DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT ON

# DELHI - SANTOS PUTAMURDIE NO. 1

# PALYNOLOGICAL EXAMINATION OF CORES AND SIDEWALL CORES

by

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# SOUTH AUSTRALIA

LOCALITY PLAN OF DELHI - SANTOS
PUTAMURDIE Nº 1 & PANDIEBURRA Nº 1 WELLS

NORTHERN TERRITORY

QUEENSLAND

WESTERN AUSTRALIA

NEW SOUTH WALES

VICTORIA

GREAT AUSTRALIAN BIGHT

Putamurdie Nº 1

Pandieburra Nº 1

Oodnadatta

Innamincka

LAKE EYRE

Marree

Leigh Creek

LAKE TORRENS

LAKE FROME

Cook

Tarcoola

LAKE EVERARD

LAKE GAIRDNER

Penong

Ceduna

Streaky Bay

Pt. Augusta

Yunta

Whyalla

Pt. Pirie

Morgan

Murray River

Renmark

Pt. Lincoln

ADELAIDE

Tailem Bend

Bordertown

Kingston

Mt. Gambier

SCALE IN MILES

50 0 50 100 150 200

S.A. Department of Mines

129° 130° 131° 132° 133° 134° 135° 136° 137° 138° 139° 140° 141°

26° 27° 28° 29° 30° 31° 32° 33° 34° 35° 36° 37° 38°

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# DELHI - SANTOS PUTAMURDIE NO. 1

## PALYNOLOGICAL EXAMINATION OF CORES AND SIDEWALL CORES

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W. K. Harris - Geologist

## 1. ABSTRACT

The succession of microfloras in the Jurassic of Putamurdie No. 1 has enabled four tentative biostratigraphic zones to be erected. The evidence for assigning absolute ages to the assemblages is discussed and correlations with the Jurassic sequence in other wells is considered.

## 2. INTRODUCTION

Delhi-Santos Putamurdie No. 1 located approximately 41 miles north-northeast of Pandieburra No. 1, Lat. 26°16'13" Long. 139°46'35" was drilled to a total depth of 6,406 ft.

The well passed through approximately 4,100 ft. of Cretaceous and younger sediments, 1,900 ft. of Jurassic non marine shales and sandstones, 130 ft. ?Triassic quartzite and 270 ft. of steeply dipping Palaeozoic sediments.

The identification and boundaries of the Cretaceous, Triassic and Palaeozoic sediments are based on lithological data only, supplied by Delhi Australian Petroleum Ltd.

Palynological observations were made on fourteen sidewall core samples and five conventional cores from the Jurassic sequence. Four tentative microfloral zones have been erected on the basis of these observations and have been used to correlate sections of other wells drilled in the Great Artesian Basin. All cores except Nos. 1 and 2 were barren.

The microfloral zones and distribution of sporomorphs are illustrated in Plan No. 63-733.

The co-operation of geologists of Delhi-Australian Petroleum Ltd., throughout this investigation is appreciated.

## 3. NOMENCLATURE OF BIOSTRATIGRAPHIC ZONES.

Biostratigraphic units are fundamentally different from rock units and the boundary of the two may coincide or lie at quite differen

stratigraphic horizons or even cross each other. All biostratigraphic units are both records of facies and time and are most useful for determining time - stratigraphic boundaries although absolute ages can only be determined with reference to other fossils on which the time classification is based.

Lithological correlation of surface with sub-surface units in the Jurassic sequence is difficult in this portion of the Great Artesian Basin. Consequently a biostratigraphic zone system is tentatively erected on the observations of microfloral assemblages in an attempt to introduce a time classification which can be used throughout the basin regardless of lithology.

In erecting the following biostratigraphic zones, the proposals set out in "The American Code of Stratigraphic Nomenclature," in particular Articles 19 to 25, have been followed.

The following "types" of zones have been erected:-

1. Assemblage Zone - a body of strata characterized by a certain assemblage of fossils without regard to their ranges.
2. Range Zone - a body of strata comprising the total horizontal and vertical range of occurrence of a specified taxon.
3. Concurrent - range zone - defined by the overlapping ranges of specified taxa

The last "type" has not been used. However it could possibly be used at 5,726 ft., where there is an overlap of two sporomorph ranges. It is felt that more evidence is required before a zone of this type is erected as it is precise and is often the principal basis of time correlation of strata.

## 4. APPLICATION OF BIOSTRATIGRAPHIC ZONES IN THE JURASSIC SEQUENCE

The following zones are erected on a tentative basis only and are informal as denoted by the non-capitalization of initial letters. The vertical distribution of the zones is shown in the accompanying plan. All zones except the first are based on readily recognisable species even when poorly preserved, whose taxonomic position is stable and occur commonly in all samples.

a. Trilobosporites sp.nov. range zone.

