

**UNIVERSITY OF PORT HARCOURT**

**IN DEFENCE OF  
TRADITIONAL/HERBAL MEDICINE**

A Valedictory Lecture

By

**PROFESSOR CHUKWUNONYE MOSES OJINNAKA,**  
B.Sc, PhD, FCSN, FICCON, FNIBE, FILA

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**UNIVERSITY OF PORT HARCOURT**

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# A Valedictory Lecture

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**PROFESSOR OF CHEMISTRY**

**Department of Pure & Industrial Chemistry**

**University of Port Harcourt**

**MAY 5, 2011**

**UNIVERSITY OF PORT HARCOURT**

**EAST-WEST ROAD, CHOBA**

**P. M. B 5323**

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[cmojinnaka@yahoo.co.uk](mailto:cmojinnaka@yahoo.co.uk)

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**DEDICATION**

This valedictory lecture is dedicated to my nuclear family, Ifeoma, Chukwudi, Chioma and Ujunwa as well as all the students who have passed through me during my university career

## **ACKNOWLEDGEMENT**

The idea of presenting this valedictory lecture was muted by a colleague during a normal ‘varendah chats’ across my office. For this wonderful suggestion, I am grateful to Professor John O. E. Otaigbe.

My wife, Ifeoma, was a source of inspiration as I kept late hours to prepare this manuscript. My wife, Ilove you.

I am indebted to Professor Obiozo Eddy Ayalogu for proof-reading the manuscript.

The Vice-Chancellor, Professor Joseph I. Ajienka, provided logistic, financial and administrative assistance towards successful delivery of this lectur. I remain grateful to him.

To my colleagues in the Department of Pure & Industrial Chemistry, I say, :it is not yet uhuru”.

## CITATION ON

### ***PROFESSOR CHUKWUNONYE MOSES OJINNAKA*** **B.Sc (Ib), PhD (Ib) FCSN, FICCON, FNIBE, FIIA**

Professor Chukwunonye Moses ojinnaka was born on 6<sup>th</sup> June 1946 at Akpulu in Ideato North Local Government Area of Imo State. He is the second son of late Chief Samuel Onyejekwe Ojinnaka (the Ezelefeanya of Akpulu) and Late Lolo Janet Abiazuba Ojinnaka. He attended St. Anne's Primary School, Ahiaeke, Umuahia (1959), Modonna High School. Ihitte (WASC, Division One, 1960-1964) and Government Secondary School, Afikpo, (HSC, 1956-1966). In september 1970, Professor Ojinnaka gained admission into university of Ibadan, where he obtained the B.Sc. (Hons) degree in Chemistry (1973) and PhD (1977), specializing in Natural Product Chemistry. As a graduate student at University of Ibadan, late Professor D.E.U. Ekong, Professor J.I. Okogun and Professor D.A Okorie variously supervised Professor Ojinnaka.

Throughout his university education in Nigeria, Profeseor Ojinnaka was sponsored by the federal Government of Nigeria as a Federal Scholar (1970-1973) and by the university of Ibadan for the PhD degree as a University Scholar (1974-1977).

After his formal education Professor Ojinnaka had a rewarding working experience, Professor Ojinnaka taught Chemistry/Mathematics at St. Augustine's Semistry, Amechi, Ezzamgbo, Abakaliki (January 1967-Auguiust 1968) and Holy Child, Sharon, Abakaliki (January 1970-Auguswt 1970). He served at Child School, Ado – Ekiti as a member of the first batch of the National Youth Service Corps (1973 – 1974) and

worked briefly as a research officer at the Federal Institute of Industrial Assistant in the Department of Chemistry, University of Ibadan in 1975. In 1978, he was appointed Senior Research Officer and Head of Research Division, Leather Research Institute of Nigeria, Samaru, Zaria. He held the post until August 1979, before assuming duties as Lecturer II, in school of Chemistry Sciences, University of Port Harcourt. Through hard work and vigorous research, he rose steadily through the rank: Lecturer I (1981); Senior Lecturer (1985), and Professor of Chemistry (1995). Professor Ojinnaka was Senior Research Advisor to Shell Petroleum Development Company of Nigeria Limited (1999-2000 and 2008-2009).

As a University lecture, Professor Ojinnaka contributed immensely in the education and training of many students in Chemistry Engineering and training of many students in Chemistry, Engineering and Medicine. In fact, he successfully supervised the PhD graduate in the department of Pure and Industrial Chemistry, University of Port Harcourt.

Professor Ojinnaka has practically lived his life in the Laboratory searching for the active principles in one plant species or the other. A man of great curiosity about things around him, Professor Ojinnaka established himself as a leading authority in pharmacognosy and a first class scientist in natural product chemistry. He was a guest to many international University. In 1981, Professor Ojinnaka was appointed Research Associate at the college of Pharmacy, University of Illinois at the Medical Center, Chicago, where he worked under Professor Norman Fansworth; and in the 1984 – 85 academic session, he was awarded a Post – Doctorate Research Fellowship at Arrhenius Laboratory, University of Stockholm, Sweden. In 2005 and 2007, Professor Ojinnaka was a guest to University of Kumasi, Accra, Ghana and

Tshwane University of Technology, Pretoria, South Africa, respectively.

As a staff of University of Port Harcourt, Professor Ojinnaka served University of Port Harcourt in many important capacities. He was the Dean, Faculty of Science (2004-2008). As a Dean, he was the Chairman, and the Administrative Head of the Faculty, which was made up of nine departments and an Institute of Science and Laboratory Technology, Professor Ojinnaka was also a member of committee of Provost and Deans (an Academic/Administrative Committee of the University Statutory committees and Life-member of Senate, University of Port Harcourt by virtue of his Professorial rank. He was the Head, Department of Pure and Industrial Chemistry (1988-1990). Professor Ojinnaka originated and mentored the establishment of the University Central Instruments Laboratory, when he was the dean, Faculty of Science.

