COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS:

1961/63.

A PALYNOLOGICAL REPORT ON F.B.H. PORT CAMPBELL NO. 1 & 2 WELLS, VICTORIA

by

P. R. EVANS.

RECORD NO. 1961/63

CONTENTS

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SUMMARY.

An examination of samples, prepared from main cores and certain cuttings from F.B.H. Port Campbell No.1 and No.2 wells, Victoria, has suggested a provisional means of correlating a portion of the Cretaceous sections of the wells. It is considered that part of the Lower Cretaceous (Albian) and probably the whole of the Upper Cretaceous is represented in the combined well sections and that portions of these sections are equivalent to a part at least of the outcropping Otway Group.

INTRODUCTION

Frome-Broken Hill Pty. Ltd., with Commonwealth Government financial assistance, drilled Port Campbell No. 1 well (*) into Tertiary and Cretaceous strata in the Otway Basin of western Victoria during 1959 and early 1960. The results obtained from this enterprise justified the drilling during 1960 of Port Campbell No. 2 (+) in which a thicker and more complete section of Cretaceous beds was encountered. Palynological observations were made on the Cretaceous sequence while No. 1 well was being drilled; the results obtained are incorporated in this record, augmented by those from additional observations which were necessary for the clarification of problems raised at the time. Since the No. 1 well was drilled, Cookson & Eisenack (1960) have published descriptions of microplankton from the Upper Cretaceous of the Carnarvon Basin, Western Australia, of which several species are common to the Victorian beds. Their paper has made it possible for a more refined definition of the age of the Victorian strata to be attempted. Samples from No. 2 well and its sidetrack hole have been examined to check the sequence of species determined in the first hole. Not all cores from the highest Cretaceous section of the second well were made available to the Bureau of Mineral Resources so this check has not been complete, but the comparison suggests that the combined series of samples provides a picture of the local palynological variations. The sampling method used does not provide a complete correlation scheme, but it is adequate at this stage for correlations of regional significance.

At the time of writing, no details of the distribution of other faunas in the wells are available so that no overall assessment of the palaeontological information from these stratigraphic holes is possible here. It is understood that the Victorian Mines Department is conducting an analysis of the same well sections in relation to others in the Otway Basin.

RESULTS & CORRELATIONS BETWEEN WELLS

The occurrence of non-mineralized micro-organisms in both wells is shown in the chart which accompanies this report. The fossils are arranged in stratigraphic order of appearance; a check list of these species, in alphabetical order, will be found in Appendix II. Numbers which follow specific names in the text correspond to the numbers which have been allocated to those species on the chart. Many of the species which have been recorded are new and of little value at present for stratigraphic purposes and will remain so until described; descriptive palynology is not within the scope of this paper. The presence of new species is recorded chiefly to assist illustration of the degree of change in assemblage composition through the section. Those species which have been described already from the Mesozoic of Australia seem to provide adequate evidence for the present stratigraphic deductions.

The lithological columns in the chart and their division into formations are those described by the drilling company (e.g. Bain & McQueen, 1960), but the ages to which these formations are allocated are based solely on palynological evidence. In many respects the use in palynology of European stage names in the Mesozoic of Australia provides a sense of accuracy which is not fully justified by the present state of knowledge. Never-

(*) Lat. 38° 34'57"S; Long. 142°57'50"E; El. 337ft.GL,346.6ft.DF.
(+) Lat. 38° 35'55"S; Long. 142°59'27"E; El. 266ft.GL,281ft. DF.

theless, in absence of a local zonal scheme, these names, in the sense customarily followed in Australia, are all that are available for the present purposes. It will be noted that, while the microspores show a steady change throughout the sequence, the microplankton occur more or less in distinct bands. A tentative age may be assigned to these bands, but the intervening strata remain undated; more information about the distribution of microplankton in reference sections of appropriate age is required.

The ages which are noted on the chart are based on the occurrence of species, particularly of microplankton, which either were found associated with foraminifera in Western Australia (Cookson & Eisenack, 1960) or have been observed in the Artesian Basin (Evans, 1961). Unfortunately, only microspores from the Lower Cretaceous and Tertiary of Australia have been described so far: the Upper Cretaceous spore and pollen assemblages of Australia are virtually unknown and the Port Campbell wells have provided the author with the first indication of the suites existing in this part of the System. Several forms appear to be conspecific with pollens described by Couper (1960) from the Upper Cretaceous of New Zealand.