This zone is defined as being delimited by the first and last appearance of Trilobosporites sp.nov. and the absence of Callialasporites dampieri. A brief description of this species is as follows:-

Spore trilete; amb triangular with broadly rounded angles and straight to convex sides. Laesurae of the tetrad scar strongly rimmed and extend about two-thirds of the way to the equator. Exine thickness variable, about 2μ thick and psilate. Prominent verrucae and sinuous muri which may appear reticulate, are developed at and around the angles of the spore. Equatorial diameter, 50μ.

The species is similar to Trilobosporites trioreticulatus Cookson and Dettmann, but differs from this species in having a smaller size, psilate exine and prominent verrucae at the angles which may give a psuedoreticulate appearance.

Other prominent species in this zone include Todisporites sp., Leiotriletes sp., and Verrucosiporites walloonensis.

Assemblages in this zone:-

Sidewall core at 5,726 ft.

Araucariacites australis

Cyathidites australis

C. minor

Callialasporites dampieri

Classopollis torosus

Cingulatisporites granulatus

C. saevus

Ginkgocycadophytus nitidus

Ischyosporites sp.

Lycopodiumsporites spp.

Laricoidites turbatus

Podocarpidites spp.

Microcachryidites antarticicus

Osmundacidites comaumensis

Sphagnum sporites sp.

Taurocusporites sp.

Todisporites cf major

Trilobosporites sp.nov.

Verrucosisporites walloonensis

Reworked Permian spores:

Nuskoisporites sp.

Camptotriletes sp.

Sidewall core at 5,881 ft.

Araucariacites australis

Cyathidites spp.

Classopollis torosus

Callialasporites segmentatus

Cyclogranisporites breviradiata

Ginkgocycadophytus nitidus

Gleicheniidites circinidites

Leiotriletes spp.

Podocarpidites spp.

Trilobosporites sp.nov.

Sphagnumsporites australis

Sidewall core at 5,975 ft.

Acanthotriletes sp.

Cyathidites australis

Classopollis torosus

Callialasporites segmentatus

Ginkgocycadophytus nitidus

Gleicheniidites circinidites

Ischyosporites sp.

Laricoidites reidi

L. turbatus

Osmundacidites comaumensis

Podocarpidites spp.

Trilobosporites sp.nov.

Todisporites sp.

Vitreisporites sp.

Reworked Permian spores

Cirratriradites sp.

Nuskoisporites sp.

Verrucosisporites pseudoreticulata

Sidewall core at 5,996 ft.

Cyathidites sp.

Callialasporites segmentatus

Gleicheniidites circinidites

Trilobosporites sp.nov.

Sidewall core at 6,000 ft.

Araucariacites australis

Callialasporites segmentatus

Classopollis torosus

Cyathidites spp.

Ginkgocycadophytus nitidus

Gleicheniidites circinidites

Ischyosporites sp.

Laricoidites reidi

L. turbatus

Leiotriletes mortoni

Osmundacidites comaumensis

Podocarpidites spp.

Verrucosisporites walloonensis

Sidewall core at 5,756 ft. - Barren

b. Callialasporites dampieri - Laricoidites turbatus assemblage zone.

This zone is characterized by the absence of key forms found in assemblages on either side of this zone. These species include Trilobosporites sp.nov., Cicatricosisporites cooksonii and Murospora florida.

Assemblages in this zone:

Sidewall core at 5,476 ft.

Acanthotriletes sp.

Annulispora folliculosa

Callialasporites dampieri

Classopollis torosus

Cyathidites australis

Lycopodiumsporites rosewoodensis

L. austroclavatidites tenuis

Laricoidites reidi

L. turbatus

Podocarpidites ellipticus

Sphagnumsporites australis

Nuskoisporites sp (Reworked Permian Spore).

Other sidewall cores in this zone were barren.

c. Cicatricosisporites cooksonii - Murospora florida assemblage zone.

This zone is characterized by the presence of the two species C. cooksonii and M. florida and on the absence of Styxispoi ites majus. This zone is based on only one assemblage and may require mc dification.

Sidewall core at 5,058 ft.

Araucariacites australis

Acanthotriletes sp.

Callialasporites trilobatus

C. dampieri

C. segmentatus

Cingulatisporites saevus

Cicatricosisporites cooksonii

Classopollis torosus

Cyathidites australis

Ischyosporites sp.

