Palynology and Micro-paleontology of the Upper Eocene of the well Nsukwa 1 (Niger Delta, Nigeria)

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ABSTRACT

The palynology and the micropaleontology of the well Nsukwa 1 have been studied between 4320 and 9380 feet. The samples contain an abundant organic matter with characteristical spores and pollen of the Upper Eocene. The foraminifera assemblage, mostly constituted of benthonic species, confirms an Eocene age for this interval.

RÉSUMÉ

La palynologie et la micropaléontologie du sondage Nsukwa 1 sont étudiées entre 4320 et 9380 pieds. Les échantillons contiennent une abondante matière organique avec des spores et pollen caractéristiques de l'Eocène supérieur. Les foraminifères, en grande partie benthiques, confirment l'âge Eocène de cet intervalle.

INTRODUCTION

Nsukwa 1 well is located approximatively between longitudes 6°45′ and 6°50′E and latitude 6°N, within the Niger Delta oil province (fig. 1). The well is about 9400 feet deep. The sediments vary from coarse clastics with occasionally lignites bands between 4320 and 7070 feet to fine clastics between 7070 and 9400 feet. A total of 45 ditch cutting samples have been studied: 23 for microflora and 21 for microfauna.

The samples of Nsukwa 1 well were donated to the Department of Geology, University of Ife, by the Shell-BP Co. as part as the Company's contribution to the Department of Geology biostratigraphic research efforts.

PALYNOLOGY

The 23 studied samples contain an abundant organic matter, spores, pollen and a few marine organic microfossils. The preservation of the microfossils is generally very good.

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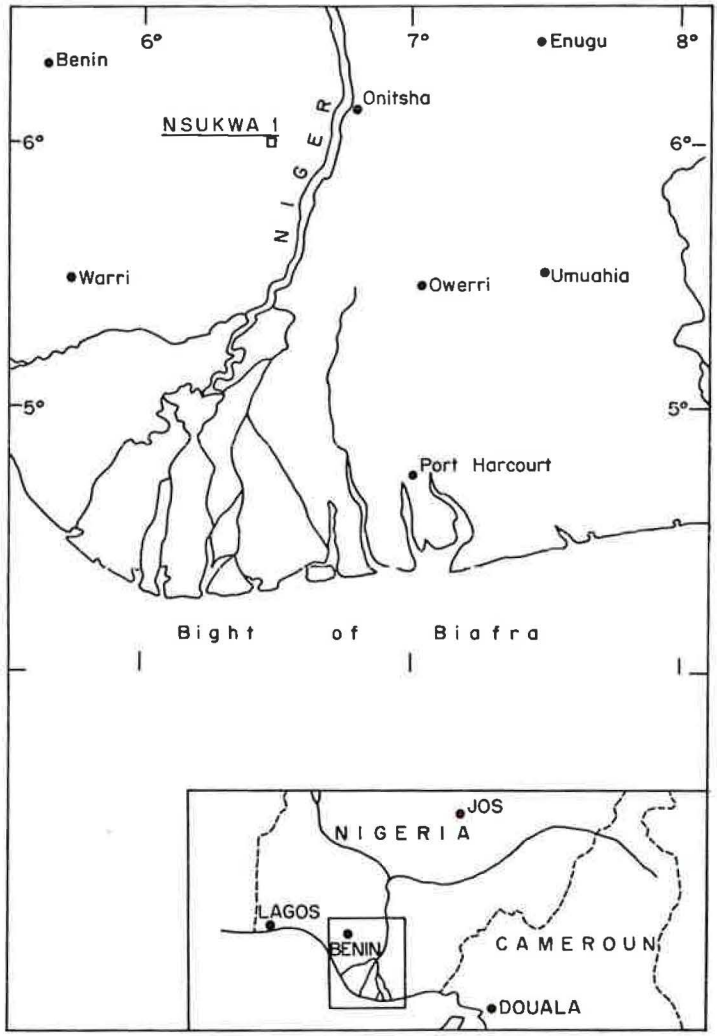


FIG. 1. *Location map of Nsukwa 1 well.*

The association of the pollen and spores is typical of the Eocene. Numerous guide species, described by Germeraad, Hopping and Muller (1968) or Van Hoeken-Klingenberg (1964, 1966), are present.

The absence of *Cicatricosisporites dorogensis* and the presence of *Verrucatosporites usmensis* associated with others Eocene species as *Proxapertites cursus, P. operculatus, Retibrevitricolpites triangulatus, Echitriporites trianguliformis*

suggest an Upper Eocene (lower part) age for the 4320 to 9380 feet interval of the Nsukwa 1 well.

Three different associations can be defined between 4320 and 9380 feet: From 4320 to 4750 feet: This interval is characterised by the presence of *Retibrevitricolpites triangulatus, Verrucatosporites usmensis* and by the absence of *Echitriporites triangulatus* and of pollen of mangrove environment such as *Spinizonocolpites* group or *Proxapertites* group. The samples contain a few dinoflagellates and *Pediastrum* but no microforaminifera.

From 5420 to 8560 feet: The top of this interval is characterised by an important diversification of the microflora with the appearance of mangrove or littoral species: *Proxapertites* group, *Spinizonocolpites* group, pollen monocolpate of Palmae. The marine organic microfossils are almost absent in this interval.

From 8600 to 8980 feet: This interval is characterised by the regular occurrence of *Bombacacidites* sp. associated with the species of the preceding assemblage. A few dinoflagellates and some microforaminifera are present in this interval.