As a renowned scientist, Professor Ojinnaka attracted attention outside University of Port Harcourt. Professor Ojinnaka attracted, for many years, has been a resource person for the National University Commission (NUC). He led many NUC accreditation and resource verification teams to many Nigeria Universities. Professor Ojinnaka has served as an external examiner to several universities both at the undergraduate and postgraduate levels. He was the Regional Editor, *Journal of Chemistry Society of Nigeria* (JCSN) and Assistant Editor, *Scientia Africana* (1997 – 1999). He is also a consulting Editor to several local and international scientific journals. He is a fellow of Institute of Biomedical Engineering (FNIBE), Fellow, Institute of Industrial Administration (FIIA) and member of various professional and learned societies within and outside Nigeria such as Nigeria Society of Pharmacognosy, Science Association of Nigeria, West African Science Association, America Society of Pharmacognosy and

Society for Medical Plant Research (Europe). Professor Ojinnaka is also cited in two International Biographies – **Marquis Who's Who in Science and Engineering** (1996-1997) and **Who's Who in the World** (1997).

It is in his leading roles in Pharmacognosy and natural product chemistry that Professor Ojinnaka delivered the 19<sup>th</sup> inaugural lecture of University of Port Harcourt in 1998 entitled “**A Forest for Novel Drugs: Natural Product Chemistry**”. This is also borne out from his immense contributions to knowledge, especially in advancement of our knowledge of modern chemistry. An author of five books and many scholarly articles in international journals, Professor Ojinnaka has made world-acclaimed contributions, especially in a study captioned “Carbonyl Peak Index in the study of Lubricant Oxidation” where he demonstrated a technique that could be used to monitor the deterioration of engine oils. He was the first to isolate, characterize and propose the name ‘**Myrianthic acid**’ for a pentacyclic triterpene acid from *Myrianthus arboreus*. At the 35<sup>th</sup> International Union of Pure and Applied Chemistry held in Istanbul, Turkey, in 1995, Professor Ojinnaka discussed the isolation of Napoleonaside (first isolation by him from a Nigeria plant *Napoleaonaea imperiarlis*) and proved that Napoleonaside was one of the most potent naturally occurring molluscicides for the control of schistosomiasis a disease that is endemic in Nigeria.

Professor Ojinnaka is married to Ifeoma Cecilia Ojinnaka (nee Okeke). They are blessed with two children, Chukwudi and Ujunwa.

Vice-Chancellor, Ladies and Gentlemen; Professor C.M. Ojinnaka, in this Valedictory Lecture, will share his experience in the application of pure and applied science especially in the area of potential drug development from medicine plants. It is



therefore, my honor to present Professor Chukwunonye Moses Ojinnaka, an intellectual giant, the developer of carbonyl peak index technique, the discoverer of myrianthic acid, a keen researcher in chemical remediation, and an astute administrator, to deliver his Valedictory Lecture.

Presented by  
Professor John O.E. Otaigbe  
Department of Pure & Industrial Chemistry  
Thursday, May 5, 2011

## **IN DEFENCE OF TRADITION/HERBAL MEDICINE**

### **INTRODUCTION:**

The birth of a hero is unannounced but the death makes headline news. On August 31, 1979, three young lecturers: Late Dr. Nwanna Nzenwunwa, Dr. Mark Anikpo and Dr. Chukwunonye Ojinnak assumed duty at University of Port Harcourt and the only person that knew of their arrival was the Chief Catering Officer of the University Guest House who assigned them flats one, two and three respectively. Since I arrived unannounced, I do not wish to leave unannounced but to use valedictory Lecture to announce my pull out from my tenured appointment.

Two Valedictory Lectures have been delivered since the inception of University of Port Harcourt. Professor Emmanuel .O. Anosike delivered the Valedictory Lecture in November 2006. In his lecture, "**Desecration of the Ivory Tower**", Professor Anosike lamented the academic and infrastructural decay in Nigerian Universities. Professor Nimi Briggs (2009) delivered the second Valedictory Lecture, "**Women's Health: A Nation's Wealth**"<sup>2</sup> in which he asserted that women represent the potential of their nation and that their general well-being (educationally and health wise) is an economic and political asset to the nation.

This is the third lecture in the series of the University of Port Harcourt Valedictory Lectures; the second from Faculty of Science and the first from department of Pure and Industrial Chemistry. While thinking about the title of this lecture, two of my most quoted publications came to mind namely "Myrianthic acid"<sup>3</sup> and "Carbonyl Peak Index Technique"<sup>4</sup>. Neither Myrianthic acid nor Carbonyl Peak Index Technique

was patented. Today Myrianthic acid is synthesized and sold without any royalty to man who first isolated, characterized and namely the compound and Carbonyl Peak Index Technique is used for the determination of percentage deterioration of crankcase oils.

Before I continue, it may be necessary to summarize my research adventure as a chemist. I was one of the pioneer staff of School of Chemical Sciences (having assumed duty as Lectures II in September 1979). I had the burden of developing programmes in teaching and research and concentrate on the successes during my tenured appointment.

I successfully supervised (with Dr. G.C. Ofunne) the first PhD graduate in the Department of Pure and Industrial Chemistry, University of Port Harcourt.

Our research in Chemistry Tribology <sup>5-8</sup> focused on the mechanistic study of high temperature characteristics as well as the role of metals in the oxidative degradation of automotive crankcase oils. We proved that polymerization products were initiated at temperatures above 260°C for fully formulated engine oils while metals had catalytic effects in the monograde oils relative to the multigrade oils. In course of this study, we established a technique known as the Carbonyl Peak Index (CPI), which provided data for infrared spectra that enabled a more lucid explanation of the oil soluble acidity and sludge deposition characteristics of monograde and multigrade formulated oils.

My research group also made great impact on environmental remediation <sup>9-12</sup>. Niger Delta region of Nigeria is prone to environment degradation as a result of oil exploitation and subsequent spillage. The focus of these projects was to carry

out environmental baseline and post-impact assessments of polluted sites in the region with a view to providing and necessary impetus for environmental protection and rehabilitation. The chemical aspect of this project, involved treatment of hydrocarbon inundated soils using inorganic (N. P. K) supplements.

Despite my rewarding adventure into tribology and chemical remediation, my major research interest is tilted towards efficacy of Nigeria medical plants <sup>13-20</sup>, which supported my publication on “**African Health Medicine**” <sup>21</sup>. *Myrianthus arboreus* P.Beauv (Urticaceae) was screened for hypoglycaemic agents. We isolation and characterized **mryianthic acid** and other novel compounds, for the first time, from rootwood of *Myrianthus arborteus*. *Musanga cecropiodes* (Urticaceae) was screened for its phytochemicals and was shown to be chemotaxonomically related to Beauv (Lecythidaceae) we isolated and characterized, for the first time, **Napoleonaside** (a novel triterpenoidal saponin) which was tested for molluscicidal properties against *Biomphalaria glabrata*, the said vector of the alarming tropical disease, schistosomoiasis, and was found to be one of the most potent naturally occurring molluscicides with an activity of 0.4 ppm (observed after 24hrs). we isolated and characterized **Cyclooctasulphur** (S<sub>8</sub>), for the first time, from fruits of *B. Coriacea* was shown to be aas a result of presence of cyclooctasulphur. It is therefore, not surprising that for this Valedictory Lecture, I will give scientific evidence “**In Defence of Traditional/Herbal Medicine**”, which formed the basis of my research for the past three decades.

