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Confidential to
Aug. 28, 1979

ROBERTSON RESEARCH (NORTH AMERICA) LIMITED

EXPLORATION REPORT NO. 181

THE MICROPALAEONTOLOGY, PALYNOLOGY AND STRATIGRAPHY OF

THE IOE IKATTOK J-17 WELL

O.F. 647

by

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Project No. RRNA/778/452

SEPTEMBER, 1977

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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/778/452, on material from the interval 90' - 12,500' T.D. of the Imperial Ikattok J-17 well.

The well was drilled offshore in the Mackenzie Delta region Northwest Territories, at Latitude $69^{\circ} 20'$ N., Longitude $136^{\circ} 15'$ W..

The stratigraphical interval covered by this well section commences in strata of Quaternary and Neogene age, which are possibly unconformably underlain by Oligocene sediments. These, in turn, pass down into strata of Eocene and Palaeocene age within which the well terminated. The occurrence of a Late Cretaceous flora and fauna within the upper part of the Palaeogene sequence is discussed in the stratigraphical remarks.

In view of the complex non-marine to marginal marine depositional history of the Canadian Arctic Coastal Plains, no attempt has been made to adopt a classification of palaeoenvironments defined in terms of marine bathymetry. An alternative assessment of maximal and minimal marine influences on the transitional environments which prevailed in an essentially deltaic complex has therefore been attempted. The characteristic lithological sequences within the Mackenzie Basin and their palaeoenvironmental interpretations have been discussed by Young, Myhr & Yorath, (1976). This evidence coupled

with fluctuating abundances of specific microplankton and foraminifera further aid environmental analyses.

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

II

SUCCESSIONTABLE I

<u>INTERVAL</u>	<u>THICKNESS</u>	<u>SERIES</u>	<u>SYSTEM</u>
90' - 750'	660'	Pliocene - Recent) Neogene-) Quaternar
750' - 1560'	810'	Middle Eocene-Oligocene)
1560' - 4350'	2790'	Early Eocene) Palaeogene
4350' - 12,500'	8150'	Palaeocene)

N. B. The above figures are based on results derived mainly from ditch cuttings and are therefore approximations only.

III

MATERIALS AND METHODS

Under Project No. RRNA/778/452 prepared material from the interval 90' - 12,500' T.D. was available for both palynology and micropalaeontology. In addition thirty-seven sidewall cores covering the interval 4680' - 12,458' together with a core from 7245' - 7265' were available for micropalaeontological analyses. Also 38 sidewall cores covering the interval 1825' - 12,314' together with cores from 2976' - 2989' and 7235' - 7245' were available for palynology. For specific information reference should be made to the biostratigraphical analysis charts, enclosures Nos. 1 and 2.

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

It should be realised that as the information is mainly derived from cuttings samples, only a generalised interpretation of the environment is feasible throughout the well section.

IV >

LATE TERTIARY - QUATERNARYINTERVAL 90' - 750': Pliocene - RecentGeneral Lithology

The interval consists of dark, grey mudstone with interbedded coal stringers throughout. Coarse to fine, angular unconsolidated sands are developed at the base of the interval.

Micropalaeontology

This interval contained an assemblage of Pliocene to Recent foraminifera characterised by the dominant species Protelphidium orbiculare, Elphidium umbilicatum and Elphidium clavatum between 90' - 540'. The interval from 540' - 750' was barren of in situ foraminifera.

Palynology

In situ palynomorphs recorded are few. These include Pinuspollenites sp., Sphagnum spp., Tripoporopollenites spp., and Alnipollenites sp.. The palynoflora is dominated by reworked forms such as Densosporites spp., Spelaeotriletes lepidophytus and Hystrichosporites sp. from the Devonian; Triassic striate pollen including Protohaploxypinus sp. and Leukosporites sp.; and Mesozoic taxa including Appendicisporites problematicus, Matonisporites sp., Pareodinia sp. and Ovoidinium verrucosum. Between 570' and 750', the occurrence of "Dinoflagellate ovoid cysts" suggests a Neogene age.

