NSM News

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Feature Article

CHLAMYDIA VACCINE MOVES A STEP CLOSER

...Pioneering clinical trials raises hopes of cure for 'hidden' sexually transmitted infection

INSIDE:

CRAWFORD UNIVERSITY

NIGERIAN SOCIETY FOR MICROBIOLOGY 42ND SCIENTIFIC CONFERENCE & ANNUAL GENERAL MEETING (AGM) HOLDING AT CRAWFORD UNIVERSITY MULTI-PURPOSE HALL, 3RD - 6TH SEPTEMBER, 2019

It is such an honour for me to partake in the organization of this great gathering of Microbiologists and allied Scientists. Nigerian Society for Microbiology (NSM) has come of age and this 42nd Annual Conference titled "**Microbial Resources: Option for Economic Diversification"** is a proof of this especially as it pertains to economic advancement of the nation. This year's conference promises to educate, inform and foster healthy relationships amongst member scientists and their counterparts within and outside the country. The sub-themes for this conference had been carefully selected such that the field of Microbiology could serve as a pedestal to higher heights for the nation. All the areas of Microbiology are covered to provide great avenues of refreshing for every participant. Highlights of the program include the keynote speech and plenary sessions in different areas of Microbiology, Annual General Meeting (AGM), Early Career Scientist forum, game time, lucky dip, Awards, Cocktail as well as Conference Dinner. It is therefore my pleasure to welcome you all on board this great time of professional empowerment and recreation.

Folashade Agbaje-Daniels, Ph.D.
Acting Head of Department, Biological Sciences, Crawford University
Chairperson, Local Organizing Committee

IN THIS ISSUE:

EDITORIAL

The Nigerian Society for Microbiology Newsletter (NSM News) has over the years, contributed to sound and new teaching methodologies, current technologies, new researches and novel breakthroughs in the field of General Microbiology and will continue to provide valuable and up-to-date information to members. In the current issue, Microbiologists who became VCs were honoured. It also contains selected synopses of lead papers presented at NSM conferences and zonal symposia in 2018/2019. Some personalities who have contributed to the growth of the society were awarded. Chlamydia vaccine moves a step closer…pioneering clinical trials raises hopes of cure for 'hidden' sexually transmitted infection is the feature article. The abecedary of microbiology and repositioning of NSM for better service delivery are here emphasized. A summary of microbiology and advances in technology has been added. Application form and guidelines for new members, information on NSM2020 hosting right is being pronounced. Names of the re-constituted NSM Newsletter/Media Team aimed at fast tracking information dissemination to members are presented. Details on 2020 NSM hosting right is here provided. There are also news flash from the National secretariat and lot more. Once again, I will like to express my deep appreciation to the authors of all the articles in this issue, not forgetting to thank our editorial team for their contributions.

The team always looks forward to your professional contributions. The NSM Newsletter will be available online via the website: www.nsm.ng.

Full articles and short communications should be submitted to the Editor for consideration and publication via the E-mail address: deleodumosu@gmail.com.

Letters to the editor as well as opinions/suggestions on how to improve the quality and availability of the Newsletter are also welcome. Those can be submitted via the same e-mail address above. The opinions presented in this Newsletter are strictly those of the authors and not necessarily that of the Nigerian Society for Microbiology. Readers can easily contact the authors of articles through their respective e-mail addresses.

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Publicity Secretary/PRO,
Editor, NSM Newsletter

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GOODWILL MESSAGE FROM THE PRESIDENT-PROF. M. B. YERIMA

Prof. M. B. Yerima, fNSM
NSM National President

I feel greatly honoured to give this goodwill message on behalf of the National Executive Council (NEC) of the Nigerian Society for Microbiology (NSM). It is my pleasure to inform the teeming membership of this Society that, we are making giant strides in building the Society and making it more relevant in the scheme of things in this country. I salute the effort and courage of the Public Relations Officer-Dr. B. T. Odumosu for making the Society more visible and interactive. The Chairmen of Committees and indeed all NEC members have been wonderful in proffering solutions by suggesting ideas that will lead to rapid progress in NSM. I commend the LOC of "Igbesa 2019" for their innovation leading to massive and seamless patronage of the upcoming Conference. It is worthy of note that a state of emergency is declared on our Professionalization agenda and National Secretariat building in Abuja. We are calling on all members to support this with all sense of commitment. I am confident that we are going to put this behind us very soon. The Zonal activities had been wonderful. The South-West zone had their Symposium in Adeleke University, Ede where more than six Vice Chancellors who are microbiologists were in attendance. It was indeed a very exciting Symposium in a serene and more exciting environment. The symposium was ably led by one of our own-Prof. O. M. Oyawoye and her team and the proceedings were proudly published in print media. The South-East had just finished their own in Abia State University, Uturu and from the reports we have received, it had been wonderful too. The Symposium was led by the Vice President himself-Prof. V. O. Nwaugo and his team. To a large extent these zonal activities are helping to reach out to our members in the grass root. I urge members to continue to be part of our programmes and keep faith in the leadership of NSM. My sincere appreciation to the NSM Newsletter Editorial Team, Dr. Bamidele T. Odumosu, Dr. Leera Solomon and other members for their unrelenting effort and support in ensuring that members are informed about our activities. Thanks.

Prof. M.B. Yerima, *fNSM* is a Professor of Applied Environmental Microbiology, Department of Microbiology and Biotechnology, Faculty of Science, Federal University Dutse, Jigawa State, Nigeria.

NSM AWARDS FOR MICROBIOLOGISTS WHO BECAME VICE CHANCELLORS

By Dr. B. T. Odumosu

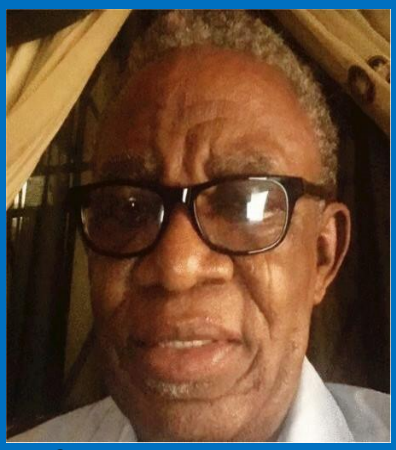
The South-West zone of NSM had their 2019 Symposium in Adeleke University, Ede where more than six Vice Chancellors who are microbiologists were in attendance. It was indeed a very exciting Symposium in a serene and more exciting environment. The symposium was ably led by Prof. O. M. Oyawoye and her team. The proceedings of the conference were proudly published in print media. The
Vice Chancellors who are Microbiologists and were awarded by the National Executive Council (NEC) of the society for their dedication to humanity and to the academia include the following:

NIGERIAN SOCIETY FOR MICROBIOLOGY

..OUR PRODUCTS...OUR PRIDE

Prof. Olukayode Amund
Elizade University, Ilara-Mokin, Ondo State

Prof. Diran Famurewa
Kings University, Ode-Omu, Osun State



Prof. Deboye O. Kolawole
Crown-Hill University, Eyenkorin, Ilorin, Kwara

Prof. Auwalu Uba, *FNSM*
Vice Chancellor, Bauchi State University, Gadau

Prof. Julius Kolawole Oloke
Precious Corner Stone University, Ibadan, Oyo State

SYNOPSES OF LEAD PAPERS

AT NSM SCIENTIFIC CONFERENCE & AGM "UMYUK 2018"

PROFESSIONALIZATION OF MICROBIOLOGY AS A TOOL FOR SUSTAINABLE NATIONAL DEVELOPMENT

By Leera Solomon, Ph.D.

