Dethmann 1964a

Ref. Td 11741

PALYNOLOGICAL REPORT ON MESOZOIC CORE SAMPLES FROM THE LOWER HORIZONS INTERSECTED IN F.B.H. PORT CAMPBELL No.1, No.2, AND No.3 WELLS

This report incorporates an outline of the microfloral succession observed in cores from the following intervals in F.B.H. Port Campbell No.1, No.2, and No.3 Wells: Port Campbell No.1 Well between 5223 and 5934 ft.; Port Campbell No.2 Well between 7403 and 8846 ft., and Port Campbell No.3 Well between 4400 and 5530 ft. The majority of the samples examined yielded a diverse variety of non-mineralised microfossils (spores, pollen, and microplankton) which are sufficiently well preserved for identification at specific level. However, core 22 in No.1 Well and core 4 in No.3 Well contain extremely sparse and poorly preserved microfloras, whilst cores 14 and 18 in No.2 Well did not yield any acid resistant microfossils. Palynological data relevant to the samples considered here and to succeeding core samples are incorporated in papers by Douglas (1961) and Cookson and Balme (1962). The evidence presented by these authors is in agreement with the palynological findings of the present investigation.

Table 1 illustrates the microfloral succession in the three sections under consideration. From this table it will be seen that while spores and pollen occur throughout the succession, the microplankton appear to be restricted to certain horizons. Thus, stratigraphical zonation of the sediments is based primarily on qualitative changes in the spore and pollen assemblages. Microplankton, when present, provide a basis for more refined stratigraphical subdivision and age determinations.

Broadly speaking the spores and pollen grains fall into three

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assemblages which are of Cretaceous age (Albian-Turonian/Senonian) and which are characterized by species recorded previously from other Otway Basin localities (Dettmann 1963a, 1963b, 1963c). The oldest assemblage is composed solely of spores and pollen grains and lacks both angiospermous grains and microplankton. The two succeeding assemblages contain an increasing abundance of angiosperm grains and microplankton while spores show a decrease both in numbers and types present. The diagnostic features and stratigraphical occurrences of the assemblages are outlined below.

The assemblage occurring in the stratigraphically lowest horizon examined (No.3 Well, core 5) is comparable to the Paradoxa Assemblage of Dettmann (1963a). Species present include Coptospora paradoxa (Cookson & Dettmann) in association with Pilosisporites grandis Dettmann, Kraeuselisporites majus (Cookson & Dettmann), Gicatr icosisporites pseudotripartitus (Bolkhovitina), and Aequitriradites spinulosus (Cookson & Dettmann). The presence of the diagnostic species together with Pilosisporites grandis and Aequitriradites spinulosus and the lack of angiosperm grains appears to be especially significant. Both P. grandis, which is restricted to Lower-Middle Albian horizons of the Tambo Formation in the Great Artesian Basin, and A. spinulosus have never been found in association with angiosperms. As such the microflora is equivalent to those recorded from Pretty Hill No.1 Well between 3340 and 4655 ft., Beachport No.1 Well between 2998 and 3162 ft., Penola No.1 Well between 1400 and 2596 ft., etc. (see Dettmann 1963a, 1963b, 1963c).

Microfloras present at succeeding horizons (core 3) in Port Campbell

No.3 Well and in Port Campbell No.1 Well cores 23,24 and Port Campbell No.2 Well cores 8-11, 15-17 are here designated Assemblage II. This assemblage is characterized by the presence of the pollen tetrad Amosopollis cruciformis Cookson & Balme, angiosperm grains (Tricolpites sp., triporate grains) together with certain spore and pollen species (Kraeuselisporites majus, Cicatricosisporites pseudotripartitus, Trilobosporites trioreticulosus Cookson & Dettmann) known also in the Paradoxa Assemblage. The index species of the latter assemblage is lacking or only doubtfully represented in Assemblage II. However, it should be noted that well preserved specimens of Coptospora paradoxa occur with Tricolpites sp. in Eumeralla No.1 Well, core 5 and in uppermost Albian strata of the Great Artesian Basin. These occurrences suggest that the ranges of the two species overlaps but horizons containing definite examples of both species either were not sampled or are absent from the Port Campbell wells.

On spore evidence the age of Assemblage II is probably Upper Albian-Cenomanian/Turonian. Evidence for the lower age limit of the assemblage is provided by Tricolpites sp. which, as outlined above, seems to have appeared during Upper Albian times. The upper age limit is probably Cenomanian/Turonian since Dictyophyllidites pectinataeformis (Bolkhovitina) and Cicatricosisporites pseudotripartitus are unknown from post Cenomanian/Turonian strata in Russia and Siberia (Bolkhovitina 1953, Samoilovitch et al. 1961). Neither of these species has been observed in the succeeding assemblage.

Microplankton obtained from certain of the samples support this age assignment. Stratigraphically significant species present include Gonyaulax edwardsi Cookson & Eisenack and Odontochitina operculata Deflandre both of which range from the Albian to the Lower Turonian (Cookson & Eisenack 1958).

Microfloras distinguishable from the two older assemblages and here referred to Assemblage III first appear in core 21, No.1 Well, core 7, No.2 Well, and core 2, No.3 Well and are present in the higher horizons examined (see Table 1). Assemblage III is characterized by the presence of cf. Gleicheniidites sp. and apparently lacks certain species (Kraeuselisporites majus, Dictyophyllidites pectinataeformis, Cicatricosisporites pseudotripartitus, and Trilobos porites trioreticulosus) which occur in the older assemblages.

