Contents

JERT Mission Statement ---------- 2

JERT Editorial Policies and Contributions ---------- 3

JERT Editorial Council ---------- 4

JERT Advisory Board ---------- 4

Preamble ---------- 5

Introduction ---------- 9

Integration of Information Technology in Education,
Instruction and Learning in a Connected Society.
Joseph O. Esin ---------- 15

The Lost Generation and/ or Perils of Belonging:
A Study of Africans in Exile
Emmanuel N. Ngwang ---------- 33

Relative age and Paleoenvironmental of Sandstone – Conglomerate
Deposits in the Northeastern Niger Delta, Nigeria.
David O. Inyang, L. C. Amajor and M. U. Udoh ---------- 75

Pebble Morphometric Analysis of Awi Formation in Calabar
Flank,Nigeria
Asukwo E. Itam, David O. Inyang, Etie B. Akpan, and Dieugo O. Ikoro ---------- 93

***JERT*- Mission Statement**

The Journal of Educational Research and Technology (JERT) is a peer- reviewed journal engaged in the publication of professional educational research with emphasis on educational technology, management information technology, professional development, educational enrichment research, academic and administrative information systems, information sciences, management information consulting, advertisements, academic collegiate conferences, and community education development summits to show the advantages and the broad range of possibilities that education, research and technology can offer in the educational and the world community. The journal is equally engaged in organizing and advising on conferences, workshops and seminars on invitation for publishing and presentation of research papers and original manuscripts that promote further research and knowledge in the humanities and the sciences in the USA, Africa and the world at large. The *JERT* is scheduled to be published three times yearly: January, May and September.

JERT Editorial Policies and Contributions

1. ***The JERT*** editors will consider manuscripts that are organized in accordance with the Mission, Journal Publication, Educational Technology, Management Information Technology, Professional Development, Educational Enrichment Research, Academic and Administrative Information Systems, Information Sciences, Management Information Consulting, Advertisements, Academic Collegiate Conferences, and Community Education Development Summits**.** Please feel free to contact us at (469) 534- 2720 or E-mail: jesin57@gmail.com.
2. Personal and professional opinions, ideas, recommendations articulated in the ***(JERT)*** do not necessary reflect the views of the Editors.
3. All manuscripts must be accompanied by well-synthesized **Preamble** or abstract of approximately 100-200 Words.
4. Manuscripts must not be less than ten (10) pages and not exceed twenty (20) pages in length, and must have outstanding and innovative educational, research, and technology features.
5. Manuscripts must be typed double-spaced in Microsoft Word version 2003 or 2007 and printed on 20 pound papers (8.5" x 11").
6. ***JERT*** will not consider politically goaded manuscripts for publication.

7. The author of the research manuscript must submit two original copies. Each copy should contain a cover page with the name of author, topic/title. The essay proper should not have any author's name or indication of origin, except for the topic/subject at the top of the paper. This is for blind reviewing.

8. All research manuscripts must be submitted with 15-20 cited-references, and 5-10 non-cited references, double-spaced, and arranged in alphabetical order.

9. Footnotes are strongly discourages but when used should be typed double-spaced, and on a separate page.

10. The basic style of writing is the American Psychological Association (APA), though room will be given for the Modern Languages Association MLA where literature and languages are involved.

11. Papers received shall be acknowledged and those accepted for publication will be notified and instructions given as to the status of the paper (accepted for publication, accepted contingent on specific revisions, and the time line for all revisions.

12. Copyright must be authorized and surrendered to JERT, and expressed usage can only be authorized by the Board of Trustees and JERT Editorial Council.

THANK YOU FOR YOUR PATRONAGE

Preamble

The Editorial Council is very delighted to publish Volume IV of the Journal of Educational Research and Technology (JERT). The production of Volume IV could have not possible without the persistent tireless efforts of the JERT Editorial Council and the priceless support of Professor of Emmanuel N. Ngwang, JERT Chief Editor and Professor Anne-Christine Hoff, Principal Editor and all well-wishers.

Professor Joseph O. Esin, the Chief Publishing Editor of *The Journal of Educational Research and Technology (JERT)*, holds a Bachelor of Science in Biology from Saint Louis University, Saint Louis, Missouri; a Master of Arts in Religious Studies with emphasis on Moral Theology from the Society of Jesus College of Divinity, Saint Louis, Missouri; and a Doctorate in Computer Education from the United States International University, San Diego, California. The State of California awarded him a Life-time Collegiate Instructor's Credential in 1989, and in 1996, the United States Department of Justice approved and conferred on him the honor of "Outstanding Professor of Research" in recognition of his contributions to academic excellence.

He met the selection criteria for inclusion in the 1992-93, 1994-95, and 1996-97 editions of Who's Who in American Education for his outstanding academic leadership in management information technology. Furthermore, he met the selection criteria for inclusion in the 1993-94 edition of the Directory of International Biography, Cambridge, England, for his distinguished professional service in academic computing technology. A Professor of Computer Information Technology from 1988-2000, a Director of Higher Education Accreditation operations in accordance with the guidelines set forth by the COMMISSION ON COLLEGES from 1991- 2000. He was appointed Associate Dean of Academic Affairs and a Deputy Provost at Paul Quinn College, Dallas, Texas, from 1997-2000. He is currently a professor of computer information systems at Jarvis Christian College, Hawkins, Texas, USA, a visiting Professor of Research at the University at Calabar, Nigeria and a Research Associate at the Botanical Research Institute of Texas (BRIT) USA. Professor Esin has published several professional journal articles including "High Level of Teachers' Apprehension (HLTA): About the use of Computers in the Educational Process." Journal of Educational Media & Library Science (JEMLS-1991); "Computer Literacy for Teachers: The Role of Computer Technology in the Educational Process." (1992-JEMLS); "Faculty Development: Effective use of Applications Software in the Classroom for instruction." (1993-JEMLS); "Strategies for Developing and

Implementing Academic Computing in Colleges and Universities." (1994-JEMLS); "Strategic Planning for Computer Integration in Higher Education through the Year 2000." (1994-JEMLS); "The Challenge of Networking Technologies." (1995-JEMLS); "The Design and Use of Instructional Technology in Schools, Colleges and Universities." (1997-JEMLS); "Decay of the Nigerian Education System." Journal of Educational Research and Technology (JERT-2013); "The Emerging Impact of Information Technology on Education and the Community." (2013-JERT); "Balanced Salary Structure for Academic Professors and Allied Educators as a Pathway to Quality Education." (2014-JERT) and "The Discovery of Computer Information Technology is an avenue for Educational Transformation in a Changing Society of Today and Tomorrow." International Organization of Scientific Research Journal of Engineering. (2014-IOSR-JEN).

