# FEDERAL UNIVERSITY OF LAFIA

## INAUGURAL LECTURE SERIES NO. 23

**FACULTY OF BASIC MEDICAL SCIENCES,**
**COLLEGE OF MEDICINE**

# BETWEEN CREATION AND DYING: OF STRUCTURES, FUNCTIONS AND DISEASES


**Ali Is'haq Shugaba**
Professor of Clinical and Microscopic Anatomy
Department of Human Anatomy



November 13, 2024

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## DEDICATION

To Allah SWT for wonderfully creating me in the human form with wonderful structures and functions. To my father, late Alhaji Is'haq Shugaba and my mother Hajiya Ramatu Umar, who were used in my creation. To my daughter, Barrister Vinitha Ali Shugaba who accepted the way Allah created her and functioned excellently to become a lawyer. To my ever-supportive son, Dr Abdulwarith Ali Shugaba, a Urologist, and a certified Robotic Surgeon. To Professor Shehu Abdur Rahman, who relentlessly encouraged and convinced me to give this inaugural lecture.

"Of Structures, Functions and Diseases"
Bismillahir Rahmanir Raheem, Wassalamu Wassalati Ala Muhammad Rasulullah.

## THE PRESENTER

**Ali Is'haq Shugaba,**
*MBBS, DGCA, M.Sc., PGDE, Ph.D, FAGP, FASN, FAMeDS*
*Professor of Clinical and Microscopic Anatomy,*
Department of Human Anatomy,
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## SALUTATION

- The Vice-Chancellor, Prof. Shehu Abdul Rahman;
- The Vice-Chancellor, University of Jos, Prof. Ishaya Tanko;
- The Deputy Vice-Chancellors;
- The Registrar, Mal. Nurudeen Abdu;
- The Bursar, Dr Daniel Anjola Wilson;
- The University Librarian, Prof Abiodun Iyoro;
- The Provost College of Postgraduate Studies;
- Deans of Faculty;
- Distinguished Professors;
- Heads of Administrative Units;
- My esteemed Colleagues in the College of Medicine;
- All Security Chiefs here present;
- Distinguished Ladies and Gentlemen.

## PREAMBLE

**In The Beginning:**

I was about two years old when I started dreaming of becoming a Hafiz (memorizer) of the Holy Qur'an. And when I reached the age of six years old, all I wanted was to be either a farmer or cattle herder. This was what our then Arabic/Islamic Teacher said were the occupations Allah (SWT) wanted any human being to do or be. My father who was a farmer, Adult Education teacher and a local politician (from where he got the name Shugaba, which I am unfortunately bearing instead of Is'haq, his real and first name, would not hear any of these from me.

He agreed unfortunately that girls should not attend western schools which were very few then, but that boys must go and learn to know how to read and write in English apart from knowing how to read and write in Ajami and Hausa. Even though the mallams tried hard to convince him that my age six ambition was the only way to salvation or going to Aljanna. I grudgingly allowed myself to be taken to Nasarawa Eggon via Shabu in a lorry through the untarred bumpy Lafia Jos road in 1967, January.

The second drama was when we reached the Local authority (later Local Education Authority LEA) Primary School Nasarawa Eggon, my hand could not go over my head to touch the opposite ear. It meant that I would not be enrolled. So, I started crying and the headmaster Mallam Abdu Maiyaki who died in 2024 then asked my father what his occupation was, he replied; “I am a councellor in the native authority of Lafia from Unguwar Rere. He said: “Because of you, we shall accept your child” even though I was almost seven years then. This was the beginning of my journey as a western Scholar. Our Primary One Teacher was one Mallam Tari of blessed memory. Gradually, I began to convince myself that I would anyway not go to hell by attending this school

since we also had an Arabic/Islamic Teacher who was teaching us the rudiments of Islam.

In 1970, when I was in primary four and getting ready to sit for the promotion examination for class five, our Teacher, Abdullahi Ubangari (Alias Akwasa) introduced us to a topic about occupation. It was during this period that I told him I would want to be a medical doctor. This thought continued in class five, when the present Aren Eggon, Justice Ahmed Ubangari was our Class Teacher.

I did not change this mind set during the remaining years of my primary Education. By the time I finished, I proceeded very briefly to John Bosco Secondary School in Doma for only two days then briefly too, for two weeks in the then Lafia Divisional Community Secondary School, Obi (Later on GSS, Obi).

**Government College, Keffi**

In the second week of September 1973, I moved to the famous Government College, Keffi, where everything about my future got concretised. And I quote what late General Emmanuel Abisoye said about this great high moulding college *'Keffi means everything to me as it gave me wholesome education, it taught me discipline, hard work, integrity, loyalty, sportsmanship, justice, equity and fair play'* and as one of the pioneer Students that started form one in the month of September in 1973, I maintained this fire of Keffi values and wanting to become a medical doctor in me throughout my school years in Keffi.

In 1975, when the Governor of Benue Plateau State late Police Commissioner Joseph D. Gomwalk Commissioned the General Hospital Lafia (now DASH) with one Dr. El-Boray from Egypt as the first Medical Superintendent, I became more interested and energized to read medicine seeing how he was carrying himself

around the hospital and in the evening when he went to relax around river Amba. On reaching form four (equivalent of SS1 now), we had visitors from the University of Ife made up of the Lecturers and some students of the department of Chemical Engineering who came to tell us about the course of Chemical Engineering and for a moment, I decided I would rather do Chemical Engineering in Ife.

Luckily by the end of form four and the beginning of form five (the final year), my Form Mistress, Mrs. Mathew Kutty who clocked 83years this year, called me to her office and told me to drop the idea of reading Chemical Engineering in preference for Human Medicine.

I didn't know what she saw, but the nature of Government College, Keffi would not allow me to contemplate arguing with her. From this day in 1978, I held on to my initial and innocent ambition of wanting to become a medical Doctor. I had no problem with this, because all my WASC subjects were science inclined and I ended up reading Biology, Chemistry, and Maths with Physics subjects in the School of Basic Sciences ABU, Zaria for my IJMB.

**Ahmadu Bello University, Zaria**

After the IJMB, we got admitted into the then faculty of Human Medicine, Ahmadu Bello University Zaria. My first day in the faculty of Medicine was in the Anatomy department and we were all taken to the dissecting room near Umar Suleiman Hall by a young Indian Lecturer at Anatomy, Mr Kumar. This was the day I came face to face with a completely dissected human body and a few of us, from that day, changed their minds from human medicine to the Sciences, Agriculture, Veterinary Medicine, Pharmacy. Some other relocated to the Congo Campus to study either Accounting or Business Administration.

Majority of us were excited, emotional and looked forward to our groupings for dissection. I particularly became more interested to dissection and fell in love with the dissecting room the way I was always happy anytime I visited the general Hospital Lafia between 1975 and 1978.

The climax of my feeling was the day we had our first lecture in Anatomy when we were taught terminologies used in the subject and the general overview of Anatomy of the human being. Since then, there has never been going back. This was how I went to school by the will of Allah (SWT), the reputation and support of my parents and my initial disbelief in western education which eventually blossomed into my wanting to be a medical Doctor and finally a medical Anatomist.

These stories of my schools can only be understood by me especially for the fulfilment of desiring right from an early age to become a Medical Doctor by Allah, SWT. The realization of this dream has strengthened my belief that Allah SWT is forever having the MAP OF MY BEING IN HIS HANDS (i.e., of my creation, living, death and eventual resurrection in the day of TRUTH!!!) So, He is always with me. I therefore revere Your Mightiness, Your Majesty and above all, Your FINALITY. We have been created by God, Almighty with structures for functions but we shall at the end die, all by His Decree.

**THE DAY OF GREAT TRANSFORMATION- JUNE 1985 (the Transition)**

In the morning – A medical student
In the afternoon – a graduate of Medicine (MBBS)
In the evening an employed house officer, surprisingly giving "orders" to the nursing sisters and matrons who mere calling him this small medical student earlier in the day. That is why this day in 1985 is always referred to as the day of **"great transformation"** –

And that is the way the journey into medicine and clinical anatomy started practically (because the initial journey into the kingdom of human Anatomy started in October 1979).

**EARLY DECLARATION**

Just like what Kwame Nkrumah of Ghana said a long time ago that he was an African not because he was in Africa but because Africa was born in him; I am an Anatomist not because I studied, I got certificates and researched Anatomical issues but because ANATOMY describes the totality of my normal structures, normal functions and my diseased and aging self no matter what I am wearing.

We do not create but we believe in the divine fact that the Almighty decrees anything and everything for it to happen. But between fertilization of the sex cells in the fallopian tube of the mother to the time of delivery at the end of pregnancy is a period of various complex and determining events that lead to the eventual formation of the human in its wonderful shape ready to do the functions of his or her existence to the glory of God till the time of death. We are therefore not like manufacturers who design various fabrics including the interesting aspect of colouring for production and eventual usage.

The Anatomist however studies, describes and reports every aspect of creation and development from those two determining cells through their developmental levels to the eventual cessation of the functions of all the component parts and death and of course the changes that begin after the given period of stay in the world. Again, we do not kill for the purposes of understanding structures, functions, diseases and death. And this is the essence of the spirit behind this Inaugural Lecture.

We are not in charge or responsible for creation and dying. But we are heavily involved in structures, functions and diseases. And somehow on some of the events of creation and dying.

Yes, I wanted to be a Medical Doctor and destiny by Allah (SWT) made it so. I did not just want to be any Medical Doctor who will either be in the Consulting Room, Labour Room, Laboratory, theatre, the Accident and Emergency Room (A&E), the Emergency Pediatric Unit (EPU), the Mortuary alone but that Medical Doctor who will produce all of these Doctors including the Public Physicians, the Teachers, the Researchers, those who will be saying good bye to the Dead but will be in the inner recesses of the Theatres and the Laboratories enjoying and savoring the joys of appreciating normal structures in all the ramifications and I dare say; their functions.

And that is the only way I can and will ever remain a doctor of other Medical Doctors, Students, the Humans, the Animals and of course the dead. This to me, should be the function and basis of humility of all human beings journeying through this world.

I was not talked/pushed into medical Human Anatomy. I went in with my eyes wide opened, ears very receptive and my fingers, hands and brain ready to see, study and understand the structures of the man!

My being both a medical practitioner and a Researcher is also to debunk the perceived rivalry between Medical Doctors who are essentially in the hospitals and those Teaching Medical Students, especially the subjects of Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology, Clinical Chemistry and lately Therapeutics.

This is because historically, there is this wrong notion that the former are Clinicians and the latter are pure Scientists, even though both groups have as their basic and foundational qualification, the MBBS degree.

So truly speaking by my training, experience and practice, none of these groups can/should claim to be practical doctors and the other not. Meaning therefore, that superiority or inferiority complex should not exist between the two especially arising from the fact that one group has in addition to the MBBS, Ph.D. and the other a Professional Diploma or fellowship. It is because of this that I jettisoned my earlier intention of being just a Surgeon to the idea of being a hybrid, thereby embarking on the twin journey of focusing on:

1. Clinical and Patient Care;
2. Basic Research and Laboratory evaluation so that the yoke of looking at some of us as real Doctors and others pure Scientists is completely diminished or non-existent. So, instead of competing with anybody, I competed against myself and rose to where I am today in co-ruling the world of medicine.

I have also advocated and practiced interdisciplinary collaboration among the different shades of Medical Doctors to quash any perceived differences in power dynamics and status. In fact, when established government health institutions were shying away from this, we built a medical centre with my money to prove the point that patient care and research makes for progressive, collaborative health care delivery. In this way, I have over the years promoted: Mentorship, Regular Dialogue, Interdisciplinary Education and Training, Leadership and Policy Support, celebration of successes and breakthroughs and forever evaluating and improvement of the wider and accommodating field of health care system.

My colleagues will always flaunt this adage; that "it is better to have a live problem than a dead certainty". But to me, it is better to have both live problem and a dead certainty. Whichever way, I shall not only cut but research and report to the glory of knowledge.

**Human Anatomy: The Fascinating Study of the Human Body**

The history of anatomy made us to understand how the ancient doctors came about the diagnosis and treatment procedures after cutting up the human bodies. This history extends from earliest examination of sacrificial victims to the sophisticated analyses of the body performed by modern scientists. The study of human anatomy can be traced back thousands of years from Egyptians to the modern anatomy.

**Ancient Anatomy**

The study of anatomy began as early as 1600BC were Edwin Smith, surgical papyrus. Its treatise shows that the heart and its vessels, liver, spleen, kidneys, hypothalamus, uterus and bladder were recognized and that the blood vessels were known to emanate from the heart. The ancient Greek and anatomy underwent great changes and advances throughout the early medieval world.

Herophilus and Erasistratus were the famous anatomists in the third century that conducted dissections on cadavers of condemned criminals and used the cadavers for medical research. Erasistratus described the structure of the brain and circulating systems. Herophilus discovery helped the understanding of the brain, eye, liver, reproductive organs and nervous system.

In the 2$^{nd}$ century, Galen of Pergamum, an anatomist, clinician, writer and philosopher wrote the final and highly influential anatomy treatise of ancient times. That explained the anatomical procedures and the uses of the parts of the human body. His work became foundation for all medical writers until 15$^{th}$ century.

**Medieval to early Modern**

In 16th century, the anatomists Mondino de Luzzi, Alessandro Achillini and Antonio Benevento at Bologna carried out the first systematic human dissections since ancient times.

Leonardo Da Vinci (1452-1519), made use of anatomical knowledge in his artwork, making many sketches of skeletal structures, muscles and organs of humans.