The palynological results compare favourably with the lithological correlations, particularly in the top of the Waarre Formation (*), but the lack of samples from higher levels in No. 2 well and the fact that No. 1 well did not penetrate the lowest Waarre Formation and "Otway Group" (+) prevent any other correlations at this stage.

AGE DETERMINATIONS

The section under consideration ranges from the Lower Cretaceous (probably Albian) to the (?) Tertiary and includes a large section of the Upper Cretaceous. The boundaries defined herein must still be regarded as tentative.

The lowest strata which have yielded microfossils are in the "Otway Group" in No. 2 well and they were cut by cores 16 and 17 (8560 - 8611 feet). Samples from the two cores below this level were barren of micro-organisms and so cannot be dated. Rare microplankton and a variety of spores were located in cores 16 and 17, while Dr. Crespin (pers. comm.) records the presence of glauconite and some arenaceous foraminifera in core 16. Both the microflora and microfauna are typically Lower Cretaceous. The microplankton are not sufficient to define where in the Lower Cretaceous the samples should be placed, but the presence of *Balmeisporites holodictyus* (44) suggests nothing older than the Albian is present.

The beds cut in No. 2 well by cores 9, 14, 11, 15 (x) (8174-8415 feet) are undated since all the samples from these cores were barren, but cores 5 - 8 (7887-8102 feet) yielded abundant microplankton, similar to those of the Waarre Formation of No. 1 well. The horizon where *Odontochitina operculata* (3)

(*) The erection of this formation, the Belfast Mudstone and the Paaratte Formation has been proposed for the first time in Port Campbell No. 1 completion report (Bain & McQueen, 1960) and no published definitions of their character are available. Therefore, they are used informally in the present report.

(+) "Otway Group" is used in the sense employed by the company in reference to the subsurface sections. This may not be exactly the same as Otway Group of outcrop and more work will be required to reconcile the two (see p. 4).

(x) The cores are arranged in stratigraphic order. Their numerical sequence is governed by the need to cut a side-track hole during drilling.

and Deflandrea acuminata (17) occur together, compares closely with the Cenomanian section of the Gearle Siltstone of the Carnarvon Basin (Cookson & Eisenack, 1958). For the present, the underlying beds, which contain only O. operculata (of the two key species), are regarded as Albian in age. The microspores are in accordance with this sequence: Trilobosporites trioreticulatus (61) is typical of an upper portion of the marine beds and the overlying freshwater beds (Winton Formation) of the Artesian Basin where it occurs also with Cingulatisporites euskirchenoides (62) and Leptolepidi tes verrucatus (69). Although these latter species are known to have long ranges, their locality frequency (Couper, 1959) is very high at this level in the Cretaceous.

A succeeding division, probably extending from the Cenomanian to (?) Lower Turonian, fills in the space between the Cenomanian of the top of the Waarre Formation and the base of the Belfast Mudstone on the one hand and the succeeding (?) Turonian of the top half of the Belfast Mudstone on the other. Within this intermediate zone only one possibly distinctive species, Balmeisporites glenelgensis (87), has been located. Cookson & Dettmann (1958a) considered the possibility of an Upper Cretaceous age for this species, so that its association with the angiospermous Proteacidites sp. nov. 1 (86), above beds which are no older than the Cenomanian, would support this view. Angiosperm pollens are known from the Artesian Basin Winton Formation, but none compare with the triporate types of Port Campbell, which develop into a major component of the higher Cretaceous beds. Nevertheless, B. glenelgensis is present at a very high level in the Winton. Another fact worthy of comment is the occurrence of Cicatricosisporites australiensis (48) at the same level as B. glenelgensis, an association noted by Cookson & Dettmann (1958a) in the Nelson well of Western Victoria. Although C.australiensis would seem to be a typical and very widespread microfossil in Lower Cretaceous sediments in Australia, its range, therefore, continues into the Upper Cretaceous.