Prof. Auwalu Uba, *fNSM*
Vice Chancellor, Bauchi State University, Gadau,

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend. The desired result is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system. In January 2016, the 2030 goals for sustainable development were set by the United Nations for achieving environmental, social and economic growth through green methods and cleaner production technologies. The most significant targets of these goals are the fulfilment of basic human needs and desires, since essential human necessities like food, cloth, shelter and health care are still not accessible to majority of the people despite the great pace in the world's economy. Increased waste products and continuously depleting natural resources have diverted human attention towards efficient green and clear production technologies. The Sustainable Development Goals (SDG) aim at providing these fundamental necessities to everyone through the intelligent use of sustainable science. One hundred and ninety-three (193) countries agreed to the 17 Sustainable Development Goals (SDG), which is a United Nation's sponsored effort for a sustainable economic development of the world. These goals have been classified into five (5) subgroups -People, Planet, Prosperity, Peace and Partnerships. The SDGs aim at developing the solutions which can enable economic and societal development, but not at the expense of environmental damage. Rather, these efforts emphasise on the environmental protection by preventing and controlling the unlawful exploitation of natural resources (United Nations, 2016). Each of the 17 SDGs has specific targets to be achieved by 2030. The goals and targets are universal, meaning they apply to all countries around the world, not just poor countries. Reaching the goals requires action on all fronts – governments,

businesses, civil society and people everywhere all have a role to play. In this regard, microorganisms, which are vital to the maintenance of life on earth are best suited and therefore can play the greatest role in attaining the sustainable development goals. Greater understanding of these creatures therefore through improvement in the study and research capabilities in microbiology and related fields can contribute tremendously to sustainable development. The microbial world, a treasure in itself, if exploited judiciously, can therefore contribute to the sustainable development. There are three super challenges of the 21st century: (1) climate change, (2) food security, (3) dependence on imported petroleum, and I think microorganisms are efficient enough in meeting out these challenges. Nigeria is not an exception in facing these challenges and therefore must utilize its enormous human capital in addressing them. Understanding the Science of Microbiology ensures production of adequate food, safety of food, treatment and preventing diseases, developing green technologies, our environments are clean, contributing to our GDPs by making tremendous contributions to our manufacturing sectors and tracking the role of microbes in climate change. Microbiologists aim to answer many important global questions by understanding applying the physiological capabilities of microbes. The application of microorganisms and their potentials can prosper solution to all of these challenges. Therefore, encouraging and harnessing the potentials of microbiologists and promoting the practice of microbiology by regulating its practice will help greatly. The outstanding applications of microbiology cut across all aspects of human life, which include agriculture, environment, medical and industrial. These applications are currently harnessed mostly through biotechnology, a highly skilled technique of exploring biological processes for beneficial purposes. As majority of biotechnological applications are of microbial origin, microbiology is indispensable, and its professionalization can substantially contribute to sustainable national development in a number of ways. Professionalizing the practice of microbiology has some attendant benefits such as:

1. **Improvement and Maintenance of the Standard of Microbiology Practices:** Professionalization entails establishing acceptable qualifications, recommend best practice and oversees the conduct of members, and some degree of demarcation of the qualified from unqualified amateurs. At least, minimum standard of practice will be adhered to at all times. The regulatory body should have mechanism in place that will ensure the enforcement of the profession's guidelines. This will improve and sustain the standard of microbiological practices, and in turn will have positive impact on societal development.
2. **Easing and Guiding Government Policies:** Government can easily access microbiology experts through the professional association if professionalized, for

judicious advice on microbiological issues of national interest. True experts can guide and advise government about policies on various issues, such as tackling the menace of antibiotic resistance by microorganisms, prevention and control of epidemics, bio alternatives to fossil fuels, waste management and pollution control. This may also lead to various researches, which may yield novel results.

3. **Self-Development:** Professionalization requires members of a profession to have certain minimum educational qualification before they can be certified. Furthermore, the members are accredited on timely basis to ensure competence. This will encourage members to be in constant self-development and improvement so as to satisfy the accreditation requirements of the professional association. Professionalizing the practice of microbiology will ensure that young members will undergo a sustained period of mentored experience/apprentice ship and continuing education for greater output.
4. **Shape Research Direction:** Professional members will at least on annual basis organize meeting/conference, so that members will share and discuss thier research outcomes with peers and listen to other people's research. This provides avenue for knowledge sharing and transfer. The professional association can identify area/areas of particular national or societal importance, which members will be mandated to focus researches on, thus addressing national problem and contributing to national development.
5. **Patent License and Idea Protection:** Professionalization protects the rights of its professional members from forces within and outside the profession. Protection of members' ideas will certainly instill confidence into members; promote researches that will lead to production of various goods and services for national development.

The Theme of this year's conference is ''Professionalization of Microbiology as Tool for Sustainable National Development. The contribution of microbiology in sustainable national development cannot be overemphasized. Microbes are major stakeholders. A summary of the role of microbes/microbiology in achieving the sustainable development goals is presented in Table 1:

Table 1: Summary of role of Microbes in achieving Sustainable Development Goals 1- 17

SDG	GOAL	APPLICATION OF MICROORGANISM
1	Poverty Reduction (No Poverty)	**Income Generation** **Production of Gobar Gas** by methane-producing organisms such as Methylosinus, Methylocystis, Methanomonas, Methylomonas, Methanobacter, and Methylococcus, **Traditional food in Nigeria** like Ogi, Garri, Pito, and Iru, Vinegar (by Lactic Acid Bacteria and Yeast), and daddawa by many species of bacteria.
2	Hunger Reduction (Zero Hunger)	**Fermentation** **Pickles** (Leuconostoc mesenteroides, Lactobacillus plantarum, Pediococcus cerevisiae), **Milk** (Lactobacillus), **Tempe** (Acetobacter and Rhizopus oligosporus), **Cheese** (Penicillium roqueforti, Streptococcus salivarius subsp thermophilus), **Soy Sauce** (Aspergillus oryzae, Aspergillus soyae, Aspergillus glaucus), **Yogurt** (Lactobacillus delbruekii subsp bulgaricus, Streptococcus salivarius subsp thermophilus) and **Bread** (Saccharomyces cerevisiae) **Soil Fertility:** Arbuscular mycorrhizal symbiotic fungi and phosphate solubilizing microorganisms such as Pantoea agglomerans, Microbacterium laevaniformans and Pseudomonas putida
3	Good Health and Well-Being	**Prebiotics and Probiotics** (Lactobacillus acidophilus, Aspergillus niger, Saccharomyces carisbergensis) **Development of New Drugs** Penicillin (*Penicillium notatum*) (*Streptomyces venezuelae*) **Immunoregulation in Humans** (Bifi dobacteria and Lactobacilli) **Gastrointestinal Flora Prevention of diseases** like gastroenteritis (*Prevotella, Bacteroides*, *Faecalibacterium prausnitzii* and Ruminococcus) **Controlling Pollution related diseases** like *Burkholderia, arthrobacter*, Chromobacterium, Micrococcus, Candida, Pseudomonas and Bacillus.
4	Quality Education	**Teaching, Research and Innovation:** Building Good Environment, **Renewable energy sources for** reading in rural communities Microbial Fuel Cell, Biogas
5	Gender Equality	**Sexual and Reproductive health** **Income generation** **Empowerment** **Well-being** of the family Promoting education among women will improve the wellbeing of their children, families, and society
6	Clean Water and Sanitation	**Controlling Poor-Sanitation** **Regulation of microbial load** Escherichia coli, Salmonella, Vibrio, and Shigella can significantly contribute in controlling water-borne diseases
7	Affordable and Clean Energy	**Electricity generation** (Bioenergy and Biofuel): Botryococcus can store up to 50% of the biomass in the form of long-chain hydrocarbons. Utilizing of organic matter by *Shewanella oneidensis* and *Geobacter sulfurreducens* to produce utilizable electricity. Utilizing waste products such as sewage sludge, municipal solid waste and agricultural waste by Trichoderma, Aspergillus, Penicillium, and Clostridium to produce bioenergy.

