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18/10-1, 17/12-3, BREAM 17/12-1 WELLS

- (NORWAY) -

PALYNOLOGICAL CORRELATIONS IN
EARLY CRETACEOUS AND JURASSIC SEDIMENTS

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A B S T R A C T

The palynological correlations on Early Cretaceous and Jurassic deposits between the 18/10-1, 17/12-3 and Bream 17/12-1 wells are presented in this report.

7 pages
1 figure
2 plates

C O N T E N T S

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E N C L O S U R E S

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Cretaceous and Jurassic series - (interval 4900-9010 feet) -

Plate 2 - Palynological correlations in the Early Cretaceous and Jurassic
series between the 18/10-1, 17/12-3 and 17/12-1 wells -

1 - INTRODUCTION

The purpose of this report is to provide a palynological scheme for zonation of the Early Cretaceous and Jurassic Sediments in the 18/10-1^①, 17/12-3^② and Bream 17/12-1^③ wells. The previous analytical results of Bream 17/12-1 have been revised according to the new dinocyst data now in use. The main palynological results of the study of 17/12-1 are summarized on Plate 1.

The palynological correlations between the 18/10-1, 17/12-3, Bream 17/12-1 wells are shown on Plate 2. Palynological subdivisions on the 18/10-1, 17/12-3, 17/12-1 wells are presented in Fig. 1.

2 - STRATIGRAPHICAL COMMENTS

- 2.1 - The Lower Jurassic microfloras are poor and badly characterized. These microfloras appear to be approximately the same throughout the three wells studied and suggest the NJ3a microflora. Moreover the terrestrial assemblages of 17/2-3 well (8600-8440') rather favor the NJ3a2 zone of Late Pliensbachian age. And the assemblages of 17/12-1 well (8500/8510' - 8200/8210'), with scarce dinoflagellates tentatively attributed to *Maturodinium* sp., provide evidence which support this age attribution.

The Late Pliensbachian (inferred NJ3a2 zone) corresponds approximately to the Red Beds and to the lower part of the shales and sands overlying the Red Beds.

- 2.2 - The Early Bajocian (NJ4a zone) has been recognized in the 18/10-1 well between 2603 and 2421 metres. The NJ4a zone is particularly well characterized in the cored interval which corresponds to the sandy deposits.

The NJ4a zone is also observed in the 17/12-1 well between 8100/8110 and 7900/7920 feet. In this well, the upper limit of the NJ4a zone is not accurately marked because of an uncharacterized interval between 7800/7820 and 7600/7625 feet in which the microflora do not allow an accurate dating.

The NJ4a zone has not been observed in the 17/12-3 well.

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- ① - 18/10-1 well - Biostratigraphical study of the Cretaceous and the Jurassic (interval 1388-2791m) -
J. DUCAZEAUX - P. DURIF - E. GROSDIDIER - J.L. VOLAT - Juillet 1980 - n° 0/1931 RP -
- ② - 17/12-3 well - Biostratigraphical study of the Jurassic series between 7300' and 8860' -
J. DUCAZEAUX - J.L. VOLAT - Juillet 1980 - n° 0/1930 RP -
- ③ - Bream 17/12-1 well - Rapport palynologique sur le Mesozoïque entre 4000' et 9010' -
J.F. RAYNAUD - Mai 1973 - n° 3/783 R -

Note

The NJ4a zone of the 18/10-1 and 17/12-1 wells was typically developed in an exclusively continental facies whilst in the Northern part of Norwegian off shore, the NJ4a zone was typically developed in marine (and continental) facies. On the basis of this dinoflagellate control, the NJ4a microflora was correlated with the marine microflora known in the Early Bajocian of Northern Europe. It should be born in mind that the European stages Early Bajocian and Aalenian are equivalent in stratigraphical classification.

For stratigraphical attribution of the NJ4a zone it is preferable to abandon the previous term, late Aalenian-Bajocian, and adopt the term Early Bajocian.

- 2.3 - The Bathonian s.l. (inferred NJ4b zone) is tentatively considered to be present at 8365 feet in the 17/12-3 well (unspecified thickness). This thin level is overlain by an uncharacterized interval up to 7845 feet.
- 2.4 - The Late Callovian (Upper NJ5a zone) can be only accurately localized in the 17/12-3 well at 7803 feet.
- The NJ5a zone s.l. is very tentatively suggested at 2410 metres in the 18/10-1 well but no conclusive evidence is available. The NJ5a zone has not been observed in the 17/12-1 well.
- 2.5 - The Middle Oxfordian (NJ5c zone) has been recognized in the three wells on a thin interval which corresponds to the base of the argillaceous series.
- 2.6 - The Late Oxfordian - Early Kimmeridgian (NJ6 zone) has been recognized in 18/10-1 and 17/12-3 wells in which it is characterized by a rich marine and terrestrial microflora. This biozone has not been observed in the 17/12-1 well.
- 2.7 - The Middle/Early Kimmeridgian (NJ7 zone) is typically characterized in the three wells.
- 2.8 - The Late Kimmeridgian - Early Portlandian (NJ8 zone) is perfectly characterized in the 18/10-1 well at 2198 metres and in the 17/12-1 well at 6825/6850 feet.
- 2.9 - The Late Portlandian (NJ9 zone) has been recognized in the 18/10-1 well between 2149 and 2060 metres and in the 17/2-1 well between 6700/6725 and 6500/6525 feet.
- 2.10 - The Cretaceous series range from Berriasian to Aptian (NCO, NCI, NCII, NCIII, NCIV zones). These biozones have been localized in the 18/10-1 and 17/12-1 wells (no study in the 17/12-3 well).