Andreas Vesalius (1514-1564) – was the founder of modern human anatomy and published the influential book "De human corporis fabrica". During the 19th century, anatomical research was extended with histology and developmental biology of both humans and animals. During this period comparative anatomy enabled the medical students to distinguish humans from animals' body.

**Modern Anatomy**

Before the modern medical era, the main means for studying the internal structures of the body were dissection of the dead and inspection, palpation and auscultation of the living. It was the advent of microscopy that opened an understanding of the building blocks that constituted living tissues.

The inventions of microscope allowed research into the ultrastructure of the cells and the organelles. Advances in the fields of histology and cytology along with advances in surgical techniques allowing for the painless and safe removal of biopsy specimens. Other advances occurred in non-invasive techniques (like x-rays, magnetic resonance imaging, computed tomography and ultrasound imaging) for examining the interior structures of the body.

Human anatomy is therefore the scientific study of the structure and organization of the human body. It is a vast and intricate field

that has captivated scientists, philosophers, and artists for centuries. From the tiny cells that make up our tissues to the complex systems that govern our bodily functions, human anatomy is a fascinating and complex subject that continues to inspire and educate us.

The word Anatomy is derived from Greek roots that mean “to cut up or as we say now “to dissect. The field of study of human anatomy in its early stages was adequately defined by this term, for anatomy dealt only with structures that the naked eyes could see, dissected and displayed. This is what we now call Gross Anatomy. But Anatomy was never a morphological science alone even in the earliest writings there were speculations and ridiculous assumptions of the importance of the various parts and how they worked. This, a consideration of the use to which a part is put and how it fulfils its functions has always been a part of anatomy. So Anatomical study that did not consider functions would be somewhat analogous to leaving the names and arrangement of all the parts of an automobile engine but having no concept of what the engine does or how it works.

Only as methods of investigating function because increasingly complex and with use of the microscope, special stains, and the like, the investigation of morphology also became more complex was physiology separated from anatomy as a science in its right.

The division between the two subjects, however, can never be as sharp one as intimated by the separate names and the different methods and places of study for structures in the body necessarily have or have had some function, and function is necessarily based upon structure gross, microscopic or even molecular. Just as anatomy and function overlap, the distinction depends primarily upon where the greatest emphasis is placed. That is either or structure or function.

## Gross Anatomy: The Study of Visible Structures

Dissecting a Cadaver

Gross human anatomy is one of the oldest branches of medicine which has allowed medical knowledge to develop (Prasad, 1984) therefore, from a historical point of view, human anatomy can be considered one of the basic pillars of medical training (McLachlan and Patten, 2006). Beyond this, the technical advances of new disciplines have cannibalized anatomy and minimized its relative importance. Its suppression in the curricula of some medical schools has even been considered (Dyer and Thorndike, 2000). Consequently, a permanent debate has arisen as to the role of human anatomy along with the importance of cadaver dissection in medical training (Di Dio, 1999; Korf et al., 2008). However, as Friedrich Tiedemann once said, “Doctors without anatomy are like moles. They work in the dark and the work of their hands is mounds.”

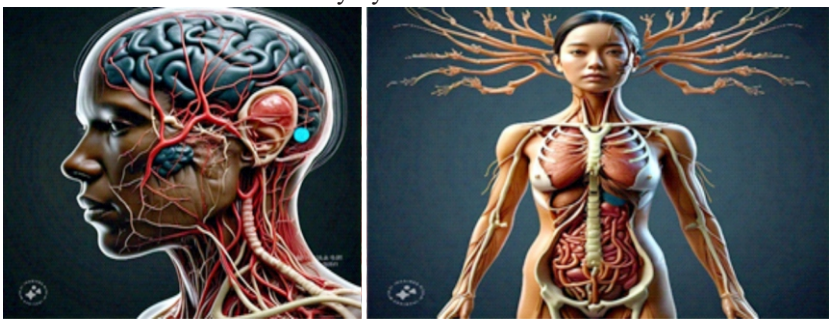
The word “anatomy” comes from the Greek words “ana” meaning “up” and “tome” meaning “a cutting”. The studies of anatomy traditionally depend on cutting up or dissection. Dissection means the cutting up of dead bodies (cadavers) to study the organs and systems of a human body. The discipline of anatomy can be subdivided into several branches. These subdivisions of Anatomy are purely arbitrary and for convenience of instruction only for no one of them is understandable without some knowledge of the others:

1. Gross or macroscopic anatomy: the study of structures large enough to be seen with the naked eye.
2. Superficial or surface anatomy: the study of the external body features with aid of the naked eye.
3. Microscopic anatomy: the study of human structure that cannot be viewed with the naked eye. This examination is done with the aid of a microscope. This branch can also be called histology which is the study of the cells and tissues of a human body.
4. Embryology/developmental anatomy is the study of immature conditions in human body or developmental part of the human body.

   The two major branches of anatomy that really affect the study in medicine is the gross anatomy and microscopic anatomy. The macroscopic anatomy involves the use of cadavers (corpses) in order to collect information about a particular part or system of the human body. It uses dissection or non-invasive methods. During dissection, the scientist cuts open the human cadaver to examine its organs and system.
5. Comparative anatomy (the study of anatomical differences between species).
6. Neuroanatomy (the study of the nervous system).
7. Clinical anatomy.

Gross anatomy focuses on the study of visible structures, such as organs, bones, muscles, and nerves. This branch of anatomy explores the macroscopic features of the human body, from the shape and function of the heart to the structure and movement of the skeletal system. Gross anatomy is essential for understanding the overall organization of the body and how different parts interact.

Human Body Systems In An Individual



Human Body Systems In An Individual

A Dissection Session and ANATOMAGE – The kind in the study of human structures. FULafia is one of less than five Universities in Nigeria to have one.

**Clinical Anatomy: The Application of Anatomical Knowledge**
Clinical anatomy applies anatomical knowledge to medical practice, enabling healthcare professionals to diagnose, treat, and manage various medical conditions. It is essential for understanding the relationships between structures, identifying potential problem areas, and developing effective treatment plans. Clinical anatomy is crucial in medical education and practice, as it helps students develop a three-dimensional understanding of the body and its functions.

**Microscopic Anatomy (Histology): The Study of Cellular Structure**
Microscopic anatomy, also known as histology, examines the microscopic structure of tissues and cells. This field reveals the intricate details of cellular organization, allowing us to understand how tissues function, respond to stimuli, and adapt to changes. Microscopic anatomy has led to numerous discoveries in cellular biology, enabling advances in fields like genetics, immunology, and cancer research.

- Clinical anatomy has many practical applications, such as in surgical planning, injury repair, and understanding the spread of disease.
- Microscopic anatomy has led to a greater understanding of cellular differentiation, tissue engineering, and regenerative medicine.

Anatomy is therefore the pacemaker or heartbeat of the entirety of medicine. Anatomy is undoubtedly and interplay of structure, function and diseases. Structures are molded in order to shape functions to have a panacea for healthy living.

The basis of all medical and surgical knowledge is anatomy. Not a single step can be made either in medicine or surgery, considered either as an art or science without it. Anatomy underpins all clinical practice- physicians call on anatomical knowledge to perform examinations, formulate differential diagnoses, undertake investigations and communicate findings to patients and colleagues. Some reports have shown that junior physicians with deficient knowledge in applied clinical anatomy are less safe. This coupled with an increase in litigation claims due to anatomical ignorance," have raised concerns. Thus, there is no rational medicine and safe surgery without a thorough knowledge of anatomy. Knowledge of the structure of the human body from what can be seen with the unaided eye (gross anatomy) down to the molecular level is fundamental to understanding bodily function and how both structure and function are modified by disease.

During the last few decades, there has been an explosion of new techniques for imaging anatomy in living patients. Examples range from endoscopy and laparoscopy to computer tomography (CT) and magnetic resonance imaging (MRI), together with newly emerging technology for three-dimensional visualization. The emergence of these sophisticated imaging techniques has been accompanied by the development of minimally invasive therapy targeted to specific organs and/or sites within them. As a result, knowledge of gross anatomy has become increasingly important, not only to interpret the images that are produced by these sophisticated techniques, but also to understand the pathway for targeting therapy to a specific site.

**CREATION AND DYING**

In the grand tapestry of life, creation and dying are two inseparable themes that weave together to form the fabric of existence. Between these two extremes lies a complex web of structures, functions, and diseases that shape the human experience. This Inaugural Lecture explores the intricate relationships between

creation, dying, and the biological processes that govern our lives. On one hand, creation is the spark that ignites life, bringing forth new structures and functions that enable growth, development, and evolution. From the birth of a cell to the emergence of complex organisms, creation is the driving force behind the diversity of life on Earth. It is the manifestation of genetic information, the unfolding of proteins, and the organization of cells into tissues and organs.

On the other hand, dying is the inevitable counterpart to creation, marking the end of an organism's life cycle. It is the culmination of a series of cellular, tissue, and organ failures that ultimately lead to the cessation of life. Yet, dying is not merely an endpoint, but also a transformative process that recycles energy, matter, and information, giving rise to new life forms.

Between creation and dying lies a vast expanse of structures, functions, and diseases that define our existence. Our bodies are comprised of intricate networks of cells, tissues, and organs, each with unique functions that maintain homeostasis and enable us to interact with the world. However, when these structures and functions are disrupted, diseases arise, threatening the delicate balance of life.

Diseases are the manifestation of creation gone awry, where faulty genetic blueprints, environmental stressors, or microbial invaders perturb the normal functioning of our biology. Yet, even in disease, there lies a hidden beauty, as our bodies respond with remarkable resilience, adapting and evolving to counter the insults.

**CREATION AND DYING: ANATOMIC BASIS**

Creation can be defined as the systematic ways of bringing to life or making something new or causing something to exist that did not exist before. Creation of living organism is one of the exciting

areas that need to be studied at the level of human reproduction which is very important for the fundamental understanding of how the human body develops. While dying has to do with disease of the cells, structure, organs and systems which many lead to complete cessation of the brain cells. So, the anatomical basic of creation and dying can be explained from the developmental stages it structure through the deformities to complete death of every living organisms.

**CREATION REQUIRES REPRODUCTION, VARIATION, AND SELECTIVE PRESSURE**

Once the necessary building blocks were available, how did a living system arise and evolve? Before the appearance of life, simple molecular systems must have exited that subsequently evolved into the complex chemical systems that are characteristic of organisms. To address how this evolution occurred, we need to consider the process of evolution. There are several basic principles common to evolving systems, whether they are simple collections of molecules or competing population of organisms. First, the most fundamental property of evolving systems is their ability to replicate or reproduce. Without this ability of reproduction, each "species" of molecule that might appear is doomed to extinction as soon as all its individual molecules degrade. For example, individual molecules of biological polymers such as ribonucleic acid are degraded by hydrolysis reactions and other processes. However, molecules that can replicate will continue to be represented in the population even if the lifetime of each individual molecule remains short.

The second principle fundamental to evolution is variation. The replicating systems must undergo changes. After all, if a system always replicates perfectly, the replicated molecule will always be the same as the parent molecule. Evolution cannot occur.

The third basic principle of evolution is competition. Replicating molecules compete with one another for available resources such as chemical precursors, and the competition allows the process of evolution by natural section to occur. Variation will produce differing populations of molecules. Some variant offspring may, by chance be better suited for survival and replication under the prevailing conditions than are their parent molecules. The prevailing conditions exert a selective pressure that gives an advantage to one of the variants. Those molecules that are best able to survive and to replicate themselves will increases in relative concentration. Thus, new molecules arise that are better able to replicate under the conditions of their environment. The same principles hold true for modern organisms. Organisms reproduced, show variation among individual organisms, and compete for resources; those variants with a selective advantage will reproduce more successfully. The changes leading to variation still take place at the molecular level, but the selective advantage is manifest at the organismal level.

**REPRODUCTION IN LIVING ORGANISM**

Each organism can live only for a certain period. The period from birth to the natural death of an organism represents its life span and there must be a way to produced offspring to sustain life. Reproduction therefore can be defined as a biological process in which an organism gives rise to young ones (offspring) like itself. The offspring grow, mature and in turn produce new offspring. Thus, there is a cycle of birth, growth and death. Preproduction enable the continuity of the species, generation after generation. There is a large diversity in the biological world and each organism has evolved its own mechanism to multiply and produce offspring which is the basis for creation. The organism's habitat, its internal physiology and several other factors are collectively responsible for how it reproduces. When two parents (opposite Sex) participate in the reproductive process and involve fusion of male and female gametes, it is called sexual reproduction.

**Asexual Reproduction**

In this method, a single individual (parent) can produce offspring. As a result, and in plants and animals with relatively simple organizations. Many single –cell organisms reproduced by binary fission, where a cell divides into two haves and each rapidly grows into an adult (e.g.) amoeba, paramecium). In years, the division is unequal and small buds are produced that remain attached initially to the parent cell which, eventually gets separated and mature into new year organisms (cells). Members of the Kingdom Fungi and simple plants such as algae reproduce through special asexual reproductive structures. The most common of these structures are zoospores that usually are microscopic motile structures. Other common asexual reproductive structures are conidia (penicillium), buds (hydra) and gemmules (sponge).

While in animals and other simple organisms the term asexual is used unambiguously, in plants, the term vegetative reproduction is frequently used. In plants, the units of vegetative propagation such as runner, rhizome, sucker, tuber, offset, bulb are all capable of giving rise to new offspring. These structures are called vegetative propagules. Obviously, since the formation of these structures does not involve two parents, the process involved is asexual. It is interesting to note that asexual reproduction is the common method of reproduction in organisms that have a relatively simple organization, like algae and fungi and that they shift to sexual method of reproduction just before the onset of adverse conditions. Asexual (vegetative) as well as sexual modes of reproduction are exhibited by the higher plants. On the other hand, only sexual mode of reproduction is present in most of the animals.