8	Decent Work and Economic Growth	Biogas stove provides jobs in Sub-Sahara Africa. Microbes produce a lot of industrial products that provide jobs, etc.
9	Industry, Innovation and Infrastructure	Biofertilizers: *Pseudomonas* and *Rhizobia*. Microbial products: Coenzyme (*Brevibacterium ammoniagenes*), Riboflavin fermentation (*Eremothecium ashbyii*, Ashbya gossypii, *Bacillus* sp.), Vitamin B12 (*Propionibacterium shermanii*, *Pseudomonas denitrificans*), S-Adenosylhomocysteine (*Alcaligenes faecalis*), Biotin (*Serratia marcescens*, *Bacillus sphaericus*); etc.
10	Reduced Inequality	Women can be taught the importance of soil microflora like *Burkholderia*, *Pseudomonas*, *Rhizobium*, *Trichoderma*, *Bradyrhizobium*, and *Azospirillium* in improving crop productivities
11	Sustainable Cities and Communities	Ecology of urban cities and Solid waste management Composting of the solid waste uses microorganisms like *Pseudomonas*, *Bacillus*, *Microbispora*, *Actinobifida* and *Thermoactinomycetes* for converting its organic constituents into useful end products.
12	Responsible Consumption and Production	Responsible production through bacterial cellulose Bacterial Cellulose (BC) from Komagataeibacter can be used in the production of fuel and Li-ion batteries
13	Climate Action	Microbial and Environmental education Bioremediation Biogeochemical cycles: Microbes are key drivers in biogeochemical cycles like nitrogen, carbon and phosphorus cycles. Nitrogen fertilizers Biofuel production
14	Life below Water (Marine Ecosystems)	Aquaculture: Microbes can effectively boost the production of fisheries by controlling the pathogenic outburst and water quality, as well as regulating the environmental impact.
15	Life on Land (Ecosystems)	Ubiquitous functions Microbes stabilize the soil structure, enable nutrient uptake by plants, control pests and diseases, decompose organic material and degrade harmful chemicals, as well as being an indicator of the soil health.
16	Peace, Justice and Strong Institutions	Combating bioterrorism Microbial forensics can be used to trace perpetrators and sources of biohazard, thereby being used as a powerful tool for combating bioterrorism.
17	Global Partnerships for Sustainable Development	Capacity building on trade-related aspects. The benefits of microbes and microbial technology can only reach the people through globalization and overcoming land barriers.

The sub-themes of this conference have been chosen to give more insight into the potentials of microbes in contributing to national development. As erudite scholars will speak on each of them, I will only give a little highlight about each.

1. **Microbial Biotechnology for Sustainable Economic Growth:**

Numerous individuals and organizations have emphasized the economic potential of knowledge-based business sectors, and the need to invest in and nurture them, and in the infrastructure needed for them to thrive. Microbial biotechnology is both one of the oldest technologies and one of the newest and most rapidly growing industries. There should be no doubt in anybody's mind that

microorganisms are the most powerful creatures in existence. They can be harnessed to sustain life and create wealth. Because they produce a variety of products which enjoy a constant and reliable market demand and the ability to secure income for nations.

Microbial Biotechnology contains many diverse technologies that may be applied in food, medical, Pharmaceuticals, seed technology, agriculture and industrial sectors. It also includes a range of technologies used to process the raw food materials produced by the crop, fishery and livestock sectors. Microbiology in the food processing sector targets the selection and improvement of microorganisms with the objectives of improving process control, yields and efficiency as well as the quality, safety and consistency of bioprocesses products.

The advent of biotechnology has made it very easy for us to take advantage of the various useful aspects of microbes. Now we can take the genes out of microbes in any environment and study their diversity by looking at their genes with a view to manipulating them to improve our lot.

It is no doubt, therefore those microbes, through their beneficial effects and processes impact on economic empowerment. As such microbes make huge impact on economic growth and invariably, significantly contribute to the GDP of any nation.

a) Microbial cells are transformed and used in production of commercially important products, e.g. production of human insulin, human growth hormone.
b) Using biotechnology techniques, bacteria can also be bioengineered for the production of therapeutic proteins, such as insulin, growth factors or antibodies.
c) Fermentation processes, such as brewing, baking, cheese and butter manufacturing.
d) Chemical manufacturing such as ethanol, acetone, organic acid, enzymes, perfumes etc.
e) Microbial mining, in which bacteria and other microorganisms are cultured in container and then used for these processes e.g., copper extraction, iron extraction involving bacteria called Ferro-oxidans.

2. Microbes for Agricultural Development and Food Security

Microbes for agricultural development and food security can be viewed under different perspectives, such as:

i. Microbes and soil fertility
ii. Microbes and food production
iii. Microbes and food quality
iv. Microbes and food safety, etc.

In general agriculture, soil microorganisms affect plant productivity by:

i. acting upon soil physical and/or chemical properties and,
ii. interaction with plant roots.

The conversion of complex molecular compounds into ionic forms is carried out by microorganisms either directly or indirectly through a process called mineralization.

3. Microbiology for Enhanced Environment and Public Health

Microbes and their biosynthetic capabilities

have been invaluable in finding solutions for several intractable problems mankind has encountered in maintaining the quality of the environment. They have, for example, been used to positive effect in human and animal health, environmental protection, and municipal and industrial waste treatment. Microorganisms have enabled feasible and cost-effective responses which would have been impossible via straightforward chemical or physical engineering methods. Microbial technologies have of late been applied to a range of environmental problems, with considerable success. Starting from the mining of raw materials to production, transportation, use by end users, disposal or accidental spills of chemicals often contaminate soil to the extent that threaten the health of human life, livestock, wildlife and indeed whole ecosystems. Traditional methods to clean up or decontaminate the soil are expensive, labour intensive, do not always ensure that pollutants are completely removed or destroyed and often result in abrupt changes to the physical, chemical, and biological characteristics of the treated soil. Use of microorganisms have shown promises in remediation of soil contaminated with heavy metals and radionuclide, organic compounds including chlorinated solvents like TCE; explosives such as TNT, RDX; petroleum hydrocarbons including PAHs; PCBs and pesticides such as atrazine and organophosphates.

Understanding microbiology also helps in prevention, diagnosis and treatment of infectious diseases. In addition, this field of science studies various clinical applications of microbes for the improvement of health.

Conclusion

- Microbes are key contributors to the attainment of the sustainable development goals.
- They are adjudged to be very powerful tools that can: drive industrial growth, Provide jobs, promote sustainable agriculture and ensures food security, diversify economy such as Nigeria's that can help reduce dependence on mono commodity, help maintaining the quality of the environment, help in prevention, diagnosis and treatment of infectious diseases and improvement of human and animal health. What else do we expect from these tiny unseen creatures? All we need to do is to improve on the application and practice of the science of microbiology so that we can understand them more and more for our own benefit. The more we understand them, the more benefits we derive from them as a nation.