Within the upper half of the Belfast Mudstone and the lower quarter of the Paaratte Formation (No. 1 well, 4758-5231 feet), an assemblage is present, typified by Odontochitina porifera (29) and Deflandrea cretacea (28). Subdivision of this section may be possible if the upper portion, with Nelsoniella aceras (35), Gymnodinium nelsonense (32) and Amphidiadema denticulata (33), is separated. These species have been described from Turonian, Santonian and (?) Campanian of Western Australia (Cookson & Eisenack, 1960), Although different opinions occur over the relative parts of the Turonian or Santonian, which may be present in that area (cf. Belford, 1958), the position of these microplankton, relative to the other assemblages in the Port Campbell wells, is identical to their arrangement so far established in the Carnarvon Basin, and some note can be made of their role as markers of a level approximately in the middle of the Upper Cretaceous. The associated spores are of little stratgraphic value at present, except for the fact that a greater variety of angiosperm pollens are present at this level than in lower strata.

Above this section age determinations are in doubt so that the position of the Cretaceous - Tertiary boundary cannot be determined readily. Nelsoniella tuberculata (40) and Xenikoon australis (41) were described initially from Upper Cretaceous sediments but the presence of e.g. Dacrydiumites mawsonii(122) in the same cores (No. 1 well, core 14/15, 4280-4291 feet) suggests that Tertiary beds cannot be far from this horizon. For the present, the microplankton are regarded as the main markers and it is suggested on this basis that sediments at 4518 feet in No. 1 well are still Cretaceous in age.

In summary, therefore, the following ages may be assigned to the formations of the Port Campbell wells on the basis of their micro-organic content.

Wangerrip Group	Tertiary,
Paaratte Formation	Upper Cretaceous,
Belfast Mudstone	Upper Cretaceous,
Waarre Formation	Lower-Upper Cretaceous, (Albian-Cenomanian)
"Otway Group"	Lower Cretaceous.

There is no palynological evidence available to suggest that there is a break in this sequence except perhaps between the Waarre Formation and the Belfast Mudstone in No. 1 well. Marine influences were repeatedly,if not continuously, present during Cretaceous times.

REGIONAL CORRELATIONS

Comparisons have been made already in this report between the Cretaceous beds of Port Campbell and the Carnarvon and Great Artesian Basins. It is natural that a comparison should be attempted with the Cretaceous of the outcropping Otway Group to the east (Cookson & Dettmann, 1958a, 1958b) and with the subsurface Cretaceous of the bore at Nelson in the extreme west of Victoria (Baker & Cookson, 1955). It is assumed that the westerly section will be included in the work of the Victorian Mines Department and the subject can be raised here only briefly. The appearance of a microspore and microplankton association (B. glenelgensis, C. australiensis, O. porifera)in the Upper Cretaceous of the Nelson bore has been mentioned already (p.3). It is likely, when Belfast No. 4 bore is taken into account (Kenley, 1959), that a widespread development of Upper Cretaceous rocks underlies the Tertiary of the western half of the Otway Basin.

No hint has yet been made of the presence of Upper Cretaceous strata in the Otway Group to the east of Port Campbell. Cookson & Dettmann examined a sample from near the Mesozoic - Palaeocene unconformity at the mouth of the Gellibrand River, the assemblage from which (1958b, p.120) can be no younger than those of the Waarre Formation or the very base of the Belfast Mudstone (in No. 2 well only). Not one of the samples examined by Cookson & Dettmann from the Otway Group yielded microplankton and, although those authors considered nothing to be younger than the Albian, the microplankton - microspore association of Port Campbell suggests that it could be difficult, on the microspore species lists available, to distinguish Albian from Cenomanian samples. However, allowing for the possibility of Cenomanian being present in the Otway Group, at least at Gellibrand, it appears that the remainder of the Upper Cretaceous is missing in outcrop. From another viewpoint, the Cenomanian part of the Waarre Formation may not have an equivalent at outcrop, but it is almost certain that the major portion of the formation could be equivalent to part of the outcrop sequence. A difference between bore and outcrop lies in the presence of microplankton in the subsurface section, reflecting the existence of a different facies at Port Campbell to that at Otway during Lower Cretaceous times. The (?) marine facies even existed, at least briefly, in the basal Otway Group of Port Campbell. However, only seven localities from the Otway Group were sampled by Cookson & Dettmann and detailed work might readily prove the extension of marine influences at certain levels to the outcrop area.

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APPENDIX I.