He served as a member of Doctoral Dissertation Committee at Southern Methodist University, Dallas, Texas (1998-2000), and Jackson State University, Jackson, Mississippi (2010-2011). He is the author of The Power of Endurance (2008); The Evolution of Instructional Technology (2011); The Messianic View of the Kingdom of God (2011) and Global Education Reform (2013). Professor Esin's current research emphasis is on The Fundamentals of Computer Information Technology in a connected society.

Word of Caution

In order to achieve what is possible, you must attempt the impossible.

Professor Joseph O. Esin,
JERT-Chief Publishing Editor

Professor Emmanuel N. Ngwang, the Chief Editor of *The Journal of Educational Research and Technology (JERT),* is a 1986 graduate of Oklahoma State University with a Ph.D. in American Literature and presently a Professor of English and Foreign Languages at Jarvis Christian College. Before joining the faculty of Jarvis Christian College, he taught in several universities since 1982: a Graduate Associate at Oklahoma State University (1982-1987); University of Yaoundé, Cameroon (1987-1997); Kentucky State University (1997-2003); Mississippi Valley State University from (2003-2010); and at Claflin University (2010-2012). He has edited two books on criminal justice by Peter Nwankwo: *Criminological and Criminal Justice Systems of the World: A Comparative Perspective* (2011) and *Criminal Justice in the Pre-Colonial, Colonial, and Post-Colonial Eras: Am Application of the Colonial Model to changes in the severity of punishment in the Nigerian Law* (2010).

In addition, Professor Ngwang has published and presented research papers on postcolonial, African, and modern dramatic literature and Feminism. Some of his recent publications include "Education as Female (Dis) Empowerment in Anne Tanyi-Tangs *Arrah"* in *The Atlantic Review of Feminist Studies Quarterly (*2012)*.* "Arrah's Existential Dilemma: A Study of Anne Tanyi-Tang's *Arrah* in *Cameroon Literature in English: Critical Essays* (2010), "Spaces, Gender, and Healing in Alice Walker's *The Color Purple* and Mariama Ba's *So Long a Letter*" in *New Urges in Postcolonial Literature: Widening Horizons* (2009), "Re-Configuration of Colonialism or the Negation of the Self in Postcolonial Cameroon in Bole Butake's Plays in *Reconceiving Post colonialism: Visions and Revisions* (2009), Buchi Emecheta's *Destination Biafra*: A Feminist (Re-)Writing of the Nigerian Civil War in *Journal of African Literature: International Research on African literature and Culture (JAL:IRCALC)* (2008)*, "*In Search of Cultural Identity or a Futile Search for Anchor: Africa in Selected African American Literary Work*s*" *Identities and Voices. ALIZES (TRADE WINDS 2007)* "Literature as Politics: Revisiting Bole Butake's *Lake God and Other Plays*" in *The Literary Griot: International Journal of African-World Expressive Culture (2002*)*,* and "Female Empowerment and Political Change: A Study of Bole Butake's *Lake God, The Survivors,* and *And Palm Wine Will Flow"* in *ALIZE (TRADE WINDS): A Journal of English Studies (2004)* (University of La Reunion, France).

Professor Ngwang has also been a recipient of prestigious awards in recognition of his academic and research endeavors: 2013-2014 Faculty Scholar Award in Recognition of His

Outstanding Research and Publication Work conferred by the Faculty Governance Senate of

Jarvis Christian College, Hawkins, Texas; the *2004 Humanities Teacher of the Year Award* from the Mississippi Humanities Council, Jackson Mississippi; *2002-2003 Excellence in Scholarship and Creative Activities*, College of Arts and Sciences, Kentucky State University; and two-time nomination to the *Who's Who Among America's Teacher* (2001 and 2002 respectively), Educational Communications, Inc.; Lake Forest, Illinois.

A word to think about:

We are remembered by what we leave behind

For what we leave behind tells the true story of who we

were And how and for what we lived.

Professor Emmanuel N. Ngwang
JERT-Chief Editor

Introduction

The JERT Editorial Board is again delighted to present to you Volume 4 of the *Journal of Educational Research and Technology* (*JERT)*, which takes a swift turn in the area of technological research. The inclination towards expulsion of African, earth sciences and integration of information technology in the articles presented shows the determination of the Editorial Board to include and embrace all areas of research, especially the research the shares knowledge of our homeland and mother Earth.

This Volume is dignified by the continuous efforts of Professor Joseph O. Esin to bring the integration of technology into the educational process, instruction, every learning and business environment especially in today's world of globalization and cyber gyration. In Article 1, Integration of Information Technology in Education, Instruction and Learning in a Connected Society, Professor Esin takes the reader back to the domain of the classroom instruction, learning endeavors, the invasion and role of information technology in education and computer literacy. Professor Esin continues to insist on the reality of the overpowering nature of instructional technology, which is here to stay and eventually make instruction and learning less stressful. His research has revealed that today's "professors, allied educators, students and consumers are using technology to prepare, educate, manage and deliver instruction, publish and disseminate information that was previously too expensive and almost impossible to produce and distribute to the general public." He goes further to declare emphatically that, "the era of integrated technology is sponsoring the democratization of the production and flow of information to the educational community and the masses." This research reveals the incontestable value of educational technology and the need for all— both in the educational world and the public spheres—to welcome and embrace this initiative wholeheartedly to "unlock students' academic potential" and global communications.

This article particularly resonates with the "Y" and Millennium generations who are much more attached and atoned to technology in all aspects of their lives, including academic advancement. This article tends to argue for them and support their determination to be computer savvy, because that is the way of today's word and nobody wants to be left behind. This approach will definitely revolutionize education and move it from the constraints and limitations of the classroom to the outside world academic projects and class assignments can be done from the ease of a sitting room, in the pew of a church or the arm chair of the airplane. Professor Esin also addresses the Best Practices of tailoring educational delivery to the learning styles of the students so as to get the best, "to trigger students' critical thinking ability, productive outcomes and lasting solution to learning processes." He particularly draws his conclusions from a set of questionnaire he administered to college students who indeed are the core and cardinal partners of his research initiative.