**Traditional Medicine** is the use of plants or animals in the treatment or amelioration of disease within an organized indigenuous system whereas **Herbal Medicine** is the use of

plants by members of an indigenous culture for which there is no organized medical system <sup>22,23</sup>. In herbal medicine, herbs should not be regarded as naked entities only; rather they are always associated with other ingredients such as clay, potassium, skin of animals, liver, feathers, water, incantations, or prayers, limestone and such as other materials that are complementary in the preparation and use of traditional medicine <sup>24</sup>.

Before the efficacy of traditional medicine is discussed, let us see how orthodox medicine is comparable to traditional medicine. Figure 1 shows major medicine (orthodox, semi-orthodox and traditional medical workers exist (i) those who merely use herbs (“Nwadibia” or Onisegun”) and those who combine the use of herbs with metaphysical incantation (“Alfa”, “Nwadibia Ogba aja” and “Babalowo”).

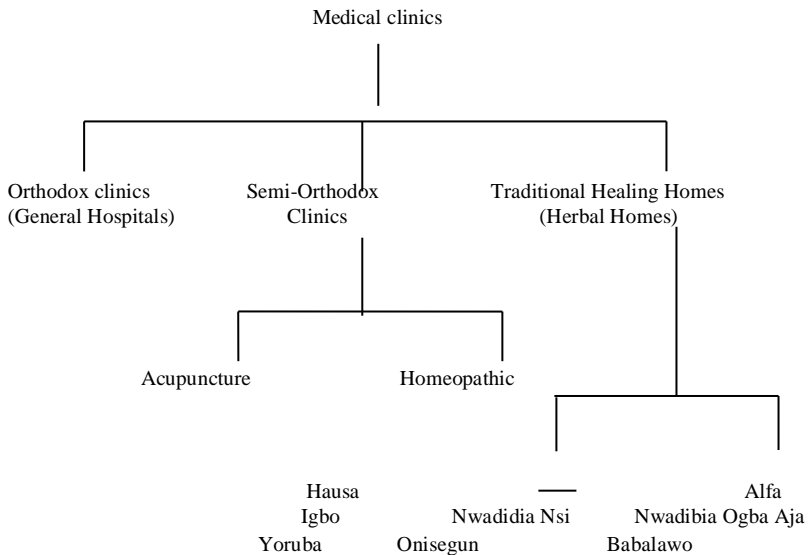


Fig. 1. Types of Medical Clinics in Nigeria

Orthodox medicine differs from traditional medicine by the mode of its operation; which explains the basic misunderstanding between each other. Thus a pharmacist who does not understand incantation dubs the herbalist as a fellow shrouded in mystery and vice-versa. Traditional medicine and its practices are complementary to orthodox medicine. When the drug of the pharmacist fails a patient who does not originally believe in native medicine, the only option for such a person is herbal medicine. That woman on the street who fails to get pregnant after seeing an orthodox doctor will attest to this fact. The orthopaedic/trauma patient whose leg was not amputated in an herbal home will bear witness to the efficacy of medicinal plants. Western medicine has no absolute cure for ailments such as hypertension, broken bone, diabetes, sickle-cell anaemic. Acquired Immune Deficiency Syndrome – AIDS and of course illness caused by witchcraft but traditional medicine has a cure for all these disease<sup>24</sup>. These is a local adage, which believes that **“The firewood of a people cooks their food”** (Nku no na mba n’eghere mba nri) and that adage informs the use of herbal medicine by indigenous people.

Medicinal plants are plants that have at least one their parts (leaves, stem, fruits, barks or root) used is herbal or traditional medicine (ethnomedicine)<sup>25</sup>. The active principles in medicinal plants are secondary medabolites. These secondary metabolites are used or have been used in medicine and pharmacy. The properties of plants were discovered by the “theory of signs”<sup>23</sup>

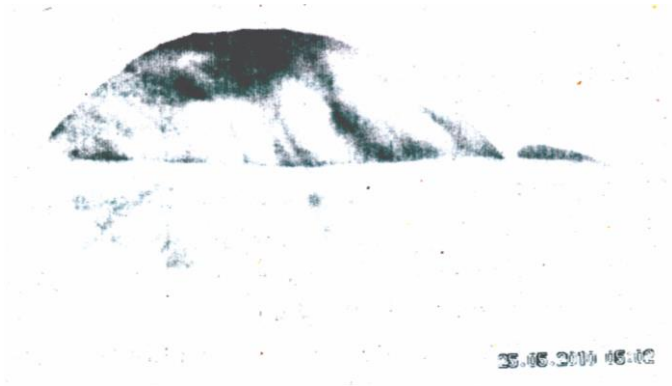


Figure 2: The Orange Leaf

For example. The leaves of oranges tree have a little heart in their base, and thus have been recommended for the treatment of heart dysfunction. Being a sedative, they are favorably effective for many heart diseases. Medicinal plants have become important for the treatment of different disease conditions, such as diabetes, mlalaria, anaemia<sup>26</sup>. The availability and relatively cheaper cost of medicinal plants in Sub-Saharan Africa, makes them more attractive as therapeutic agents when compared to “modern” medicines<sup>27</sup>.

Medicinal plant research in Nigeria follows from the establishment of two important agencies in 1931 and 1948. The department of Government Chemist which later became Pharmacy Department, was established by the Colonial Masters in 1931, initially to analyze water and other consumables available then and advise Government on their safety or otherwise for human consumption<sup>28</sup>. Department of Chemistry, University College, Ibadan, was established in 1948. The Government Chemist and Department of Chemistry were the initial centers of Pharmacy/Chemistry in Nigeria.

The Department of Chemistry, University College, Ibadan had a mission to organize the study of Chemistry as a discipline and a mandate to research into the natural products of the Africa. The Nigerian forest stems partly from the early work of Dr. Dalziel and partly from the Colonial Administrations' interest in improving the quality of the timber products, which were the major export of British West African Colonies.