Fig.1 : 18/10-1 - 17/12-3 - 17/12-1 WELLS (NORWAY)

PALYNOLOGICAL RESULTS

| STAGES | Zonation | 18/10-1 | 17/12-3 | 17/12-1 |
|--|---------------------|-------------------------|------------------------|---|
| | | First sample studied | | First sample studied |
| APTIAN s.l. | NC IV | 1499 swc | | 4900/4925' cutt. |
| Late BARREMIAN | Upper NC III | | | 5100/5125' cutt. 5200' cutt. |
| Early BARREMIAN | Lower NC III | 1622 swc 1663 swc | | 5275' cutt. 5350/5375' cutt. |
| Late HAUTERIVIAN | Upper NC II | | | 5500/5525' cutt. |
| Middle - Early HAUTERIVIAN | Lower NC II | 1709 swc 1752 swc | | 5675/5700' cutt. 5775/5800' cutt. |
| Late - Middle VALANGINIAN | Upper NC I | 1803 swc 1854 swc | | 5850/5875' cutt. 5925/5975' cutt. |
| Early VALANGINIAN | Lower NC I | 1927 swc | | 6125/6150' cutt. |
| Late BERRIASIAN | Upper NC 0 | 1992 swc 2018 swc | | 6225/6250' cutt. |
| Early BERRIASIAN | Lower NC 0 | 2045 swc | | 6300/6325' cutt. |
| Late PORTLANDIAN | NJ 9 | 2060 cutt. 2149 swc | | 6400/6425' cutt. |
| Early PORTLANDIAN Late KIMMERIDGIAN | NJ 8 | 2198 swc | | 6500/6525' cutt. |
| Middle - Early KIMMERIDGIAN | NJ 7 | 2252 swc 2283 swc | 7300' swc 7480' swc | 6700/6727' cutt. 6825/6850' cutt. |
| Early KIMMERIDGIAN Late OXFORDIAN | NJ 6 | 2317 swc 2382 cutt. | 7550' swc 7650' swc | 6950' cutt. 7300/7325' cutt. |
| Middle OXFORDIAN | NJ 5c | 2395 cutt. | 7740' swc 7760' swc | 7450/7475' cutt. 7525/7550' cutt. |
| Late CALLOVIAN | Upper NJ 5a | 2410 cutt. ? | 7803' swc | |
| BATHONIAN s.l. (inferred) | NJ 4b inferred | | 8365' swc | |
| Early BAJOCIAN (= Aalenian) | NJ 4a | 2421 core 1 2603 swc | | 7900/7920' cutt. 8100/8110' cutt. |
| Late PLIENSACHIAN inferred | NJ 3a-b inferred | 2626 swc 2791 swc | 8440' swc 8600' swc | 8200/8210' cutt. 8500/8510' or 9000/9010' cutt. |

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3 - CONCLUSIONS

- 3.1 - In the 18/10-1 and Bream 17/12-1 wells a stratigraphical hiatus separates the Late Pliensbachian (NJ3a2 zone), which corresponds to the Red Beds s.l., from the Early Bajocian (NJ4a zone) which corresponds to the sands. Terrestrial conditions are clearly developed during the Early Bajocian deposits with a strong influx of terrestrial material.

In the 17/12-3 well, there is an unconformity between the Late Pliensbachian and the Bathonian (NJ4b zone). The Bathonian is only established on one level. Terrestrial conditions also prevail during the Bathonian deposits.

- 3.2 - In the 17/12-3 well, above a Bathonian of unspecified thickness, the Late Callovian (Upper NJ5a zone 7803') is accurately localized on a thin level at the uppermost part of the sands (top 7778').

The Late Callovian has been very tentatively suggested (cutting sample 2410m) at 18/10-1 and has not been observed at Bream 17/12-1. There is, therefore, an unconformity between these deposits with no Bathonian and no Early Callovian recognized.

- 3.3 - The Middle Oxfordian (NJ5c zone) has been recognized in the three wells on a very thin level situated at the bottom of the argillaceous series. There is a possible unconformity between these deposits with no Early Oxfordian recognized.

- 3.4 - The following argillaceous sediments are characterized by microfloras which range continuously from the Late Oxfordian to the Late Portlandian. A marine environment prevails with strong terrestrial influences during the Late Oxfordian/Early Kimmeridgian (NJ6 zone). Terrestrial influence became weaker late in the Kimmeridgian and Portlandian (NJ7-NJ8-NJ9 zones).

