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THE MICROPALAEONTOLOGY, PALYNOLOGY AND STRATIGRAPHY OF
THE PANARCTIC TENN. ROBERT HARBOUR K-07 WELL

by

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ENCLOSURES: Biostratigraphical analysis charts, Nos. 1 and 2.

I

INTRODUCTION

This report comprises a summary of the micropalaeontological, palynological and stratigraphical analyses carried out under Project No. RRNA/767/406 on material recovered from the interval 960' - 12,485' (T.D.) of the Panarctic Tenn. Robert Harbour K-07 well.

This well was drilled on north Cameron Island in the Canadian Arctic Islands at Latitude $76^{\circ} 36' 32.2''$ N., and Longitude $104^{\circ} 02' 14.1''$ W..

The stratigraphic interval covered by this report ranges in age from Early Triassic to Early Permian. Early Triassic Bjorne sediments are underlain in turn by the Degerbols - Troid Fiord, Van Hauen - Assistance, Hare Fiord and ?Antoinette Formations in which the Late Permian and the Early Permian, Kungurian, Artinskian and Sakmarian stages are recognised. The well reached T.D. in sediments of Early Permian, Sakmarian age.

The formational names adopted for these sediments are based predominantly on the works of Thorsteinsson & Tozer, in Douglas (1970) and Stuart Smith & Wenekers (1977). Both palaeontological and lithological criteria have been considered in their interpretation.

A summary of the sequence penetrated in the well can be seen overleaf in Table I.

III

MATERIALS AND METHODS

Under Project No. RRNA/767/406, cuttings samples were examined from the interval 960' - 12,485' (T.D.), together with samples from two cores covering the intervals 5877' - 5907' and 8904' - 8930'. The examination comprised both detailed palynological and micropalaeontological studies. For specific information, reference should be made to the biostratigraphical analysis charts, enclosures 1 and 2.

A tentative interpretation of the environments of deposition is indicated on the biostratigraphical analysis chart and discussed in the stratigraphical remarks. The interpretation of a probable environment is based on the use of a combination of factors including the faunal and floral diversity and dominance, stratigraphical distribution, the comparison of species, genera and assemblages with analogous components in the Recent and fossil record, and the lithological characteristics of the intervals studied.

Because of the confusion in the literature over the correlation of the Russian and North American Permian classifications the following correlations apply within the Permian and are used herein:

Late Permian	Dzhulfian)	
)	Ochoan
	Tatarian)	
)	Guadalupian
	Kazanian)	
Early Permian	Kungurian)	
)	Leonardian
	Artinskian)	
	Sakmarian	Wolfcampian

The Russian classification is adopted in this report.

Striatoabietites richterii and S. multistriatus which indicate an Early Triassic, Scythian age. Reworked Middle to Late Devonian spores are present in the lowermost sample.

Weylandites striatus, W. vittifer, Cycadopites cymbatus, Neoraistrickia cf. ramosa, Protohaploxypinus limpidus, and Sulcatisporites cf. ovatus.

The assemblages contain many of the forms found in the overlying Triassic but the Triassic influence gradually diminishes towards the base of the interval. Permo-Triassic forms which appear here for the first time include Klausipollenites schaubergerii, Vitreisporites pallidus, Kraeuselisporites apiculatus, K. vestitus, Aculeisporites variabilis and Propriisporites pococki.

Acritarchs present include Micrhystridium spp., M. cf. piveteauii, M. breve, M. stellatum, Cymatiosphaera sp., Veryhachium? riburgense and V. cf. europaeum. Reworked Middle to Late Devonian spores are present in all samples, often in abundance.

INTERVAL 4050' - 6550': Early Permian, Kungarian

General Lithology

Sandstones are the predominant lithology down to 5060' with small amounts of black and red-brown ferruginous shales, clays and limestones. The sandstones are generally fine to medium-grained, light grey to medium reddish-brown in colour, occasionally ferruginous, kaolinitic, calcareous or cherty and with traces of glauconite. From 5060', light brownish-grey limestones pass down into fine to very fine-grained sandstones, light grey to greyish brown in colour, which occasionally grade into light grey siltstones and medium-brown to greyish-brown shales.

These sandy lithologies give way at approximately 5900' to medium-grey siltstones, which are occasionally calcareous or siliceous, and dark-grey shales which become more abundant and pass eventually into alternating

Decussatisporites sp. B, Striatopodocarpites cancellatus, Nevesisporites fossulatus and a single specimen of Cordaitina cf. crenulata.

The presence of acritarchs in the upper part of the interval may be due to cavings contamination.