(References for this keynote paper presented are available with the Media/Editorial team of this NSM Newsletter)

MICROBIAL BIOTECHNOLOGY FOR SUSTAINABLE NATIONAL DEVELOPMENT

Professor Mohammed Bello Yerima, ***fNSM***
Professor of Applied Environmental Microbiology, Department of Microbiology and Biotechnology, Faculty of Science, Federal University Dutse, Jigawa State, Nigeria

The crux of the presentation is that sustainable national development in Nigeria can and will be driven by judicious, sustained, deliberate and improved applications of microbial biotechnology in all its multifaceted forms and dimensions. Professor Yerima, who was then Vice President, and now, President, Nigerian Society for Microbiology, talked about nanotechnology, the fast rising branch of microbial biotechnology that lower the bar from microns to nano. He introduced 'traditional biotechnology' as the applications of biotechnology in local contexts, often unknowingly, e.g. in the production of the traditional Hausa condiment, *daddawa*, and *nono*, a fermented milk product. The professor proceeds to discuss about the incursion of biotechnology into agriculture, where, for example, gene transformation in plants and the mechanisms behind the penetration of cell walls of plants by microorganisms. Prof Yerima cited numerous examples, often accompanied by vivid illustrations, including the one of 'Professor *P. indica*' in Delhi, who used the fungus *P. indica* for biocontrol, hence the sobriquet assigned to him was the name of the fungus. This illustrates the potential of fungi as important agents in microbial biotechnology, in addition to the well-known quintessence of bacteria in such roles. Another important fungus the professor talked about is *Trichoderma* which is employed in plant stress resistance induction experiments, especially against abiotic conditions. Prof also talked about the biotrophic root symbiont *Piriformosporai*, and its application, which leads to a discussion about arbuscular mycorrhizal fungi (AMF) in general, and their role in plant-microbe interactions. Prof Yerima then delved into statistics to illustrate his points made during the presentation more elaborately. By 2020, the professor explained, biotechnology will be contributing thousands of dollars to the economy. For instance, 20% of all chemicals, globally, will be produced through biotechnology.

Bioelectrogenesis was the next talked about topic by the Professor, and for me, probably one of the pieces de resistance of the presentation. In the period, power supply can be described as being interruptive or epileptic, at least in my locale, so this topic naturally grabbed my already captivated attention more. Prof Yerima talked about *Magnetosprillum magnetotacticum* and 'Blembersi bacilli' and their application in generating electricity from microorganisms! To conclude the lecture, one of the most enduring memories from the conference was created

when Prof Yerima acknowledged Professor D. A. Machido who was present in the first row at the University Auditorium, as his teacher. He thanked him for teaching him the "difference between chalk and cheese". After a thunderous applause, Professor M.B. Yerima gave a golden quote: "Never underestimate the power of microbes, if you take care of them, they will take care of you in the future". It is a befitting end to a truly wonderful presented that was educative, informative and served to drive the point home that microbial biotechnology will hold sway among the comity of catalysts that will hopefully accelerate sustainable national development in Nigeria.

(References for this keynote paper presented at UMYUK 2019 Conference are available with the Media/Editorial team of this NSM Newsletter).

L-R: Former NSM Secretary, Prof. M. D. Mukhtar presenting an award of stewardship and excellent leadership to the newly elected NSM president, Prof. M. B. Yerima during the society's 41th Scientific Conference & AGM held in UMYU Katsina 2018.

MICROBIOLOGY FOR ENHANCED ENVIRONMENTAL AND PUBLIC HEALTH

By Yunusa Yahaya Riko

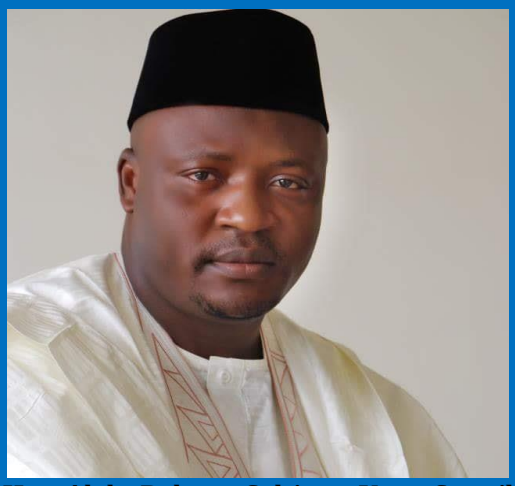
Prof. J. N. Ogbulie, FNSM, FNES
Federal University of Technology, Owerri

Professor J.N. Ogbulie, of the esteemed Federal University of Technology, Owerri, presented about the role microorganisms can play in the contexts of environment and public health, with specific emphasis on the role of microbes in pathogenesis of ailments of high public concern and their control, and the established phenomenon of microbial bioremediation and environmental reclamation. The professor gives a refresher of an overview on microbiological basics in general, with emphasis on various approaches to categorization of microbes. This greatly helped the up-and-coming microbiologists, as the lecture was brought to their level. Then, Professor Ogbulie moved notches higher, and this began with the excellent rhetoric question asked by the Professor: "Without microbes and microbiology, what would our environment: soil, air, water etc be like". Come to think of it, in the absence of microbes, to quote something I once saw somewhere but can't remember exactly where, "the whole will be a giant refuse dump", teeming with carcasses and corpses, filthy to look to the eye, inhospitable to man and virtually all creatures. I remembered the Professor talking about the application of the SMART acronym from a microbiologic perspective, i.e. designing of policies, etc shall be tailored towards creation of objectives/policies that are Specific, Measurable, Achievable, Reliable and Timely. The professor also discussed about Mycoremediation, where the myriad of fungi's digestive enzymes are utilized in the breaking down of hydrocarbons, pesticides, and heavy metals. Of the key magnum opuses of the presentation was the divulging by Professor Ogbulie that the fungus *Geobacter sp* is employed in the bioremediation of radioactive materials. Further 'new friends' - as we call newly known members of the microbial world – introduced by the professor include *Methylobacter mesophilicum*, *L. rhamnosus* (which is employed in the treatment of anxiety!) and *C. sporogenes*, which, to put it simply, kills cancer. Profesor Ogbulie also asserts that globally, only US is selling bioremediatory microorganisms on a commercial scale. This dovetailed with the overall emerging idea emerging from the conference, there is great potential, but little utilization of microbes, and hence we must do more. The professor concludes the presentation by concurring that giant strides remain to be taken in developing countries like Nigeria, towards the utmost utilization of the diverse potentialities of microorganisms, especially in the area of environmental and public health from the Nigerian viewpoint.

AWARD OF RECOGNITION TO DISTINGUISHED PERSONALITIES BY NSM NEC IN 2018

In line with the Constitution of the Nigerian Society for Microbiology (NSM), some eminent personalities who have distinguished themselves and have supported the society were recognized and awarded. The event took place at the 41st Scientific Conference and Annual General Meeting held at the Umaru Musa Yar'Adua University, Katsina, in September, 2018. The 2018 Fellowship Awardees include the following personalities:

Distinguished Senator Barau I. Jibrin
Kano North Senatorial District
[Facilitator and sponsor of the Microbiology Council of Nigeria (MCN) Bill]



Hon. AbdurRahman Suleiman Kawu Sumaila
Facilitator of Microbiology Council of Nigeria (MCN) Bill at the House of Representative

Prof. Idris ISa Funtua
VC, Umaru Musa Yar'Adua University, Katsina

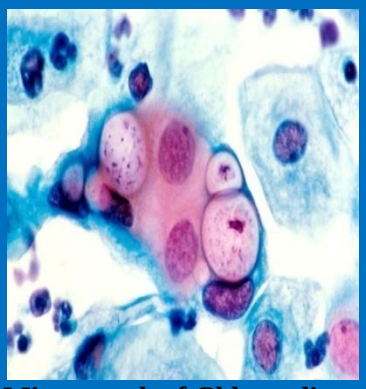
The Awardees were presented with plaques and certificates. With this award, the awardees are authorized to use the acronym "*FNSM*" after their names and hence, admitted into the Committee of Fellows of the Society. The Nigerian Society for Microbiology fellowship "*FNSM*" awardees were encouraged to maintain the hard work and dedication to the service of the society and humanity, which earned them this highest recognition of the learned professional society (the NSM).