Preliminary work on medicinal applications of the floral heritage of West Africa was initiated in 1937. Recall that, in 1937, Dr. J. M. Dalziel, a colonial medical officer wrote "The Useful Plants of West Tropical African"<sup>29</sup>, a supplement to the "Flora of West Tropical Africa" (a compilation of some of the commonly used native plants). **The Useful Plants of West Tropical Africa** was revised in 1994, by H. M. Burkill<sup>30</sup> to include some secondary metabolites recently isolated from the plants. Early work by C. W. L. Bevan and his research group, at University of Ibadan was anchored on the isolation and characterization of organic compounds of plant origin<sup>31</sup>. Little attempt was made towards testing the bioactivity of the compounds and linking their results to active principles used in traditional medicine as shown in the publication "The Chemistry of Nigeria Medicinal plants"<sup>32</sup>. Of course, testing the bioactivity was not the mandate of a Department of Chemistry that was pre-occupied with the isolation of extractives, which may improve the quality of timber products especially those of the family Meliaceae.

The importance of medicinal plants and the contribution of traditional medicine to the well-being of a significant number of the world's population have attracted interest from a variety of disciplines. Whereas herbal medicine involves the use of plants as complex mixtures, the process that leads from the plant to a pure bioactive substance is very long, tedious and



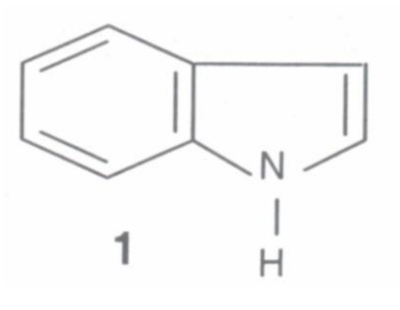
requires a multi-disciplinary collaboration of botanists, natural product chemistry/pharmacognosists, pharmacologists and toxicologists<sup>23,33</sup>.

The chemist, in this term, isolates the active principles using a bioassay as a guide. The ultimate aims are to isolate pure crystalline material and to discover prototype drugs from natural sources. A prototype drug, in a chemist's view, is defined as the drug that has a wholly different medical applications<sup>23</sup>. In this forum, scientific evidences that support some remedies and practices used in traditional/herbal medicine are discussed.

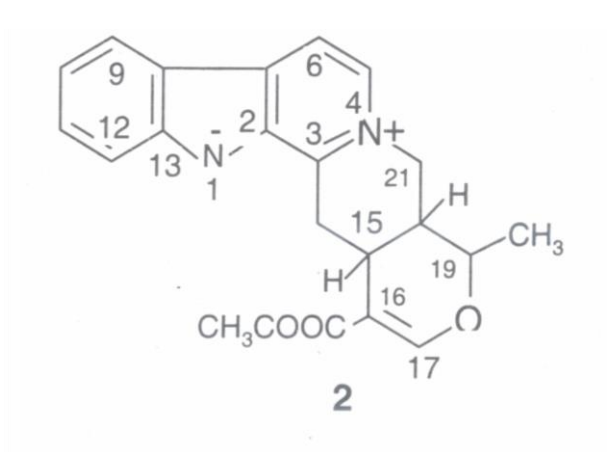
### **POTENCY OF MEDICINAL PLANTS**

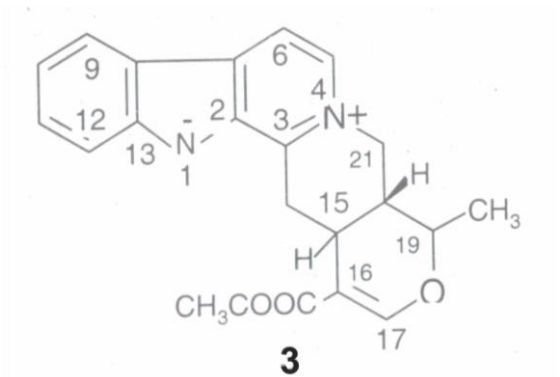
In Tropical West Africa, traditional healers have relied on medicinal plants as remedy to incurable disease and a medicinal plant may be used to cure different (related and unrelated) ailment. Different plant species may have similar bioactivity. This 'miracle' may be as a result of the presence, in such plant species, of compounds with different mode of actions have been isolated from species of the same of different plant family.

Traditional healers are not interest in molecules (chemicals) that heal but in end products of their applications. Among the chemical classes present in medical plants species. Alkaloids stand out as a major important class in the development of new drugs. Alkaloids posses a great variety of chemical structures and have been identified as responsible for pharmacological properties of many medicinal plants. Some plant families have the genetic capability of producing more than one alkaloid whose nuclear structure is the same but with structural diversity<sup>34</sup>. For, example, more alkaloids in the Family Apocynaceae possess indole (**1**) ring in their structures.

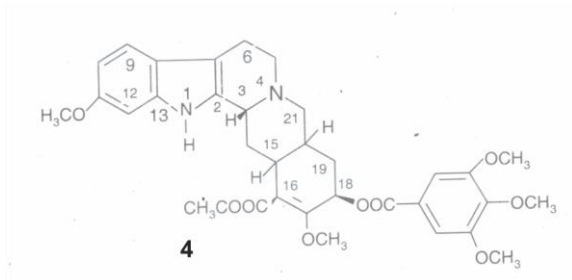


In Nigeria, traditional healers have used *Alsonia boonei* for cure of malaria. Alstonine (2), which is isolated from *Alstonia boonei*, is indicated as an antimalarial agent. Alstonine and even serpentine (3) are the basic structures found in extracts from species of the Family Apocynaceae such as *Catharanthus roseus* (L) G. Don, *Picralima nitida* (Stapf) Th & Dur and *Rauwolfia vomitoria* Afzel.