INTERVAL 6550' - 8250': Early Permian, Artinskian

General Lithology

Dark brownish-grey, calcareous shales pass down into light grey, very fine-grained sandstones. These in turn pass down, at approximately 6600', into medium grey to medium to dark brownish-grey shales, which are occasionally calcareous, pyritic or siliceous, with traces of fine sandstone. Very light to brownish grey, calcareous siltstones with occasional shales comprise the remainder of the interval.

Micropalaeontology

The top of this interval is marked by the common to abundant occurrence of a foraminiferid fauna again of Early Permian aspect. Core no. 2 (8904' - 8930') yielded a fauna in similar proportions to the surrounding cuttings samples. The first occurrences and increasing abundances with depth of Hemigordius haltoni and Nodosinella digitata, together with the occurrences of Endothyra sp., Thuramminoides sphaeroidalis, Ammobaculites inconspicua and Meandrospira sp., are all indicative of the Early Permian to Late Pennsylvanian as described by Cummings (1955) and Cushman and Waters (1928).

The ostracod fauna includes species of Bairdia, Bairdiacypris and Cavellina, also of Early Permian age.

"Productid" brachiopod spines are rare over this interval.

dolomite are present from 11,940' - 12,000'. Medium brown, microcrystalline limestones appear at 12,220' and become abundant below 12,340'.

Micropalaeontology

The foraminiferid fauna throughout the upper half of this interval is essentially similar in occurrence and abundance to that of the overlying interval. However, the increased abundance of the ostracod fauna is the most significant feature of the upper half of the interval. A similar increase in the ostracod assemblage abundance has been found elsewhere in the Canadian Arctic Islands in strata of Sakmarian age.

The first and single occurrence of a fusulinid foraminifer, namely Pseudofusulinella utahensis, was found in the cuttings sample 10,460' - 10,500'. However from 11,060' to 12,485' T.D., the above species together with Schwagerina spp., Schubertella spp., Schubertella cf. giraudi and S. kingi occur in increasing abundance. Both P. utahensis and S. kingi have been found in the Early Permian, Belcher Channel Formation by Thorsteinsson, in Harker and Thorsteinsson, (1960). It is possible therefore that this assemblage may indicate an early Sakmarian age. Similarly the occurrences of Palaeotextularia sp. and Climacammina sp. in the lower part of this interval, are indicative of the Early Permian to Late Pennsylvanian, as recorded by Cummings (1956).

Bryozoan remains and "productid" spines are common to abundant throughout almost the entire interval.

VI

STRATIGRAPHICAL REMARKS

The Panarctic Tenn. Robert Harbour K-07 well reached T.D. at 12,485' in shales which were dated as being of Early Permian, Sakmarian (Wolf-campanian) age using both palynology and micropalaeontology. These dark grey to black shales are overlain by thin sandstones, shales and limestones which persist to 12,350' and are tentatively correlated with the Antoinette Formation. The fusulinid and bryozoan fauna present over this interval suggest a shallow marine environment.

Sakmarian sediments persist to 8250' and consist in the main of shales and fine sandstones, with some minor siltstones, which are correlated with the Hare Fiord Formation. Thin limestones at approximately 11,150' suggest a minor interfingering of the laterally equivalent Antoinette Formation as illustrated by Thorsteinsson & Tozer in Douglas (1970) and Stuart Smith & Wennekers (1977), whereas the traces of gypsum and anhydrite at 10,320' - 10,370' and 9220' - 9320' suggest the proximity of the Mount Bayley Formation. Again the presence of fusilinids, bryozoans and "productid" spines suggest a dominantly shallow marine environment.

The interval 8250' to 6550' was dated palynologically as being of Artinskian age. This unit consists mainly of shales with subsidiary siltstones near the base and sandstones near the top. It is correlated with the Hare Fiord Formation which is probably of shallow marine origin in this interval.

fossils were only recovered from the three lowermost composite cuttings samples. The sediments are predominantly terrestrial in origin and consist of red and green shales and, light grey, brown-grey and brick-red sandstones which are correlated with the Bjorne Formation. Light grey, glauconitic siltstones near the base of the unit along with the presence of acritarchs in the palynological residues indicate a slight marine influence prior to the major Bjorne regression.

An unconformity, the result of the Melvillian Disturbance is generally postulated at the base of the Bjorne Formation. The sudden appearance of abundant brachiopod spines in the 3060' - 3100' sample also suggests this possibility. An unconformity is therefore tentatively postulated at a distinct log-break at 3065'.