EARLY - MIDDLE TERTIARY

INTERVAL 750' - 1560': Middle Eocene - Oligocene

General Lithology

The interval 750' - 1000' is a continuation of that immediately above with coarse to fine, angular, unconsolidated sands and conglomerates. The remainder of the interval consists of dark, grey mudstone underlain by interbedded mudstone and siltstone with minor coal stringers.

Micropalaeontology

This interval was barren of in situ foraminifera.

Palynology

This interval is characterised by an influx of terrestrial forms indicative of the Upper Palaeogene. Taxa recorded include Tiliaepollenites sp., T. sp. cf. crassipites, Ulmipollenites sp., Triporopollenites spp., Ericipites (tetrad) sp., Caryapollenites sp. cf. veripites, Pterocaryapollenit sp., Tricolpites spp., Osmundacidites spp., Laevigatosporites spp., and Tricolporopollenites sp. (Castaneoid type). This section is included in the Tiliaepollenites Assemblage Zone.

Reworked forms are still numerous. In situ microplankton are absent.

INTERVAL 1560' - 4350': Early Eocene

General Lithology

The entire interval consists of alternating units of coarse to fine, angular, unconsolidated sands; interbedded siltstones and mudstone, and continuous mudstone sequences. Minor coal stringers, cherts and pyrite occur throughout the interval. The cyclic development of these units is apparent.

Micropalaeontology

This interval was barren of in situ foraminifera with the exception of ditch cuttings sample 2370' which yielded the common occurrence of Cyclammina arctica - borealis. This foraminifer is thought to be of probable Eocene age, *fidé* Langhus and Zingula in Staplin (1976).

Palynology

Taxa recorded from this interval include the angiosperms Pistillipollenit mcgregorii, P. sp., Paraalnipollenites sp., Tiliaepollenites vescipites, Engelhardtia sp., Tricolporopollenites spp., T. sp. cf. kruschii, Aquilapollen spp., Alnipollenites verus, Tripoporopollenites bituitus, T. simplex and Expressipollis sp., and the spores Cicatricosporites sp. cf. dorogensis, Laevigatosporites ovatus and Osmundacidites wellmanii.

There is an influx of the fungal group in this interval. Characteristic forms recorded include Pesavis tagluensis, Brachysporisporites cotalis, Pluricellaesporites hillsi and undifferentiated fungal hyphae. These terrestrial palynofloral elements are ascribable to the Pesavis-Tiliaepollenite Assemblage. The occurrence of the above mentioned taxa in the assemblage

suggest an Early Eocene age for the interval. Except for Palambages sp., microplankton are rare. Although not occurring as commonly as in the overlying strata, derived forms are still evident. Of particular significance is the occurrence of the Late Cretaceous forms Wodehouseia spinata, Aquilapollenites sp. cf. trialatus, A. clarireticulatus, A. parallelus and Integricorpus sp..

INTERVAL 4350' - 12,500' T.D.: Palaeocene

General Lithology

The top of the interval down to 6500' consists of alternating angular sandstones and mudstones with minor coal stringers and siltstones. Between 6500' - 7150' a more continuous series of dark shale with minor coals and siltstones occurs.

From 7150' - 11,180' alternating sequences of unconsolidated, fine to coarse, angular sands and sandstones together with mudstones are present; minor shales, siltstones and coal stringers occur throughout.

The basal part of the interval between 11,180' - 12,500' (T.D.) consists of a continuous shale sequence which can be divided into an upper member of dark shale between 11,180' - 11,800' and a lower member of dark shale with regularly alternating siltstone beds to total depth. Minor coal stringers also occur at the base of the interval between 12,300' - 12,400'.

Micropalaeontology

This interval was concluded to be barren of in situ foraminifera. However, the common occurrence of foraminifera which are generally accepted to be of Late Cretaceous, Campanian - Maestrichtian age were found. Diagnostic

species including Haplophragmoides collyra, H. rota, H. excavatus, Gaudryina cf. bearpawensis and Verneuilioides cf. cunningensis were recorded between 5280' - 9810'. This fauna was very common between 5280' - 7700'. Their presence over this interval is discussed in the stratigraphical remarks.