REGISTERED SAMPLE NUMBERS

Samples, which have been examined from the Port Campbell Nos. 1 & 2 wells, have been recorded in the Bureau of Mineral Resources palynological collection under the following numbers.

PORT CAMPBELL NO. 1

MFP. 1186	core 14	4280-4281	feet	(mudstone)
MFP. 1187	" 14	" "	"	(sandstone)
MFP. 1188	" 15	4290-4291	"	
MFP. 1189	" 16	4518-4520	"	
MFP. 450	" 17	4758-4760	"	
MFP. 473	" 18	4862-4864	"	
MFP. 474	" 19	5020-5025	"	
MFP. 475	" 20	5028-5030	"	
MFP. 476	" 21	5223-5231	"	
MFP. 652	cuttings	5300-5310	"	
MFP. 653	"	5400-5410	"	
MFP. 654	"	5500-5510	"	
MFP. 643	"	5600-5610	"	
MFP. 644	"	5610-5620	"	
MFP. 645	"	5640-5650	"	
MFP. 646	"	5650-5660	"	
MFP. 455	core 22	5660-5662	"	
MFP. 477	" 22	5660-5665	"	
MFP. 647	cuttings	5660-5670	"	
MFP. 648	"	5670-5675	"	
MFP. 641	"	5675-5680	"	
MFP. 650	"	5680-5690	"	
MFP. 651	"	5690-5700	"	
MFP. 454	core 23	5700-5708	"	
MFP. 456	" 24	5932-5934	"	
MFP. 610	cuttings	5960-5965	"	

PORT CAMPBELL NO. 2 (including sidetrack hole)

MFP. 1031	core 12	7097-7099	feet
MFP. 1032	" 13	7691-7693	"
MFP. 872	" 5	7887-7890	"
MFP. 873	" 6	7906-7908	"
MFP. 874	" 7	7927-7930	"
MFP. 875	" 8	8100-8102	"
MFP. 876	" 9	8174-8176	"
MFP. 1149	" 14	8313-8315	"
MFP. 1148	" 11	8339-8341	"
MFP. 1121	" 15	8413-8415	"
MFP. 1122	" 16	8560-8562	"
MFP. 1123	" 17	8609-8611	"
MFP. 1124	" 18	8630-8632	"
MFP. 1054	" 19	8826-8846	"