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ROBERT HARBOUR K-07

Plates 1 - 3

All magnifications X500

PLATE I

1. Equisetosporites steevesii 2700'
2. Protohaploxylinus jacobii 2900'
3. Taeniaesporites novimundi 3000'
4. Micrhystridium piveteauii 3300'
5. Micrhystridium breve 3300'
6. Limitisporites cf. parvus 3300'
7. Weylandites vittifer 3600'
8. Peltacystia venosa 3800'
9. Protohaploxylinus cf. sewardii 5100'
10. Protohaploxylinus cf. sewardii 5200'
11. Lophotriletes cf. tereteangulatus 5500'
12. Decussatisporites sp. A 5100'
13. Decussatisporites sp. A 5100'

PLATE 3

1. Illinites sp. 8200'
2. Klausipollenites sp. 8300'
3. Chasmatosporites sp. 8400'
4. Hamiapollenites tractiferinus 8700'
5. Vittatina sp. A 8700'
6. Vittatina sp. A 11100'
7. Protohaploxylinus limpidus 9400'
8. Striatopodocarpites sp. 9500'
9. Vittatina subsaccata 10000'
10. Vittatina saccata 10100'
11. Striatoabietites sp. 10400'
12. Protohaploxylinus cf. amplus 11400'

PLATE 1

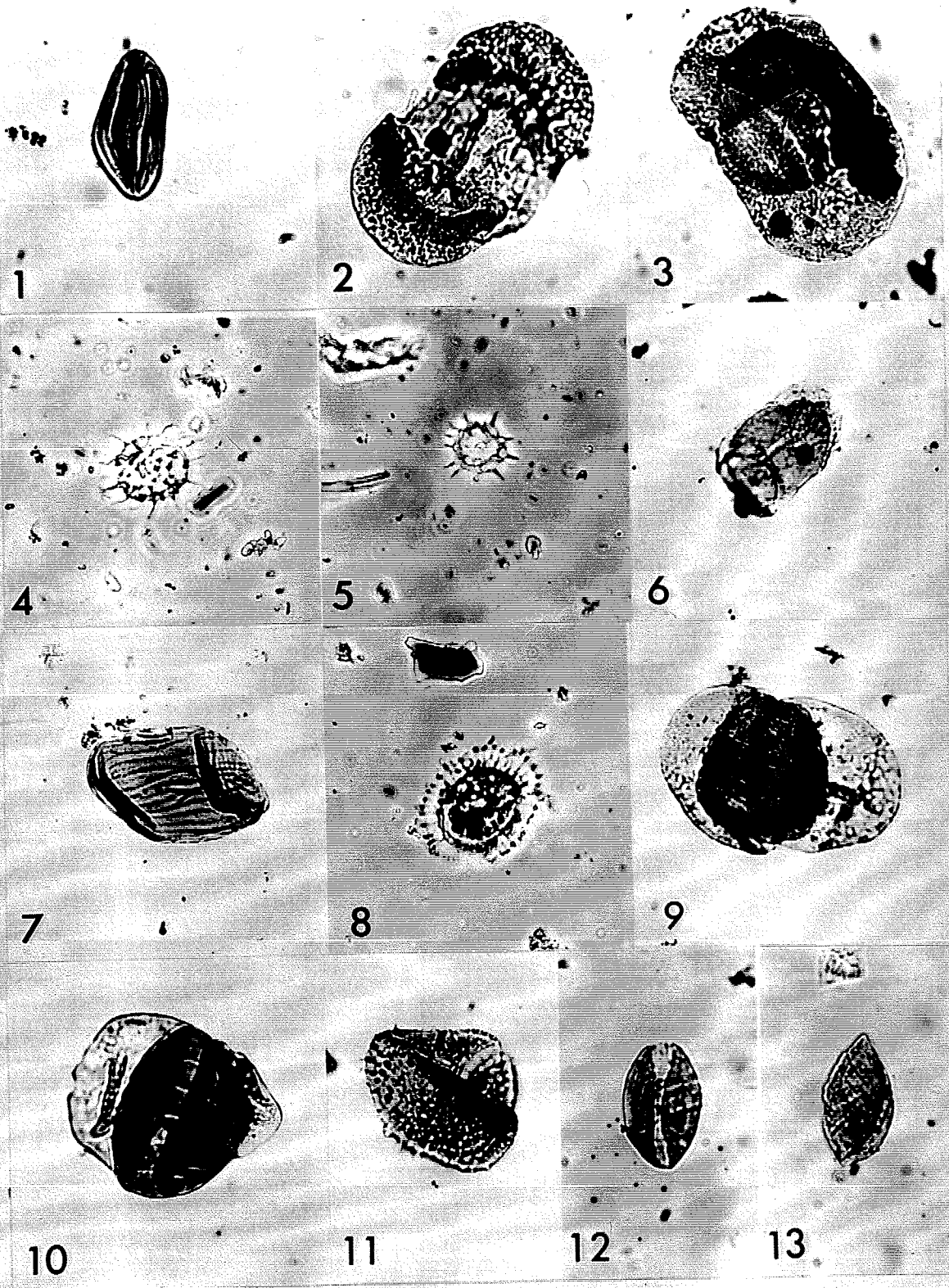


PLATE 2

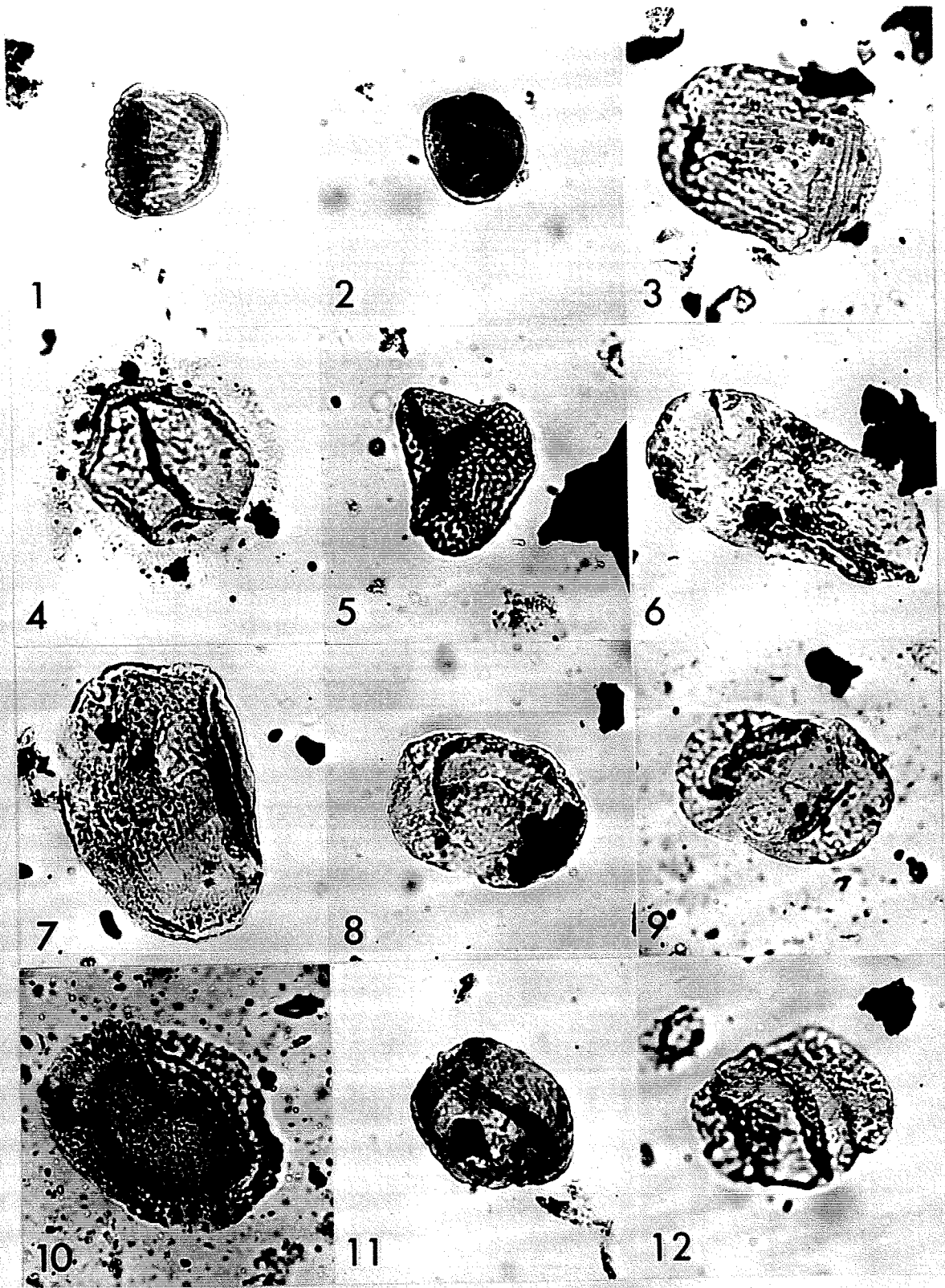


PLATE 3