Palynology

The palynoflora is characterised by the continuing dominance of fungal spores and the gradual disappearance and paucity of many terrestrial taxa. Recorded are the fungal elements, Pesavis tagluensis, Diporicellaesporites sp., Striadiporites sanctaebarae, Ctenosporites sp., Brachysporisporites cotalis, microthyriaceous germling and undifferentiated fungal hyphae and spores. This assemblage is included in the Pesavis Assemblage.

This interval contains a fairly impoverished terrestrial palynofloral assemblage. Included are the spore types Cyathidites minor and Osmundacidites spp., gymosperm pollen Taxodiaceapollenites hiatus and the diagnostic angiosperm taxa Paraalnipollenites confusus, Triporopollenites spp. and Pistillipollenites sp..

A few aquiloid Late Cretaceous forms including Aquilapollenites sp. cf. trialatus, Aquilapollenites clarireticulatus and Integricorpus sp., which were recorded in the previous interval continue to occur fairly regularly particularly in the upper 5000' of this interval down to a depth of 9780'. In situ microplankton are rare.

VI >

STRATIGRAPHICAL REMARKS

The Ikattok J-17 well penetrated Tertiary and younger sediments as determined mainly on palynology, together with a thick interval containing reworked palynoflora of Late Cretaceous age. The well was terminated at 12,500' T.D.. No formational nomenclature has been assigned to the rock units due to the apparent uniformity of the lithologies examined, coupled with the absence of gamma ray and sonic log recordings.

The well penetrated a series of shales, mudstones and sandstones with minor coal stringers throughout over the interval 12,500' (T.D.) - 4350'. These sediments have been determined as Palaeocene in age and assigned to the Pesavis palynological Assemblage Zone. Overlying these deposits is an Early Eocene interval which consists mainly of interbedded mudstones and unconsolidated sands. It extends from 4350' - 1560' and has been assigned to the Pesavis - Tiliaepollenites Assemblage Zone. The interval 1560' - 750' of Middle Eocene - Oligocene age falls within the Tiliaepollenites Assemblage Zone. The sediments over this interval are dominantly unconsolidated sands and conglomerates with interbedded mudstones. The environment for the Palaeogene sequence above, which forms the majority of sediments in this well, is thought to be one of coastal and delta plain (fluviodeltaic) deposition. This environmental interpretation of Young, Myhr and Yorath (1976) is also supported by the lithologies examined which were often sandstone dominated, containing silty and coaly mudstone together with thin, discontinuous

coal seams. These units were developed as alternating facies. The absence of in situ microplankton also supports this interpretation.

The topmost interval, 750' - 90', is of Pliocene - Recent age. Between 540' - 90' a Protelphidium/Elphidium foraminiferid Assemblage Zone was recognized. These foraminifera probably indicate a shallow marine to brackish water environment. The sediments over the entire interval are similar to those of Middle Eocene - Oligocene interval. A tentative unconformity is postulated between the Palaeogene and Neogene at 750' due to the probable absence of Miocene sediments.

The presence of a Late Cretaceous floral and faunal influence is probably the result of large scale reworking. The exact thickness of the interval in which this reworking occurs is difficult to determine, but extends down to 9810'.

From extrapolation of the regional geology, as described by Young, Myhr and Yorath (1976), it would appear that the Ikattok J-17 well is situated within or near to the Kaltag-Blow Fault Zone which probably accounts for the reworked Cretaceous sediments due to the long term active nature of this structure. The diagrammatic cross-section of the above authors (fig. 23, section x¹ - x) tends to simplify this fault zone, although immediately to the west and outside the structure, the top of Late Cretaceous sediments are thought to exist at approximately 6200 ± below sea level.

VII

APPENDIXCLASSIFICATION OF PALYNOLOGICAL ASSEMBLAGE ZONESTiliaepollenites Assemblage

Tiliaepollenites is the significant form in this assemblage. It is associated with occurrences of the following species which are characteristic of, although not necessarily restricted to, the zone.

Triporopollenites bituitus

Ericipites sp.

Triporopollenites spp.

Ulmipollenites sp.

Triporopollenites (Betula type)

Bombacacidites sp.

Pterocaryapollenites sp.