Laricoidites reidi

L. turbatus

Lycopodiumsporites rosewoodensis

Murospora florida

Osmundacidites comaumensis

Podocarpidites spp.

Reticulatisporites pudens

Sphagnumsporites australis

d. Styxisporites majus - Cicatricosisporites cooksonii assemblage zone.

This zone is defined on the appearance of the characteristic form Styxisporites majus and on the absence of Cicatricosisporites australiensis.

Assemblages in this zone:

Core 1. 4,472 - 4,482 ft.

Callialasporites dampieri

Cicatricosisporites cooksonii

Cyathidites australis

Laricoidites reidi

Lycopodiumsporites austroclavatidites

L. austriclavatidites tenuis

Microcachryidites antarcticus

Murospora florida

Osmundacidites comaumensis

Podocarpidites sp.

Ischyosporites scaberis

Taurocusporites sp.

Core 2. 4,787 - 4,797 ft.

Araucariacites australis

Annulispora folliculosa

Acanthotriletes sp.

Callialasporites dampieri

C. trilobatus

Cyathidites australis

C. minor

C. crassiangularis

Cicatricosisporites cooksonii

Cingulatisporites caminus

C. saevus

Foveosporites canalis

Ginkgocycadophytus nitidus

Ischyosporites scaberis

Laricoidites reidi

Lycopodiumsporites spp.

Murospora florida

Osmundacidites comaumensis

Podocarpidites spp.

Rugulatisporites ramosus

Styxisporites majus

Sphagnumsporites sp.

Sidewall core at 4,833 ft.

Acanthotriletes sp.

Annulispora folliculosa

Callialasporites dampieri

C. segmentatus

Cicatricosisporites cooksonii

Cyathidites spp.

Foveosporites canalis

Ischyosporites scaberis

Laricoidites reidi

Lycopodiumsporites spp.

Murospora florida

Podocarpidites spp.

Osmundacodites comaumensis

Styxisporites majus

Sphagnumsporites australis

Sidewall core at 4,861 ft. - Barren.

Sidewall core at 4,879 ft.

Araucariacites australis

Acanthotriletes sp.

Callialasporites dampieri

Cicatricosisporites cooksonii

Cyathidites spp.

Foveosporites canalis

Ginkgocycadophytus nitidus

Ischyosporites scaberis

Laricoidites reidi

Lycopodiumsporites spp.

Murospora florida

Osmundacidites comaumensis

Podicarpidites spp.

Rugulatisporites ramosus

Sphagnumsporites sp.

Styxisporites majus.

## 5. AGE OF THE MICROFLORAL ASSEMBLAGES.

The age determination of the microfloras must necessarily be referred to similar assemblages occurring in intercolated marine and non-marine sediments in Western Australia and dated as Bajocian (Balme 1957).

On this basis the highest microfloral zone can be dated as Upper Jurassic with strong Cretaceous affinities. The second zone, C. cooksonii - M. florida, is possibly lowermost Upper Jurassic. However, it is possible that a hiatus exists between the Bajocian and the Upper Jurassic of Western Australia, and these two species may in fact extend into the Middle Jurassic.

The lower two microfloral zones are consistent with a Middle Jurassic age. There appears to be very little evidence for assigning a Lower Jurassic age to these assemblages.

## 6. CORRELATIONS WITH OTHER WELLS IN THE GREAT ARTESIAN BASIN.

D.S. Pandieburra No. 1.

This investigation has shown that only broad correlations exist between these two wells due to the poor nature of the samples in the Pandieburra. The age determinations are confirmed for this well, but the boundary between the Middle and Upper Jurassic would now be placed at approximately 5,900 ft.

D.F.S. Beetoota No. 1.

Two core samples from this well have been examined.

Core 10 at 4,209'

The assemblage included the key forms, S. majus, C. cooksonii and M. florida.

This core is correlated with the S. majus - C. cooksonii assemblage zone of Putamurdie No. 1.

Core 13 at 5,223 ft.

The assemblage included the key species Trilobosporites sp.nov. and is correlated with this zone in Putamurdie No. 1.

Phillips - Sunray Cothalow No. 1 (de Jersey and Paten, 1962).

The microfloral ranges and assemblages of the Jurassic in this well agree very closely with those in Putamurdie No. 1. The

boundary between the Middle and Upper Jurassic at approximately 4,450 ft., is based on similar evidence as is found in Putamurdie No. 1. The lowest samples at about 5,000 ft. are consistent with assemblages from 6,000 ft. in Putamurdie No. 1.

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PALAEONTOLOGY SECTION

WKH:EMD
19.9.63.