Feature Article:

CHLAMYDIA VACCINE MOVES A STEP CLOSER

…Pioneering clinical trial raises hopes of cure for 'hidden' sexually transmitted infection

Chlamydia can be treated with antibiotics, but infection often has no symptoms and many people are unaware they have it. Without treatment, it can lead to a range of complications for men and women, including fertility issues and an increased risk of HIV. Dr Frank Follmann, the head of chlamydia vaccine research at Statens Serum Institute in Denmark and a co-author of the study, said: "Chlamydia is a hidden epidemic. It is very well adapted to infecting both men and women and in most cases it does it without any symptoms."



Micrograph of Chlamydia

There have been recent drives to improve testing through screening programmes, particularly among young people, but the study's authors say such measures have failed to tackle the problem and suggest a vaccine would be beneficial. Writing in the Lancet Infectious Diseases journal, the researchers describe how they tested two formulations of a vaccine, with each type given to 15 women aged between 19 and 45 who did not have chlamydia. Another five chlamydia-free women were given a placebo. All received three injections into their arm muscle over four months, followed by two doses administered through a nasal spray in the weeks after. Neither the women nor those monitoring the impact of the vaccine were aware of who was in which group. The results showed no serious adverse reactions to the vaccines. The vaccinations, but not the placebo, produced an immune response. Follmann said the presence of antibodies in vaginal fluid was important. "We see the antibodies as a first line of defence," he said. "They should be able to target the bacteria once it enters the genital tract." He said the study suggested the injection could provide sufficient protection against chlamydia, without the need for the nasal spray. The findings raise hopes that the vaccine could eventually be given at the same time as the HPV vaccine, which protects against certain cancers including that of the cervix.

Dr. Leera Solomon

The treatment is still at an early stage of development, but the team said the trial results were promising and that testing should proceed to the next stage with a larger number of participants. "The next step is to test whether or not it could in fact protect [against chlamydia infection] in humans," Follmann said.

(References for this article are available with the media/editorial team of this NSM Newsletter). For further information on this finding, you may visit www. theguardian.org.

MICRO-POEM: THE ABECEDARY OF MICROBIOLOGY

Mr. Yunusa Yahaya Riko
B.Sc. (Hons.) Microbiology, Umaru Musa Yar'adua University, Katsina
Member, Nigerian Society for Microbiology (NSM) Editorial Team

Before you can say you know our dear microbiology, 'Tis said that our alpha and beta are your first ideology.

Our **A** is for autoclaving things raw,
B is for the bacteria we all once saw,
C is for culturing, that is 'to grow',
And **D** is for dry-heat, did I hear you say 'Ow!'?

Our **E** stands for Elephantiasis – a disease,
F is for *Francisella*, let's our knowledge increase,
G is for Gram-staining: be in it well versed,
H is for hand-washing, hey safety first!

I is for immunology: where microbes go 'crunch'!
J is for Jackard-C, a sort of a brain lunch,
K is for Koch; hey we've got history,
L is for Laboratory, where we solve every mystery.

M is for *Mycobacterium*, and molds,
N is for *Neisseria* and the bad rep it holds,
O is for *Orientia tsutsugamushi*,
And **P** is for *Providencia rettgeri*.
Q is for quorum sensing – the microbial hug,
R is for resistance, I hate you – O superbug!
S is for *Saccharomyces*, our dear yeast,
T is for Tuberculosis, that thing is a beast!

U is for UTIs that debilitate the old, and the maids!
V is for viruses, such as the one that cause AIDS,
W is for wine-making, work and wealth,
X stands for X-ray, in public health.

Y is for *Yersinia*, ever heard of the plague?
Z is for Zika, and Zidovudine, a knock on the morgue.

Brief note on the Micropoem

Title: The poem attempts to capture the multifaceted nature of microbiology as a discipline, by referencing as many a facet as

possible. Hence the term abecedary attempts to signify the relation of the alphabet as being the entities with which all of English language is written, and comparatively associating it with the various aspects of microbiology presented in the paper, from numerical taxonomy to pharmaceutical microbiology.

Line 2: The term alphabet was coined from alpha and beta, the first two letters of the Greek alphabet

Line 3: The term 'raw' here refers to the uncooked sense, and after things are autoclaved, hence, sterilized, they are ready to be used, essentially, as if they have never been used, or cooked, before

Line 8: The idea here is increasing one's knowledge of various pathogens, from their names to their nature.

Line 11: Immunology is the course that really explores and brings to the fore the vulnerability of microbes, and macrophages specifically are known to 'eat' microbes, (from phagein – to eat) hence the illusion to crunch, a certain onomatopoeic expression for an act of eating.

Line 12: The Jackard coefficient is a coefficient of association employed in numerical taxonomy to group microbes into related taxa based on matching characters, where, characters that both organisms lack are not taken into account. It is said to be a brain lunch because the reader, upon seeing a new expression, will research and know it, hence, exercising his brain, in other words, giving his brain a lunch, or, if he knew it already, he will smile and recall, also giving his brain a lunch.

Line 16: *Neisseria* species have a particularly bad rep, or, reputation, two type species are: *Neisseria gonorrhae*, associated with gonorrhoea - a sexually transmitted disease, and *Neisseria meningitis*, known for its ruthless pathogenesis and brutal symptoms.

Lines 17 and 18: Part of the mystique of microbiology is its exotic-sounding, awe-inspiring specie names, and two common, yet cool ones are presented here.

Line 19: Quorom-sensing is a bacterial technique for checkmating population density through expression of signal protein. The term hug, in humans, signifies affection, bond and relation. As used in this context, it signifies inter and intra relation betwixt and among variegated microbial species and populations.

Line 23: The urinary tract infections have been proven to have a penchant for attacking the elderly, obviously due to immunosuppression, however, young maids are also particularly susceptible due to their uro-genital caricature.

Line 25: This line serves to show that since antiquity, microbiology is a "marketable course", and it is incorporated in the poem to invoke elements of job opportunities for microbiologists in the reader.

Line 26: Microbiology is closely related to medicine in general. The x-ray referred here is not the one to detect broken bones, rather, it is the one done to detect parasites after administration of barium emulsion to patients.

Line 28: The *Zika virus* can be fatal, and zidovudine is administrated against AIDS - a disease once synonymous with death.

Mr. Yunusa Yahaya Riko is a graduate of Microbiology, Umaru Musa Yar'adua University, Katsina.

