLLOCLADIDITES EUNUCHUS MS
40	PHYLLOCLADIDITES MAWSONII
99	PHYLLOCLADIDITES VERRUCOSUS
172	PLICATIPOLLENITES SPP.
14	PODOCARPIDITES SPP.
15	PODOSPORITES MICROSACCATUS
93	POLYCINGULATISPORITES CLAVUS
65	PROTEACIDITES SPP.
173	PROTOHAPLOXYPINUS SPP.
174	PSEUDORETICULATISPORA PSEUDORETICULATA
23	RETITRILETES AUSTROCLAVATIDITES
84	RETITRILETES CIRCOLUMENUS
73	RETITRILETES EMINULUS
66	RETITRILETES FACETUS
87	RETITRILETES NODOSUS
16	RETITRILETES SPP.
119	RIMOSICYSTA SPP.
53	RUGULATISPORITES ADMIRABILIS MS
77	RUGULATISPORITES MALLATUS
74	RUGULATISPORITES N.SP. (large)
144	SCHIZOCYSTIA LAEVIGATA
112	SCHIZOSPORIS RETICULATUS
85	SENECTOTETRADITES SP.
113	SIGMOPOLLIS CARBONIS
121	SPINIFERITES SPP.
54	STEREISPORITES ANTIQUISPORITES
55	STEREISPORITES POCOCKII
94	STEREISPORITES VIRIOSUS
41	STOVERISPORITES MICROVERRUCATUS
149	TANYOSPHAERIDIUM SALPINX
129	TRICHODINIUM CASTANEA
100	TRICOLPITES CONFESSUS
24	TRICOLPITES SPP.
79	TRICOLPITES VARIVERRUCATUS MS
101	TRICOLPORITES APOXYEXINUS
42	TRILOBOSPORITES PURVERULENTUS
43	TRILOBOSPORITES TRIORETICULOSUS
25	TRIPOROLETES RETICULATUS
102	TRIPOROPOLLENITES SPP.
151	TRITHYRODINIUM SPP.
161	TRITHYRODINIUM VERMICULATA
138	VALENSIELLA GRIPHUS
17	VELOSPORITES TRIQUETRUS
145	VERYHACHIUM SPP.
44	VITREISPORITES SIGNATUS
167	botryococcus
165	fungal fruiting bodies
163	fungal hyphae
164	fungal spores
166	microforaminiferal liners

.	.	.	F	R	.	.	.	.	F	C	R	R	F	F	.	.	.	R	.	.	F	F	R	.	116	ODONTOCHITINA COSTATA
.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	117	ODONTOCHITINA OPERCULATA
.	.	.	R	.	R	R	.	.	.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	118	OLIGOSPHAERIDINIUM COMPLEX
.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	119	RIMOSICYSTA SPP.
.	.	.	.	C	R	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	120	CYCLONEPHELIUM COMPACTUM
.	.	.	.	R	R	R	R	.	.	.	R	F	.	C	R	R	.	R	.	R	R	R	.	.	121	SPINIFERITES SPP.
.	.	.	.	.	R	.	.	.	C	F	F	.	R	F	F	.	.	R	.	.	.	.	.	.	122	CHILAMYDOPHORELLA NYEI
.	.	.	.	.	R	.	.	.	.	R	.	.	.	.	.	.	R	.	.	R	.	.	.	.	123	CRIBROPERIDINIUM SP.
.	.	.	.	.	R	F	F	C	A	A	A	C	A	C	C	F	.	R	F	C	C	F	F	F	124	HETEROSPHAERIDIUM HETERACANTHUM
.	.	.	.	.	R	R	.	.	C	F	F	F	F	F	C	F	F	R	.	.	.	.	.	.	125	KIOKANSIUM POLYPES
.	.	.	.	.	R	F	.	.	R	R	R	R	.	.	R	R	.	.	.	.	.	.	.	.	126	OLIGOSPHAERIDIUM PULCHERRIMUM
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	127	OLIGOSPHAERIDIUM SP. (short processes)
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	128	PALAEOPERIDINIUM CRETACEUM
.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	129	TRICHODINIUM CASTANEA
.	.	.	.	.	.	.	.	R	R	F	.	F	.	C	F	.	.	.	.	.	.	.	.	.	130	ISABELIDINIUM EVEXUS MS
.	.	.	.	.	.	.	.	.	R	R	C	R	.	F	F	.	R	R	.	.	.	.	.	.	131	CLEISTOSPHAERIDIUM ANCORIFERUM
.	.	.	.	.	.	.	.	.	R	R	R	R	.	R	R	.	.	.	.	.	.	.	.	.	132	CYCLONEPHELIUM VANNOPHORUM
.	.	.	.	.	.	.	.	.	R	.	R	R	R	.	R	.	.	R	.	R	.	.	.	.	133	EXOCHOSPHAERIDIUM SPP.