Caryapollenites sp.

Alnipollenites verus

Taxodiaceaepollenites hiatus

Tricolporopollenites spp.

Bisaccate pollen

Juglanspollenites sp.

Pesavis - Tiliaepollenites Zone

The zone is named for Pesavis tagluensis and Tiliaepollenites vespipites. A characteristic of the zone is the prominence of fungal forms both in the number of specimens and the number of form genera present. The rapid proliferation of fungal forms along with the characteristic members of the Bombacaceae and Tiliaceae makes this assemblage distinctive. The following species are characteristic of the zone, although not necessarily restricted to the zone.

Tiliaepollenites vespipites

Pesavis tagluensis

Bombacacidites macimientensis

Pesavis simplex

Nyassapollenites sp.

Involutisporonites spp.

Betulapollenites infrequens

Ctenosporites sp.

Triporopollenites bituitus

Brachysporisporites sp.

Alnipollenites verus

Brachysporisporites cotalis

Tricolporopollenites spp.

Pluricellaesporites spp.

Striadiporites sanctaebarae

Pesavis Zone

Pesavis tagluensis is the significant form in this zone and is associated with the following species which are characteristic of, although not necessarily restricted to, the zone.

Pesavis tagluensisDiporicellaesporites sp.Striadiporites spp.Brachysporisporites cotalisPluricellaesporites hillsi

Unidentified fungal spores hyphae

Ctenosporites sp.Inapertisporites sp.

The paucity of the pollen and spore assemblage also characterises this assemblage zone.

VIII

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ADDENDUM

- JANSONIUS, J. (1976): Palaeogene fungal spores and fruiting bodies of the Canadian Arctic. *Geoscience and Man*, Vol. XV, pp. 129-132.
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IKATTOK J-17 WELL

Plates 1 - 3

All magnifications X500

PLATE 1

		<u>Depth</u>
1.	Dinoflagellate ovoid cyst	630'
2.	<u>Ericipites</u> (tetrad) sp.	900'
3.	<u>Laevigatosporites</u> sp.	810'
4.	<u>Ericipites</u> (tetrad) sp.	900'
5.	<u>Caryapollenites</u> sp. cf. <u>veripites</u>	810'
6.	<u>Piceapollenites</u> sp.	900'
7.	<u>Tiliaepollenites</u> sp.	810'
8.	<u>Ulmipollenites</u> sp.	810'
9.	<u>Pterocaryapollenites</u> sp.	810'
10.	<u>Stereisporites antiquasporites</u>	890'
11.	<u>Podocarpidites</u> sp.	810'
12.	<u>Tripoporollenites</u> sp.	1620'
13.	<u>Tripoporollenites bituitus</u>	1800'
14.	<u>Tricolporopollenites</u> sp. (Castanea type)	810'
15.	<u>Tricolporopollenites</u> sp.	1800'