- 3.5 - Overlying, the Lower Cretaceous consists of a conformable marine sequence of Berriasian to Aptian age.
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| DEPTH | | MAIN LITHOLOGY | ZONATION | MARINE ASSEMBLAGES | TERRESTRIAL ASSEMBLAGES | STRATIGRAPHY |
|-------|------|----------------|---------------|--|--|-----------------------------|
| m. | feet | | | | | |
| 1500 | 4900 | | 4900/925 | <i>Cauca parva</i> <i>Dingodinium cerviculum</i> <i>Aptea polymorpha</i> <i>Ossisucysta tentoria</i> | | APTIAN s.l. |
| 1600 | 5100 | | 5100/125 | | | |
| | 5200 | | 5200 | <i>Leptodinium</i> sp. D 805 | | Late BARREM. |
| | 5300 | | 5275 | | | 5275 |
| | 5400 | | 5350/375 | <i>Cassiculosphaeridia magna</i> | Dominant <i>Gleicheniaceae</i> | E. BARREM. |
| | 5500 | | 5500/525 | | <i>Staplinisporites caminus</i> | |
| 1700 | 5600 | | "Upper NC II" | <i>Lithodinia stoveri</i> <i>Muderongia simplex</i> | <i>Pilosporites</i> <i>Sestrosporites pseudoalveolatus</i> <i>Densoisporites perinatus</i> <i>Trilobosporites</i> | Late ? |
| | 5700 | | 5675/700 | | | |
| | 5800 | | 5775/800 | 5775/800 <i>Nelchinopsis kosiramiensis</i> | | Mid. E. |
| | 5900 | | 5850/875 | | | |
| | 6000 | | 5925/975 | | | |
| | 6100 | | Upper NC I | <i>Speetonia delicatula</i> <i>Muderongia tetracantha</i> <i>Ctenidodinium elegantulum</i> <i>Aprolobocysta varigranosa</i> | | Late-Middle VALANGINIAN |
| | 6200 | | 6125/150 | | | |
| | 6300 | | 6225/250 | <i>Diacanthum hollisteri</i> <i>Endoscrinium pharo</i> <i>Tubotuberella apatela</i> | <i>Cicatricosisporites purbeckensis</i> | Early VALANG. |
| | 6400 | 6386 | 6300/325 | <i>Parvocavatus spinosus</i> <i>Egmontodinium torvum</i> | | Late BERRIAS |
| | 6500 | | 6400/425 | <i>Polystephanophorus sarjeantii</i> <i>Adnatosphaeridium apiculatum</i> | | Early BERR. |
| | 6600 | | 6500/525 | | | |
| 2000 | 6700 | | NJ 9 | <i>Gonyaulacysta gigas</i> <i>Parcodinia dasyforma</i> | Long ranging species of Jurassic series | Late PORTLANDIAN |
| | 6800 | | 6700/725 | | | |
| | 6900 | | NJ 8 | <i>Senoniasphaera jurassica</i> | | E. PORTL. L. KIMMERIDG. |
| | 7000 | | 6825/850 | | | |
| | 7100 | 7100 | 6950 | | | |
| | 7200 | | NJ 7 | <i>Gonyaulacysta jurassica</i> <i>Glossodinium dimorphum</i> | | Middle - Early KIMMERIDG. |
| | 7300 | | 7200 | | | |
| | 7400 | | 7300/325 | | | |
| | 7500 | 7500 | 7400/425 ? | | | |
| | 7600 | | 7450/475 | <i>Adnatosphaeridium aemulum</i> <i>Gonyaulacysta cladophora</i> <i>Seriodinium crystallinum</i> | | Mid. OXFORD. |
| | 7700 | | 7525/550 | | | |
| | 7800 | | 7600/625 | | Dominant <i>Cerebropollenites</i> microflora (IAT.3) | ? |
| | 7900 | | 7800/820 | | | |
| 2400 | 8000 | 8000 | NJ 4a | | Predominant <i>Cyathidites</i> microflora (80 %) (IAT. 2.5 and 3) | Early BAJOCIAN (= Aalenian) |
| | 8100 | | 7900/920 | | | |
| | 8200 | | 8100/110 | | | |
| | 8300 | | 8200/210 | <i>Maturodinium</i> sp. | | Late PLIENSBACH. inferred |
| | 8400 | | NJ 3a s.l. | | <i>Quadraeculina anellaformis</i> | |
| | 8500 | | 8500/510 | 8500/510 <i>Maturodinium</i> sp. | | |
| | 8600 | | | | Heavy NJ 4a microflora caving | ? |
| | 8700 | | | | | (cuttings) |
| | 8800 | | | | | |
| | 8900 | | | | | |
| | 9000 | | 9000/9010 | | | |
| | 9100 | | | | | |

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| PL.1 | |
| BREAM 17/12-1 (NORWAY) | |
| REVISED PALYNOLOGICAL STUDY OF EARLY CRETACEOUS & JURASSIC SERIES (interval 4900-9010 feet) | |