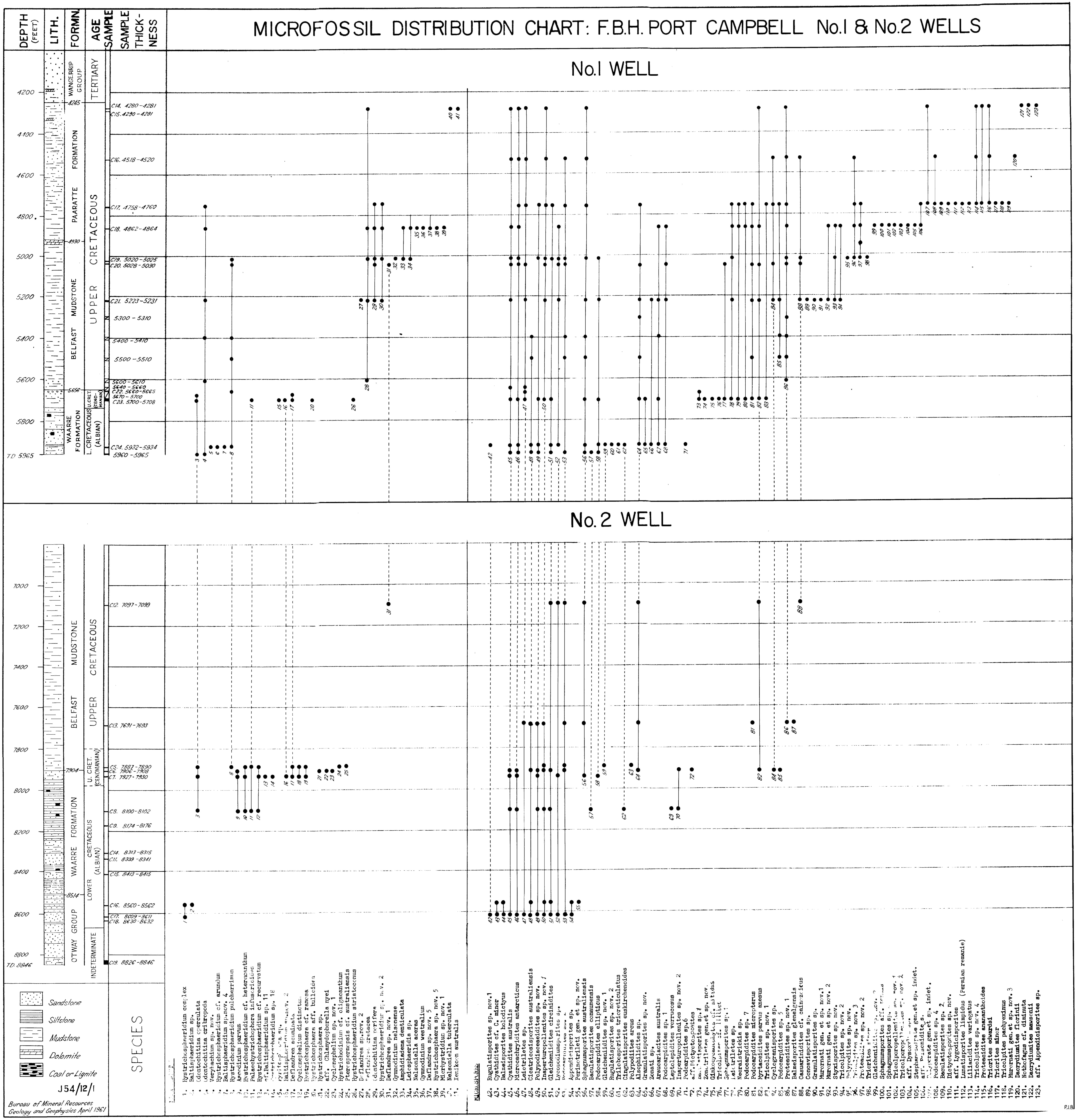
APPENDIX II

SPECIES CHECK LIST

Species	Chart No.
Microplankton	
Amphidiadema denticulata	33
Ascodinium parvum	9
Baltisphaeridium sp. nov. 2	16
Baltisphaeridium sp. nov. 4	7
Baltisphaeridium sp.	2
cf. Baltisphaeridium sp. 11	13
aff.Chlamydophorella nyei	22
Cyclonephelium distinctum	18
Cyclonephelium sp. nov. 1	23
Deflandrea acuminata	17
Deflandrea cretacea	28
Deflandrea sp. nov. 1	31
Deflandrea sp. nov. 2	27
Deflandrea sp. nov. 5	37
Gymnodinium nelsonense	32
Gymnodinium westralium	36
Hystrichodinium cf. oligacanthum	24
Hystrichosphaera aff. bulloidea	20
Hystrichosphaera cf. ramosa	19
Hystrichosphaera sp. nov. 5	38
Hystrichosphaera sp.	21
Hystrichosphaeridium cf. arundum	6
Hystrichosphaeridium complex	1
Hystrichosphaeridium cf. heteracanthum	10
Hystrichosphaeridium pulcherrimum	8
Hystrichosphaeridium cf.recurvatum	12
Hystrichosphaeridium striatoconus	26
Hystrichosphaeridium sp. nov. 2	30
Hystrichosphaeridium sp. nov.18	14
Leiosphaeridia sp.	34
Micrhystridium sp. nov.1	39
Nelsoniella aceras	35
Nelsoniella tuberculata	40
Odontochitina cribropoda	4
Odontochitina operculata	3
Odontochitina porifera	29
Palaeohystrichophora infusorioides	11
Pterospermopsis cf. australiensis	25
Pyritosphaera sp.	15
Veryhachium sp. nov. 1	5
Xenikoon australis	41

