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Research Article

PALYNOLOGICAL AND PALEOENVIRONMENTAL STUDY OF AN OUTCROP AT AKPOHA, AFIKPO BASIN SOUTH EASTHERN NIGERIA

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ABSTRACT

A total of ten (10) Surface outcrop were collected and analyzed for their Palynomorph count around Akpoha, Afikpo area and environs. The result of the analysis shows that the samples was very poor assemblage of pollen and spores the forms identified in all the sample; include Aletesporites sp, Pteris dentate, Psilatriporites, Polyadosporites sp, Zonocosites sp Aletesporites sp, Verrucatosporites peudsecundus, Polyadosporites sp. Their presence indicates reworking the dominance of spores probably implies a cooling of the climate and a swampy nearshore environment. Chitinous foraminifera test linings are abundant and consist of planispiral forms. Based on the association of these forms, know diagnostic assemblage was recovered therefore, the age for the studied outcrops is considers indeterminate.

Key Words: Palynomorphs, Paleoenvironment, Akpoha and Afikpo

INTRODUCTION

An interest has developed recently in palynology and Stratigraphy. According to Nwajide and Reijers (l997), Nkporo Shale overlying an erosional surface of a Santonian dolerite dyke which intruded the Albian Abakaliki Shale. Boulders of dolerite at the base of the sequence mark the position of an angular unconformity between the Abakaliki Shale and the Nkporo Shale. Less than half a kilometer to the northwest, is another dolerite intrusion which was quarried for the construction of this expressway, leaving a pit from which samples for much of this work were taken. In this area, the plunge of the sediments of the Abakaliki Basin and subsequent erosion, have caused the Campanian Nkporo Shale Formation at the basal Anambra Basin, to overstep onto the Turonian Eze-Aku Shale with the Coniacian-Santonian Awgu Shale missing. Reworked Palynomorphs have been found very useful in identifying uncomformities at geological boundaries and for interpreting the palaeoenvironments in otherwise stratigraphically complex terrains. The aim of this study is to infer on the Palynological content and Paleoenvironment of the study area.

LOCATION OF STUDY AREA/ACCESSIBILITY

The study area lies between latitude 6°00′ - 5° 50′N and longitude 7° 47′ 30″ - 7° 55′ 20″E within the Afikpo Basin. The area is accessible through Okigwe – Uturu major road and other minor roads that run through it.

GEOLOGIC SETTING AND STRATIGRAPHY

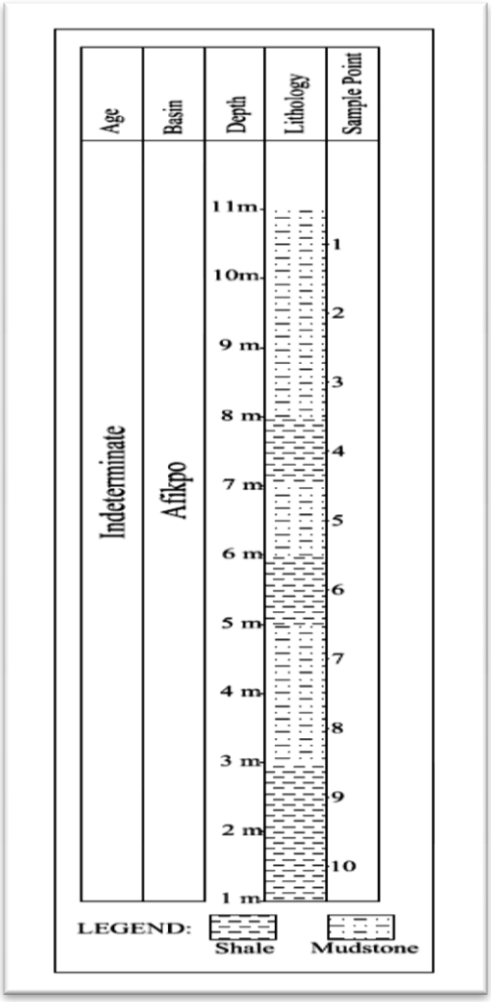
Sedimentation history of the Anambra Basin is related to the Lower Benue Trough evolution which is usually linked to separation of the Gondwana during the Middle Cretaceous time Nwachukwu, (1972).The evolutionary trend of Anambra Basin is patterned by east to west shifting of the depocenters Akaegbobi, (2005).The initial area of active sedimentation was located in the Abakaliki Trough from Aptian to Santonian. However, recent studies have shown that the active sedimentation was not restricted to the Abakaliki Trough alone but also took place within the graben of the faulted block segments of the Anambra Basin Jardine *et al*, (1965). The pre Santonian formations are the Asu River Group, Eze Aku and Awgu Formations.However, Reyment, (1965)indicated that the Anambra Basin became active after the Santonian tectonic event. Anambra Platform started prograding by depositing deltaic facies. It later subsides and an east-west prograding system developed. The deltaic system became aborted during the Maastrichtian by the commencement of major marine transgression Akaegbobi, (2005).The Nkporo Shale and the overlying Lower Coal Measures were deposited towards the center of the basin.The deltaic system was aborted during the Maastichtian by the commencement of major marine transgression Akaegbobi, (2005).The Tertiary period was characterized by deposition of Imo Shale (Paleocene); Ameki (Eocene); Ogwashi-Asaba (Late Miocene-Pliocene Ola-Buraimo *et al*, (2012) and finally overlain by Benin Formation.

