



Entomology in Nigeria: The Past, the Present and the Future

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ABSTRACT. Against the backdrop of the evolution of Entomology as an important science which dates back to the establishment of Biology as a field of study, an attempt has been made in this paper to define the relevance of the science of Entomology and to enunciate its essence in the past, its potentials in the present and the prospects for the future with particular reference to Nigeria. Early entomological imprints were typified by the activities of the foundation entomologists which led to the inauguration of the Entomological Society of Nigeria (ESN) in 1965. The monumental roles played by these fore bearers at building the agricultural economy of the newly independent Nigeria positioned agriculture (through appropriate insect pest management) as the main stay of the nation's economy at the time. The ESN which started in Ibadan as a branch has grown significantly to over 18 branches with over 600 members. The past of Entomology revealed the activities and support of expatriates mainly from Great Britain who provided the much needed national pest management services. However, this past gradually terminated and ushered in the first generation Entomologists between 1960 and 1969 with significant achievements reflected in high agricultural exports in Nigeria. The present era which commenced around 1970s till date is characteristically marked by significant explosion in the number of trained Entomologists, better organized ESN as platform for interaction and communication especially with the outside world and good practice. The future of entomology in Nigeria is very bright but would be moulded positively by several factors including improvement of entomological research funding, better mentoring, resuscitation of moribund research facilities, prominence at the national front and professionalization of the science of Entomology. National Entomologists are therefore encouraged to work hard to reposition insect science in Nigeria in order to shape the nation's collective future.

Keywords: Nigerian Entomologist, Entomological Society of Nigeria, Cocoa pests, Insect Science, moribund research facilities.

INTRODUCTION

The science of entomology has evolved worldwide with a revolution. It is therefore a rare privilege to attempt a peep into the general

knowledge and practice of entomology in Nigeria as a science with particular reference to its evolution and development in the past, evaluate its current operations, challenges and prospects as well as make a sort of incursion and projection into its applications and future in Nigeria.

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Progressive Development of Entomology

Entomology is a field that is fully devoted to the study of all aspects of insects and other closely related organisms in the Phylum Arthropoda. Insects are the most abundant animals on earth and indeed more than one million different types of insects have been identified and described. Insects have existed on earth for more than 300 million years and so, they have mastered and conquered life on earth. They are found in just about every situation, location or habitat on earth and their life and activities influence and, or affect human beings in diverse ways. As an ancient science that dates back to the establishment of biology as a formal field of study by Aristotle (384-322 BC), entomology, has progressively developed into a full fledged field of study. The works of Shen Kuo which in 1061 AD described the role of predatory insects in protecting crops from insect pests, the anatomical works of Marcello Malpighi who discovered the insect Malpighian tubules in 1669, the systematic works of Carl von Linne in 1758 and the development of DNA fingerprinting tools which help match hard-to-identify larvae to adults that have been positively identified in 2005 (<http://en.wikipedia.org/>), all attest to the progressive developments that have become attributes of insect science over the years. Apart from the diligent works of early entomologists, this growth in insect science may also be attributed to the adaptation of the great scientific discoveries that occurred over the years. Consequently, the development of the compound microscope by Galileo Galilei in 1609, the complete crack of the genetic code by Rosalind Franklin in 1952 (<http://en.wikipedia.org/>) and other great scientific discoveries within and after these periods have all helped give birth to the modern day entomology.

Importance of Entomology

The relevance of insect science in today's world is by far more than what it was a century ago. In several countries, entomologists work to protect valuable crops from insect pests. Annual losses to agricultural insect pests are enormous and in some areas can result in up to a 25 percent loss in yield. Agricultural entomologists are thus

involved in several researches that help to manage and control insect pests' infestation of crops both on the field and in storage. In a similar way, Medical and Veterinary entomologists help protect humans and livestock from insect pests and insect vectors. Entomology also plays important roles in other sectors besides agriculture. In the medical and public health sector for example, entomologists work for federal, state and local public health departments and deal with pest control problems.

Entomologists are also engaged in public health work in different areas of research and in the control of house flies, mosquitoes, cockroaches, lice, fleas, ticks and many other pests that pose a health hazard or nuisance. Similarly, the military entomologists work for various branches of the armed forces and supervise pest control operations at a large number of military bases especially as found in the United States of America and other places. Research work and the protection of military personnel against insect-borne diseases and parasites are important aspects of entomology in the military service. Trained entomologists also help supervise the inspection of plants, fruits, vegetables, artifacts, baggage and animals at international ports of entry in many countries. Many countries also have laws regulating the activities of pest control operators and pesticide applicators. Entomologists help enforce those important laws and provide technical information needed to facilitate insect control work. In the area of criminology, Forensic entomologists play an important role.

Entomologists in this specialty use their knowledge of insect life cycles and behaviour to help police solve crimes.