**Sexual Reproduction**

Sexual reproduction involves formation of the male and female gametes, either by the same individual or by different individuals of the opposite sex. These gametes fuse to form the zygote which develops to form the new organism. It is an elaborate, complex and slow process as compared to asexual reproduction. Because of the fusion of male and female gametes, sexual reproduction results in offspring that are not identical to the parents or amongst themselves.

A study of diverse organisms-plants, animals or fungi-show that though they differ so greatly in external morphology, internal structure and physiology, when it comes to sexual mode of reproduction, surprisingly, they share a similar pattern. All organisms must reach a certain stage of growth and maturity in their life, before they can reproduce sexually. That period of growth is called the juvenile phase. It is known as vegetative phase in plants. This phase is of variable durations in different organisms. Before human can reproduce, changes can be seen in human beings that are indicative of reproductive maturity.

Animals must rich maturation (puberty) before they can reproduce. However, animals can reproduce seasonal or through the year; for example, birds living in nature lay eggs only seasonally. However, birds in captivity (as in poultry farms) can be made to lay eggs throughout the year in this case, laying eggs is not related to reproduction but is a commercial exploitation for human welfare. The females of placental mammals exhibit cyclical changes in the activities of ovaries and accessory ducts as well as hormones during the reproductive phase.

In non-primate mammals like cows, sheep, rats, deer, dogs tiger, etc, such cyclical changes during reproduction are called oestrus cycle whereas in primates (monkeys, apes, and humans) it is

called menstrual cycle. Many mammals, especially those living in natural, wild conditions exhibit such cycles only during favourable seasons in their reproductive phase and are therefore called seasonal breeders. Many other mammals are reproductively active throughout their reproductive phase and hence are called continuous breeders.

That we all grow old (if we live long enough), is something that we recognize. But what is meant by growing old? The end of reproductive phase can be considered as one of the parameters of senescence or old age. There are concomitant changes in the body (like slowing of metabolism, etc.) during this last phase of life span. Old age ultimately leads to death. In both plant and animals, hormones are responsible for the transitions between the three phases. Interaction between hormones and certain environmental factors regulate the reproductive processes and the associated behavioral expressions of organisms.

## EVENTS IN SEXUAL REPRODUCTION

After attainment of maturity, all sexually reproducing organisms exhibit events and processes that have remarkable fundamental similarity, even though the structu4res associated with sexual reproduction are indeed very different. The event of sexual reproduction though elaborate and complex, follow a regular sequence. Sexual reproduction is characterized by the fusion (or fertilization of the male and female gametes, the formation of zygote and embryogenesis. For convenience these sequential events may be grouped into three distinct stages namely, the pre-fertilization, fertilization and the post-fertilization events.

### a. Pre-Fertilization Events

These include all the events of sexual reproduction prior to the fusion of gametes. The two main pre-fertilization events are gametogenesis and gamete transfer.

i. *Gametogenesis*

Gametogenesis refers to the process of formation of the two types of gametes – males and female. Gametes are haploid cells. In some algae the two gametes are so similar in appearance that it is not possible to categories them into male and female gametes Gametogenesis is divided into:

a. Isogametes when the gamete is produced by same individual; and
b. Heterogametes of homo sapiens when they are produced from separate parent as in human beings i.e. Sperm and ovum.

ii. *Gamete Transfer*

After their formation, male and female gametes must be physically brought together to facilitate fusion (fertilization). In a majority of organisms, male gamete is motile and the female gamete is stationary. Exceptions are a few fungi and algae in which both types of gametes are motile. There is a need for a medium through which the male gametes move. A large number of the male gametes, however, fail to reach the female gametes. To compensate this loss of male gametes during transport, the number of male gametes produced is several thousand times the number of female gametes produced.

**b. Fertilization**

Fertilization is a cell-cell recognition process that occurs between two distinct cells: a small asymmetric and motile sperm cell and large and non-motile egg (Gregg Gunderson 2021). The most vital event of sexual reproduction is perhaps the fusion of gametes. This process called syngamy results in the formation of a diploid zygote. The term fertilization is also often used for this process. The terms syngamy and fertilization are frequently used though, interchangeably.

However, it must be mentioned here that in some organisms like rotifers, honeybees and even some lizards and birds (turkey), the female gamete undergoes development to form new organisms without fertilization. This phenomenon is called parthenogenesis. In most aquatic organisms, such as most algae and fishes as well as amphibians, syngamy occurs in the external medium (water), that is, outside the body of the organism. This type of gametic fusion is called external fertilization. Organisms exhibiting external fertilization show great synchrony between the sexes and release a large number of gametes into the surrounding medium (water) in order to enhance the changes of syngamy. This happens in the bony fishes and frogs where a large number of offspring are produced major disadvantage is that the offspring are extremely vulnerable to predators threatening their survival up to adulthood.

In many terrestrial organisms, belonging to fungi, higher animals such as reptiles, birds, mammals and in a majority of plants (bryophytes, pteridophytes, gymnosperms and angiosperms), syngamy occurs inside the body of the organism, hence the process is called internal fertilization. In all these organisms, egg is formed inside the female body where they fuse with the male gamete. In organisms exhibiting internal fertilization, the male gamete is motile and has to reach the egg in order to fuse with it. In these even though the number of sperms produced is very large, there is a significant reduction in the number of eggs produced. In seed plants, however, the non-motile male gametes are carried to female gamete by pollen tubes.

**c. Post-Fertilization**

Events in sexual reproduction after the formation of zygote are called post-fertilization events.

**The Zygote**

Formation of the diploid zygote is universal in all sexually reproducing organisms. In organisms with external fertilization, zygote is formed in the external medium (usually water), whereas in those exhibiting internal fertilization, zygote is formed inside the body of the organism. Further development of the zygote depends on the type of life cycle the organism has and the environment is exposed to. In organisms belonging to fungi and algae, zygote develops a thick wall that is resistant to desiccation and damage. It undergoes a period of rest before germination.in organisms with haplontic life cycle, zygote divides by meiosis to form haploid spores that grow into haploid individuals. Zygote is the vital link that ensures continuity of species between organisms of one generation and the next. Every sexually reproducing organism, including human beings begin life as a single cell the zygote.

**Embryogenesis**

Embryogenesis refers to the process of development of embryo from the zygote. During embryogenesis, zygote undergoes cell division (mitosis)s and cell differentiation. While cell divisions increase the number of cells in the developing embryo; cell differentiation helps groups of cells to undergo certain modifications to form specialized tissue and organs to form an organism. Animals are categorized into oviparous and viviparous based on whether the development of the zygote take place outside the body of the female parent or inside, i.e., whether they lay fertilized/unfertilized eggs or give birth to young ones. In oviparous animals like reptiles and birds, the fertilized eggs covered by hard calcareous shell are laid in a safe place in the environment; after a period of incubation young one hatch out.

On the other hand, in viviparous animals (majority of mammals including human beings), the zygote develops into a young one inside the body of the female organism. After attaining a certain stage of growth, the young ones are delivered out of the body of the female organism. Because of proper embryonic care and protection, the chances of survival of young ones is greater in viviparous organisms.

## STAGES IN THE CREATION OF STRUCTURES OF THE DEVELOPING EMBRYO

***Stage 1:*** In the first stage of development following fertilization, is formation of the zygote. At this stage, the male and female pronucleus have not yet combined to form the single zygote nucleus. These are the nuclei from the spermatozoa (sperm) and oocyte (egg) and contain all the nuclear genetic material (chromosomes, DNA, genes). Two of the eggs polar bodies contain the excess DNA from the meiotic divisions of the egg. The zona pellucida forms a specialized thick extracellular matrix layer around both the developing conceptus for the first week. Mitochondria in the cytoplasm contain additional genes and in humans these mitochondrial genes are entirely derived from the oocyte, and originally the mother.

At this stage in vivo:
There would still be granulosa cells and spermatozoa attached to the zone pellucida.
The zygote floats freely within the uterine tube.
The cell is preparing for the first mitotic division.

***Stage 2:*** First cell mitotic divisions of the zygote forming initially 2 blastomere cells, these continue to divide to form the morula, a "berry", a solid mass of cell. Each cell is approximately the same size and about half the size of the original zygote. Both are still enclosed within the zone pellucida. Early mitosis represents a

unique embryonic cell cycle (M, S, M phases). With virtually no GI or G2 phases this results in a reduction in cytoplasmic volume of each daughter cell with each cell division. The morula then forms a cavity at about 4 days and is now described as a blastocyst.

***Stage 3:*** The free-floating blastocyst continues to divide and normally has the uterine body, still enclosed in the zona pellucida. The specialized extracellular matrix that is the zona pellucida, has been providing a protected environment for these early divisions and may also contribute to shaping the structure of the blastocyst. The zona pellucida was originally pierced by the fertilizing spermatozoa, and now has been stretched and has been slowly degrading by uterine and/or blastocyst secretions. The blastocyst then leaves (hatches) the zona pellucida. It is only after hatching that the blastocyst can now commence the next Carnegie stage by attachment to (adplanation) and then implantation into the uterine wall.

***Stage 4:*** Zona Pellucida, Trophoblast shell, inner cell mass, blastocoel: here, the attached blastocyst begin implantation into the maternal uterine lining epithelium and underlying stroma. All cells of the original fertilization are now referred to as the conceptus, this will include embryonic and extra embryonic tissues of the fetal membranes and placenta. When conceptus implantation completes, a coagulation plug is formed at the site of implantation and development will occur enclosed within the wall of the uterus. The process of attachment and implantation initiates the first localized transformation of the uterine endometrium into the decidua (maternal decidua). Process of decidualization (decidualization) eventually spreads throughout the entire uterine lining. Features: plantation and implantation commence, increase in hCG.

***Week 2*** Week 2 is about the implantation process and blastocyst differentiation. All the cells produced from the initial fertilization event are defined as the "conceptus" and will include cells with both embryonic and extraembryonic futures. In placenta animals, this is the first physical interaction between the conceptus and the maternal uterine wall with ad plantation and then complete implantation in the uterine wall. All development from this stage will occur completely within the wall of the uterus.

***Stage 5:*** The trophoblast cells (syncytiotrophoblast and cytotrophoblast) proliferate. Syncytiotrophoblast cells continue to invade the maternal endometrium and cytotrophoblast cells form clumps that will later form sites of chorionic villi formation. The maternal endometrium locally begins the decidual process and the endometrial stroma accumulates fluid (edematous). The extra-embryonic cavities begin to form. The bilaminar embryonic disc forms from the inner cell mass (embryoblast).

***Stage 6:*** The conceptus is at the two-layer stage (or bilaminar embryo) insisting of epiblast and hypoblast cell layers. Three extraembryonic spaces (amniotic cavity, primitive yolk sac and developing chorionic cavity) are present. The large chorionic cavity is surrounded by the trophoblast cell layers extending to form chorionic villi. These villi are the beginning of the functional units of the placenta. Outside of these villi, and externing from their tips, trophoblasts invade the maternal decidua forming maternal blood-filled Lacunae (lakes); emptying into these maternal lacunas are both uterine glands and spiral arteries held open by uterine wall continues to undergo expanding decidualization in response to the implantation process.

***Week 3*** During the third week of development conceptus implanting in the uterus wall is completed. Trophoblast cells continue to invade uterine wall in the process of early

placentation. Within the conceptus, gastrulation converts the bilaminar embryo into the trilaminar embryo. Morphological changes include an epithelial to mesenchymal cell transition and folding of the embryonic disc. Cavities (coeloms) form both outside and inside the embryo.

***Stage 7:*** Gastrulation is the continue cell migration from the epiblast layer, to form endoderm and then mesoderm, the trilaminar embryo. When all cells have migrated from the epiblast layer, the remaining cells from ectoderm. Mesoderm lies between the ectoderm and endoderm as a continues sheet except at the regions of the future buccopharyngeal and cloaca membranes. These membranes have ectoderm and endoderm only and will lie at the rostral (head) and caudal (tail) of the gastrointestinal tract. From the primitive node a tube extends under the ectoderm in the opposite direction to the primitive streak. This tube forms first the axial process then notochordal process, then finally the notochord. The notochord is a key to embryonic folding and regulation of ectoderm and mesoderm differentiation. It lies in the rostro-cordal axis and the embryonic disc will fold either side ventrally, pinching off a portion of the yolk sac to form the lining of the gastrointestinal tract.

***Stage 8:*** Gastrulation is continuing as cells migrate from the epiblast, continuing to form mesoderm. Embryonic disc, primitive node, primitive streak, primitive groove, connecting stalk, and amniotic membrane can be identified. Mesoderm lies between the ectoderm and endoderm as a continuous sheet except at the buccopharyngeal membrane and cloacal membrane. These membranes have ectoderm and endoderm only and will lie at the rostral (head) and caudal (tail) of the gastrointestinal tract. From the primitive node a tube extends under the ectoderm in the opposite direction to the primitive streak. This tube forms first the axial process then notochordal process, then finally the notochord.

The notochord is a key to embryonic folding and regulation of ectoderm and mesoderm differentiation. It lies in the rostrocordal axis, and the embryonic disc will fold either side ventrally, inching off a portion of the yolk sac to form the lining of the gastrointestinal tract.

***Stage 9:*** Events that happen in stage 9 are as follows:
Ectoderm –Neural plate brain region continues to expand, neural plate begins folding over the notochord. Gastrulation continues through the primitive streak region.

Mesoderm –paraxial mesoderm segmentation into somite pairs begins (1 – 3 somite pairs). Lateral plate mesoderm begins to vacuolated, dividing it into somatic and splanchnic mesoderm and to later form the intra-embryonic coelom. Prechordal splanchnic mesoderm begins to form the cardiogenic region, from which will form the notochord.