MATERIALS AND METHODS

Ten rock samples were randomly collected from different locations for palynological and lithological description of sample was done by examining them under the binocular microscope by noting the textural characteristics such as colou, grain size, shape (roundness), sorting, effect of ferruginization, and fossil content in terms of plant remains.The crushed samples with initially treated with dilute hydrochloric acid (10%) in order to eliminate three carbonate substance present in them. They were later soaked in 40% hydrofluoric acid for silica and silicates digestion.The samples were not oxidized in order to avoid corrosion; but were sieved with 10 mesh in order to maximize concentration of miospore grains and to achieve clean slides for easy identification and photography. The recovered residues were mounted on glass slides with Depex (DPX). The amount of palynomorph recovered is moderate to barren. Total count of grains present were noted and presented in the checklist for absolute representation of different important pollen and spores grains recovered.

RESULTS AND DISCUSSION

The pollen grains, which dominated the recovered palynofloralare mainly based on the affinities of the pollen and spore species or groups with modern flora. The presence of fungal spore, fresh water green algae is also useful in determining the depositional environment.



DESCRPTION
Siltstone and Shale, carbonaceous,calcareous, minor rootlets.sub-roundedto rounded, light grey to dark grey very fine grained to medium grained sub-fissile to fissile.

Figure 1: Lithologic description of the Study Area

Sample 1, 2, and 3 marks a decrease in pollen with the presence of Aletesporites sp, Pteris dentate, Psilatriporites, Polyadosporites sp, Zonocosites sp but an increase in spore which shows a remarkable abundant. The pollen and spore assemblage consist of 6 species which is dominated by the monolete spore, the dominance by fungal spore indicates that is was derived from a restricted flora, that is a mangrove swamp. Most importantly there was a decrease and increase in fungal spore which indicate a swampy environment, between samples 1, 2 and 3. Shows a fluctuation of diatom and foraminifera test lining but their presence in a pollen dominated assemblage may indicate an infiltration of marine water/redeposition into the depositional environment. In sample 4, 5, and 6 is mark an increase in spore with abundant of fungal spore compose of more fungal spore assemblage, but there is an increase in fungal spore compared to spore. The presence of fungal spore indicate swampy depositional environment. The increase in spores consist Aletesporites sp, Verrucatosporites peudsecundus Polyadosporites sp. Their presence indicates reworking the dominance of spores probably implies a cooling of the climate, water swamp environment. Chitinous

foraminifera test linings are abundant and consist of planispiral forms. They represent benthonic foraminifers lining (Muller, 1959; Cross et al, .1966).