PLATE I

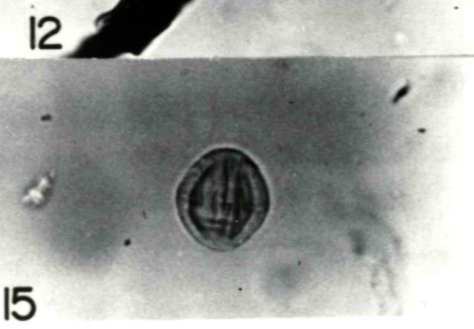
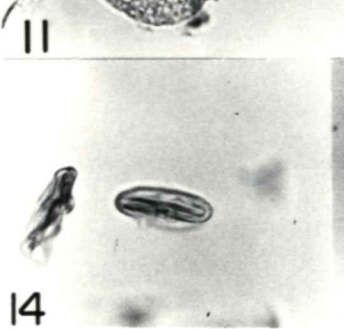
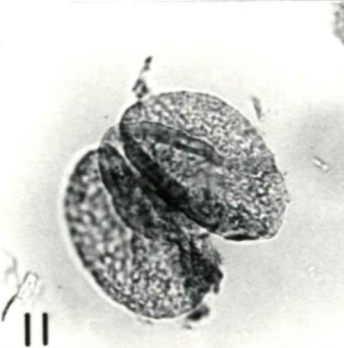
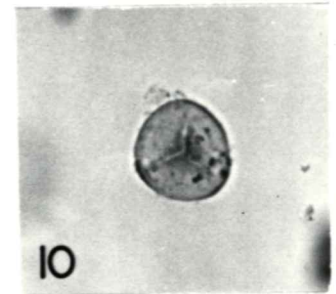
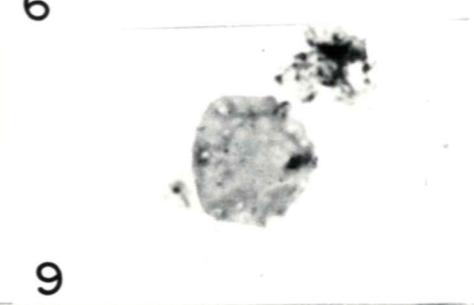
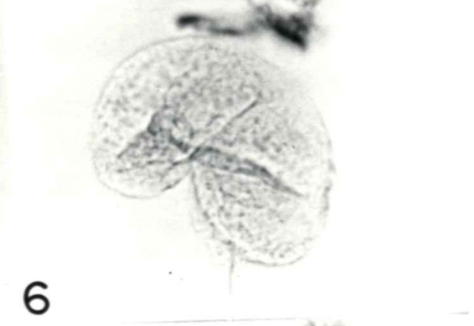
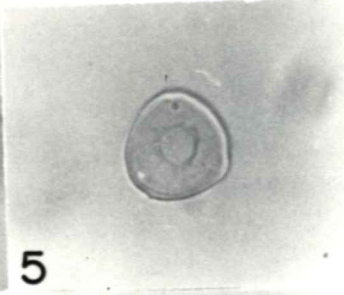
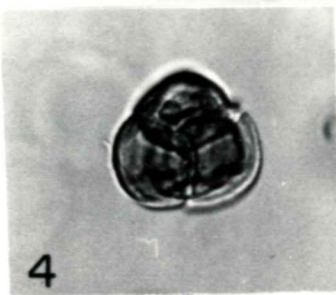
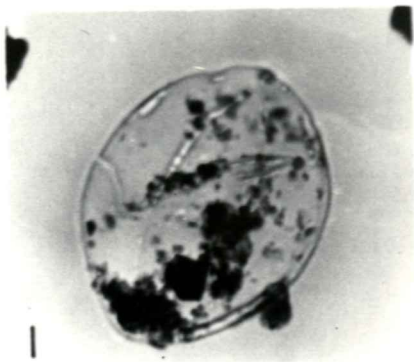


PLATE 2

	<u>Depth</u>
1, 4. <u>Cicatricosisporites dorogensis</u>	1710'
2,11. <u>Tiliaepollenites vespites</u>	1800'
3. <u>Tricolporopollenites</u> sp. cf. <u>kruschii</u>	1800
5. <u>Aquilapollenites</u> sp.	4230'
6. <u>Tiliaepollenites</u> sp. cf. <u>vespites</u>	1800;
7. <u>Taxodiaceaepollenites hiatus</u>	1980'
8. <u>Alnipollenites verus</u>	3510'
9. <u>Pistillipollenites macgregorii</u>	1710'
10. <u>Osmundacidites</u> sp.	1980'
12. <u>Pistillipollenites</u> sp.	1800'
13. <u>Pluricellaesporites</u> sp.	4050'
14. <u>Tripoporopollenites bituitus</u>	1980'