Endoderm is still widely open to the yolk sac and germ cells form part of this layer extra embryonic mesoderm on the yolk sac surface begins to form "blood islands". Neural groove and neural folds, the mesoderm, which segments beside the neural groove to form somites but extends laterally to margin of embryonic disc lateral plate mesoderm, where it merges with the covering extra embryonic mesoderm. The intra-embryonic coelom develops in the middle of the lateral plate mesoderm. Amniotic ectoderm is covered by extra emebryonic mesoderm (empty spaces above and below the mesoderm are artefacts as are the lateral folds in the ectoderm).

***Week 4*** The fourth week is the beginning of organogenesis. On the embryo surface sensory placodes (otic, optic and nasal) appear. Limb buds form from ectoderm and mesoderm (somite) components and are initially "paddle-like" projections from the trunk that will form all the upper and lower limb components.

***Stage 10:*** Features; Somite Number 4 – 12, rostral neuropore, neural folds in region of developing brain, neural tube, somites caudal neuropore, neural fold fuses, remnant of amniotic sac.
Ectoderm: Neural fold deepens, edges approach midline, neural fold fuses, neural plate folds ventrally in brain region:
Mesoderm: So mitogenesis, continued segmentation of paraxial mesoderm (4 – 12 somite pairs).

***Stage 11:*** Events are:
*Ectoderm:* Neural tube continues to close, rostral neuropore closes.
*Medoderm:* continued segmentation of paraxial mesoderm (12 – 20 somite pairs), heart tube bending.
*Features;* rostral neuropore closing, forebrain, neural tube in region of developing spinal cord, somites, caudal neuropore, connecting stalk, amnion

***Stage 12:*** Events:
*Ectoderm:* neural tube continues to close, caudal neuropore closes, forebrain
*Mesoderm:* continued segmentation of paraxial mesoderm (21-29 somite pairs), heart prominence.
*Head:* 1$^{st}$, 2$^{nd}$ and 3$^{rd}$ pharyngeal arch, forebrain, site of lens placode, site of optic placode stomodaeum
*Body:* heart, liver, umbilical, early upper limb bulge features
*Features:* day 26, 27 somites, forebrain, site of lens placode, site of optic placode, stomodeum, 1$^{st}$ pharyngeal arch, 2$^{nd}$ pharyngeal arch, 3$^{rd}$ pharyngeal arch, heart prominence, somite.

***Stage 13:*** Events:
*Ectoderm:* Neural tube continues to close, caudal neuropore closes, forebrain.
*Mesoderm:* continued segmentation of paraxial mesoderm (21-29 somite pairs), heart prominence.

*Head:* 1st, 2nd and 3rd pharyngeal arch, forebrain, site of lens placode, site of optic placode stomodaeum
*Body:* heart, liver, umbilical, early upper limb bulge features
*Features:* day 26, 27 somites, forebrain, site of lens placode, site of optic placode, stomodeum, 1st pharyngeal arch, 2nd pharyngeal arch, 3rd pharyngeal arch, heart prominence, somite.

***Week 5*** Organogenesis continues with cardiac, gastrointestinal tract and renal development. The limbs continue to grow and the structures that will eventually form the cerebral hemispheres appear, pharyngeal arches form components of the head and neck

***Stage 14:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal placode, primary/secondary vesicles fourth ventricle of brain,
*Mesoderm:* continued segmentation of paraxial mesoderm (more than 30 somite pairs), heart prominence
*Head:* 1st, 2nd and 3rd pharyngeal arch, forebrain, site of lens placode, site of optic placode stomodaeum
*Body:* heart, liver, umbilical cord, mesonephric ridge
*Limb:* upper and lower limb bud
Features midbrain, nasal placode, lens pit, 1,2,3 pharyngeal arches, fourth ventricle of brain, 1st pharyngeal groove, heart prominence cervical sinus,
Upper limb bud, mesonephric ridge, lower limb bud, umbilical cord.

***Stage 15:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal placode, primary/secondary vesicles fourth ventricle of brain,
*Mesoderm:* heart prominence
*Head:* Head: 1st, 2nd and 3rd pharyngeal arch, forebrain, site of lens placode, site of optic placode stomodaeum
*Body:* heart, liver, umbilical cord, mesonephric ridge

*Limb:* upper and lower limb bud, hand plate
*Features;* pharyngeal arches, limb buds, nasal pits fourth ventricle, somites

***Week 6*** Continued organogenesis and increase in size of existing organs. The encocrine organs begin to differentiate and the heart forms septa dividing the chambers and outflow tract the pharyngeal arches are lost as the face, head and neck differentiates. Limb "digital rays" appear as the first indicators of fingers and toes.

***Stage 16:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal pits moved ventrally, fourth ventricle of brain.
*Mesoderm:* heart prominence
*Head:* 1st, 2nd and 3rd pharyngeal arch, forebrain, eye, auricular hillocks.
*Body:* heart, liver, umbilical cord, mesonephric ridge.
*Limb:* upper and lower limb buds, hand plate, developing arm.
*Features;* Eye showing retinal pigment, nasolacrimal groove, nasal pit, fourth ventricle of brain, umbilical cord, 1st and 2nd pharyngeal arches, cervical sinus, heart, developing arm with hand plate, foot plate.

***Stage 17:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal pits moved ventrally, fouth ventricle of brain.
*Mesoderm:* heart prominence
*Head:* 1st, 2nd and 3rd pharyngeal arch, forebrain, eye, auricular hillocks.
*Body:* heart, liver, umbilical cord, mesonephric ridge.
*Limb:* upper and lower limb buds, hand digital rays
*Features;* pigmented eye, nasal pit, nasolacrimal groove, external auditory meatus, auricular hillock, heart, digital rays, liver prominence, thigh, ancle foot plate, umblilical cord.

***Week 6*** Face developing with eye and external ear appearing. Limb bone formation commences and digital rays are visible in both the upper and lower limbs. In the skin the dermis begins to thicken.

***Stage 18:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal pits moved ventrally, fouth ventricle of brain.
*Mesoderm:* heart prominence
*Head:* 1st, 2nd and 3rd pharyngeal arch, forebrain, eye, auricular hillocks
*Body:* heart, liver, umbilical cord
*Limb:* upper and lower limb buds, foot plate, wrist, hand plate with digital
Rays features upper limb digital rays, scalp vascular plexus, developing eye, remodeling of pharyngeal arches.

***Stage 19 :*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal pits moved ventrally, fourth ventricle of brain.
*Mesoderm:* heart prominence, ossification continues.
*Head:* forebrain, eye, external acoustic meatus.
*Body:* straightening of trunk, heart, liver, umbilical cord.
*Features:* eyelid, eye, external acoustic meatus, auricle of external ear, digital ray, wrist, liver prominence.

***Week 8*** The final week of embryonic development characterized by Carnegie stage 20 to 23. Limb rotation occurs moving them into their anatomical location. Gonad development occurs and the body begins to lengthen and straighten. After this period human development is then referred to as fetal.

***Stage 20:*** Events:
*Ectoderm:* sensory placodes, lens pit, otocyst, nasal pits moved ventrally, fourth ventricle of brain.
*Mesoderm:* heart prominence, ossification continues.
*Head:* forebrain, eye, external acoustic meatus.
*Features:* scalp vascular plexus, eyelid, eye, nose, external acoustic meatus, auricle of external ear, arm, elbow, wrist, liver prominence, digital rays.

***Stage 21:*** Events:
*Ectoderm:* sensory placodes, nasal pit moved ventrally, fourth ventricle of brain.
*Mesoderm:* heart prominence, ossification continues.
*Head:* nose, eye, external acoustic meatus
*Body:* straightening of trunk, heart, liver, umbilical cord
*Limb:* upper limbs longer and bent at elbow, foot plate with digital rays begin to separate, wrist, hand plate with webbed digits.
*Features:* scalp vascular plexus, eyelid, eye, nose, auricle of external ear, arm, elbow, wrist, knee, notch between digital rays, umbilical cord.

***Stage 22:*** Events:
*Ectoderm:* neural tube proliferation, neural crest migration.
*Mesoderm:* heart prominence, ossification continues
*Head:* nose, eye, external acoustic meatus
*Body:* straightening of trunk, heart, liver umbilical cord
*Limb:* upper limbs longer and bent at elbow, foot plate with webbed digits, wrist, hand plate of with separated digits.
*Features:* external ear, eye with eyelids, upper limb full external anatomy, thickened dermis, midgut (intestines) herniated at umbilicus.

***Stage 23:*** Events:
*Ectoderm:* ongoing neural development
*Mesoderm:* ossification continues
*Head:* eyelid, external ears, rounded head.
*Body:* straightening of trunk, intestines herniated at umbilicus
*Limbs:* hands and feet turned inward
*Features:* scalp vascular plexus, eyelid, eye, nose, auricle of external ear, mouth, shoulder, arm, elbow, wrist, toes separated, sole of foot, umbilical cord.

**DYING**: is practically ending, it occurs in every living organism and can be classified in many ways, cell death, which has to do with shrinking of cells and degeneration of cell, deformity in structures, organs, collapsing of system and complete death of an organism.

Dying has links from the development of an embryo, formation of structures and some congenital abnormality which from abnormal development, these cells and structure when are not normally or correctly develop can result to cell death, organ failure or complete session of the brain cell which may result dying.

The study of abnormal development in embryos and the causes of congenital malformations or birth defects. These anatomical or structural abnormalities are present at birth although they may not be diagnosed until later in life. They may be visible on the surface of the body or internal to the viscera. Congenital malformations account for approximately 20% of deaths in the perinatal period. Approximately 3% of new-born infants will have major malformations and another 3% will have malformations detected later in life.

**TERATOGENS AND THEIR EFFECTS:**

This may result to cell death, organs, structure and system failure, this including:

1) Genetic factors, (chromosomal abnormalities as well as single gene defects);
2) Environmental factors (drugs, toxins, infectious etiologies, mechanical forces); and
3) Multifactorial etiologies including a combination of environmental and genetic factors malformations may be single or multiple and have major or minor clinical significance.

Single minor malformations are observed in approximately 14% of newborns. These malformations are usually of no clinical consequence and may include features such a simian crease or ear tags. Specific minor malformations suggest the possibility of an associated major malformation. For instance, the finding of a single umbilical artery should suggest the possibility of associated congenital heart problems. The grater the number of minor malformations, the greater the likelihood of an associated major malformation. The more severe and the greater the number of major malformations, the greater the likelihood of a spontaneous miscarriage or shortened life span.

Genetic etiologies of malformations Genetic factors are the most common causes of congenital malformations and account for approximately one fourth of all congenital malformations. Chromosomal abnormalities including numerical and structural abnormalities are a common cause of congenital malformations. Specific genetic syndromes are associated with the most common of these chromosomal defects. Trisomy 21 is referred to as Down syndrome and has associated characteristic facial features, congenital heart disease, growth retardation, and mental retardation. Monosomy of the X-chromosome is referred to as

turner syndrome and is associated with webbing of the neck, lymphedema of the hands and feet, and later in life short stature and infertility.

Trisomy 13 is associated with midline defects including cleft lip and cleft palate, central nervous system malformation, microphthalmia, and congenital heart disease. Infants with this disorder rarely live beyond the first year of life. Trisomy 18 is associated with intrauterine growth restriction, clenched hands, rocker bottom feet, and congenital heart disease. Like trisomy 13, infants with the syndrome also rarely live beyond the first year of life. Other chromosomal abnormalities including interstitial deletions, interstitial duplications, and unbalanced translocations are often associated with congenital anomalies. The most common deletions have named clinical syndromes with which they are associated. In addition to gross chromosomal abnormalities, there are multiple single gene defects that can result in congenital malformations.

Many of these genes include developmentally important transcription factors and genes important in intermediary metabolism. Teratogenic agents cause approximately 7% of congenital in malformations. A teratogenic agent is a chemical, infections agent, physical condition, or deficiently that on fetal exposure, can alter fetal morphology or subsequent function. Teratogenicity depends upon the ability of the agent to cross the placenta. Certain medications such as heparin cannot cross the placenta due to its high molecular weight and are therefore not teratogenic. The embryo is most susceptible to teratogenic agents during periods of rapid differentiation. The stage of development of the embryo determines susceptibility to teratogens.

The most critical period in the development of an embryo or in the growth of a particular organ is during the time of most rapid cell

division. The critical period for each organ. The critical period for brain growth and development is from three to 16 weeks. However, the brain's differentiation continues to extend into infancy. Teratogens can produce mental retardation during both embryonic and fetal periods, this process will always lead to death, either cell death or final death in living organism.

**MICRO ANATOMY:**

Microanatomy refers to the study of the structure and organization of tiny biological structures, such as cells tissues and organs, at a level that is not visible to the naked eye. It involves the use of specialized techniques like electron microscopy, confocal microscopy and other imaging methods to visualize and analyze these tiny structures.

Micro anatomy is essential for understanding various biological processes, such as:

1. Cellular interactions and communication
2. Tissue organization and development
3. Organ function and dysfunction
4. Disease mechanisms and diagnosis
5. Drug delivery and targeting.

Some examples of micro anatomical structures include:

1. Cell membranes and junctions
2. Cytospkeleton and cellular organelles
3. Tissue matrices and fibers
4. Capillaries and microvasculature
5. Neurons and neural connections.

Understanding micro anatomy has led to significant advances in fields like medicine, biotechnology, and biomedical engineering. It has also enabled researchers to develop new treatments and therapies for various diseases and conditions.