Article 2 opens up with the current, disturbing, yet aggressive research on immigration and identity. Appropriately entitled The Lost Generation or the Peril of Belonging: A Study of Africans in Exile, Professor Emmanuel N. Ngwang's article takes a bold review of the dilemma and frustrations incumbent on African immigration into the USA. This article takes a position different from those that have often glorified immigration and the attendant benefits thereof. From Professor Ngwang's research, personal experience and interviews, the article depicts the trauma of exile as those on voluntary or forced immigration face the almost insurmountable journey of searching for peace and a successful life in a society that seems, on the outside, very welcoming, but in the inside very unreceptive to the "African" foreigners. Professor Ngwang documents instances of broken families, murders and tempted murders, accusations and victimization which these Africans have receive from vast segments of American communities inclusive of African Americans and white Americans who had migrated before them and the

Americans who consider the immigrants a continuous threat to their economy and freedom. Professor Ngwang's research gives an interesting perspective on immigration and tempts to advance a solution to the continuous conflict that tends to define and fuel the relation between African-born of African Americans and the traditional African-born Americans. The article also diagnoses the problems and issues that aggravate and intensify these feelings of loneliness, disconnectedness, and "loss," which surface in many encounters between the "the New Generation African American" and the African Americans where complexes have determined the fate of each group. The answer seems to be in the continuous lack of trust created by the receiving nation and the betrayals emerging from marital relationships and the continuous struggle among natives and colleagues to betray each other in order to move forward to the attainment of the American Dream.

Professor Ngwang's article also attempts to find solutions and propose suggestions to the solutions of those factors that are catalytic to the situation. The onus of redress lies on the incoming immigrants (strangers), who arrive with pumped up and faulty, fantastical misconceptions about the ease attendant in obtaining the American Dream in the United States, a promised land flowing of milk and honey. They envision the United States as a land of challenges where anything is possible and everything is impossible. Such a realistic approach will take away the veneer of sobriety and luxury that has tended to embroider the USA Hollywood pictures so that the real pictures of the hard knocks will become available. Secondly, there is an attempt to ask for a more humanistic and welcoming attitude on the part of the Native African Americans who tend to receive and operate with the immigrant Africans purely on artificial and suspicious terms. Globalization is a give and take and this calls for a certain measure of acceptance, understanding, tolerance, faith and collaboration from both parties.

In Article 3: Relative Age and Paleo Environment of Sandstone – conglomerate Deposits in the Northeastern Niger Delta, Nigeria, Dr. David Inyang and Professor L. C. Amajor of the Department of Geology in the University of Calabar and Port Harcourt respectively, and Dr. M. U. Udoh, a South-Sea Petroleum Consultant affiliated with both universities lead the reader into a bold attempt to determine the relative age and paleo environment of Sandstone-Conglomerate deposits in the Northeastern Niger Delta of Nigeria. This collaborative study, sponsored by the University of Calabar, Nigeria in collaboration with the South-Sea Petroleum Consultants, uses sophisticated cutting-edge technology to analyze and deduce the age of the sand-conglomerate deposits outcropping in the northeastern region of the Niger Delta. This scientific and intellectual exercise reveals and thereby confirms previous suspicions studies of the area that though the contiguous sedimentary units of the area studies were deposited in neritic environments. Based on the result of this study, it is worth noting that the sandstone- conglomerate bodies are of fluvial/continental plain origin. Furthermore, their research also found that the palynomorphs found in the sandstone-conglomerate units were mostly forest, savanna, and montane species asserting that these deposits are continental/fluvial plain in origin. Of great significance to the lay person is the vegetation or horticultural significance of the studies which revealed the level of salt and acidity and how these could affect vegetation and farming.

The overall significance in this study is the determination of the underlying bedrocks of the areas and their ultimate ramification of an implication for mineral resources, horticulture, settlement, natural disasters and mitigation as all these factors intertwine and depend very much on the solidity and chemical composition of the soil and rocks that underlie the area of study.

Article 4: Pebble Morphometric Analysis of Awi Formation in Calabar Flank, Nigeria" presents the studies and findings of Drs. Asukwo E. Itam, David O. Inyang, Etie B. Akpan and

EDUCATION

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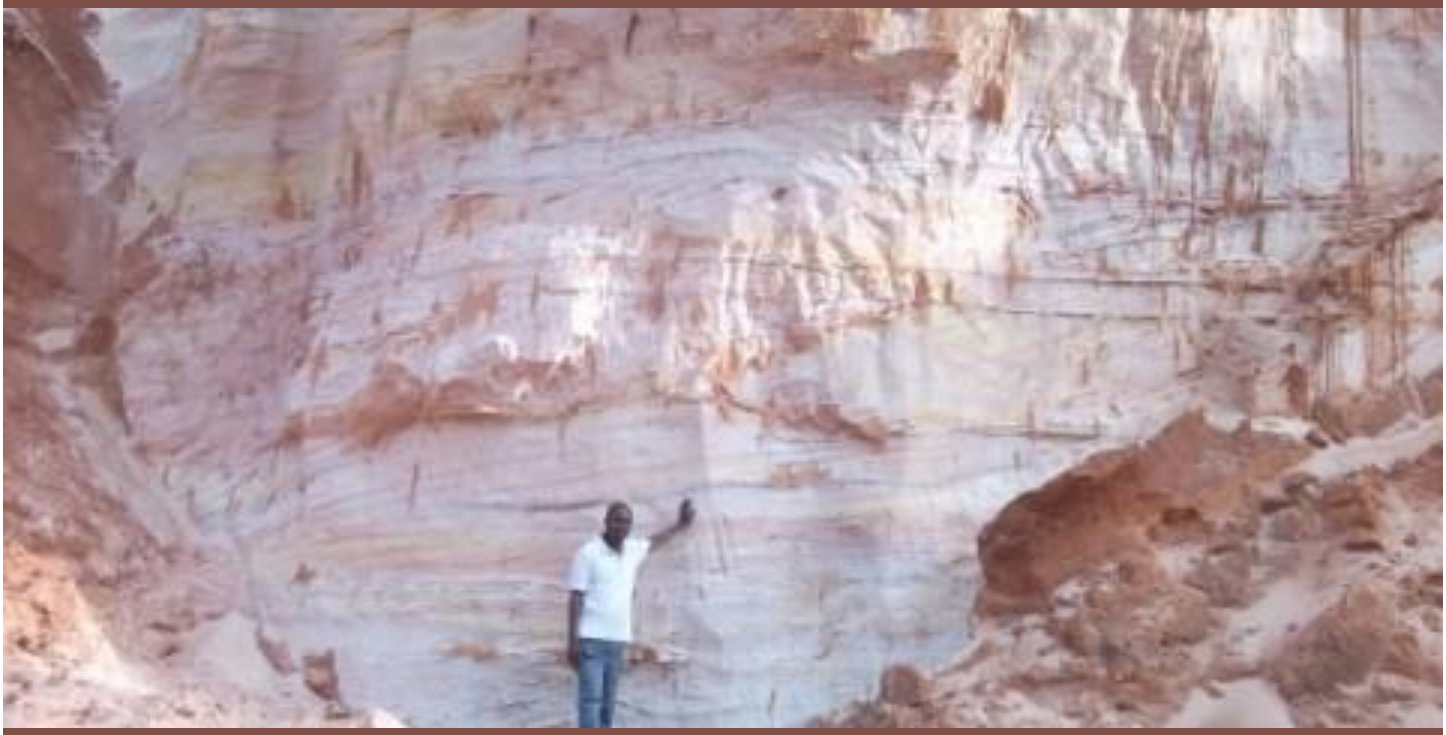
TECHNOLOGY