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NSM MEDIA TEAM

CONGRATULATES MEMBER ON HIS WEDDING CEREMONY

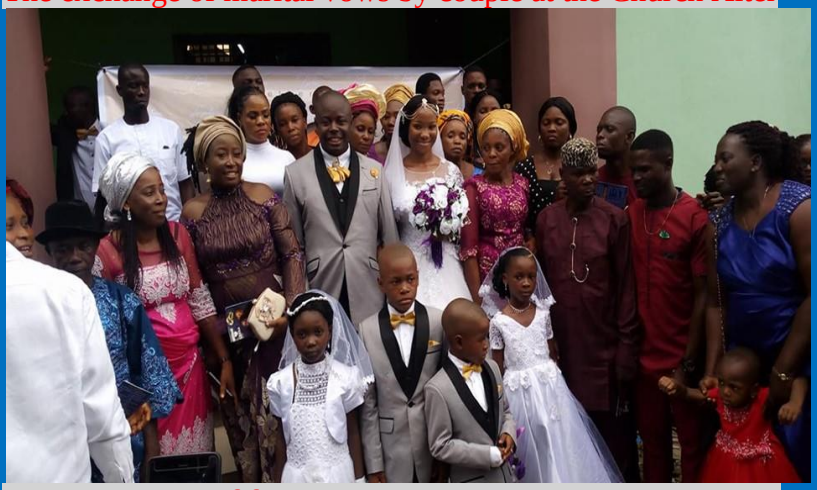
By Iyiola Olatunji Oladunjoye, Port Harcourt

The Nigerian Society for Microbiology (NSM) Media Team has congratulated one of its members, Dr. Leera Solomon on his wedding ceremony. Dr.Leera is a member of NSM Media Team and currently, the Associate Editor of the Society's Newsletter. He was joined in matrimony with his beautiful wife, Tornebari by Apt. S. L. Mgboalu on Saturday 6th July, 2019 at The Ascension Apostolic Church Worldwide, International Headquarters, Port Harcourt. The historic event was graciously attended by learned academics and well-wishers including Major G. O. N. Nwagbara, Profs. N. Frank-Peterside, S. N. Ibe, E. C. Wokoma, L. O. Odokuma and L. C. Osuji. The NSM President, Prof. M. B. Yerima, ably represented by the HOD, Microbiology Department, University of Port Harcourt, Dr. C. J. Ogugbue charged the couple to live in peace.

The Bride: Mrs. Tornebari Leera-Solomon

The exchange of marital vows by couple at the Church Alter

L-R: Prof. Nnenna Frank-Peterside, groom & bride (middle) with Prof. Stella N. Ibe at the reception



A cross section of family and well-wishers at the occasion

NEWLY ELECTED NSM
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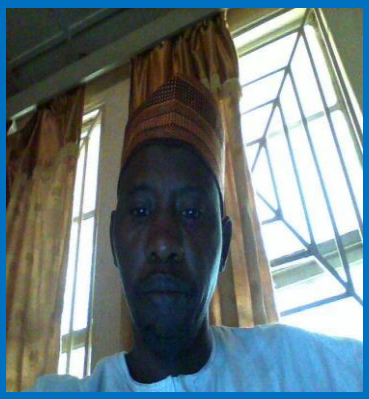

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NSM INAUGURATES NEW MEDIA TEAM

The Nigerian Society for Microbiology (NSM) has inaugurated its new media/publicity team. The team was constituted in 2018 and charged with the following responsibilities: (i) publicize the national activities of NSM along with the Public Relation Officer (PRO), (ii) publish the Society's Newsletter and (iii) manage its social media pages such as Twitter, Instagram, LinkedIn and Facebook. Team members are:

1.	Dr. B. T. Odumosu	Editor
2.	Dr. Leera Solomon	Associate Editor
3.	Yahaya Yunusa Riko	Member
4.	Joshua Oluseyi	,,
5.	Iyiola Olatunji Oladunjoye	,,
6.	Kamalu Ikechukwu Okechi	,,
7.	Epueke Mmaduka Mathew	,,

Always visit the Nigerian Society for Microbiology (NSM) online via the following:
Website: www.nsm.ng
Twitter @Nsmicrobiology
Facebook: @Nsmicrobiology
Instagram: @Nsmicrobiology
Linkedln: @Nsmicrobiology

Bamidele T. Odumosu, Ph.D.

REPOSITIONING THE NIGERIAN SOCIETY FOR MICROBIOLOGY FOR BETTER SERVICE DELIVERING

The Nigerian Society for Microbiology (NSM) is the parent body of all microbiology related societies in Nigeria. The society was founded in 1972 by passionate scientists who saw the future needs for all microbiologists to come together as one body and provide solutions to our country. Overtime the impact of the society had been felt in various areas such as food, industrial, medicine, environment and other related disciplines.

However, increase in developmental challenges and interests have evolved overtime and it seems these challenges have somehow affected the impact of this noble society. In the light of this, NSM is now poised for great awakening of the field of Microbiology and its impact in the development of this country and beyond. We have rebranded NSM in terms of our impact and mission for the nation. The National Executive Council (NEC) have taken the 'Professionalization of Microbiology' as a front burning task that must be achieve against all odds (I believe efforts on this matters are being emphasized).

Our membership drive has tripled over a short period of time because we now have various interactive platform where members can directly communicate with one another and receive immediate response. Our 'Telegram Group' can accommodate tens of thousands of our members at once with active participants of all our executive members across the nation. Our website has been fully rebranded for seamless activities such as user accounts, direct registration and membership renewals; application form are available for downloads and much more. We are visible on all relevant social media pages and our response time is unbeatable.

Our student arm, Nigerian Association of Microbiology Students (NAMS) is fully incorporated for mentorship and fast induction into the profession. Our teaching styles and technology usage is now fully integrated into our students because we strongly believe they are the future of the society we build. We saw the need for all these in the face of new tides and we are prepared to move with time. We therefore welcome you to a new era and for you to join this noble profession where our only culture is microorganism.

Dr. Bamidele Tolulope Odumosu
Department of Pharmaceutical Microbiology
University of Lagos, Akoka Yaba Lagos
National Public Relation Officer

NIGERIAN SOCIETY FOR MICROBIOLOGY

APPLICATION FOR MEMBERSHIP

I wish to become a member of the Nigerian Society for Microbiology

1. Name……
(Surname) *(Other Names)*
(Title)…… *(Date of Birth)*……

2. Academic Qualifications: ……
3. Field of Specialization: ……
4. Occupation: ……
5. Years of Experience: ……
6. Permanent Address: ……
7. Correspondence: ……
Tel. NO…… FAX……E-mail……
8. Class of Membership required: (Tick choice): Full/Fellow/Honorary/Life/Corporate/Student
9. (i) Registration:

	= ₦6,000.00		**Annual Dues:**	Full/Honorary =	₦ 6,000.00
Full/Honorary	Student (UG)	=₦ 1000.00		Life =	₦ 20,000.00
	Life =	₦		Corporate =	₦
	20,000.00		200,000.00		
	Corporate =	₦		PG student=	₦ 1000.00
	20,000.00			UG student=	N 500.00

(ii) **Payment:** Pay to any branch UNION BANK NIG. PLC (Idi-Araba, Lagos)
ACC NO: 0007380241, ACC NAME: NIGERIAN SOCIETY FOR MICROBIOLOGY
Scanned copy of Teller be sent to the Secretary via e-mail address: nsmsecretariat@yahoo.com, ualiyu@gmail.com
** Student membership forms MUST be endorsed by his/her HOD*

…… …… ……
HOD's Name Signature Date

10. Specialized groups (tick choice): A member of NSM must belong to, at least, one group
(a) **Industrial, Food and Pharmaceutical Microbiology Group**
Incorporate all aspects of Industrial and Environmental Microbiology, Food Microbiology, Pharmaceutical Microbiology
(b) **Medical Microbiology and Parasitology Group**
Incorporate all aspects of Pathogenic Microbiology, Immunology, Virology, Parasitology, Public Health.
(c) **Agricultural Microbiology Group**
Incorporate Plant Microbiology and Pathology, Rhizobiology, Soil Microbiology, etc.

11. **Declaration:** I declare that the information given above is correct.

Signature…… Date:……

Send the completed form to:

Dr. Usman Aliyu Dutsinma
The Secretary,
The Nigerian Society for Microbiology (NSM),
Department of Microbiology, Faculty of Sciences,
Bayero University, Kano, Kano State, Nigeria.