PCR MACHINE. The key Machine in Microanatomy and Genomics

PCR (Polymerase Chain Reaction) machines are not typically used in microanatomy, as microanatomy focuses on the study of tiny biological structures, whereas PCR is a molecular biology technique used for amplifying DNA sequences.
However, there is a connection between PCR and microanatomy:

1. Molecular analysis: PCR can be used to analyze the molecular composition of micro anatomical structures, such as identifying specific genes expressed in certain cells or tissues.

2. In situ hybridization: PCR can be combined with in situ hybridization to visualize specific DNA or RNA sequences within micro anatomical structures, allowing researchers to study gene expression and localization.

3. Micro dissection: PCR can be used in conjunction with micro dissection techniques to analyze specific micro anatomical regions or cells, enabling researchers to study tiny biological structures at the molecular level.

## MICROANATOMY IN NORMAL FUNCTIONS AND DISEASES

Microanatomy plays a crucial role in both normal functions and diseases. Here are some examples:

**Normal Functions:**

1. *Cell-cell interactions:* Microanatomical structures like tight junctions, gap junctions, and desmosomes enable cells to communicate, adhere, and coordinate functions.

2. *Tissue organization:* Microanatomy determines tissue architecture, allowing for proper functioning of organs like the liver, lungs, and kidneys.

3. *Neurotransmission:* Microanatomical features like synapses and neuronal processes facilitate communication between neurons.

4. *Blood flow and circulation:* Microanatomical structures like capillaries, arterioles, and venules regulate blood flow and pressure.

**Diseases:**

1. *Cancer:* Changes in microanatomical structures like cell adhesion molecules and tissue architecture contribute to tumor growth and metastasis.

2. *Neurodegenerative diseases:* Alterations in micro-anatomical features like synapses and neuronal processes are associated with conditions like Alzheimer's and Parkinson's.

3. *Cardiovascular diseases:* Micro anatomical changes in blood vessels, like atherosclerosis, can lead to heart disease and stroke.

4. *Infectious diseases:* Micro-anatomical structures like cilia and mucous membranes play a role in host-pathogen interactions and disease susceptibility.

5. *Inflammatory diseases:* Changes in micro-anatomical structures like blood vessels and lymphatic vessels contribute to inflammation and conditions like arthritis.

Understanding microanatomy is essential for:

1. *Diagnosis:* Identifying microanatomical changes can aid in disease diagnosis.

2. *Treatment:* Targeting specific microanatomical structures can lead to effective treatments.

3. *Research:* Studying microanatomy can reveal new insights into disease mechanisms and normal functions.

**MICROANATOMY AND DEATH**

Microanatomy plays a crucial role in understanding the mechanisms of death and disease. Alterations in microanatomical structures can lead to various pathologies, ultimately contributing to mortality. Some examples include:

- *Ischemic damage:* Reduced blood flow due to microanatomical changes in blood vessels can lead to tissue death and organ failure.

- *Cancer progression:* Changes in microanatomical structures like cell adhesion molecules and tissue architecture facilitate tumor growth and metastasis.

- *Neurodegeneration:* Alterations in microanatomical features like synapses and neuronal processes contribute to neurodegenerative diseases like Alzheimer's and Parkinson's.

- *Organ failure:* Micro anatomical changes in organs like the kidneys, liver, and lungs can lead to functional impairment and death.

Understanding microanatomy is essential for:

- Understanding disease mechanisms;
- Developing diagnostic and therapeutic strategies;
- Improving organ transplantation and regenerative medicine;
- Advancing forensic science and understanding mechanisms of death.

By exploring microanatomy, researchers and clinicians can gain valuable insights into the complex relationships between structure and function, ultimately leading to improved human health and understanding of the processes surrounding death.

While PCR machines are not directly used in micro anatomy, they can be a powerful tool in conjunction with other techniques to analyze and understand the molecular aspects of micro anatomical structures.

Anatomy is therefore the interplay of structures, functions, and diseases at the beginning of fertilization and when our dead bodies have become soulless and just bones without muscles.

## MY RESEARCH ACTIVITIES – ANATOMY OF EVERYTHING

From the foregoing, it is now clear that Anatomy has an independable place in the explanation of processes of creation and dying with of course the things that happen for human and non-human systems to be effective and integrative. There must be interrelationship, just little the way all the systems of the human body work and relate with each other, for ultimate functioning. Some of the works I am presenting here speak to the extent to which anatomy is our every part and everything.

My Chairman and Co-Chairman, I have a weakness. This is the weakness of when I am most happy in my life, specifically from the year 1979. My periods of happiness are:

1. When I am dissecting a dead body-because I see the wonder of creation and super arrangements of structures.
2. In the operation theatre where I will see the changes that have occurred to structures giving the symptoms and signs that brought the patient to the hospital in the first place.
3. When I am standing before my students to describe to them the structures of man that are responsible for the way we function and how they can explain every detail of sickness, living and dying.

But all these can only be done if adequate and proper research has been done or ongoing in order to justify all these to the glory of God.

I will therefore share with us a few of my research work including ongoing ones to give to us the indispensability of creation, normal structures, functions, diseases and ultimately be big one! That is death.

In symptom analysis, the importance of anatomy cannot be overemphasized. For example, in the diseases of the liver, pain is generally felt at the top of the right shoulder. The right phrenic nerve sends a branch to the liver. The third cervical nerve, from which the phrenic arises, sends numerous branches to the neighborhood of the shoulder; thus, is established a nervous communication between the shoulder and the liver. This is a fact which nothing, but anatomy could reach, and affords the explanation of a symptom which nothing but anatomy could give. This knowledge would infallibly correct a mistake into which a person, who is ignorant of it, would be sure to fall. In fact, persons ignorant of it do constantly commit fatal error. Disease of the liver has been known to be erroneously treated as rheumatism in the

shoulder, and this error may have been fatal to the patient, by giving to a fatal and insidious disease an opportunity of taking root in the system.

Persons are often attached with convulsions, especially children but these spasms are only symptoms denoting an important disease of the brain, where only the remedy is to be applied; and the ignorant practitioner who instead prescribes and administers spasmodic, not only loses the time in which the remedies to save life can be successfully employed but exacerbates the disease and accelerates its fatal termination.

Several research have been conducted on the importance of anatomy to clinical practice, knowledge of gross human anatomy was considered fundamental to be very relevant to daily clinical activities such as symptom evaluation and physical examination, imaging techniques interpretation or therapeutic procedures.

**Preliminary Immunization of Sheep Using Mucuna Pruriens Seed Protein against Snake Venom Poisoning**

The result of this work is consistent with the earlier reports on mice and rabbits. This result is promising and has potential benefits in view of the development of polyvalent anti-venom preparations to be used in active immunization of man and animals in areas of high snake bite incidence. The result of the study, therefore, suggests that immunotherapy is the choice for preventing complications due to snake bites. In Africa and Nigeria in particular, the cost of anti-venom is excessive and the only solution to cut cost is vaccination of man and animals against snake envenomation.

**Histomorphometric Profile of the Human Vermiform**

This analysis of the segmental profile of the vermiform appendix has provided histomorphometric changes in its structure capable of answering the age long question of whether disease associated with it are caused only by vascular phenomenon and luminal

intrusion of extra appendicular substances or because of the interplay of its structural configurations with other factors. This is so because of the noted strong expression of relationship between the observed parameters, more especially the ones existing between the lymphoid follicle diameter and the thickness on one hand and that between the luminal diameter and the lymphoid follicle diameter on the other. For example, the lumen decreases when either the thickness or more importantly the lymphoid follicle diameter increases in size suggesting that obstruction can occur at such sites with the resulting. Microscopic and macroscopic changes that come to bear on normal subjects.

The basis for further studies of the vermiform appendix has been established from this study especially in the areas of comparative histomorphometry and finding the effects of hyper cholesterol diet on the lymphoid follicle. Because other variables like the vascular pattern of the appendix, the various positions seen in our local areas both for the living surgical patients and dead are being looked at more than these parameters.

This study will also give a basis for caution especially when teaching students the basis for and occurrence of appendicitis and its related sequelae in clinical medicine. For those interested in appendix transplantation and endoscopic studies of the appendix, these are the results for guidance and future manipulations.

**The Effects of Physical and Oxidative Stress on The Ovary of The Female Wister Rat**

The nature of the insulting induced stress seems to be the paramount factor in the causation of the cellular, hematological and chemical changes.

The ovaries of unilaterally enucleated and bilaterally enucleated groups showed absence of primary oocyte in the Graafian follicle. Overall, there are various stages of ovarian tissue' development

with general increase in the vascularity of these organs which supports Espey's findings of 1980. This may be as a result of cellular immaturity. Oxidative stress induced by alcohol consumption, caused some cellular effects on the fallopian tube mucosa of the female Wister rat but the physical stress of nucleation did not cause any visible effect.

Statistical analysis of the diameters of the uterus showed significant differences between the groups at 5% and correlation between the control and the alcohol treated and bilaterally enucleated groups. The alcohol treated group showed thick endometrial mucosa with some enucleated cells and evidence of hyperplasia and hypertrophy, glandular cells are quite prominent with some of them showing evidence of loss of nuclei. The myometrial muscular fibres and cells show some degree of hypertrophy compared to the normal. These changes were responsible for the differences noticed in the diameters of uterus (increased mucosal thickness, reduced luminal diameter and increased in the overall thickness of the uterus).

These results are also consistent with corresponding rise in the blood cortisol level and increase in the percentages of neutrophils and eosinophils especially in the alcohol treated group because of the sustained stressful condition.

The various findings of this work have also shown no significant difference in the group weights and lengths measured of the organs of both the treated and the experimental rats. This may however not be the case in very chronic exposure.

**Bicornuate Uterus-A Case Report and Literature Review**

This anatomical delight is presented because unlike most cases of abnormal uteruses presenting with either primary or secondary infertility, this was not so. Even the pelvic ultrasound did not pick this abnormality. From her past medical history, also of interest in this case was the position of the uterus at surgery. Instead of the

usual shaped structure positioned from left to right in the pelvis, the two abnormal parts were placed anterior-posterior which ultrasonography might have been responsible for the normal appearance on. She carried three pregnancies to term, although she had caesarean delivery but due to toxaemia of pregnancy.

Again, this abnormality was not discovered during this surgery (probably because of the emergency nature of the operation). Finally, because of all these finding and the rarity of this condition among other uterine abnormalities, we are reporting this case which we believe is a delight to the anatomists but quite often a dilemma to the obstetrician and gynecologist especially in the management of such cases that present with fertility or pregnancy related problems.

**Attitude of Jos University Medical Students to their Initial Encounter with Cadavers in the Dissecting Room**

This study found that anxiety, fear, and stress are being experienced by medical students during their first encounter with a cadaver in the dissecting room. It is, therefore, very important that medical educators bring up new ideas/strategies to reduce such problems in the dissecting room. Further studies, especially in other regions of the country, are highly recommended to possibly replicate the findings in this study.

The student-cadaver-patient encounter is more important than any other thing in the medical profession because it gives a better appreciation of the three dimensional anatomy.

**Acute Appendicitis in Situs Inversus-A Case Report**

Situs inversus totalis is a rare condition and presents in diverse ways thus diagnosis may be missed, and the patient wrongly managed. A high index of clinical suspicion is required if diagnosis is to be made early and wrong treatment avoided.

**Effects of Mobile Phone Radiation on Biological Tissues: A Review Article**

Although it has not yet been established beyond reasonable doubt and in all quarters that mobile phone radiations are harmful to health, users of mobile phones are hereby enjoined to consider ways of reducing exposure by adhering to precautionary measures which will guide against any possible future harmful effect that may accumulate with time.

**The Effect of Aqueous Extract of Garcinia Kola Seed on the Liver Histology**

It may be inferred from the present study that even at higher dosage (500mg/kg) Garcinia kola did not cause significant degenerative or trophic changes in the liver cells. The hepatic lobules which are polyhedral three dimensional in shape were preserved. The actual mechanism by which Garcinia kola performs their functions is still unknown but may be due to their high bioflavonoids content. Bioflavonoids, alkaloids and tannins have been associated with anti-microbial effects in various studies using the plant extracts. In Garcinia kola flavonoid has been screened to have antioxidant property. This antioxidant which is expected to be active in the flavonoid isolated from the Garcinia kola seed extract may have acted on the liver tissue by scavenging natural free radicals which involves the donation of electrons.

**Sonographic Gallbladder Wall Thickness in Normal Adult Population in Nigeria**

Ultrasound technology can be used to reliably measure the thickness of the gallbladder wall, as was attested to by this study. In addition, this study enabled the establishing of a population-based US gallbladder wall thickness so that a gallbladder wall >3mm thick will suggest an abnormality in most patients, whereas a thickness <3mm will suggest normalcy but cannot be used to rule out gallbladder diseases.

Statistically significant differences between gallbladder wall thickness and height and weight of each sex have been established by the study. The established nomogram can be used as both a complementary modality in clinical evaluation as well as a more sensitive means of evaluating patients for gallbladder disorder.

**The Anatomical Perspective of Memory: A review Article**

We are what we are not only because we think but also because we can remember what we have thought about. Every thought we have, very word we speak, every action we engage in-indeed, our very sense of self and our sense of connectedness to others-we owe to our memory, to the ability of our brains to record and to store our experiences. Memory is the glue that binds our mental life, the scaffolding that holds our personal history and that makes it possible to grow and change throughout life; Larry R. Squire and Eric R. Kandel (Memory: from Mind to Molecules, 1999).

**The Brain and Ageing**

Ageing is a consequence as it is a subsequence. It is propagated by a predetermined genetic predisposition. It is natural and physiologic. However, it can be influenced by external and non-physiologic factors. Ageing is characterized by a reduction in otherwise physiological manifestations as responses to stimuli. However, impairment occurs due to an otherwise harmful interference or association of external factors in the form of disease states, drugs or others.