NIGERIAN



SANDSTONE

RELATIVE AGE AND PALEOENVIRONMENT OF SANDSTONE – CONGLOMERATE DEPOSITS IN THE NORTHEASTERN NIGER DELTA, NIGERIA.

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Department of
Geology **University of Calabar**

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Department of Geology
University Of Port Harcourt
and

Dr. M. U. Udoh
South-Sea Petroleum Consultants
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Abstract

The foraminiferal, palynological and nannofossil contents of the sandstone-conglomerate and other laterally outcropping lithofacies in the northeastern margin of the Niger Delta were investigated for the purposes of dating, paleoenvironmental analysis and stratigraphic placement of these fluvial deposits within the regional framework. Several index forms were recovered and these showed the contiguous sedimentary units to be Maastrichtian/Paleocene while the sandstone-conglomerate facies are Middle Eocene-Oligocene in age. Diagnostic taxa in these sedimentary units include notable forms such as **Foraminiferids**: *Morozovella aequa*, *Globigerina velasconensis*, *Morozovella midwayensis*, *Globigerina daubjergensis, Cibicides succedensis*, *Anomalinndes umboniferous*, *Planoratalites pseudomeradi*, *Bolivina africana*, *Eponides pseudoelevatus* and *Cibicides harperi,* **Palynomorphs**: *Selaginella myosurus*, *Homotryblium sp*, *Proxapertites operculatus*, *Spiniferites sp*, *Apectodinium parvum*, *Mauntidites crassiexinus* and **Nannofossils:** *Toweius crassus*, *Pontosphaera sp*, *Latelloptica sp*, *Biscustum magnum* and *Transversopontis pulcher*. Many of these forms indicate neritic (inner-outer) paleo environments for the contiguous sedimentary-conglomerate units to the Bende-Ameki and Ogwashi-Asaba formations while Agbada Formation is its subsurface equivalent.

INTRODUCTION

Sandstone-conglomerate bodies having a northwest-southeast orientation occur within the

area where the southwestern fringe of the Lower Benue Trough meets the northeastern rim of the Niger Delta (Ojoh, 1990; Webber and Daukoru, 1975; Short and Stauble, 1967; Murat, 1972; Benkehelli, 1988; Fig 1). Several lithofacies have been recognized within the sandstone-conglomerate deposits (Amajor, 1986; Inyang, 2001). Previous researchers (Inyang, 1996;

Petters, 1989; Amajor, 1986) speculated that these deposits were detritus derived from the Cameroon volcanic line which was uplifted in the Miocene (Whiteman, 1982). They referred the deposits to the uppermost part of the Ogwashi-Asaba formation and the lower part of the Benin Formation. Based on these inferences, they believed the "Rubble Beds" of the Niger Delta to be their subsurface equivalent.

The present contribution describes the micropaleontology of the sandstone-conglomerate bodies with a view towards determining their age and paleoenvironmental and those of contiguous sedimentary units in the northeastern part of the Niger Delta. Also a chronostratigraphic framework for these deposits has hitherto, been lacking. These deposits were also analyzed to decipher if they were transgressive sands having marine influence or were continental/fluvial deposits.

Geological Setting

The Niger Delta is essentially a part of the Benue trough megatectonic structure even though it formed as a marginal sag basin (Benkhelil, 1988; Dishroom et al., 1988; Burke et al., 1970). The Benue Trough is a failed rift arm of a triple junction (Burke and Dewey, 1974) and the sedimentary basins subsumed in the Benue Trough resulted from the rifting and in-filling process due to the opening of the south Atlantic (Edet and Nyong, 1993; Ojoh, 1990).

The Niger Delta is a thick wedge of sediments consisting of three basic lithostratigraphic units: basal marine shales, the Akata Formation, with a thickness ranging from 600 to over 6000m; an overlying paralic Agbada Formation, consisting of interbedded sands and shales with a thickness of 300m to about 4500m; and at the top, the Benin Formation composing of fluviatile gravels and sands. The last unit is thickest (2100m) in the central area of the Niger Delta where there was maximum subsidence of the basement. All the three mentioned Formations are

strongly diachronous. The Imo Shales (Paleocene), Bende-Ameki Formation (Eocene), Ogwashi-Asaba Formation (Oligocene-Miocene) and "Coastal Plain Sands" (Miocene-Recent) are the outcropping equivalents around the northeastern fringe of the Niger Delta. (Short and Stauble, 1967; Webber and Daukoru, 1975). The conglomerate deposits were previously believed to form the uppermost part of Ogwashi-Asaba Formation and the lowermost part of the Benin (Coastal Plain Sands) Formation (Petters, 1989; Amajor, 1986). Lithologically, the samples comprised shale, siltstone, limestone, conglomerate, gravelly sandstone and clay.

Methodology

One hundred (100) samples from the sandstone-conglomerate bodies and contiguous Formations were analyzed for their microfossil content. Apart from the forminiferids, palynomorphs and nannofossils, several micromolluscs, shell fragments, ostracods, dinoflagellates and organic wall linings were recovered. Lithologically, the samples comprised shale, siltstone, limestone, conglomerate, gravelly sandstone, sandstone, clay and ferruginous sandstone. The sandstone-conglomerate bodies were analyzed in terms of their age to determine whether they are transgressive sands, having a marine influence, or are continental/fluvial deposits.