Micropaleontology

Benthonic and Planktonic foraminifera, Ostracods, Mollusks (Gastropods, Pelecypods and Scaphopods) occur in the Nsukwa 1 well between 4320 and 9380 feet. Benthonic foraminifera constitute more of the 80% of the total foraminifera assemblage. A few ostracods have been found, most of them at the base of the studied interval. The fragments of shells, steinkerns and internal molds of mollusks are frequent in almost all the samples.

The both qualitative and quantitative distribution of the foraminifera and ostracods permit to divide the studied interval into two major parts:

From 4320 to 6990 feet: In this interval, the foraminifera and the ostracods are almost absent. The Turbinolid Scleractinian Corals, typical of a marine environment could be reworked. The shell fragments of Gastropoda and Pelecypoda are frequent.

From 7070 to 9380 feet: The foraminifera and ostracoda are abundant. The presence of the foraminifera *Planulina oyae, Eponides pseudoelevatus, Uvigerina hourcqi, Globigerina* cf. *micropora* as well as the ostracoda *Bythocypris alejo, Paijenborchellina ijuensis* and *Togoina attitogoensis* indicate an Eocene age.

Environmental interpretation

The palynology and the micropaleontology studies permit to follow the variation of the environment in the 4320 to 9380 feet interval in the Nsukwa 1 well.

At the top, the absence of mangrove pollen as well as the absence of foraminifera and ostracoda (4300-4750 feet) suggest a continental, certainly deltaic environment, behind the coastal line of the mangrove. The appearance of abundant mangrove pollen between 5420 and 6000 feet and the absence of foraminifera and ostracoda in the same levels characterise a mangrove environment without marine influences.

From 7070 to 9380 feet, the presence of the same palynological assemblage associated with the presence of foraminifera and ostracoda suggest a brackish to marine environment.

This variation from continental to brackish or littoral environment characterised the Upper Eocene regressive phase in Nsukwa 1 well.

Conclusions

The micropaleontological and palynological studies of the 4320-9380 feet samples of the Nsukwa 1 well give an Upper Eocene age to this interval. The environmental interpretation shows a slow variation between marine to brackish

Table 1

Stratigraphical distribution of the fossil pollen and spores in NSUKWA 1 well between 4320 and 9380 feet.

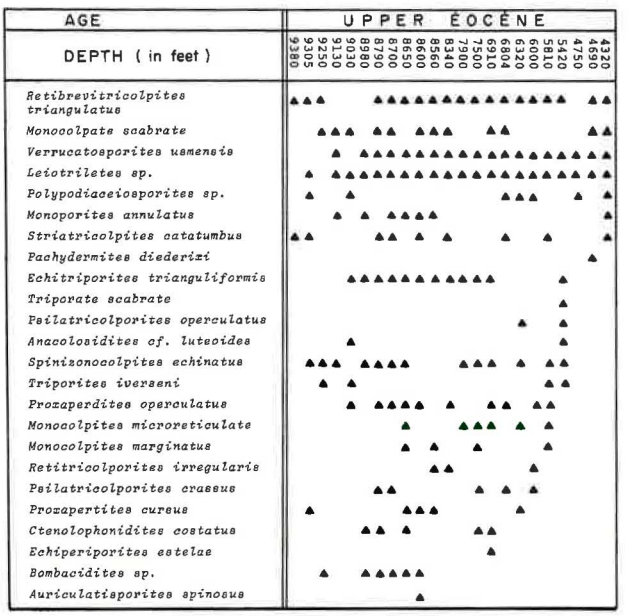
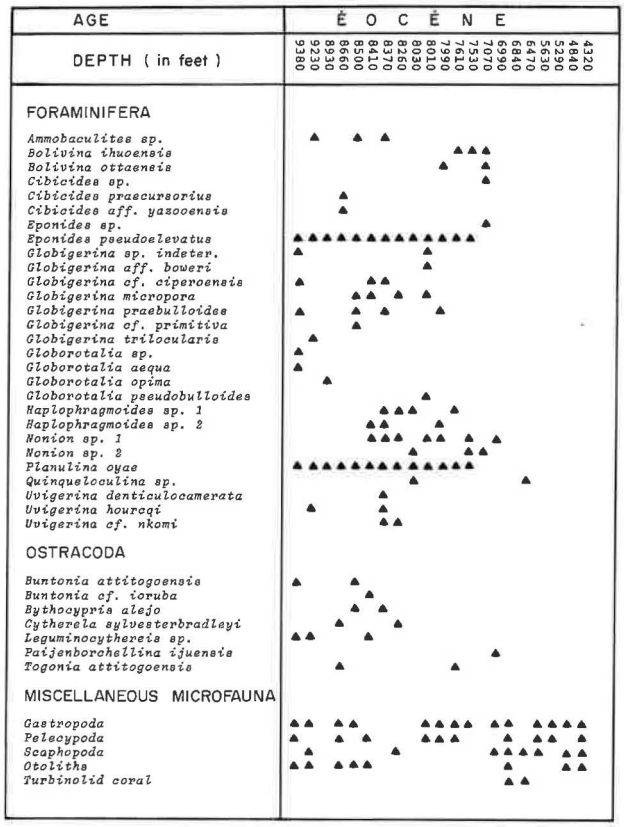


TABLE 2

Stratigraphical distribution of microfauna in NSUKWA 1 well between 4320 and 9380 feet.



water environment at the base to continental environment at the top. This variation characterises the Upper Eocene regressive phase in Nsukwa 1 well.

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