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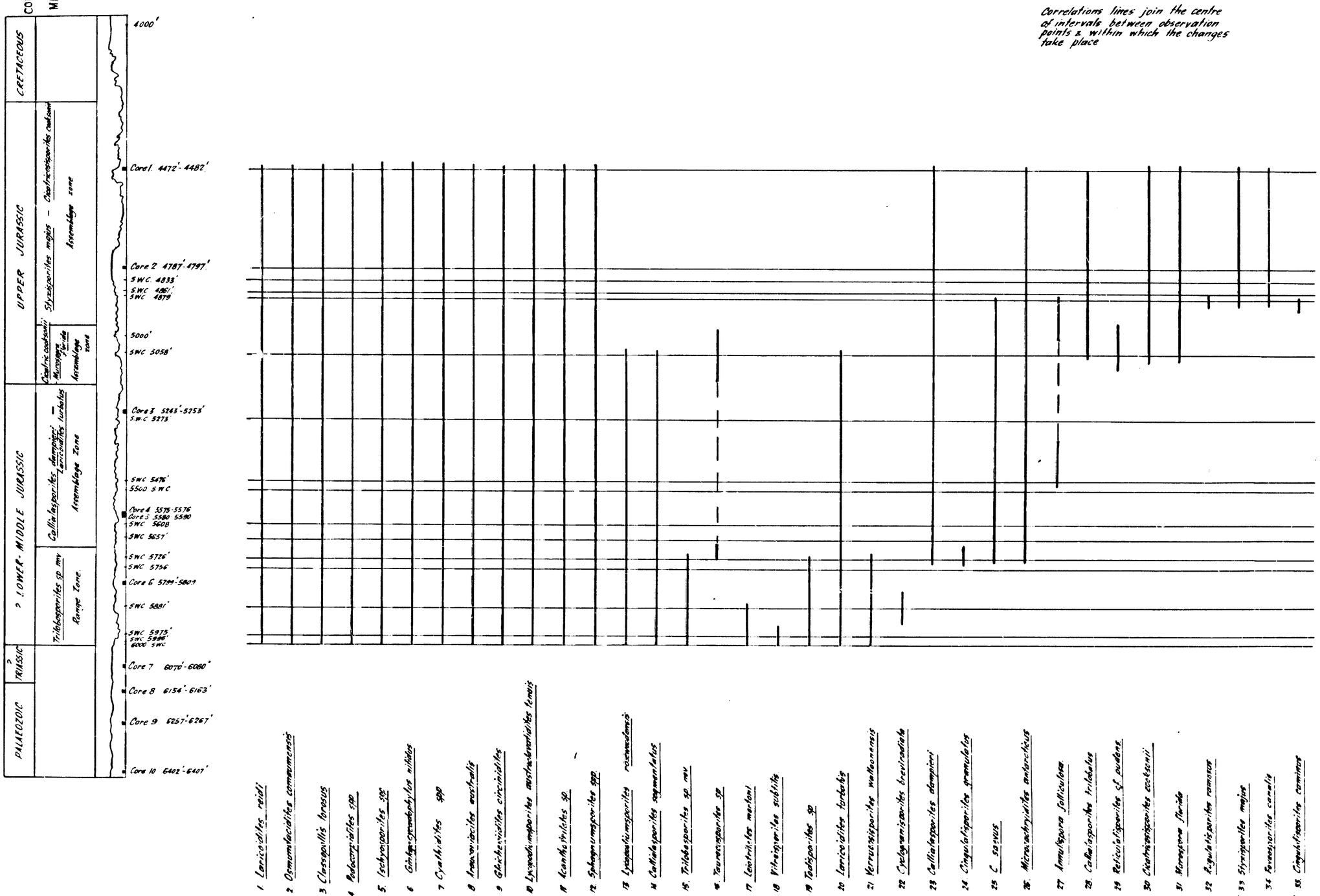
NOTE :- S.W.C. denotes Sidewall core sample.

Correlations lines join the centre of intervals between observation points & within which the changes take place




To accompany Palynological Report 8/63 by W. K. Harris, Geologist

# S.A. DEPT. OF MINES

PUTAMURDIE No 1 (DELHI-SANTOS)

MICROFLORAL RANGE DIAGRAM & CORRELATION CHART

| Associated Drawing | No. | No. | Amendment | Exd. | Date |
|---|---|---|---|---|---|
| | | | | | |

Rec. No.
D.M
Compiled from

| Approved | Passed |
|---|---|
| Director of Mines | |

Drn. MM
Tcd.
Ckd.
Exd.

Scale : 200 ft. to 1 inch (Vertical)

63 - 733

Date 13 9 63 | Cb.