Sample Preparation for Forminiferids

The sodium trioxocarbonate (IV) (Na_2CO_3) method was used in the preparation of 100 samples for foraminifer's analysis (Armstrong and Braiser, 2005). One spoonful of Na_2CO_3 was added to the each sample (of 25g) and boiled. The liquid was allowed to simmer until the rock showed no further signs of breaking down. The samples were washed through a clean fine sieve (#300 meshes) with a gentle jet of water from a tap, placed on filter paper and dried in an Oven.

Each sample was sorted and separated into size classes (#230, #200, #100, #80 and #40) to enhance the recovery and analysis of microfossils, which were placed in Franke slides and identified using a Zeiss Stereo micro paleontological microscope.

Sample Preparation for Palynomorphs

Thirty-six (36) samples were selected for palynological analysis based on their nature. However, shally sediments were given preference due to their ability to yield abundant pollen and spores while a few of the sandstone-conglomerate were also selected and studied. Briefly, the pollen preparation technique involved the following steps:

1. Each sample was treated with 10% HCl to remove free calcium carbonate in the sediments. This was carried out without heating to avoid exine corrosion.
2. The suspension was centrifuged and neutralized with KOH to deflocculate and remove humic colloid.
3. Hydrofluoric acid treatment was carried out to remove siliceous materials and acetolysis treatment removed cellulose.
4. Nitric acid or hydrogen peroxide was used in the oxidation of the preparations, removing lignin. Sieving with 10 micron mesh separated the microfossils which had been darkened.
5. The microfossils were stained with safarine ‘O’ to facilitate photography and mounted on slides for identification.

Sample Preparation for Calcareous Nannofossils

The pipette and smear technique was used in the preparation of about 70 samples for calcareous nannofossils. About 25g of each sample was disaggregated, soaked and swirled in distilled water and a small quantity of sodium hexametaphosphate (calgon) was added to disperse the clay and ensure even distribution of the particles in suspension. Using a pipette, a

drop of the suspension was mounted on a glass slide with norland optical adhesive and placed on a hot plate for a clean mount. The slide was cured with ultraviolet light for 30 to 45 minutes. The smear slides were examined under the microscope with cross polarized light at X100 magnification.

Results and Discussion

Most samples of the sandstone-conglomerate deposits were barren of microfauna and microflora but the contiguous sedimentary units exhibited diagnostic forms. The foraminiferid, palynomorph and coccolithophorid assemblages included forms of mostly Paleocene to Early Eocene age but there were few Late Maastrichtian to Early Paleocene age taxa (Bolli et al., 1985 and Berggren 1995) namely: *Globigerina fringa*, *Globigerina daubjergensis, Planulina nacatochensis and Cibicides harperi.* Paleocene to Early Eocene taxa were, among others:

Planktonic foraminiferids	Benthonic foraminiferids
Morozovella velascoensis(Late Paleocene-Early Eocene)	*Eponides pseudoelevatus(Paleocene)*
M. pseudomenadi(Late Paleocene-Early Eocene)	*Anomalinoides umboniferous*
M. cf. pseudobulloides(Paleocene)	*Bolivina africana(Paleocene)*
M. aequa (Late Paleocene-Early Eocene)	*Cibicides succendens(Paleocene)*
Globorotalia chapmani	*Epitominella minuta(Paleocene-Eo.)*
Pseudohastingerina wilcoxensis(Late Paleocene-M. Eocene)	
Planorotalites compressa (Paleocene)	*Anomalinoides midwayensis(Paleoc.)*

Globigerina velascoensis *Nonionella insecta(Late Paleocene)*

G. triloculinoides(Paleocene)

M. inconstant (Paleocene)

Acarinina cf. nitida

Planorotalites pseudomenardi(Late Paleocene-Early Eocene)

Also present, however, is *Epistominella potoni* which suggests an Oligocene age. Most of these forms are diagnostic of inner, middle and outer neritic environments; but there are few upper bathyal forms. Petters (1983) observed that the mid-Cretaceous epeiric seas in the Benue Trough were shallow, restricted, anoxic and subject to pronounced salinity fluctuations; that the shallow shelf (mostly inner neritic) planktonic foraminifers in the Gulf of Guinea coastal basins show peak diversity and abundance (of tropical to subtropical species) during the Middle –Late Maastrichtian, Late Paleocene-Early Eocene and Late Miocene-Pliocene; and that the study area was affected by marine transgressive peaks in the Maastrichtian, Paleocene, Eocene and Oligocene.

Petters (1982) observed that the Cretaceous — Early Teritary marginal marine shales (which are contiguous units to the present sandstone-conglomerate deposits) — exposed along the southern parts of the interior basin and in the coastal basins contain mostly arenaceous f

oraminifers; and that the low diversity calcareous and arenaceous assemblages in shales and limestones suggest abnormal salinities for the Cretaceous-Teritary epeiric seas with a change from an initial brackish to anoxic environment in the Benue trough. He also recognized fluviatile sands in the eastern and central depocentres of the Niger Delta.

Analysis of these sedimentary units in the study area for nannofossil content yielded recoveries for two samples: Shale from Oniong-Ono, UC/23 (*Biscutum magnum*, *B. melaniae*,

Cylindralithus sculptus and *Cyclagelopsphaera margelli*) which suggest a Late Maastrichitian age; Shale from Ikot Ossom Ikpe, UC/45 contained the Early Eocene taxa such as *Toweius crassus* and *Toweius occulatus.*

Palynological analysis therefore suggested that the contiguous shale, limestone, and siltstone/mudstone units are predominantly of Late Maastrichtian to Early Eocene age. Pollen and spore content from the sandstone-conglomerate units include forms which range into the Middle Eocene. Notable forms present in the study area are (Fig 2 and 3):

Pollens shown on Fig. 2.

1. *Retidiporites bengalensis*	Late Paleocene –Eocene
(cf. *Retidiporites magdalensis*)	
2. *Monocolpopollenites marginatus*	Late Maastrichtian – M. Eocene
(cf. *Monoporites annulatus*)	
3. *Retistephanocolpites williamsi*	Late Paleocene- Oligoecene
4. *Mauritidites crassiexinous*	Late Paleocene – Eocene
5. & 7. *Proxapertites operculatus*	Paleocene –Eocene
6. *Ctenolophonidites costatus*	Paleocene – Eocene

Spores shown on Fig 3.