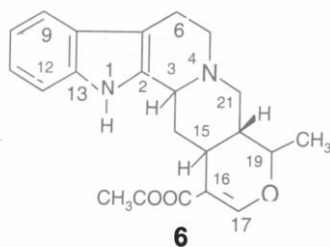
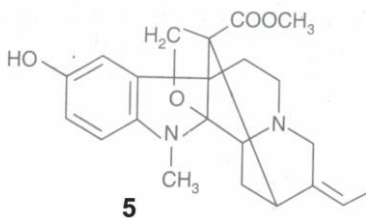




*Catharanthus roseus* has been indicated as a purgative for treatment of indigestion and dyspepsia, and has been considered to be useful in the treatment of diabetes. *Rauwolfia caffra* is traditionally used to treat fever, insomnia, rheumatism and pneumonia whereas *Rauwolfia vomitoria* is associated with *Xylopia aethiopica* (Dun) A. Rich (Annonaceae) to treat convulsion in children. *Rauwolfia vomitoria* and *Xylopia aethiopica* possess anti-inflammatory activity<sup>35</sup>. Reserpine (4) was isolated from *Rauwolfia serpentine* Benth changed the history of conditions as diverse as schizophrenia and hypertension.



From *Picralima nitida*, akuammine (5), ajmalicine (6) related alkaloids were isolated.



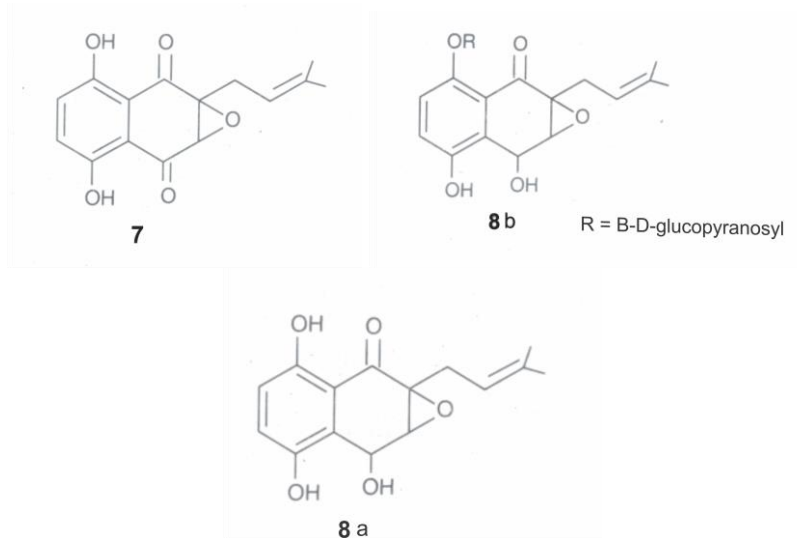
The methanol extract of *Picralima nitida* fruit showed potent and dose-dependent anti-inflammatory, antipyretic and antimalaria activities<sup>36</sup>. Bark and seed extract of *P. nitida* caused hypoglycaemia in both normal and elloxan-induced diabetic rabbits by a mechanism independent of the availability of insulin from pancreatic  $\beta$ -cells. The seed extract exhibited faster hypoglycaemic activity than the standard drug tolbutamide<sup>37</sup>.

## MEDICINAL PLANTS AND HEALTH-CARE DELIVERY

Our discussion will centre on known/confirmed medicinal plants, which traditional healers use as antifungal, antiviral, antimalaria, anticancer and molluscicidal agents as well as those that are used to control sickle-cell anaemia, diabetes mellitus and HIV/AIDS.

## ANTIFUNGAL AND ANTIVIRAL AGENTS

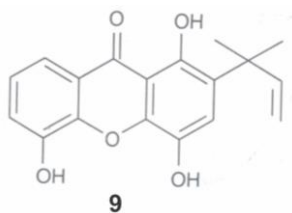
Traditional healers in West Africa have claimed success in the treatment of several infectious diseases. The claim has prompted many researchers to study closely the chemical components of the plant species involved in the treatment of infectious disease<sup>38, 39</sup>. Extracts from *Sesamum angolense* (Pedaliaceae) exhibited antifungal activity and the active components were two naphtoxirene derivatives (7) and (8a).



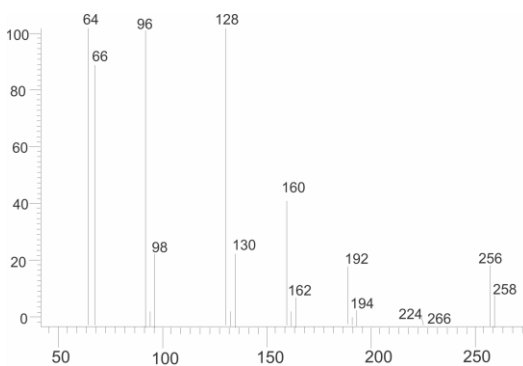
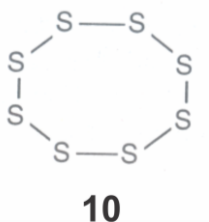
The fungal activity seems to require the presence in the molecule of an –OH (hydroxyl) group in the peri position to a carbonyl function. Hence compound (7) is more active than (8a) and (8b) is inactive.

We are used to chewing *Garcinia kola* to get relief from pains associated with sore throat and cough. It is discovered that *Garcinia kola* is effective against bronchitis; throat infections and the seed extracts possess remarkable antihepatotoxic

property. From the root extracts of *Gartina gerrardii*, a fungicidal active pyranoxanthone (9) was extracted.



We isolated an antifungal molecule, cyclooctasulphur (10), from the seed kernels of *Buchholzi coriacea* (Capparidaceae) and its structure elucidated by its mass spectrum.



Mass spectrum of Cyclooctasulphur (S<sub>8</sub>)

The isolated of cyclootaspur confirmed the use of *buchholzi coriacea* ethnomedicinally as a remedy against skin eruption<sup>40, 41</sup>.

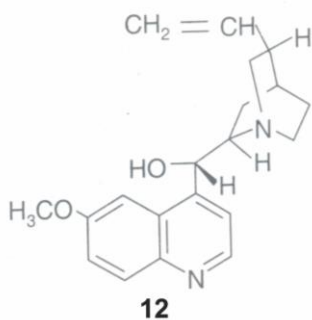
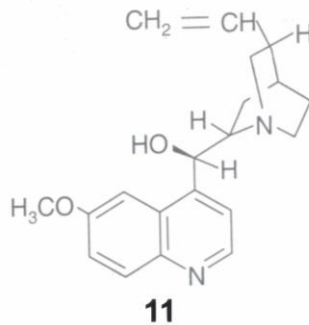
### **ANTIMALARIA AGENTS**

The list of medicinal plants employed by rural communities of Nigeria as a remedy against malaria attack is endless. The normal recipe for malaria remedy is:

*Azadirachta indica* (Dogo-yaro),  
*Carica papaya* (Paw-paw),  
*Citrus Limon* (lemon),  
*Psidium guajaba* (guava),  
*Cymbopogon citeatus* (lemon grass),  
*Ocimum viride* (Scent leaf)

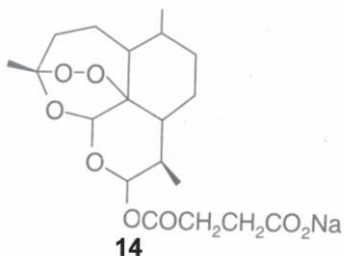
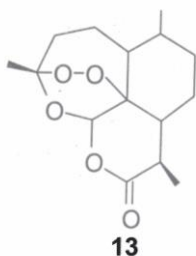
The mixture of the leaves is boiled in a pot and the patient who is covered with a thick blanket inhales the vapours. The patient sweats profusely and within one hour he is relieved of the fever. The decoction may also be taken orally.