PLATE 2

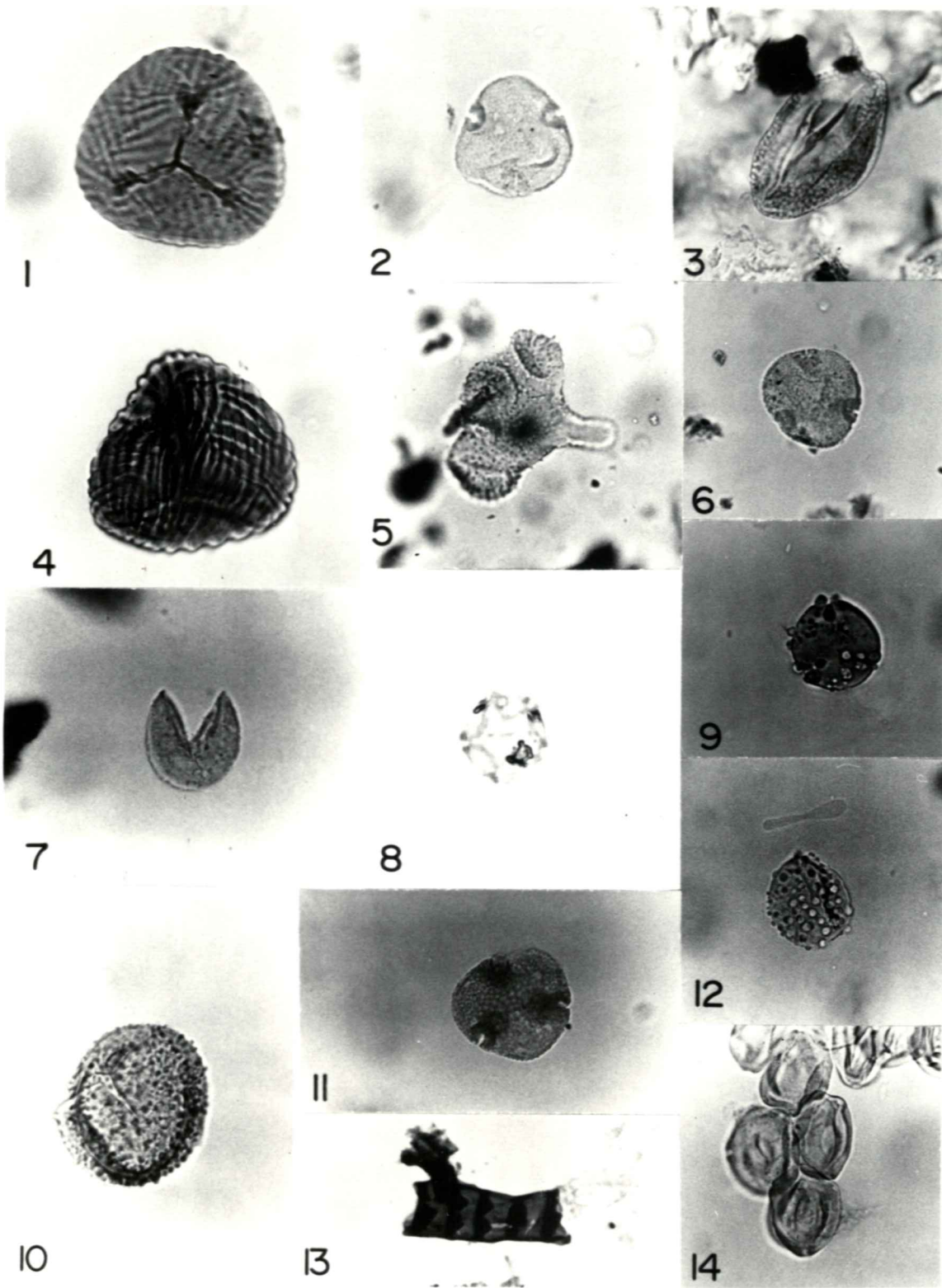


PLATE 3

	<u>Depth</u>
1. <u>Paraalnipollenites confusus</u>	9142' S.W.C.
2. <u>Pistillipollenites macgregorii</u>	4200'
3. <u>Pesavis</u> sp.	3480'
4. <u>Triporopollenites</u> sp.	2070'
5. <u>Diporicellaesporites</u> sp.	5184' S.W.C.
6. <u>Brachysporisporites cotalis</u>	7195' S.W.C.
7. <u>Ctenosporites</u> sp.	5971' S.W.C.
8. <u>Pluricellaesporites hillsi</u>	7195' S.W.C.
9. Fungal fruiting body	2970'
10. <u>Striadiporites sanctaebarae</u>	4966' S.W.C.
11. <u>Pesavis tagluensis</u>	2978.5' C.C.

PLATE 3