FOR OFFICIAL USE ONLY

The above named Prof./Dr/Mr./Mrs./Miss……Of……has been accepted as……member of the Nigerian Society for Microbiology (NSM) upon payment of……naira for which Receipt No……of……was issued. Received by Secretary on……Secretary's signature:……Information sent to Treasurer on:……

UNIVERSITY OF PORT HARCOURT

TO HOST THE 43RD SCIENTIFIC CONFERENCE & AGM OF NSM IN 2020

"NSM-UNIPORT2020"

University of Port Harcourt will play host to the 43rd Scientific Conference and Annual General Meeting (AGM) of the Nigerian Society for Microbiology (NSM) in 2020. As the renounced Entrepreneurial University of Port Harcourt prepares to host members of the NSM family and other professionals in 2020, Associate Editor, NSM Newsletter, Dr. Leera Solomon, obtained a brief history of the citadel of academic excellence and that of Microbiology Department from the H.O.D., Microbiology for the *NSM Newsletter.*

The University of Port Harcourt was initially established in 1975 as the University College of Port Harcourt. But in 1977, the University was granted a full university status. Microbiology as a discipline was at a time designated "Microbiology Unit" (like the other disciplines) in the then School of Biological Sciences. The unit metamorphosed into a full-fledged Department of Microbiology on October 1, 1983. However, the Department turned out her first set of graduates (B.Sc. in Microbiology) in 1981.Since then, the number of students in the department has grown tremendously over the years. The Department offers one of the most diverse areas of bioscientific and biotechnological studies including Environmental, Food, Industrial and Medical Microbiology and these areas have generated considerable research and practical interest globally. In line with the National Universities Commission (NUC) and with respect to the Minimum Academic Standard (MACS), the Department emphasizes the concept of relevant broad-based training comprising biological, chemical and physical sciences as well as arts. The knowledge impacted is to produce graduate who will be of considerable service to academia, food and agricultural industries, breweries, medical/pharmaceutical establishments, oil/gas industries, etc. In this regard, many of our graduates are self-reliant and gainfully employed in various sectors of the economy including Government Regulatory Agencies, Petro-chemical industries, Food Manufacturing Industries, Public-Health Establishments, Universities, Polytechnics and others.

The Department is located in the hub of oil and gas business in Nigeria and contributes positively to the industry through relevant research outputs and the training of capacity. Thus, it contributes to local and national development. According to the Head of Department, Microbiology, Dr. C. J. Ogugbue, the department is poised to host the 43rd NSM Scientific Conference and AGM in September, 2020 and welcomes all Microbiologists and other professionals in Nigeria and the diaspora to this august meeting. It promises to be an epoch-

making event in the treasure base
of the Nigeria, he stated.

PHOTO GALLERY FROM NSM SCIENTIFIC CONFERENCES AND ZONAL SYMPOSIA HELD IN 2018

Prof. S. A. Ado (left) and Prof. J. D. Mawak (right) and their colleague (middle) sitting at the 41th NSM Scientific Conference and AGM held UMYUK2018

Dr. B. T. Odumosu (4th middle) being flanked by newly inducted NAMS Executives at Chrisland University Abeokuta, Ogun State in 2018

Prof. Idris Isa Funtua (VC UMYU Katsina) and Prof. Auwalu Uba (VC Bauchi State University, Gadau

Prof. Olaitan DVC Osun state University presenting an award to the Honourable commissioner in Katsina State who is a Microbiologist during UMYUK Conference 2018

A cross section of Delegates at the 41st Scientific Conference and AGM in UMYUK

R-L: Profs. E. S. Amadi, O. C. Ugbogu, K. I. T. Eniola, N. C. Nwachukwu, Mr. Happy Ndom and Dr. Hope Okereke at the 6th NSM S/E Annual Zonal Symposium ABSU2019.

MICROBIOLOGY AND ADVANCES IN TECHNOLOGY

Being a summarized paper presented by Dr. (Mrs.) C. B. Chikere at the 6th South-East Zonal Symposium and Annual General Meeting "ABSU2019" of the Nigerian Society for Microbiology (NSM)

Dr. Chioma Blaise Chikere, MRSB
Senior Lecturer
Environmental Microbiology & Bioremediation Division, Department of Microbiology, Faculty of Science, University of Port Harcourt, Port Harcourt, Nigeria.

The history of microbiology can be traced to the year 1675 when Anthony van-Leeuwenhoek first reported his observation about the oral microbiota. This initial report has been the basis for several technological advances that have been recorded in the study of microorganisms and their interactions with hosts or the environment. One of the major milestones during the early stages of microbial studies was the successful cultivation of microorganisms using solid culture media by Robert Koch in 1888. This breakthrough enabled the understanding of microbial physiology, however the development of microscopy revealed disparity in microbial numbers observed under a microscope and those found on solid media. The study of microbial communities and their interactions was terribly impeded as only less than 1% could be cultured using the available culture-dependent techniques. However, the invention of high through-put sequencing techniques, which eliminate the need for cultivation, has revolutionized the study of microbes. Microorganisms can now be studied in their natural microenvironments and their functions determined using multi-OMICs techniques. This involves the use of marker genes (16S rRNA, 18S rRNA, ITS) for microbial characterization (metagenomics), determination of their response to perturbation (metatranscriptomics), determination of their functions (metaproteomics) and products of their interactions (metabolomics). Milestones from the current OMICS studies include the treatment of autism and gastrointestinal tract infections in humans through microbiome transfer; Detection of microbial signatures of colorectal cancer; Understanding of complex microbial interactions that drive remediation; Discovery of biomarker taxa and pathways (Figs. 1 and 2). Current microbiological revolution came with its own challenges of handling big data, requirements for computational skills for data analyses and interpretation. Despite this complexity, life scientists

are encouraged to have a good knowledge of computing so as to allow them carryout appropriate experimental design for unearthing novel microbial functions and products.