Plant species from the families Apocynaceae, Meliaceae, Rubiaceae, Cariceae, Gramineae and Anacardiaceae are prominent candidates. The indole alkaloids of Apocynaceae (species *P. nitida* and *Alstonia boonie*) and the quinoline alkaloids of Rubiaceae (for example *Cinchona officinalis*, from which quinine (11) and quinidine (12) were isolated) have been shown to be effective as antimalarials. Whereas quinine<sup>42</sup> is an antimalarial (analgesic and antipyretic), its dextrorotary, stereoisomer, quinidine is antiarrhythmic (cardiac depressant). This fact corroborates with the ethanomedical belief that one medicinal plant can be used to cure more than one disease.



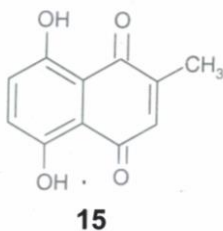
Artemisinin (13), a new chemical class of antimalarial compounds involving sesquiterpene lactone molecules, was isolated from the aerial parts of *Artemisia annua* (Asteraceae)<sup>43</sup>.





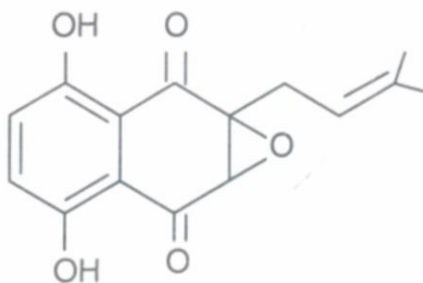
The drug has a high level of blood schizontocidal activity against *Plasmodium* strains resistance to all known antimalarials. Artemisinin is highly lipophilic; hence there is problem of administration. To overcome this problem, a derivation, sodium artesunate (14) was synthesized. There are many derivatives of arthemisinin marketed as their methyl esters.

A prototype of a new class of drugs derived from naphthoquinones is discovered to be excellent antimalarial. Isoshinanolone (15), for example, was isolated from the roots of *Nepenthes thorelii* Lec (Nepenthaceae).



We have demonstrated so far that medicinal plants used in traditional medicine are sources of antimalarial drugs and that alkaloids are not the only class of compounds that could be used as antimalarial agents. More prototype drugs that have

not yet undergone clinical trials are discovered everyday from medicinal plants. It is important to note that a change in the structure of a compound brings about change in the structure of a compound (7) possess antifungal activity whereas (15) is an antimalarial drug.



7

### **ANITCANCER AGENTS**

I believe that herbal medicine has a prospect in treatment of benign prostate hyperplasia (BPH or Old Man's Prostate) and prostate cancer.

The recipe

**Grind watermelon, pumpkin seeds**

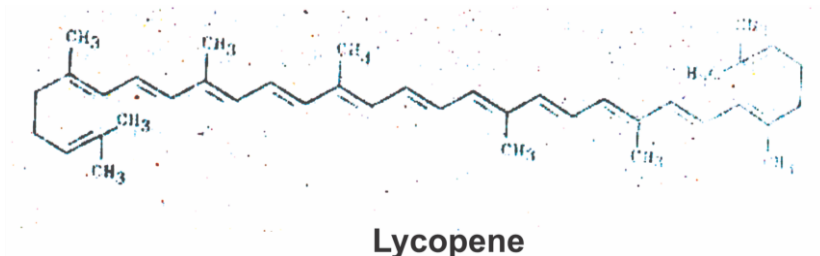
**Red grapefruit and sweet tomato**

**Add macerated guave**

**Mix up with water.**

**Take a cup full of beverage once a day.**

The beverage contains lycopene that prevents formation of by-product of testosterone that seems to encourage healthy prostate cells to become malignant.



Recipe 2:

**Mix 100mg *Prunus africana* bark and**

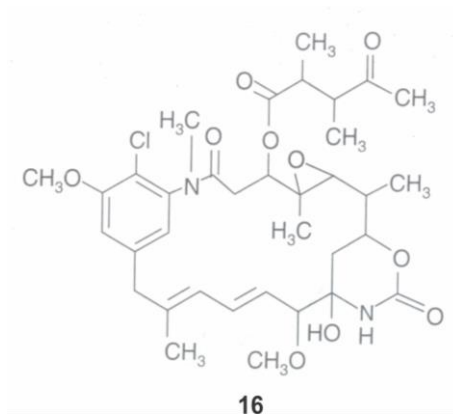
**Stinging nettle roots**

**Make hydroalcoholic tincture**

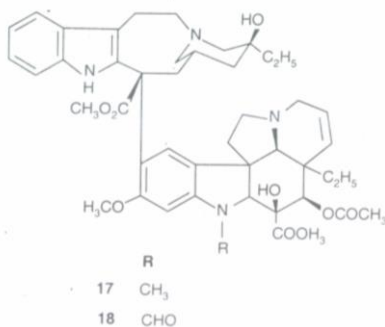
**Take once per day for 60 days**

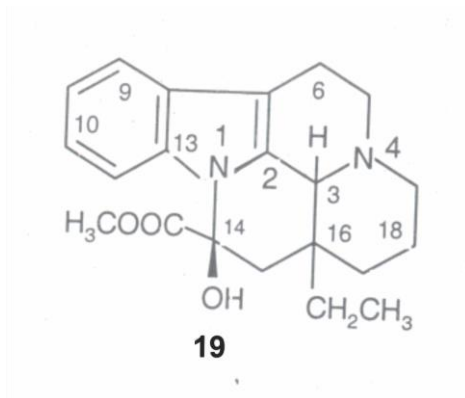
This alcohol tincture induces significant improvement in urinary frequency, urgency and urine flow<sup>44</sup>. The extract contains active phytosterols in free and glycosylated forms, pericyclic triterpenes in free and glycosylated forms, pericyclic triterpenes, ferulic esters of long fatty alcohols and esters of fatty acids<sup>45, 46</sup>.