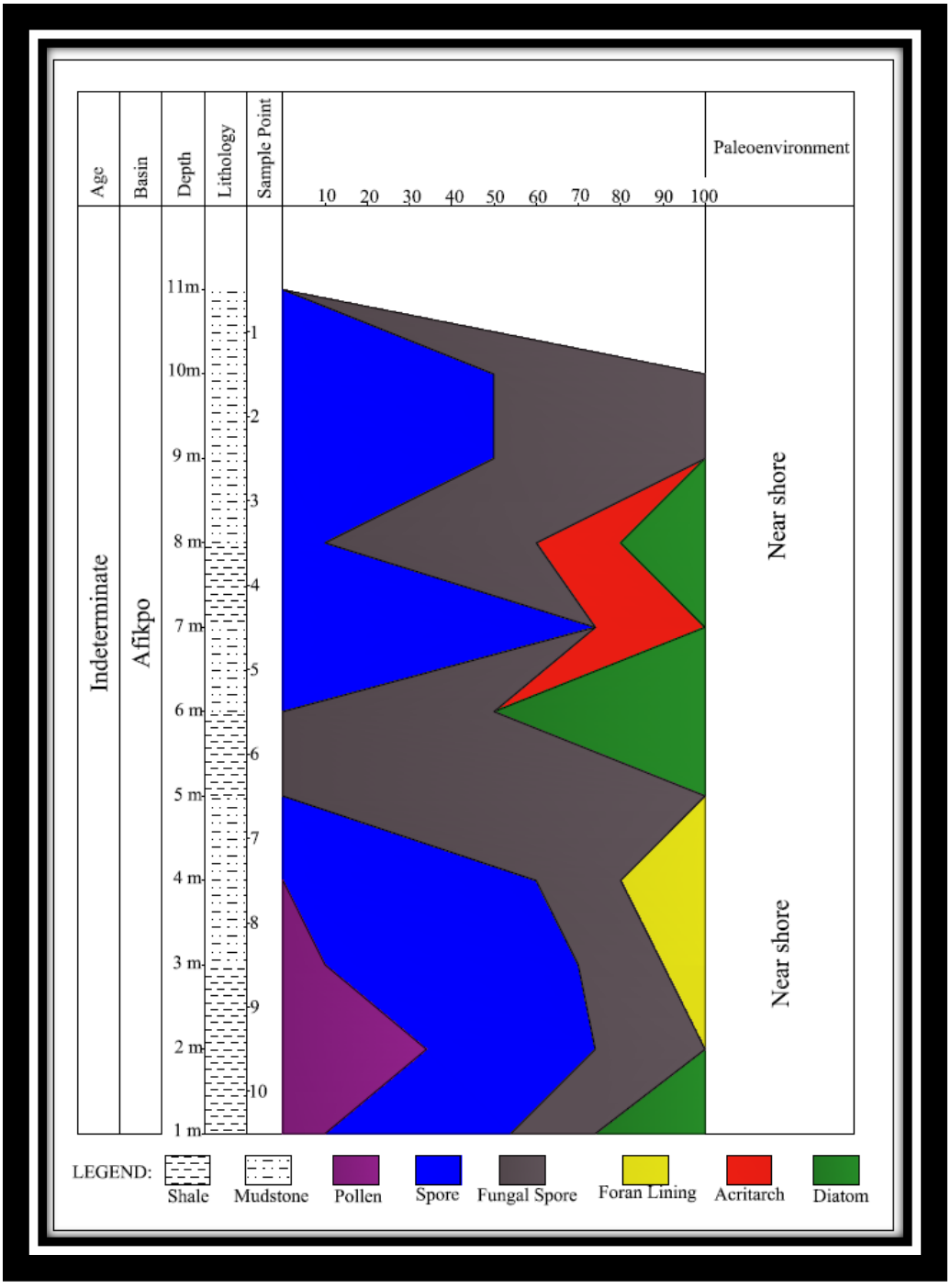


Figure 2: Showing percentage distribution of palynomorph in the Study Area

In sample 7, 8, 9 and10 shows and increase in fungal spore and spore with a percentage rate of 50% - 50% but with decrease in acritarch and diatom; the presence of acritarch and diatom indicates proximity to a

mangrove, near shore depositional environment (Germeraad *et al.,* 1968). The abundance of Acritarch in sample 8 indicates that the species is derived from a restricted flora growing near the shore or even in the marine water, which is a mangrove plant; this agrees with the near shore marine interpretation based on the Acritarch and Diatom. The relatively low species diversity, with no clear dominant species, probably indicate transportation of sporomorphs from upland regions into the swamp environment where they were fossilized; the profuse number of fungal spore, however indicate that the depositional environment has a fresh water influx which probably transported from a freshwater environment into the marine.

CONCLUSION

The sample collected from an outcrop of cretaceous surface exposures of Afikpo within the Anambra Basin which is a tectonic subdivision of the Benue Trough, however, since the base of the outcrops have not been encountered to allow a complete assessment of the Stratigraphic extent of monolete occurrence dating is based on the relative frequency and consistent association of a few stratigraphically important monolete. It indicates that the recovered assemblages is very poor and know age diagnostic palynomorph was recovered and the age of the sample was considered indeterminate. Integrated Palynological data shows that paleoenvironment of deposition of the areais near shore marine environment.