Species	Chart No.
MICROSPORES	
Alsophilidites sp.	64
Appendicisporites sp.	54
aff. Appendicisporites sp.	123
Araucariacites australis	67
Baculatisporites comaumensis	57
Baculatisporites sp. 1	73
Baculatisporites sp. 2	109
Balmeisporites glenelgensis	87
Balmeisporites holodictyus	44
Casuarinidites cf. cainozoicus	88
Cicatricosisporites australiensis	48
Cingulatisporites euskirchenoides	62
Concavisporites sp.	89
Cyathidites australis	45
Cyathidites cf. minor	43
Cyclogranisporites sp.	84
Dacrydiumites florinii	120
Dacrydiumites mawsonii	122
Dictyotosporites sp. nov.	110
aff. Dictyotosporites sp.	72
aff. Dysoxylum sp.	104
Ginkocycadophytes cf. nitidus	75
Gleicheniidites circinidites	51
Gleicheniidites sp. nov. 1	59
Gleicheniidites sp. nov. 2	99
Granulatisporites sp. nov.	65
Granulatisporites sp.	90
Inaperturopollenites sp. nov. 1	50
Inaperturopollenites sp. nov. 2	70
Leiotriletes sp.	47
Leptolepidites verrucatus.	69
Liliacidites variegatus	113
Lunatisporites limpidus (Permian remanie)	112
aff. Lygodiosporites sp.	111
Microcachryidites antarcticus	46
Murornati gen. et sp. nov. 1	91
Murornati gen. et sp. nov. 2	92
Murornati gen. et sp. nov. 3	119
Myrtaceidites parvus anesus	82
Neoraistrickia sp.	79
Nothofagus cf. diminuta	121
aff. Parsonidites sp.	106
Perinotrileti gen. et sp. nov.	55
Podocarpidites ellipticus	58
Podocarpidites micropterus	81
Podocarpidites sp. 1	68
Podocarpidites sp. 2	53
Podocarpidites sp. 4	108
Podocarpidites sp. 5	85
Podocarpidites sp. 6	71
Podocarpidites sp. 7	80
Polypodiaceaeidites sp. nov.	49
Polypodiites arcus	63
Polypodiites sp. nov.	95
Polyporate gen. et sp. indet.	107
Proteacidites sp. nov. 1	86
Proteacidites sp. nov. 2	97
Rugulatisporites sp. nov. 1	42
Rugulatisporites sp. nov. 2	60
Sphagnumsporites australiensis	56
Sphagnumsporites aff. tenuis	100
Sphagnumsporites sp. 1	77
Sphagnumsporites sp. 2	101
Stephanocolpate gen. et sp. indet.	105
Styxisporites sp. nov.	93

Species	Chart No.
MICROSPORES (CONTD)	
Tricolpites cf. lillei	76
Tricolpites pachyexinus	118
Tricolpites sp. nov. 1	83
Tricolpites sp. nov. 2	94
Tricolporopollenites sp. nov. 1	102
Tricolporopollenites sp. nov. 2	103
Trilobosporites trioreticulatus	61
Triorites edwardsi	116
Triorites minor	117
Zonati sp.	66
Zonotriletes gen. et sp. nov.	74