1. *Apectodinium sp*	Paleocene- Eocene
2. *Apectodinium quinquelatum*	Late Paleocene- Mid-Eocene
3. *Homotryblium pallidum*	Eocene-Oligocene
4. *Apectodinium homeomorphum*	Upper Paleocene-Mid-Eocene

A pollen diagram showing the percentages of trees, shrubs, herbs and ericales was not prepared, neither were plots showing varieties of trees, shrubs and ericales. The palynological interpretation is qualitative. The zonations of Martini (1971) and Bolli, et al., (1985) were used for the nannofossil analysis. They observed that coccolithophorids such as *Pontosphaera* and *Transversopontis* are more common in shelf areas than in open oceans lending credence to the above paleoenvironmental interpretation for the sedimentary units contiguous to fluvial deposits. Generally, the sandstone–conglomerate units were barren of macrofossils, microfossils and nannofossils. They yielded a few spores, however, and frequent organic linings and dinoflagellates. These properties indicate continental deposits with little or no marine influence (Bolli, et al., 1985; Berggren et al., 1995).

These assemblages support the conclusion derived from foraminiferal analysis that the shale, limestone, mudstone and siltstone units are products of marginal marine (inner, middle and outer neritic)) environments. Palynomorphs found in the sandstone-conglomerate units are mostly forest, savanna and montane species indicating that these deposits are continental/fluvial plain deposits. Considering the age of the laterally contiguous sediments, the sandstone – conglomerate units are mostly likely to be of Middle Eocene age.

Conclusion

This research work attempted to deduce the age of the sandstone – conglomerate deposits outcropping in the northeastern sector of the Niger Delta by analysis of foraminifers, palynomorphs and nannofossils recovered from contiguous sedimentary units which are of Maastrichtian/Paleocene to Mid – Eocene age. The sandstone - conglomerate bodies are probably Mid- Eocene to Oligocene and are alluvial facies within the Bende – Ameke and Ogwashi – Asaba Formations. Their subsurface equivalents are therefore to be found within the Agbada Formatiom of the Niger Delta. These findings corroborate earlier proposals as the ages of sedimentary units in this part of the Niger Delta (see fig. 4). Though the contiguous sedimentary units were deposited in neritic environments, the sandstone–conglomerate bodies are of fluvial/continental plain origin.

Acknowledgement

We are grateful to the University of Calabar for the study fellowship granted to the first author and for useful comments by colleagues. We are very grateful to the management and staff of South-Sea Petroleum Consultants for assisting in micropaleontological analyses.

Legend to figures

Figure 1: Geologic sketch map of the study area

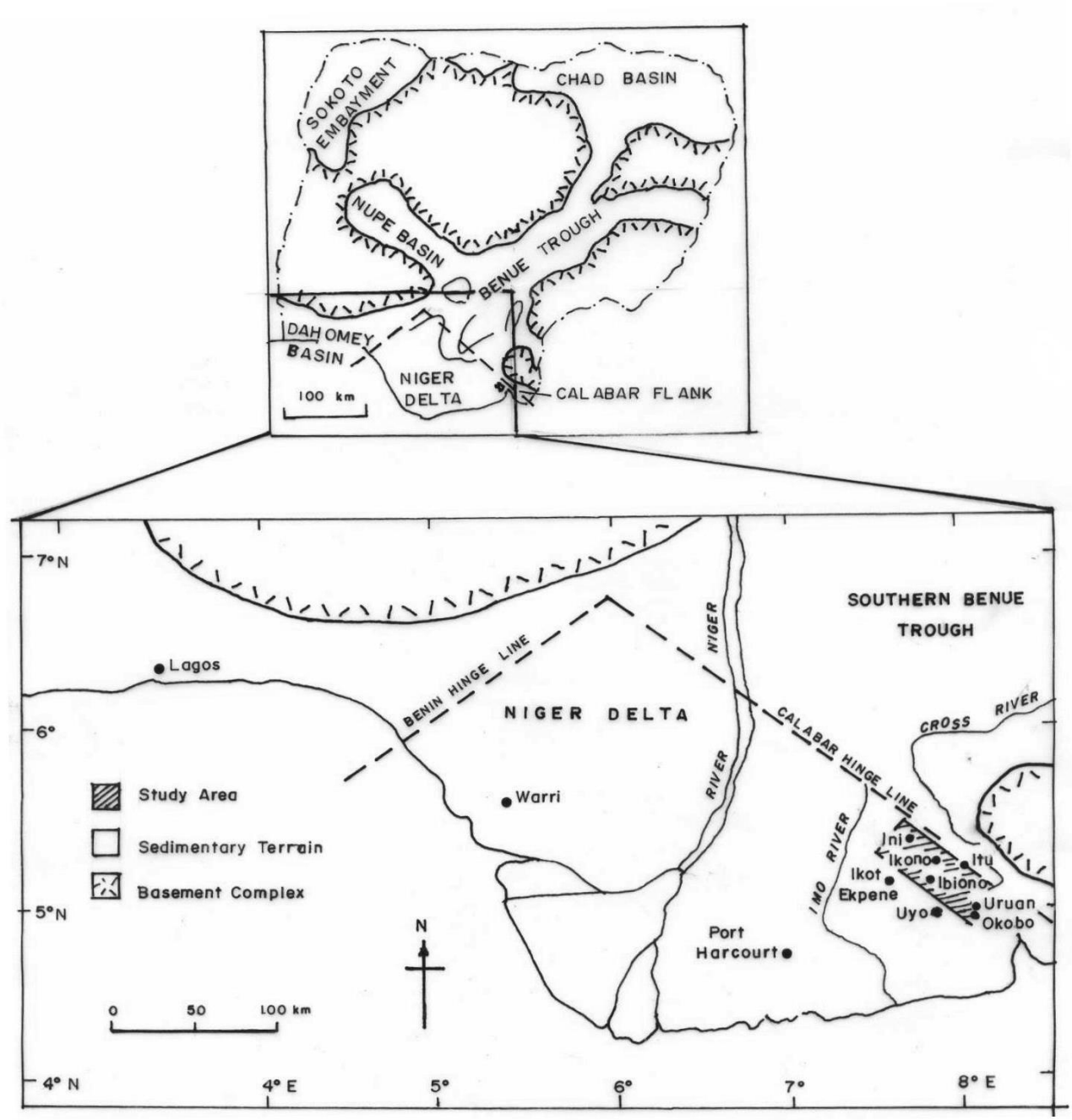

Figure 2: Notable pollens in the study area

1. *Retidiporites bengalensis*	Late Paleocene –Eocene
(cf. *Retidiporites magdalensis*)	
2. *Monocolpopollenites marginatus*	Upper Maastrichtian – M. Eocene
(cf. *Monoporites annulatus*)	
3. *Retistephanocolpites williamsi*	Late Paleocene- Oligoecene
4. *Mauritidites crassiexinous*	Late Paleocene – Eocene
5. &7. *Proxapertites operculatus*	Paleocene –Eocene
6. *Ctenolophonidites costatus*	Paleocene – Eocene