The search for novel anticancer drugs started since the last five decades. Kupchan was the first chemist to isolate an antileukemic ansa macrolide, maytansine (16), from an Ethiopian species of *Maytenus ovatus* (Celastraceae)<sup>47</sup> and the total synthesis of maytansine was carried out by Corey and his co-workers<sup>48</sup>. Through Kupchan isolated maytansine; he died of cancer in 1975 before the development of his drug.



It was mentioned earlier that extracts from *Catharanthus roseus* has hypoglycaemic activity. The studies to verify antidiabetic properties of *Catharanthus roseus* extracts led instead to the discovery and isolation from the Madagascan rose periwinkle, *Catharanthus roseus* G. Don (Apocynaceae), of well-known anti-tumor vinblastine (17), vincristine (18), vincamin (19), and camptothecin<sup>49</sup>.





From the structure/activity relationship studies, vinblastine and vincristine differ in their clinical utility and toxicity. The major use of vinblastine is the treatment of patients with renal, testicular, head and neck cancer. Vincristine is widely used, in combination with other anticancer agents, in the treatment of cervical and breast cancer. The isolation from the same plant of drugs with different mode of action confirms that a traditional healer can use one medicinal plant to cure unrelated ailments. Many anticancer drugs undergoing different clinical screening have been isolated from medicinal plants.

### **MOLLUSCICIDAL AGENTS**

Some snails, most especially of the genera *Biomphalaria*, *Bulinus* and *Oncomelania*, transmit schistosomiasis, a disease endemic in tropical Africa. An important mechanism for the control of schistosomiasis is the eradication of the intermediate host snail, which is confirmed by the parasitic cycle of *Schistosoma haematobium* (figure 3)<sup>50</sup>.

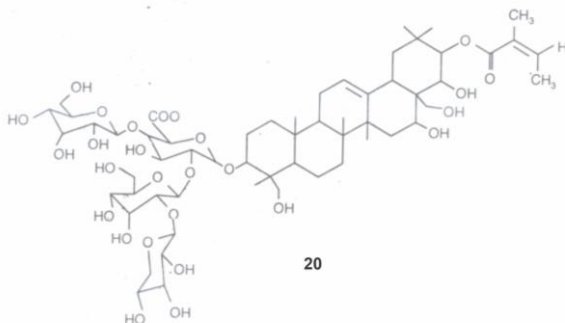
*Schistosoma haematobium* (figure 3)<sup>50</sup>



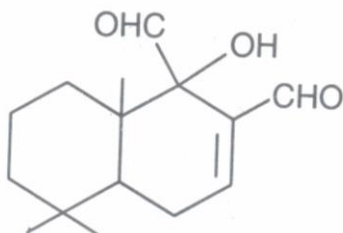
**Fig 3: Parasitic cycle of *Schistosoma haematobium***

Key 1 adult worm; 2 egg; 3 miracidium; 4 snail; 5 cercaria

Our key focus therefore, is to isolate plant derived water-soluble compounds, which are lethal to the snail. Triterpene glucoside appears to be in the forefront of the natural products with the most potential in the fight against schistosomiasis<sup>51</sup>. A highly promising plant molluscide, napoleonaside (20), was extracted from the fruits of *Napoleanea imperialis* (Lecythidaceae).



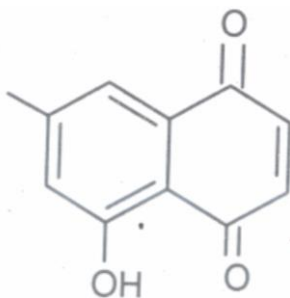
Napoleonaside is a very potent naturally occurring plant molluscicide with activity of 0.4 ppm (observed after 24 hr)<sup>52</sup>.



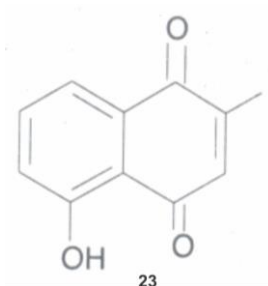
21

It is interesting that several sesquiterpenes and sesquiterpene lactones are potential molluscicidal agents. Warburganal (**21**), from the bark of the East African tree *Warburgia ugandensis* (Canellaceae)<sup>53</sup>, kills *Biomphalaria glabrata* snail at 2 ppm within 24hr.

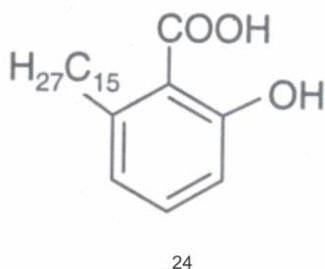
The root barks of *Diospyros usambarensis* (Ebenaceae)<sup>54</sup>, used in Malawi as a traditional schistosomiasis cure, afforded 7-methyljuglone (**22**) and plumbagin (**23**) with activity of 5 ppm and 2 ppm respectively.



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The Cashew nut shells of *Anacardium occidentale* (Anacardiaceae), contain anacardic acid (24), which is a very potent naturally occurring molluscicide with high toxicity (LC<sub>50</sub> 0.35 ppm)<sup>55</sup>.



Our field experience is that in the localities where *Napoleonaea imperialis* and *Anacardium occidentale* predominate, there is little or no incidence of schistosomiasis because, the freshwater snail, *Biomphalaria glabrata*, the intermediate host of the parasite, hardly survives in these areas.

### **SICKLE-CELL ANAEMIA**

In traditional medicine, the seed of *Cajanus cajan* (Papilionaceae) is used for treatment of small-pox recently decoction of the seed is employed in control of sickle-cell anaemia.



Recipe:

**Boil *Cajanus cajan* seeds (vio-vio) in water**

**Take a tumbler full of the decoction twice a day**

**Be relieved of pains!**

We are at home with recent endorsement by World Health Organization (WHO) of “Ciklavit”, a drug formulated from the extracts of *Cajanus cajan* for the management of sickle-cell anaemia<sup>56, 57</sup>.