Microplankton are conspicuous and sometimes dominant components of Assemblage III. Gonyaulax edwardsi, Odontochitina operculata, and Deflandrea acuminata Cookson & Eisenack are present in the stratigraphically lower samples and are replaced by Deflandrea cretacea Cookson, D. tripartita Cookson & Eisenack, Amphidiadema denticulata Cookson & Eisenack, and Odontochitina cribropoda Deflandre & Cookson. The G. edwardsi-D. acuminata - O. operculata association is indicative of a Cenomanian/Lower Turonian age for the following samples: core 2, No.1 Well; cores 5-7, No.2 Well (see Cookson a nd Eisenack 1958). The presence of O. cribropoda, D. cretacea etc suggests a Turonian/Senonian age for core 21, No.1 Well; core 13 No.2 Well; and core 1, No.3 Well.(Cookson & Eisenack 1960, 1962).

Note: An assemblage containing cf. Gleicheniidites sp. was previously recorded (Dettmann 1963b) from Pretty Hill No.1 Well, core 7. Although the sample is devoid of microplankton the evidence cited above indicates that the contained microflora is referable to Assemblage III and is Upper Cretaceous in age (probably Cenomanian-Senonian).

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Microspores and pollen of Permian and Triassic age have been

observed in the following samples: Port Campbell No.1 Well, core 21;

Port Campbell No.2 Well, core 15; Port Campbell No.3 Well, cores 1,3,4,5,

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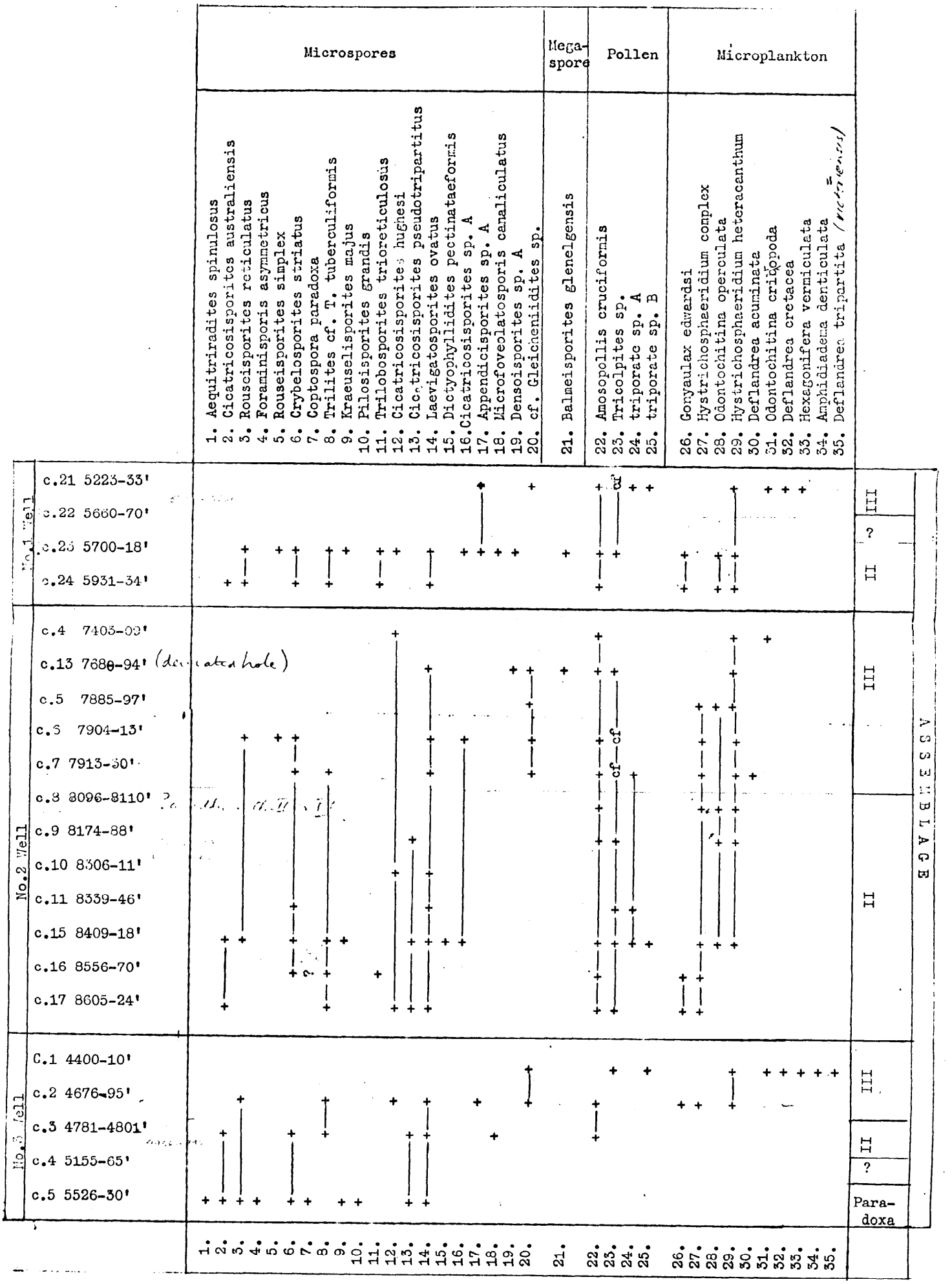

Table 1. Distribution of selected spore, pollen, and microplankton species in core samples from the lower parts of the Mesozoic sequences intersected in Port Campbell No.1, No.2, and No.3 wells.

\+ - species present
cf - specimens similar to, but not identical with, a particular