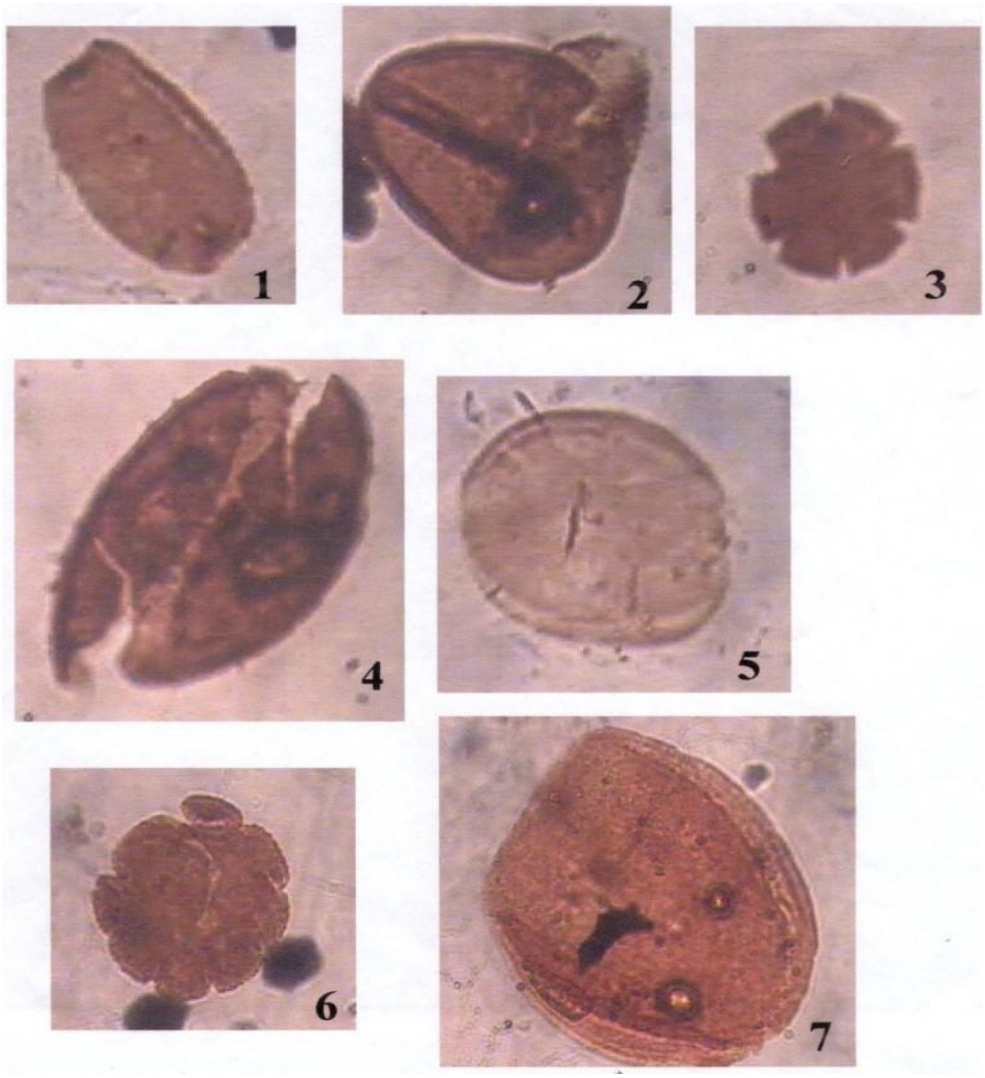

Figure 3: Diagnostic spores in the study area

1. *Apectodinium sp*	Paleocene- Eocene
2. *Apectodinium quinquelatum*	Upper Paleocene- Mid-Eocene
3. *Homotryblium pallidum*	Eocene-Oligocene
4. *Apectodinium homeomorphum*	Upper Paleocene-Mid-Eocene