MICROFOSSIL DISTRIBUTION CHART: F.B.H. PORT CAMPBELL No.1 & No.2 WELLS
DEPTH (FEET)
LITH.
FORMN.
AGE
SAMPLE
SAMPLE THICK-NESS
No.1 WELL
No.2 WELL
WANGERRIP GROUP
TERTIARY
PAARATTE FORMATION
BELFAST MUDSTONE
UPPER CRETACEOUS
WAARRE FORMATION
U. CRET. (CENOMANIAN)
L. CRETACEOUS (ALBIAN)
LOWER CRETACEOUS (ALBIAN)
OTWAY GROUP
INDETERMINATE
TD 5965
TD 8846
C14. 4280-4281
C15. 4290-4281
C16. 4518-4520
C17. 4758-4760
C18. 4862-4864
C19. 5020-5025
C20. 5028-5030
C21. 5223-5231
5300-5310
5400-5410
5500-5510
5600-5610
5640-5660
C22. 5660-5665
5670-5700
C23. 5700-5708
C24. 5932-5934
5960-5965
C12. 7097-7099
C13. 7691-7693
C5. 7887-7890
C6. 7906-7908
C7. 7927-7930
C8. 8100-8102
C9. 8174-8176
C14. 8313-8315
C11. 8339-8341
C15. 8413-8415
C16. 8560-8562
C17. 8609-8611
C18. 8630-8632
C19. 8826-8846
Sandstone
Siltstone
Mudstone
Dolomite
Coal or Lignite
J54/12/1
Bureau of Mineral Resources Geology and Geophysics April 1961
SPECIES
1. Hystrichosphaeridium complex
2. Baltisphaeridium sp.
3. Odontochitina operculata
4. Odontochitina cribropoda
5. Veryhachium sp. nov.
6. Hystrichosphaeridium cf. arundum
7. Baltisphaeridium sp.nov. 4
8. Hystrichosphaeridium pulcherrimum
9. Ascodinium parvum
10. Hystrichosphaeridium cf. heteracanthum
11. Palaeohystrichophora infusorioides
12. Hystrichosphaeridium cf. recurvatum
17. Deflandrea acuminata
18. Cyclonephelium distinctum
19. Hystrichosphaera cf. ramosa
20. Hystrichosphaera aff. bulloidea
21. Hystrichosphaera sp.
22. aff. Chlamydophorella nyei
23. Cyclonephelium sp. nov. 1
24. Hystrichodinium cf. oligacanthum
25. Pterospermopsis cf. australiensis
26. Hystrichosphaeridium striatoconus
27. Deflandrea sp.nov. 2
29. Odontochitina porifera
30. Hystrichosphaeridium sp. nov. 2
31. Deflandrea sp. nov. 1
32. Gymnodinium nelsonense
33. Amphidiadema denticulata
34. Leiosphaeridia sp.
35. Nelsoniella aceras
36. Gymnodinium westralium
37. Deflandrea sp. nov. 5
38. Hystrichosphaera sp. nov. 5
39. Micrhystridium sp. nov. 1
40. Nelsoniella tuberculata
MICROSPORES
42. Rugulatisporites sp. nov.1
43. Cyathidites cf. C. minor
44. Balmeisporites holodictyus
45. Cyathidites australis
46. Microcachryidites antarcticus
47. Leiotriletes sp.
48. Cicatricosisporites australiensis
49. Polypodiaceaeidites sp. nov.
50. Inaperturopollenites sp. nov. 1
51. Gleicheniidites circinidites
52. Lycopodiumsporites sp.
54. Appendicisporites sp.
55. Perinotrileti gen. et sp. nov.
56. Sphagnumsporites australiensis
57. Baculatisporites comaumensis
58. Podocarpidites ellipticus
59. Gleicheniidites sp. nov. 1
60. Rugulatisporites sp. nov. 2
61. Trilobosporites trioreticulatus
62. Cingulatisporites euskirchenoides
63. Polypodiidites arcus
64. Alsophilidites sp.
65. Granulatisporites sp. nov.
66. Zonati sp.
67. Araucariacites australis
68. Podocarpidites sp. 1
69. Leptolepidites verrucosus
70. Inaperturopollenites sp. nov. 2
71. Podocarpidites sp.6
74. Zonotriletes gen.et sp. nov.
75. Ginkocycadophytus cf. nitidus
77. Sphagnumsporites sp. 1
79. Neoraistrickia sp.
80. Podocarpidites sp. 7
81. Podocarpidites micropterus
82. Myrtaceidites parvus anesus
83. Tricolpites sp. nov. 1
84. Cyclogranisporites sp.
85. Podocarpidites sp. 5
86. Proteacidites sp. nov. 1
87. Balmeisporites glenelgensis
88. Casuarinidites cf. cainozoicus
89. Concavisporites sp.
90. Granulatisporites sp.
91. Murornati gen. et sp. nov.1
92. Murornati gen. et sp. nov. 2
93. Styxisporites sp. nov.
94. Tricolpites sp. nov. 2
100. Sphagnumsporites aff. tenuis
101. Sphagnumsporites sp.
102. Tricolporopollenites sp. nov. 1
105. Stephanocolpate gen.et sp. indet.
108. Podocarpidites sp. 4
109. Baculatisporites sp. 2
110. Dictyotosporites sp. nov.
111. aff. Lygodioisporites
112. Lunatisporites limpidus (Permian remanie)
113. Liliacidites variegatus
114. Tricolpites sp. nov. 4
115. Proteacidites ananthoides
116. Triorites edwardsi
117. Triorites minor
118. Tricolpites pachyexinus
119. Murornati gen. et sp. nov. 3
120. Dacrydiumites florinii
121. Nothofagus cf. diminuta
122. Dacrydiumites mawsonii
123. aff. Appendicisporites sp.
P.J.B.