PLATES

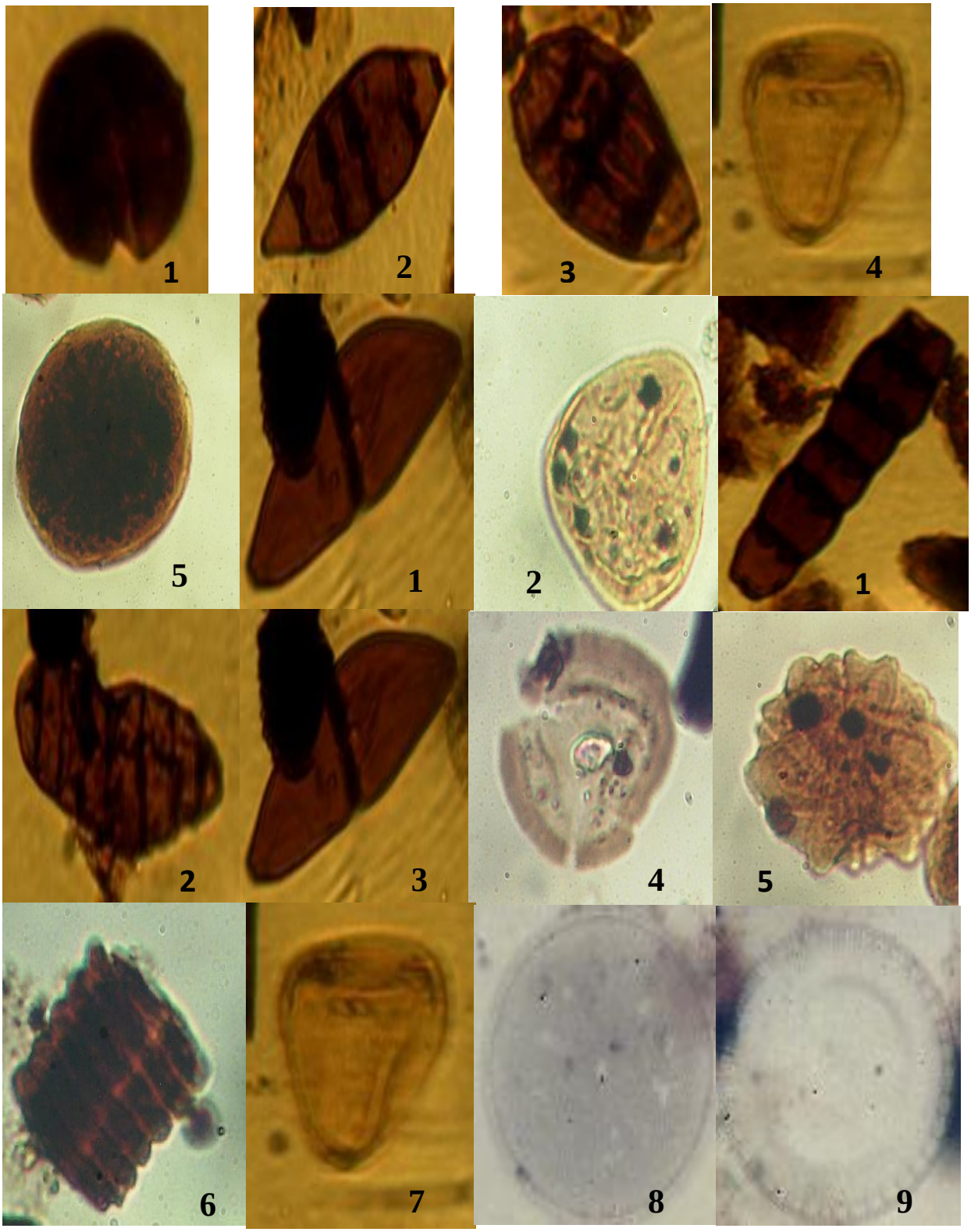


Fig 1,3,6,8,9 and 10 *Fungal spore*

Fig 4 *Zonocostites sp*

Fig 5-6 *Foram test lining*

Fig 7 *Pteris dentata*

Fig 2 *Psilatriporites*

Fig 8-9 *Diatom*

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