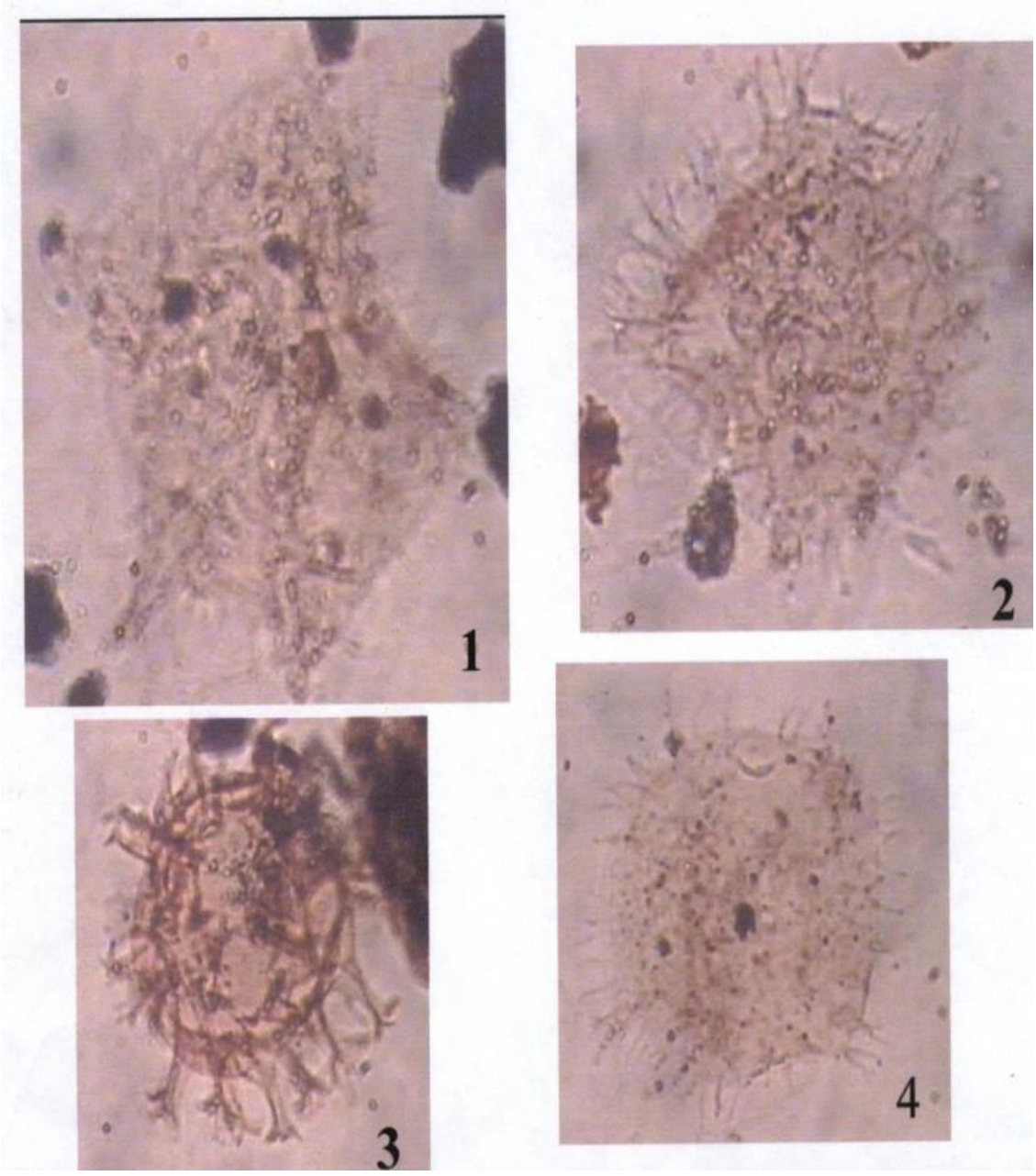

Figure 4: Geology sketch map showing Dahomey Basin, Niger Delta and Calabar flank

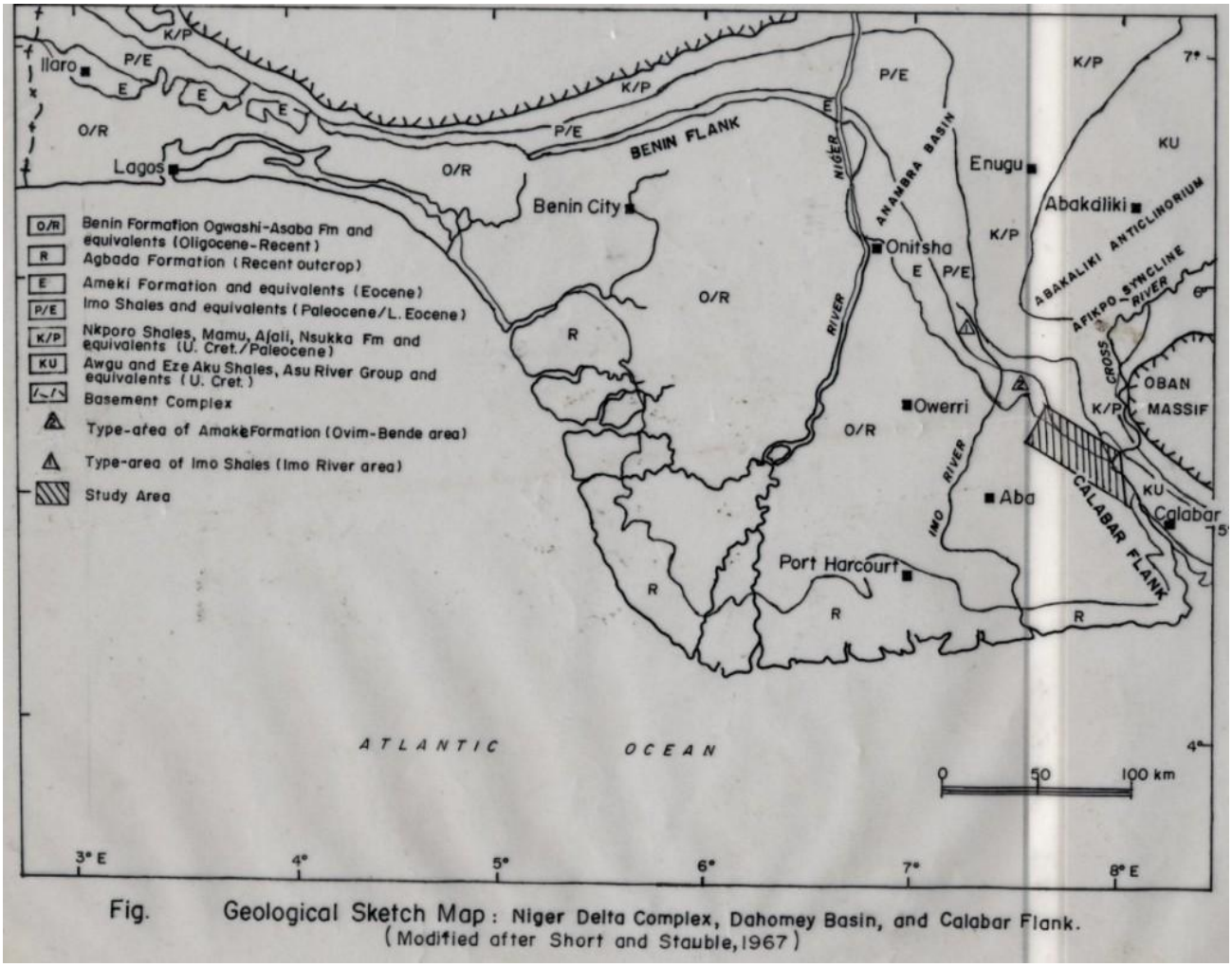

Fig. Geological Sketch Map: Niger Delta Complex, Dahomey Basin, and Calabar Flank.
(Modified after Short and Stauble, 1967)

Legend to figures

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