In the brain, ageing occurs due to a reduction in the number of neurons, which is due to a decrease in neurogenesis. Usually, there is no associated impairment of function, although there is a general decrease in function as a result.

Brain ageing is characterized by structural, chemical and functional changes which include, but are not limited to, decreased brain weight and volume, decreased number of

neuronal circuitry and connections, increased ventricular volume, increased neurotic plaques, decrease in synthesis and uptake mechanisms of neurotransmitters, increased accumulation of iron.

The non-physiologic brain ageing which results in acutely or chronically impaired brain function, whether or organic origin or functional origin, characterizes dementia. Such impaired brain function affects memory, thinking, orientation, comprehension, and calculation, analysis, learning capacity, language and judgment. Consciousness is not affected. These are commonly associated with deterioration in emotional control, social behavior, or motivation. These manifestations are such that there is an interference with or obstruction of daily life and living, as opposed to an otherwise normal ageing process. Alzheimer's disease causes this. Also implicated include Parkinson's disease, Huntington's disease, Lewy body dementia, frontotemporal dementia, normal pressure hydrocephalus, Creutzfeldt-Jakob disease, head injuries and their sequelae, alcoholism and the abuse of psychoactive substances and drugs, side effects of some drugs, vitamin deficiencies (E.g., B12), cerebral palsy etc.

Brain function impairment occurs through various pathways and mechanisms and manifest in various ways which allow them to be distinguishable, the one from the other, whether to aid research or to aid clinical diagnosis on toward acceptable management.

In a world with an increasing aged population, looking at ageing and how it affects the brain in order to work towards healthy ageing becomes quite expedient indeed.

**Contraceptive effect of Lawsonia Innermis (Henna) in the Amo Women of Jengre, Bassa Local Government Area, Plateau State using the albino rats as experimental animals**

The results obtained from this research agree with the claim by some herbalists that Lawsonia Innermis (Lalle) has antifertility

properties. And some of the effect could not be fully investigated and understood within the scope and limitation of the work.

**A study of the Inner and Outer Intercanthal Distances Among the Bura Ethnic Group of Northeastern Nigeria**

This study in a minute way has established standards for the inner and outer intercanthal distances in the Buras, demonstrated the anthropometric variation of the studied parameters with age and showed that there is significant sexual dimorphism with higher mean values in males.

These findings would be of benefit in the diagnosis of craniofacial syndromes associated with hyper/hypotelorism, management of posttraumatic cranial and orbitofacial deformities in the manufacture of spectacle frames and lenses and as a guide for dentists in selecting denture teeth.

**The Interpupillary Distance and the Inner and Outer Interdental Distances**

This review in a minute way has demonstrated that genetics, environmental factors, sex and age are responsible for the variation in the considered parameters. Therefore, when making clinical determination of ocular hypo-or hypertelorism in some craniofacial malformations and various syndromes, it should not be enough to rely on impression on physical features on the face only but to consider standards already established for each race, ethnic group, sex and age of the patient.

The review also intends to familiarize the science community with the reviewed subject matter and the paucity of data in same, so as to stimulate interest for further research. It is therefore recommended that more studies be carried out among the numerous other ethnic groups as races so that national and international standards can be documented.

**Leptin hormone in Health and Disease: Overview**

Leptin contributes to the regulation of energy homeostasis, neuro endocrine function, metabolism, immune function, and bone metabolism. Leptin may be that metabolic elixir that can revolutionize our understanding of metabolism and diseases associated with its dysfunction.

**Hematological Profiles in Apparently Healthy Blacksmiths in Maiduguri Metropolis**

The study has demonstrated that Nigerian black-smiths are exposed to many occupational health hazards associated with chronic pollution from burning charcoal, resulting in chronic inhalation of soot, smoke, carbon-monoxide and metal fumes. These results are like those obtained from other studies in individuals chemically exposed to diverse environmental pollutants (Kraishna, 1986; Bukar, 1993).

The haematological parameters of the blacksmiths were significantly lower than the control group. As quoted earlier from Ukaejiofor et al, 1979; Ezeilo, 1978, Enyikwola and Goshal, 1998, that the erythrocytes values obtained in this study were within the African ranges, this further underlines the need to establish local reference values for diagnosis of haemotological disorder in African (Enyikwola and Goshal 1998) instead of total reliance on Caucasian values.

**Orbital Measurements among the Ethnic Groups of Plateau State, Nigeria**

In Kano among the Hausa/Fulani, Taura 2002. In other studies, carried out elsewhere among the whites and black Americans Barreto and Mathog 1999, the values for blacks for these parameters were found to be higher than the values for the whites and they concluded that ethnic background should be considered when evaluating orbital and facial anatomy.

**Parents-adolescents Communication and HIV/AIDS in Jos North Local Government Area, Plateau State, Nigeria**

This study showed positive parental affection and very low level of interaction between parents and early adolescents (even though most of them were brought up with their parents) on HIV/AIDS. One important factor noted for the communication barrier between these two groups was the inadequacy of knowledge on the part of the parents.

**Cardiothoracic ratio of non-hypertensive patients at Jos University Teaching Hospital (JUTH)**

From the study 126 patients (73 males and 53 females) had their CTR measured and there was no significant difference between the CTR of males and females p 0.115 > 0.05. The mean heart diameter is 13.3849, mean thoracic diameter 28.9357 and mean CTR 0.4622.

**Handedness and Footedness in Footballers in Jos, Nigeria**

There is no significant difference in the degree of crossed lateral preference demonstrated by the left-handed or right-handed footballers and left handedness is significantly higher among the male siblings of the left handed footballers. Although non-right handedness is associated with many unpleasant things it has some advantages. Being right handedness or non-right-handed should not be considered as good or bad, but rather simply different (Gershwin and Galaburda, 1985).

**Histomorphologic and Histomorphormetric changes of the Fallopian Tube of the Female Wistar Rat Following Induced Physical and Oxidative Stress**

Oxidative stress induced by alcohol consumption, caused some cellular effects on the Fallopian Tube mucosa of the female Wister rate but the physical stress of enucleation did not cause any visible effect.

The findings of this work have also shown no significant difference in the gross weights of the rats and lengths of the fallopian tubes of both the treated and the experimental rats. This may however not be the case in very chronic exposure.

**Knowledge, Attitude and Counselling of HIV/AIDS among Nigerian Muslim Women in Jos, North Central Nigeria**

Muslims have fair knowledge of HIV/AIDS as any other set of people. Their attitude towards the scourge is also encouraging, but confidentiality as practiced in VCT cannot be applied to Muslims because of the polygamous nature of their married life. It is therefore recommended that VCT among Muslims should be modified, and further study should be carried out in other Muslim settings to ascertain this.

**Relationship between Foot Length, Foot Breadth, Ball Girth, Height and Weight of School Children Aged 3-5 Years Old**

From this study, it is observed that the relationship between foot length, foot breadth, ball girth, eight, and weight of 200 school children aged. 3-5 years old of the University of Jos primary school had statistically significant relationship of both genders to all the parameters studies except the ball girth which showed no significant relationship.

The males had increased values in all the parameters of study, which can be due to the weak ligamentous structure in the females' feet which results in the collages of the longitudinal arch during weight bearing as reported by Henning (2001).

It can also be concluded that foot length, foot breadth, and ball girth can be regarded as three separate elements, which are to be precisely known for optimal manufacturing of shoe lasts while height and weight are useful in the estimation of developmental status in children.

**The Effects of Induced Physical and Oxidative Stress on the Cortisol Levels of Female Wister Rat**

From the various works done on the hormonal and chemical changes following various forms of induced stress (1,5.6), there is usually accompanying increases in these parameters. The increased cortisol levels might affect other physiological functions. It is such an important hormone in the body, secreted by the adrenal grands and involved in glucose metabolism, regulation of blood pressure, insulin release, immune function and inflammatory response.

Combinations of various stressful conditions or indeed the administration of pure cortisol might cause undesirable effects especially to the organs of the female reproductive system. (7). The results of this study showed that stressful conditions can cause increase in blood cortisol levels. We intend to in a follow up study look at the Histomorphologic changes caused by this increase in cortisol levels on the ovary, Fallopian tube and the uterus. It can also be used for further studies involving not only the combination of stressful conditions but also the measurement of serial levels and changes of cortisol and other hormones like progesterone, estrogen and glucocorticoids. We shall also use the studies involving other forms of stress to find out how effective anti-stress and antioxidants like vitamin c are in reversing Histomorphologic changes. The nature of the insulting induced stress seems to be the paramount factor in the causation of the changes in cortisol level Alcohol as an oxidative stressor in this study has caused significant changes in the levels of cortisol compared to the two forms of physical stress.

**Discriminant Function Analysis as a Proof for Sexual Dimorphism among the Yoruba Ethnic Group of Nigeria: A Cephalometry Study**

This shows that the Multivariate analysis that involve all the eight parameters showed that the result of stepwise analysis that

chooses only four parameters (Head length, Head width Bizygomatic distance and Nose width) gave the highest percentage accuracy of 91.10%. his compares well with others studies (6,7). Our study also showed that these cephalometric parameters are sexually dimorphic and therefore could be used in sex determination especially in crime scenes where the body is mutilated but the head is left intact. The functions derived in this study are specific to only Yoruba population who are the second most populous ethnic group in Nigeria and are also found in some West African countries.

**Giant Ovarian cyst masquerading as "Retained Second Twin" A case Report**

Giant Ovarian cyst is a rare tumour of the ovary presenting with a diameter greater than 10cm. it is uncommon in the developed world. This study is the first documented reported case in North-Central Nigeria and the largest suspicion, and a simple ultrasound scan is needed to make an informed diagnosis. We hope to draw the attention of the government Anatomy is therefore the interplay of structures, functions, and diseases at the beginning of fertilization and when our dead bodies have become soulless and just bones without muscles to channel some of its resources in provision of common diagnostic tools such as a portable ultrasound machine to rural communities and less privileged sub-urban neighborhood in Africa and Nigeria, to save the life of women and their newborns. Since, "every life matter".

**Tuberculosis of the Testis: A Case Report**

Although it is a very rare disease, the clinician should consider tuberculosis of the testis as a possible differential of a scrotal mass. This will increase the possibility of early diagnosis as well as proper and early management.

Anatomy can therefore be likened to jack of all trades, master of all (Medical Profession) i.e., to say Anatomy, is the master of all the

medical professions. From basic medical, basic Clinical, Clinical dentistry and indeed Allied Health Sciences of the Health Sciences/Health Technology (my Vice Chancellors, I am happy, this is an inaugural Lecture where none of these colleagues can ask me any question today!!!

## CURRENT AND FUTURE RESEARCH WORKS

1. Mode of branching of appendicular artery: This is ongoing research that started six years ago in Abnira Medical Centre Jos, Nasiha Clinic Jos, Kwandare Comprehensive Health Centre. This is to better minimal access surgery of appendicitis.

2. The Genetics of Benign Prostatic Hyperplasia (BPH): About to be started.

3. The Ethnic Variation in pain, perception and treatment: Where we are currently trying to determine dosages of narcotic analgesics among the various tribes residing in Jos Metropolis (Individualized Medicine (IM)).

4. The central nervous system effect of Akuskura herb

## CONCLUSION

Mr. Chairman and Co-Chairman, in conclusion, I will just say this; that between creation and dying, there are structures and functions. They can be normal, abnormal or even congenital, but I need to add these.

All these works have shown us the roles of normal structure, the normal function that leads to healthy being. The absence of these normalcies will lead to disease states. The severity of the disease will therefore depend on the state or states of the human structure

(either congenital/genetic or acquired). Maintenance of the normal structure is vital in order for the being (in this case, human) to function well and live without diseases.

The interplay between creation, dying, structures, functions, and diseases is a testament to the awe-inspiring complexity of life. As we navigate the journey between birth and death, we are reminded that every moment is precious, every breath a gift, and every life a unique creation worthy of wonder and respect, so maintain normal structures freely given to you by God in order to function well without diseases.

Anatomy remains the bedrock of medicine, and its firm understanding ensures a safe life and rational for medical practice.

Chairman and Co-Chairman Sirs, Ladies and Gentlemen, our esteemed guests, and students. When we remember where God brought us from, we will stop doubting where He can take us to, so, nobody in his/her right senses, will for even a second distance his/her life from the details and gists of structures and functions as I have just done. This is because structures, functions, and diseases do not live in isolation. For completeness of life and wellbeing of the humans, they must co-exist! (Sounds funny or wicked?). This must be our disposition in trying to solve the myriad of problems/issues in the whole world of medicine. This is my sole reason of embarking on this journey of normal structures and functions, abnormal structures and functions, and abnormal events for solving of human medical problems. You can see the contribution of Anatomy to medicine and indeed living, which is foundational, structural, and functional. I can confidently say, with anatomy, there is no failure of biological and medical sciences.

## RECOMMENDATIONS

1. The Medical and Dental Council of Nigeria (MDCN) in collaboration with Nigerian Universities Commission should make a basic degree in anatomy a foundational requirement for reading medicine and dentistry.

2. The Professional Association of Anatomy, Basic Medical Science, Basic Clinical Sciences, Allied Health Sciences, Health Technology and Dentistry should endeavor to make anatomy education in future to be doubled or tripled subject facilitations apart from the bedside ward round or what we call clinical demonstration so that our students are wholistically trained in all the component parts of living (i.e., creation, structures, functions and dying).

3. The regulatory bodies and various postgraduate professional establishments must and should under the deliberate actions of all governmental levels do everything within the ambit of the law irrespective of the various specialties to provide a standard workable framework for the betterment of excellent Health Community for improved health care delivery to the glory of God.