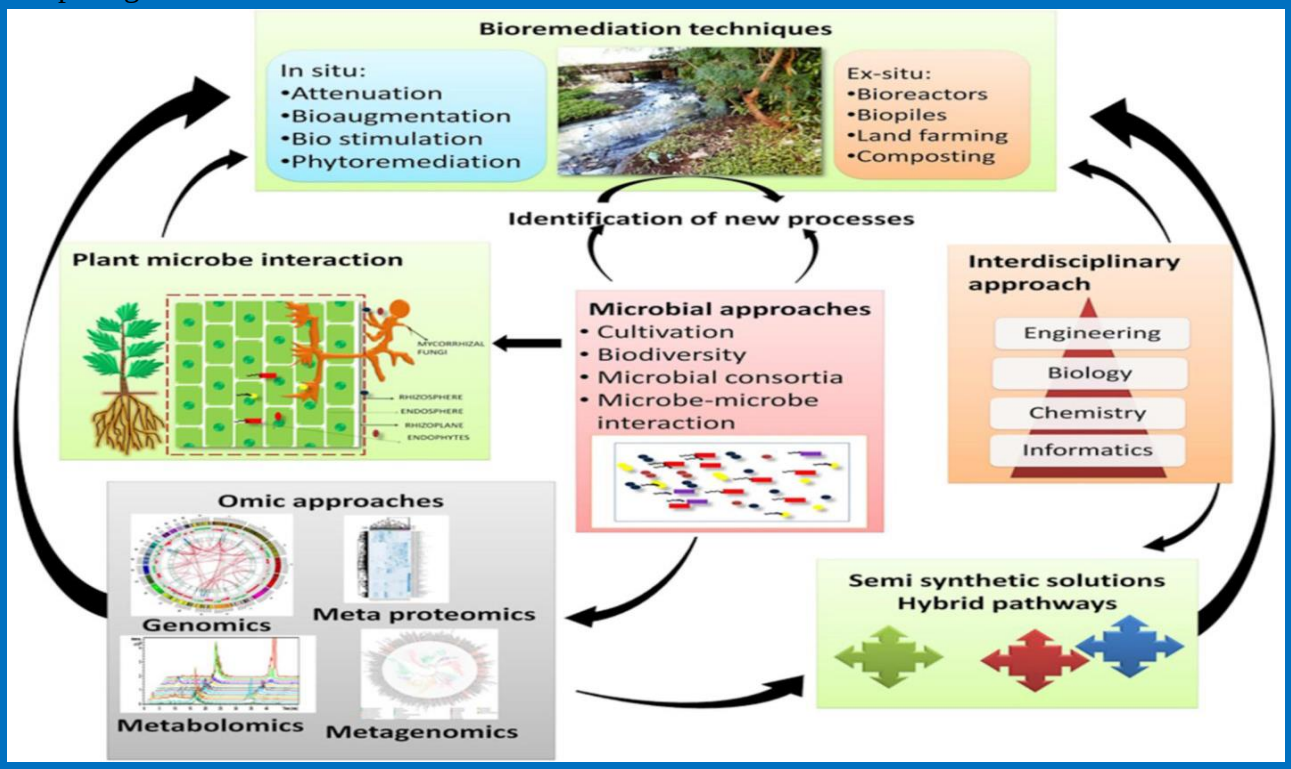


Fig. 1: Novel approaches that enhance remediation of environmental pollutants.

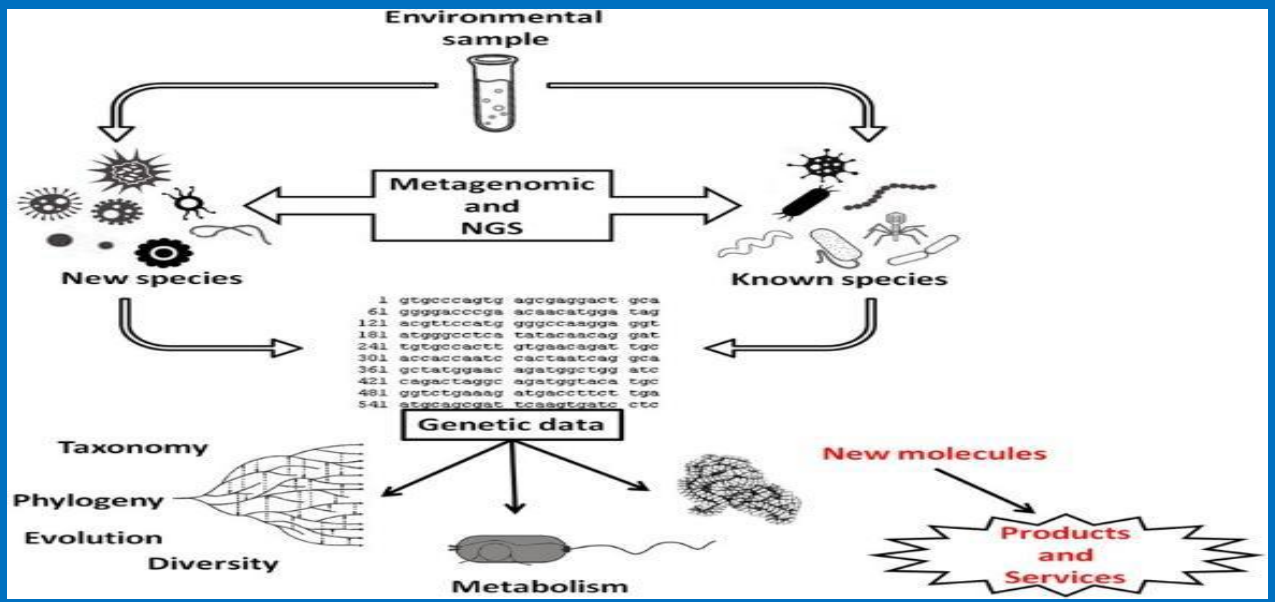


Fig. 2: Beyond microbial ecology – the discovery of new biomolecules and biomarkers.

NEWS FLASH FROM THE DESK OF THE NSM NATIONAL SECRETARIAT

NSM Micro-Register

The Secretariat is about to update the Micro-register of members on the society's website. Consequently, members are enjoined to pay their annual dues, as only up-to-date members will be included on the list, which will be assessable to all institutions and organizations to verify any one claiming to belong to the society. The account details of the society for your annual dues and other payments are as follows:
Account Name: Nigerian Society for Microbiology
Bank: Union Bank
Account Number: 0007380241

Membership Certificates

The national secretariat has a large number of uncollected membership certificates. Members are urged to come to the Nigerian Society for Microbiology Scientific Conference and Annual General meeting coming up at Crawford University, Igbesa, Ogun State and University of Port Harcourt, Port Harcourt in 2019 and 2020 respectively, to pick them.

Nigerian Journal of Microbiology

Full-length articles can be submitted for consideration in the official Journal of the Nigerian Society for Microbiology titled Nigerian Journal of Microbiology (NJM). The paper(s) should be saved with the surname of the first author with NJM as prefix and sent as an e-mail attachment to the editor-in-chief, Prof. S. A. Ado, via e-mail address: salehado@yahoo.com.
The Journal website could also be accessed via: www.nsmjournal.com

News Flash!

The National Executive Council of the NSM at its 2017 first quarter meeting held on 11th March, 2017, at the Joseph Ayo Babalola University, Ikeji-Arakeji, Osun State, approved the appointment/reappointment of the following as zonal co-ordinators for a period of two years (2017 through 2019):

North-West

Prof. S. A. Ado

Prof. M. B. Yerima

North-Central

Prof. M. D. Makut

Prof. S. O. Obiekezie

North-East

Alhaji Modu Bukar

Dr. E. Udosen

South-East

Dr. E. S. Amadi

Dr. E. Archibong

South-West

Dr. D. Oluwole

Prof. D. Arotupin

South-South

Dr. C. J. Ogugbue

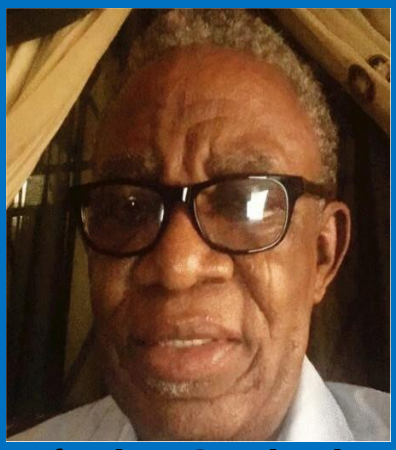
Dr. Usman A. Dutsinma
National Secretary, NSM

THE NIGERIAN SOCIETY FOR MICROBIOLOGY NEWSLETTER

Congratulates VCs

Prof. Julius Kolawole Oloke
Precious Corner Stone University, Ibadan, Oyo State

Prof. Olukayode Amund
Elizade University, Ilara-Mokin, Ondo State



Prof. Deboye O. Kolawole
Crown-Hill University, Eyenkorin, Ilorin, Kwara

Prof. Auwalu Uba, *FNSM*
Vice Chancellor, Bauchi State University, Gadau

Prof. Diran Famurewa
Kings University, Ode-Omu, Osun State

www.nsm.ng.