.	.	.	.	.	.	.	.	.	R	F	F	R	.	.	.	.	.	R	.	R	.	.	.	.	134	HETEROSPHAERIDIUM CONJUNCTUM
.	.	.	.	.	.	.	.	.	F	A	F	.	.	F	.	.	.	.	.	.	.	.	.	.	135	KALLOSPHAERIDIUM SP.
.	.	.	.	.	.	.	.	.	R	R	R	.	.	.	R	.	R	R	.	R	.	.	F	.	136	NUMMUS SPP.
.	.	.	.	.	.	.	.	.	R	R	F	F	.	C	C	.	.	R	.	.	.	F	.	.	137	PALAEOHYSTRICHOPHORA INFUSORIOIDES
.	.	.	.	.	.	.	.	.	C	C	C	C	C	F	C	C	F	R	.	.	.	.	.	.	138	VALENSIELLA GRIPHUS
.	.	.	.	.	.	.	.	.	.	?	.	?	.	.	.	.	.	.	.	.	.	.	.	.	139	CORONIFERA OCEANICA
.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	F	F	.	.	.	.	140	ISABELIDINIUM BALMEI
.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	R	.	.	R	R	R	.	.	.	.	141	APTEODINIUM SPP.
.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	R	.	.	.	.	.	.	.	142	CALLAIOSPHAERIDIUM ASYMMETRICUM
.	.	.	.	.	.	.	.	.	.	.	R	R	.	F	R	.	R	.	F	.	F	.	.	.	143	PALAMBAGES SPP.
.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	144	SCHIZOCYSTIA LAEVIGATA
.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	F	.	.	.	R	.	.	.	.	.	145	VERYHACHIUM SPP.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	146	HYSTRICHODINIUM PULCHRUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	147	HYSTRICHOSPHAERIDIUM RECURVATUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	148	HYSTRICHOSPHAERIDIUM TUBIFERUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	149	TANYOSPHAERIDIUM SALPINX
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	R	.	.	.	.	150	FROMEA N.SP.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	C	R	R	.	.	.	151	TRITHYRODINIUM SPP.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	152	ISABELIDINIUM BELFASTENSE
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	153	ISABELIDINIUM CONTRACTUM MS
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	R	?	?	154	ISABELIDINIUM CRETACEUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	155	ISABELIDINIUM ELONGATUM MS
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	R	.	.	156	ISABELIDINIUM SPP.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	157	ODONTOCHITINA PORIFERA
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	158	CANNINGIA ROTUNDATUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	159	DINOGYMNIUM ACUMINATUM
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	160	ISABELIDINIUM ROTUNDATUM MS
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	161	TRITHYRODINIUM VERMICULATA
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	162	NELSONIELLA ACERAS
.	R	R	.	.	R	R	C	F	R	R	R	.	R	F	C	.	R	F	F	R	F	R	.	.	163	fungal hyphae
.	.	.	.	.	R	.	F	R	.	.	R	R	.	.	R	.	.	.	R	.	R	R	.	F	164	fungal spores
.	.	.	.	.	.	.	.	R	R	R	.	.	.	.	R	.	.	.	.	.	.	.	.	.	165	fungal fruiting bodies
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	166	microforaminiferal liners
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	167	Botryococcus
.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	168	ANTULISPORITES VARIGRANULATUS
.	.	.	.	W	W	.	.	.	W	.	.	.	.	.	.	.	.	.	.	W	.	W	.	.	169	DICTYOTOSPORITES SPECIOSUS
.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	.	.	170	GRANULATISPORITES TRISINUS
.	.	.	.	W	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	W	.	.	171	MICROBACULISPORA SPP.
.	.	.	.	W	.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	W	W	.	W	172	PLICATIPOLLENITES SPP.