4. Translational Anatomy (Structure, function and disease) should be in the forefront of Medical Research. This is one of the various ways, we can mitigate the agonies of many diseases (both acquired and congenital) and of course infectious and non-infectious diseases like hypertension, diabetes Asthma, Cancer etc. etc. We must therefore initiate and welcome innovative ideas in this regard towards greater understanding of diseases.

5. Yes, we are in the era of Technology (which we have seen with Anatomage and PCS), but with the advent of AI, a lot of things will be affected even in divine situation like creation, and of course structures, functions and diseases. We must however not forget the empathy and consciousness that the human possesses in dealing with these compared to the soulless AI. We must therefore employ it in the field of medicine with the caution and ethics it deserves.

6. I encourage me and indeed all of us here to imbibe and practice the culture of whole-body donation for the purposes of teaching and research. The Government can facilitate this by making appropriate legislation.

7. The anatomy act should be further subjected for interrogation by all the fields of medicine, the legal system and cultural consideration for eventual passage of it and signing. I must add here that we are not opposed to decent burial.

8. FULafia should create a department of Biomedical Engineering where the biologists, nutritionists, engineers, technologists and AI specials will have an institutional hub for both training ans service.

Let me say this in a lighter but instructive mood. The Lawyer says it is legal to be his/her friend/lover, the Agriculturist says you will not be hungry if you are his/her friend/lover, the students and Alumni of Maiduguri say they are made in Unimaid, those of ABU Zaria say they are ahead of us, while the Medical Doctor insists that you will be healthy if you associate with him **BUT I DARE SAY TODAY THAT IF YOU ARE APPRECIATIVE OF YOUR CREATION, STRUCTURES AND FUNCTIONS, DISEASE PROCESSES AND DEATH, THEN LOOK FOR AND HAVE A MEDICAL ANATOMIST AS A FRIEND.**

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## APPRECIATION

### ALLAH, SWT.

My Chairman and Co Chairman, I can't thank Allah S.W.T, the Creator of the Heaven and Earth enough. In fact, many of us here can never thank the Creator enough for wonderfully structuring us to function normally and without disease till death comes.

***My Parents***

Permit me to thank my late father Alhaji Is'haq Shugaba in a special way. My dear father, I am quite sure you remember when I used to tell you that one day, I will treat you of all disease the way you used to carry me from dispensary to dispensary and as a councilor, brought health workers to our house to give us those painful injections. I am here today on this occasion without you telling the world the undisputable story of my scholarship painfully without you (permanently for that matter) if parenthood was anybody's weakest point, then that person is the strongest. Father, you were that person, that was why you were fantastically strong and wholistically fatherly. Steve. Jobs said, “your time on earth is limited, don't waste it living someone else's life” Ladies and gentlemen, my father knew this very well and therefore, lived it without bothering about someone else's life except and I repeat except bothering about humanity. Thank you for including us in this humanity.

Again, Martin Luther King said “We must learn to live together as brothers or else we would perish like fools” you made sure you taught us the act of living together that is why I have continued to live with all manners of human beings. Thank you, daddy.

Muhammad Ali, the great on the other hand said “Don't count the days but make the days count” this, I have been doing because of you. I will by the special grace of God, continue to do that as long as my body structures continue to function.

Just like Albert Einstein said, “I am thankful to all those who said no to me because of them, I did it myself”. Father, you said no to me on several occasions. Those nos made me whom I am today.

Father you were my best teacher and last mistake. Yes, if death was my father's last teacher then this is indeed my best mistake that kept me going. My father, my friend, my brother, my living model, you were created and came from Allah (SWT), contributed to my birth, lived with me and instead of waiting to witness this day, diseases of age, from your aging structures and functions took away after spending only some 80 plus years; truly every living mortal will surely taste death. Adieu father.

To my mother, Hajiya Ramatu Umar who is still living no words (or even all the words of this world) can express my gratitude and loyalty to you.

***My Children***

My Children, Dr. Abdulwarith and Barristers Vinitha and Ummi, Eng, Faiz, Abdussamad, Ahmad, Khalil, Hadiza Abdulwarith, Vinitha Abdulwarith (grandchild) and Officer Abdullahi, please continue to be my friends and live with everybody like your political grandfather.

***My Wives***

My Wives, fantastic and divinely supportive souls. Dr Mary Mathew, my love and headmaster of the house. Hajiya Halima Abdullahi Usman, my Princess, late Associate Professor, Dr. Zuwaira Adamu Garkuwa, and the baby of the house, Nawar Aliyu Tilde. May the Almighty Allah continue to bless, protect and guide you. I am also looking forward to the days of your Inaugural Lectures or validatory Lectures.

***My Siblings***

My Siblings the dead and the living Zainab Abubakar, Muhammad Maishayi, Isa, Azimi, Zainab Awayi, Abdullahi, Hulera, Fatima, Sa'adatu, Hajara, Muhammad Alhaji, Ahmad, Khadija, Rabiatu, Abba, Muhammad Danlami, Kalthume, and, and Barrister Shehu Shugaba. Thank you, thank you, and thank you.

***Special***

V-C University of Jos; immediate Past V-C of FULafia, Professor Sanusi Liman; the present V-C, FULafia, Professor Shehu Abdul Rahman; Prof. Munzali Jibril, the immediate past Pro-Chancellor and Chairman of Council of FULafia; Emir of Lafia, HRH, Justice Sidi Bage Muhammad1, (*JSC Rtd*); Aren Eggon, HRH, Justice Ahmed Alaku Ubangari (Rtd); the Oriye Rindre, HRH, Justice Lawal Musa Nagogo (Rtd), The Ohimege Opanda, HRH, Alhaji Usman Abdullahi; the Osana of Keana; the Sangarin Shabu; the Andoma of Doma; the Emir of Nasarawa, HRH, Alhaji Ibrahim Usman Jibrin; Barrister Danladi Umar Halilu Envuluanza; Maisudan of Lafia, Alhaji Makama Dunama.

To my special students, friends, wonderful colleagues I cannot thank you enough. They include Drs Salihu Aminu, Salihu Mohammed Ozegya, Ahmed Mohammed Rabiu, Yohanna Usman, Mohammed Bello, Hassan Majority, Cecelia Edeh, Adis Mohammed, Gaza S. Gaza, Rabiu Kuku, Abdul Longwap, Ikrama Hassan, Faisal Shuaib, and Professors Ahmed Ashuku, Shuaibu Hudu, Ishaku Bako Ara, Junaid Siraj, Sheikh Khalid, Abu Abdissamad, Muhammad Sulaiman Abu Sulaiman and late MBT Umar.

***Other friends and associates:***

Late Professor Singh, late Jibrin Ahmed, General Ibrahim Dogara (rtd) and family, Air-Vice Marshal I. A Balogun (rtd), Hon. Peter Vwang, Ben Aboje (Oche Idoma of Nasarawa), Late Ali Dikwa,

Dr. Aliyu Tilde, Alhaji Baba Kwalkwala, Kamaluddeen Garba, Alhaji Saluhu Angulu, Safiya Ali Dikwa, Auwal (Bana), Aisha Ali Dikwa, Emir of Wase (Dr. Haruna), late Professor Charity Anzayi, Professor Viola Onwuliri, Professor Barnabas Mandong, Professor S. J. Yiltok, Professor Nuhu Dakum, Professor Christiana Okoli, Professor Edith Okeke, Professor Patrick Daru, Monica Bala and all staff of ABNIRA Medical Centre Jos, late Peter, late Mohammed Galadima, late Larai Gomwalk, Bilya (Bilyan Daji), Mr John Ben and family, late Bulus, late Sheikh Ismaila Idris Zakariya, late Sheikh Alhassan Saeed, Late Sheikh Bawa Mai Shinkafa, Musa Abubakar MAMSER, Barrister Auwal (Kinmalo), Professor Mariam Solomon.

To my sister and brothers in the management team of FULafia; Professors Aleruchu and Dakyes, Mallam Nuradeen, Dr Wilson Anjola and Professor Abiodun Iyoro, I say thank you.

The Inaugural Lecture Committee is just marvelous under the motherly and insisting chairmanship of Professor Josephine Odey; the friend of the senior friend and of the Archbishop.

To the staff of the office of DVC Administration and VC especially, Dr Musa Bashir Agbawu, Bashir Ozomata, Haruna Angulu, the Amina's, Abdul-Aziz Yusuf, Ibrahim Shuaibu, Ibrahim I. Galadima, Rabiu A. Maikasuwa, Ugboloke Chioma M., Maza Ngode (Corp member), Musa Abdulhamid, Abdulrazak Bala.

To the University Information and Protocol Unit, I say continue the good work of projecting the positive and futuristic image of FULafia, well-done Abubakar, Auta, Alaga and Co.

My longtime friends. Alhaji Danladi M S Abdullahi and family, Dr Yusuf Abdullahi Nadabo, AR Nuhu and Justice Sirajo and Family, thank you for keeping the flame aglow.

Alhaji Bature, Mustapha Dahiru, Abdullahi Gindau Magayaki and their families have been supportive in making me adjust to my stay in Lafia.

***My Teachers:***

***Primary:***

This group of God - sent people were something else! From Mallam Abdu Maiyaki who despite the fact the none of my hands' fingertips could reach the opposite ear, I was enrolled into primary one in 1967 in LA, primary school N/Eggon, to Mr. SB Etim in primary seven in Dunama Primary School, Lafia, in January 1973. Mallam Tari was my primary one teacher, Fidelis Muhammed Sani of primary two, Mr Abalaku in primary three, Abdullahi Yakubu Ubangari, primary four, The present Aren Eggon in primary five, Mr. JJM Kpason, primary six and Mr. Gungu in primary seven in Dunama. May the almighty God continue to reward you appropriately.

***Secondary:***

Government college Keffi, was something out of this world. It was a miniature Nigeria with teachers and students from all the states and I dare say the tribes of NIGERIA. The teachers and students were committed. This is one place I will want to school again in if there is another chance. We had teachers from Nigeria, Africa, Europe, North and South America, Asia, Middle East and from far away Australia. This was the nature of Keffi and all of us grew up to become unrepentant nationalists and global players.

I must single out late Mr. DO Idah of blessed memory who admitted me and nine others who sat for the common entrance examination from the then Akwanga division into form one without interview. M. Angi who was the form master of form one B was one of those teachers that shaped my entire outlook to life. Of special and nostalgic note were my Indian science teachers, MR. and Mrs. Avirah, Mr. and Mrs. Mathew Kutty, Mr. and Mrs.,

Jacob and Mathew. Following closely were Miss Ingram, Miss Ferouz, Mallam Balarabe, Mr. Ifomadu, Mr., Obasi, Mr. Fiana'am, Mr. Iliya Uhili, Mr. Agada, Alhaji Yusuf, Mr. Adigun, and a host of other fantastic academic and non-academic staff. I must however mention Mallam Maiwada Raji who availed the junior and senior science laboratories to be used as my second dormitory, especially when I resigned as the academic prefect in my pursuit of academic laurel.

***University***

My teachers in ABU, Zaria (SBS, Undergraduate and postgraduate), I say thank you. All of you especially late Professors, A. A. Tadros, Sheriff, Bunnings, SP Singh, JO Ogunranti and DN Dimitrov, who died this year. All fantastic Medical Anatomists, the ever young, but old Professor Asala. I cannot and will never forget the original ABU! IN OUR TIME, ESPECIALLY IN THE NORTH, YOU WERE EITHER IN THE ORIGINAL ABU, ZARIA OR ANY OTHER LIKE ABU IBADAN, ENUGU, LAGOS, IFE, MAIDUGURI, SOKOTO OR JOS. That was the place of ABU, Zaria then.

***Post University***

My post university teachers and period spanned from ABUTH, Zaria, plateau hospital, Jos, JUTH, Jos, University of Jos, ABU, Zaria, universities of Abuja, Sokoto, Maiduguri, Gombe State university, Bayero university, Kano and of course Federal University, Lafia,

In these places, I met wonderful teachers and mentors. Chief of them is Dr Nandul Durfa, who taught me the initial rudiments of surgical procedures just like Professor Odigie who gave me the knife as a medical student to perform my first appendectomy in 1982. Late Professor Ogunranti did not only believe in my anatomic instincts and intention but said it without hesitation that, this run-away civil servant will become a professor of anatomy in not distant future. Yeah! This came to pass.

Professor Monday Mwanvat, VC of university of Jos easily believed that I was ready to make do with the slave like salary of the university system after enjoying medical scale salary for close to 15 years. So, he gave me together with late professor Emmanuel Mador and Dr Goncim appointments as lecturer two on the recommendation of the HoD who had earlier served under me in the department of surgery Plateau hospital as my house officer.

***My Mates:***
Too numerous to mention from primary to university were FANTASTICALLY brotherly. Adieu to the dead and salutations to the living. My colleagues in the various places I traversed, Unijos, UniAbuja, UniSokoto and FULafia (teaching and non-teaching staff, my college of medicine family and all brothers and sisters in the senate of the university), THANK YOU.

I thank all my students, for giving me the numerous awards occupying spaces in my Jos and Lafia collections. All I can say is to say thank you and may the Almighty Allah who knows why you have given those awards bless and reward you appropriately.
These students in University of Jos, ABU Zaria, University of Abuja, University of Sokoto, Unimaid, Bauchi State University Gadau and FULafia were my strength in this journey. Thank you for making me. I wouldn't have been here without you.