## **DIABETES MELLITUS**

**Prepare an infusion of**

**Two or three leaves of**

***Annona nuriata* (Sour-sop)**

**And *Myrianthus arboreus* (Ujuju).**

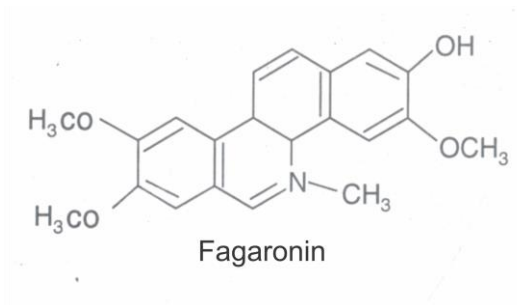
**Drink infusion three or four cups daily;**

**Your blood glucose level is lowered.**

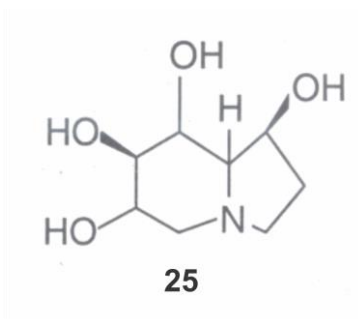
For diabetes mellitus, glucoside extracted from *Myrianthus arboreus*<sup>58</sup>, p-insulin<sup>59</sup>, v-insulin<sup>60</sup>, foetidin<sup>61</sup>, from fruit and seeds of *Momordica charantia* and *foetida* (Curcubitaceae) have acted as supplements to synthetic drugs.

## **HIV/AIDS**

In Nigeria, there has been controversy over the use of medicinal plants for the control of HIV. No matter the controversy, it remains a fact that nature has already synthesized drugs that possess the ability to control the spread of HIV and cure AIDS. It is our duty to identify the medicinal plants and isolate the active principles that possess retro-viral properties. One of the medicinal plants in Nigeria that may be useful in treatment of HIV is fagara (*Zanthoxylum zanthoxyloides*).



Development of programmes for anti-HIV drugs led to the isolation of castanospermine (25) from the seeds of *Castanospermum austral* (Leguminosae<sup>62</sup>, Castanospermine is a potent inhibitor of  $\beta$ -glucoside and thus inhibits the replication of HIV<sup>63</sup>. Without the proper glycoprotein coating, the HIV-virus is unable to spread to non-infested cell.



## THE HERBAL HEALER, THE PHARMACIST AND THE PHYSICIAN-A CONTROVERSY

The controversy between the herbalist, pharmacist and physician over who cures what and what recipe to use in curing a particular disease is endless. It is known that as disease become resistance to commonly used drugs; mixtures of drugs are used to cure more resistant diseases.

The herbalist believes in combination of different medicinal plants for the cure of persistence and re-occurring disease. Hence, herbalists administer to their patients a decoction of *Artemisia annua* and *Cinchona officinalis* for effective cure of resistance strains of malaria parasite. The physicians quarrel with this therapy but recommend a combination of Artemisinin and quinine for the treatment of very resistant strain of *Plasmodium falciparum*. However, we now know that artemisinin and quinine were first isolated from *Artemisia annua* and *Cinchona officinalis* respectively. The herbalist also uses one medicinal plant to cure related and unrelated diseases. Examples are the use of *Catharanthus roseus* for the cure of diabetes and cancer and *Cinchona officinalis* as an analgesic and cardiac depressant.

On the part of the pharmacist, administration of decoction or infusion from two medicinal plants is considered poisonous because the infusion/decoction may not only be toxic but may have side effects. The major side effects reported from the use of modern Western medicines.

The physician and the pharmacist now acknowledge that some crude herbal extracts are more potent than the purified drugs because of the synergic effect of the so-called toxic substances. There are established methods of medicinal plant preservation, which impart on the extracts reduced risks of poisoning, high concentration of active principles. Preservation should be done under shady, well-ventilated and dust-free places (not direct sunlight) and extraction carried out under similar conditions used by herbalists.

The materials employed in traditional medicine are also used in the preparation of western medicine. The difference between Western drugs of traditional medicine origin is that whereas the former are produced and subjected to Western laboratory analysis, the latter are produced according to the knowledge of the herbalist. The likelihood of new drug discovery from medicinal plants is high. In fact, many orthodox researchers (chemists, pharmacists, etc) have made fruitless efforts to discover a single drug that cures diseases that are complicated and resistant to conventional drugs.

## CONCLUSION

It must be acknowledge that the **“firewood of a people cooks their food”** (Nku no na mba n’eghere mba nri) and traditional medicine techniques for curative purposes have come to stay in Africa. Nigeria is endowed with abundant natural resources. We, as a nation, owe it a duty to tap the wealth from the forest. The only way to tap the wealth is by patronizing traditional medicine. Traditional medicine involves the use of medicinal plants and the basis for traditional medicine is to utilize the therapeutic properties of these plants. Literature shows that majority of the publications on Nigerian medicine plants hinge on pharmacological screening of crude extracts to establish the efficacy of the plants. However, many natural product chemists have abrogated their responsibility (of isolating pure active principles from these plants) to pharmacological testing of crude extracts. This singular practice has imparted negatively on the work of natural product chemists whose primary function is to isolate the active principle from plants to prove that the molecules so isolated are the active principles involved in traditional medicine. The miracle of creation provides us a fundamental lesson. Just as God, the Almighty, performed the first chemical reaction through the creation of light, the natural product

chemist should create more molecules from plants that will advance the use of traditional medicine. From our discussion, there is abundant scientific evidence, which proves that active principles from medicinal plants are employed in traditional medicine and that chemistry/phytochemistry played complementary role in traditional healers' claim. It is obvious that chemistry does not only play a central role in the discovery of drugs but impart on the drug the characteristics, which are manifested on their therapeutic application.

The general belief that natural products serve as major sources (about 50%) of drugs and the realization that these drugs are products from less than 90 (out of over 250,000) species of flowering plants on earth (most of them are in Nigeria) reveals the potential plants hold for new drug discovery. The potential can only be tapped by dedicated natural product chemists/pharmacognosts in the isolation of new plant drugs, thus complementing the work of traditional healers. Traditional medicine is a forerunner of modern medicine; medicinal plant development and subsequent application are *sine qua non* in Nigeria Health-Care Delivery. Traditional medicine and the use of medicinal plants therefore hold great potentials for the realization of the Government plan for **Health for all in the 21<sup>st</sup> Century.**

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