.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	173	PROTOHAPLOXYPINUS SPP.
.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	W	.	.	.	W	.	W	W	.	.	174	PSEUDORETICULATISPORA PSEUDORETICULATA
.	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	175	COPTOSPORA PARADOXA
.	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	176	MATONISPORITES COOKSONIAE
.	.	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	177	CALLIALASPORITES SPP.

ANALYSIS BY: Alan D. Partridge 27 May 1997

154 *ISABELIDINIUM CRETACEUM*	155 *ISABELIDINIUM ELONGATUM MS*	156 *ISABELIDINIUM SPP.*	157 *ODONTOCHITINA PORIFERA*	158 *CANNINGIA ROTUNDATUM*	159 *DINOGYMNIUM ACUMINATUM*	160 *ISABELIDINIUM ROTUNDATUM MS*	161 *TRITHYRODINIUM VERMICULATA*	162 *NELSONIELLA ACERAS*	163 fungal hyphae	164 fungal spores	165 fungal fruiting bodies	166 microforaminiferal liners	167 *Botryococcus*	168 *ANTULISPORITES VARIGRANULATUS*	169 *DICTYOTOSPORITES SPECIOSUS*	170 *GRANULATISPORITES TRISINUS*	171 *MICROBACULISPORA SPP.*	172 *PLICATIPOLLENITES SPP.*	173 *PROTOHAPLOXYPINUS SPP.*	174 *PSEUDORETICULATISPORA PSEUDORETICULATA*	175 *COPTOSPORA PARADOXA*	176 *MATONISPORITES COOKSONIAE*	177 *CALLIALASPORITES SPP.*	178 *CONTIGNISPORITES BURGERI*	179 *CRYBELOSPORITES STYLOSUS*	180 *DIDECITRILETES ERICIANUS*			
?	.	.	.	.	.	.	.	I	.	F	.	.	.	.	.	.	.	W	.	.	.	.	.	.	.	.	1118.0	M	SWC 48
?	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	1200.0	M	SWC 47
R	.	R	R	R	I	F	F	.	R	R	.	.	.	.	W	.	W	W	.	W	.	.	.	.	.	.	1320.0	M	SWC 46
C	R	C	R	.	.	.	.	.	F	R	.	.	.	.	.	W	.	W	.	W	.	.	.	.	.	.	1422.0	M	SWC 45
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	W	.	W	.	.	.	.	.	.	.	.	.	1498.5	M	SWC 44
.	.	.	.	.	.	.	.	.	F	R	.	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	1520.0	M	SWC 43
.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	1524.0	M	SWC 42
.	.	.	.	.	.	.	.	.	R	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1526.5	M	SWC 41
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1530.0	M	SWC 40
.	.	.	.	.	.	.	.	.	C	R	R	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	1533.5	M	SWC 39
.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1535.5	M	SWC 38
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	1538.0	M	SWC 37
.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	.	1543.0	M	SWC 36
.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1544.5	M	SWC 35
.	.	.	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	.	W	.	.	.	1548.0	M	SWC 34
.	.	.	.	.	.	.	.	.	R	.	R	.	.	.	W	.	.	W	.	.	W	W	.	.	.	.	1549.0	M	SWC 33
.	.	.	.	.	.	.	.	.	F	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1566.0	M	SWC 31
.	.	.	.	.	.	.	.	.	C	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1567.0	M	SWC 30
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1622.0	M	SWC 22
.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	W	.	W	.	.	.	.	.	.	.	.	.	1635.0	M	SWC 21
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	W	W	W	W	W	.	.	.	.	.	.	1646.0	M	SWC 19
.	.	.	.	.	.	.	.	.	.	.	.	.	.	W	.	.	.	.	.	.	.	.	.	.	.	.	1650.5	M	SWC 18
.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1654.0	M	SWC 17
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151	TRITHYRODINIUM SPP.
161	TRITHYRODINIUM VERMICULATA
138	VALENSIELLA GRIPHUS
17	VELOSPORITES TRIQUETRUS
145	VERYHACHIUM SPP.
44	VITREISPORITES SIGNATUS
167	botryococcus
165	fungal fruiting bodies
163	fungal hyphae
164	fungal spores
166	microforaminiferal liners

95 CLAVIFERA VULTUOSUS MS