Finally, Finally, I wish to say that I have nothing to offer all of you in the world but to beseech Allah SWT to appropriately reward you and to register my continuous gratitude too. I wish all of us safe journey back to our various homes and destinations. All these go to say that between creation (Development) and dying, there are normal structures for normal functions, and disease states because of abnormal structure, over function, mal function, under function, which can lead to death. This is in fact the basis for the title of this Inaugural Lecture.

**THANK YOU**

# PROFILE/CITATION

## Professor Ali Is'haq Shugaba,

**MBBS, DGCA, MSc, PGDE, PhD, FAGP, FASN, FAMeDS.**

The Inaugural Lecturer brings to this event today with almost 4 decades of medical practice/medical mentorship and twenty-four years of teaching human anatomy to a varying group of Medical, Allied Health and Anatomy/Physiology graduate and postgraduate students.

He was born in Unguwar Rere, Lafia Central District, to the family of Alhaji Shugaba on the 21st of December 1959. He attended LEA Primary School, Nassarawa Eggon, and Dunama Primary School Lafia. He proceeded to St John Bosco Doma for two days then Lafia Division Community Secondary School, Obi for two weeks, (all in the month of September 1973) and finally ended in Government College, Keffi in the same month to start his secondary education. Ali obtained division distinction to become the second-best student in both Keffi and the then Benue Plateau state. He proceeded to the School of Basic Studies, ABU, Zaria, where he did his IJMB and later studied medicine in ABU, Zaria and graduated with the MBBS degree in 1985. He did a diploma course in general computer application at the university of Jos bagging a distinction.

He went back to the great ABU Zaria for Masters in Human Anatomy where he worked extensively on the human vermiform appendix. He immediately commenced his PhD in the same ABU doing research in reproductive histomorphology. On joining the academics after spending fifteen years in the civil service in the medical field, he enrolled and did a postgraduate diploma in education to become a certified and registered professional teacher.

**Work Experience/Career Progression:**
Dr. Ali Is'haq Shugaba joined the then Plateau State Civil Service in 1985 after obtaining the MBBS degree as a pre-registration house officer and went to Kano for just one week to commence the mandatory NYSC but was specially requested by the state to return to Plateau hospital in the department of surgery where he rose to PMO II. He headed the department of surgery and then Anaesthesia/ICU. HE also served as Anatomy demonstrator in the department of human anatomy before withdrawing his service for both private medical practice and academics, just before the creation of Nasarawa State. In between, he was at the casualty of the University for emergency experience.
He then joined the university of Jos in 2000 where he rose through the ranks to become a professor.

**Responsibilities:**
He held several responsibilities within the university system, including**:**

- Head of Department Anatomy, University of Jos;
- AG. Head of Department Anatomy, University of Jos;
- Coordinator-In-Charge Anatomy, University of Jos;
- Department of Anatomy Examination Officer, University of Jos;
- Clinical Anatomy Demonstrations Coordinator, University of Jos;
- Coordinator B.Sc. Anatomy Program, University of Jos;
- Ag. Dean (On Many Occasions);
- Director of Research and Creative Thoughts, FULafia;
- Provost, College of Medicine, FULafia;
- Deputy Vice-Chancellor (Administration), FULafia and Ag. Vice Chancellor, FULafia (Jan. 2024 and 1st to 7th March 2024).

**Scholastic Honours/Awards:**

| | | | |
|---|---|---|---|
| i. | Overall Best Student, Form Three, Government College, Keffi. | - | 1976 |
| ii. | Overall Best Geography Student, Government College, Keffi. | - | 1976 |
| iii. | Distinction in WASCE | - | 1978 |
| iv. | 2nd Best WASCE Candidate, Plateau State. | - | 1978 |
| v. | Plateau State Government Undergraduate Scholarship | - | 1979-1985 |
| vi. | Distinction in General Computer Application (UNIJOS) | - | 2000 |
| vii. | Jos University Medical Students Association Lecturer Award | - | 2004 |
| viii. | Friend of the Class Award (Class of 2005 Graduating Doctors) | - | 2005 |
| ix. | Best Lecturer (Pre-Clinical) Award | - | 2008 |
| x. | Best Lecturer (Pre-Clinical) Award | - | 2009 |
| xi. | Fellowship (FAGP) Award of the Association of General and Private Medical Practitioners of Nigeria | - | 2010 |
| xii. | Best Lecturer (Pre-Clinical) Award | - | 2012 |

xiii. Fellowship (FAMeDS) Award of the Academy of Medicine Specialties of Nigeria - 2021
xiv. Fellowship (FASN) award of the Anatomical Society of Nigeria - 2019
xv. Best pre-clinical lecturer for the Graduating MBBS Class of 2024 of Unijos

**Membership of Professional Bodies:**

He belongs to several professional associations. Some of which include:

- Nigeria Medical Association (NMA);
- Academic Staff Union of Nigerian Universities;
- Anatomical Society of Nigeria;
- Anatomical Society of Africa;
- Association of General and Private Medical Practitioners of Nigeria;
- Neuroscience Society of Nigeria;
- Society of Experimental and Clinical Anatomists of Nigeria;
- Bio Anthropological Society of Nigeria;
- Nutrition Society of Nigeria.

Professor Ali Is'haq Shugaba is Fellow of the Anatomical Society of Nigeria, Medicine Specialties of Nigeria and Association of General and Private Medical Practitioners of Nigeria.

He is a member, Society of Experimental and Clinical Anatomy, Association of Specialist Medical and Dental Doctors in Academics, Anatomical Society of Nigeria and Society of Medical and Dental Anatomist of Nigeria, Bio-

anthropological Society of Nigeria, and Nigerian Medical Association. Not forgetting ASUU and NAMDA.

Since then, his main preoccupation has been the training of medical and dental students, BSc. Human Anatomy Students, MSc. Human Anatomy Students, PhD. Human Anatomy Students, Medical Laboratory Students, Pharmacy Students, Nursing Students and Junior academic/Medical Doctors.

During this period, he has from his research activities Published in Local, National and International peer reviewed journals of good impact and strong visibility. He has published over 60 scholarly researched papers and presented several papers in workshops, seminars national and international conferences.

His areas of research interest are:

1. In vivo study of the mode of branching of appendicular artery in the Human beings (ongoing);

2. The Epidemiology of the Pyramidalis muscle (ongoing);

3. Reproductive Histomorphology (ongoing);

4. Relationship between Foetal weight and Placental weight at birth in a private facility in Jos (ongoing);

5. Genetic Polymorphism of Three Sodium Voltage and their Association with Painful Diabetic Neuropathy among Nigerians with Diabetes Mellitus (TETFund 2019 Award);

6. Effects of Variations in Mu Opioid Receptor Gene on Postoperative Morphine Requirement Using Patient Controlled Analgesia After Midline Laparotomies (TETFund 2020 Award);

7. Clinical, Microscopic and CNS analysis of Akuskura herb (about to start).

He has attended and participated in many professional and non-Professional conferences home and abroad.

Professor A. I. Shugaba is well published and has to his credit over 60 published articles in reputable journals, home and abroad; several book reviews and book chapters; and over 40 conferences, seminars, workshops and training presentations He has also, in the past years, been involved in the external examination of undergraduate MBBS and BDS examinations, MSc, and PhD defense/viva voice examinations in all the geopolitical zones of Nigeria.

Professor A.I. Shugaba has participated in the NUC Accreditation and resource verification visits and Medical and Dental Council Accreditation and resource visits in the past ten years, traversing the length and breadth of the country.

He has also been involved in the assessment of lecturers across the Nigerian Universities to the Professorial Cadre (Associate and full Professors). In the following universities: Ahmadu Bello University, Zaria; UniMaid; Bayero University, Kano; University of Illorin; Edo State University; Imo State University; Kaduna State University; Obafemi Awolowo University, Ife; Federal University of

Technology, Owerri; Yusuf Maitama Sule University, Kano; Federal University, Dutse; Alex Ekwueme University; Nile University, Abuja; and Usman Dan-Fodio University, Sokoto.

**Visiting Appointments:**
He has since 2010 being a visiting scholar to University of Abuja UDUS, Sokoto, Yusuf Maitama Sule University, Kano. He still finds and creates time for community services right from his secondary school days apart from currently doing general medical and surgical practice.

In Federal University of Lafia, he is Chairman to over 14 standing committees and many more ad-hoc committees in addition to his duties as the Deputy Vice Chancellor, Administration.

His skills include Case reporting, measurement, surgery observations studies, evidence-based medicine instrumentation, Gross Anatomy, Human Anatomy, Medical Education Osteology Skeletal biology Microscopic Anatomy, Tissue preservation, Histological staring, medical Illustration, functional morphology, Tissue preparation morphometric. Embalming plastination, comparative histology and histological analysis. Tissue dissection, histo-chemistry, microtomy Histomorphometric analysis and sectioning.

Professor Ali Shugaba, the Santali of Unguwar Rere and Wakilin Maganin Lafia emirate is happily married to Associate professor Mary Mathew, Hajiya Halima Usman Abdullahi, Late Associate professor Zuwaira Hassan Garkuwa and Mallama Nawar Aliyu Tilde with children.

| S/No. | Author | Title | Date |
|---|---|---|---|
| 1. | Prof. Mbe Nja | A Digital Glance at Policy Implementation | 16th Dec., 2015 |
| 2. | Prof. Moses Udo Ikoh | Sociology of the Criminal, Arc of Tension and Harvest of Insecurity in Nigeria: Patterns, Linkages and Implications for National Security | 29th Sept., 2021 |
| 3. | Prof. Amin Zaigi Ngharen | History, Culture and Resistance | 24th Nov., 2021 |
| 4. | Prof. Matthew O. Aremu | Exploiting Underexploited Plant Based Foods | 23rd Nov., 2022 |
| 5. | Prof. Uji Wilfred Terlumun | Migrations, Social and Economic Development in Historical Trajectory | 12th Dec., 2022 |
| 6. | Prof. Okpeh O. Okpeh, Jr | The Historian as a Catalyst: History, Ideology and the Social Process | 14th Feb., 2023 |
| 7. | Idris O.O. Amali | Oral Poetry as Repository of Knowledge: An Investigation of Idoma Alekwaafia Masquerade | 5th June, 2023 |

| S/No. | Author | Title | Date |
|---|---|---|---|
| 8. | Prof. Christian C. Echeta | Daring the Jungle of Research in Ceramics: Contending with its Technical Realities and the Diplomacy of Colour | 14th June, 2023 |
| 9. | Prof. Aleruchi Chuku | Indoor Fungi: Friends or Foes? | 22nd June, 2023 |
| 10. | Prof. Rebecca Ape | Health Information Needs of Nigerians: An Integrative and Inclusive Approach to Library Services for National Development | 10th October, 2023 |
| 11. | Prof. David B. Ugal | Fertility: A Double Edged Sword | 22nd Nov. 2023 |
| 12. | Prof. Monday U. Ukwela | Insects: Diversity, Natural and Strategic War | 12th March, 2024 |
| 13. | Prof. Ilemona Adofu | Navigating Nigeria's Economic Horizon: Can We Harness Monetary Policy Reforms to Achieve Financial Deepening for Sustainable Growth? | 16th April, 2024 |

| S/No. | Author | Title | Date |
|---|---|---|---|
| 14. | Prof. Zara E. Kwaghe | *Herstory* in the Making of Modern Nigeria: Patriarchy, Women and the Politics of Knowledge Production | 14th May, 2024 |
| 15. | Prof. Victor Samson Dugga | Applied Theatre: The Science of Individual and Community Transformation | 28th May, 2024 |
| 16. | Prof. Blaise Gundu Gbaden | From Long Trains in the Wet Soil to Social Ideation: Individuations on Art, Inspiration and Nigeria | 25th June, 202 4 |
| 17. | Prof. Abdullahi Dan'Asabe Jibrin | State, Power Struggle and Paradox of Development in Nigeria | 25th June, 2024 |
| 18. | Prof. Abu Egwa Ozegya | Communication Strategies, Inclusive Practices and Education of Children with Hearing Impairment | 31st July, 2024 |
| 19. | Prof. Adam Adebayo Sirajudeen | Beaming the 'Dark Africa': Construction, Deconstruction and Reconstruction of *Afrabic* Historiography | 14th August, 2024 |

| S/No . | Author | Title | Date |
|---|---|---|---|
| 20. | Prof. Surajudeen A. Juna id | Tales of Man's Travails and Triumphs as the Battle with Viruses Rages on | 24 th Sept . 2024 |
| 21. | Nasirudeen Mohammed Baba | Dirty Stone and Biomass: Feedstocks for Sustainable Energy and Industrial Chemicals | 2nd October, 2024 |
| 22. | Prof. Halima Idris Amali | Burning Down the House of Knowledge: The Fall of Idoma Folktale Performative Tradition | 6th Nov ., 2024 |
| 23. | Prof. Ali Ishaq Shu gaba | Between Creation and Dying: of Structures, Functions and Diseases | 13 th Nov., 202 4 |

## PHOTO GALLERY


My Primary 1 Classroom1967
Dunama Primary School, Lafia

My Primary 7 classroom 1973
Dunama Primary School, Lafia

## SIGNIFICANCE OF INAUGURAL LECTURE IN FULAFIA

The rite of passage to be come a Professor in a University has for hundreds of years included the test of having to profess one's knowledge to a lay audience and fellow academics. Indeed, the origin of the title 'Professor' comes from the need to profess, or declare publicly, one's knowledge. The occasion of Inaugural Lecture Presentation is, therefore, an essential component of the University's public events through which the institution engages with audiences with a broader interest in its research, including funders and decision-makers from Government, Academia and Industry. Professionals and Academics gain a unique opportunity to engage across knowledge boundaries for the benefit of mankind.

### VISION

To become a renowned institution of learning, research and innovation for positive socio-economic transformation of the nation

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