Entomology in Nigeria: The Past

The Entomological Society of Nigeria

The science and practice of Entomology in Nigeria cannot be divorced from the activities of the Entomological Society of Nigeria (ESN). The ESN was formally inaugurated in 1965 by some frontline entomologists such as Professors Timothy Ajibola Taylor, Harry Caswell, M. A. Cornes and others. The idea might have been

motivated from the fact that most of these pioneers especially W.E. Eguagie, S. A. O. Adeyemi, M. A. Cornes and S. A. Apeji had been graduates of Imperial College, London while others went to other foremost universities in U.K. and other parts of the world where national societies of Entomology existed. These early entomologists mobilized their graduates and the Society started officially in 1965 with Ibadan as the first branch. The Constitution was drafted by these set of scholars while the logo was designed by Professor Anthony Youdeowei with *Dysdercus* as the prime insect; probably because Professor Youdeowei had worked on this insect. Most of the activities of the Society were carried out at the then Department of Agric. Biology, now Department of Crop Protection and Environmental Biology, University of Ibadan, Nigeria. The society has over the years grown and now extends far beyond the one Branch Society of 1965 to over 18 Branches nationwide. The past Presidents of the society include the following: Professors Ajibola Taylor (1967-1971), Afolabi Toye (1971-1975) and Anthony Youdeowei (1975-1979) from Ibadan branch; Dr Sam Apeji (1979-1983) from Zaria/Kaduna branch; Professor S.N. Okiwelu (1983-1988) from Port Harcourt branch; Professor R.A Balogun (1988-1992) from Ile-Ife branch; Professor Ajibola Daramola (1992-1996) from Ibadan branch; Professor B.A Okwakpam (1996-2000) from Port Harcourt branch; Dr Olupomi Ajayi (2000-2004) from Zaria/Kaduna branch; Professor Adeyinka Adesiyun (2004-2008) from Ilorin/Ogbomoso branch, Professor Mike Dike (2008-2012) from Zaria/Kaduna branch and Professor Daniel Enobakhare (2012 to date) from Benin branch. About 600 men and women are currently registered with the Entomological Society of Nigeria and the number is still rising. These registered entomologists work as professionals in Nigeria. The works they do include teaching about insects; working as extension entomologists (public educators who provide information on insects and their management in agricultural and urban environments); Apiculturists who are restricted to raising bees; enforcing quarantines regulations; performing insect survey work; consulting on integrated pest management topics

and selling insecticides. Others are controlling pests and conducting research on insect classification, taxonomy, biology, ecology, behaviour and control. However, the bulk of the total number of Nigerian entomologists are employed or engaged in some aspects of economy or applied entomology that deals with the control of pestiferous insects either at household, field or stored product levels. Yet, there are also several others who are unclassified but who work as amateur entomologists and hobbyists. Many of these study insects probably for the love and interest of it but they always provide very useful information on insect distribution, seasonality and activity patterns, identification, life cycles and behaviour.

Entomological Science in Nigeria: The Past and the early Emphases

Entomology has been practiced in Nigeria long before independence. Available literature shows that entomological research in Nigeria during the first half of the 20th Century and even up to the time of independence in 1960 was largely done by expatriates mainly from Great Britain (Taylor, 1967; Toye, 1974, 1987; Adesiyun, 2002). Thus, in this paper, the past shall be viewed as starting from independence and ending at the start of the new millennium. It is worthy of note that Nigerian entomology in the past is made up of several entomologists many of whom are still actively contributing to the practice of entomology in the nation today. This makes it difficult to categorize Nigerian entomologists into the past and the present as separate groups.

The founding fathers of the Entomological Society of Nigeria earlier mentioned made up the first generation (1960-1969) of entomologists in Nigeria. Apart from laying the foundation of the science in the country, these pioneer entomologists, also worked hard at mentoring the second generation (1970-1979) of entomologists in the country. The premium placed on mentoring by the first generation entomologists may be due to the fact that as at independence in 1960, only one Nigerian (Professor J.C. Ene) had training up to the Ph.D degree level in entomology (Adesiyun, 2002). In other words, there were just a handful of Nigerian entomologists within the first ten years

of independence thus the need to mentor new ones. Having laid a proper foundation for the study and practice of insect science in Nigeria through the founding of the ESN, the crop of pioneer entomologists began to work with particular emphasis on proffering answers to agricultural questions of national importance. This focus on agriculture in the early years was mainly due to the important place agriculture occupied in the nation at that time. It is pertinent to note that the interest of the colonial masters up to independence in 1960 was on export crops like cocoa, cotton, groundnut etc. After independence therefore, the focus of the first generation and second generation of entomologists was mainly on the control of the major insect pests that attacked such cash crops.

Publications from that era showed that great amount of researches were carried out to control major insect pests of cereal crops in the field like *Busseola fusca*, *Sesamia calamistis*, *Eldana saccharina* and *Spodoptera exempta* (Harris, 1962; Usua, 1966; Taylor, 1967, Adesiyun, 1980; Adesiyun and Ajayi, 1980). The major legume crops at that time were groundnut and cowpea. Consequently, much work was done to control the insect pest *Aphis craccivora* which transmits the groundnut rosette virus. Several researches were also done to control the various pre-flowering and post-flowering insect pests of cowpea (Taylor, 1967, Ezueh, 1981, 1982). The cocoa industry, which in the sixties was a key enterprise in the agricultural sector, relied solely on the cocoa insect pest managers. Consequently, entomological researches relevant to cocoa production and cocoa pest management were embarked upon. This can be illustrated with the story of the cocoa swollen shoot virus (CSSV). This disease was quite devastating to cocoa trees in West Africa and the only known control measure in the 1950s was to uproot infected trees and burn them. Up to 1.5m stands of cocoa were destroyed in Nigeria alone in an attempt to control CSSV yet the problem persisted. It was not until entomologists identified the mealybug complex of *Planococcus citri*, *P. njalensis* and *Ferrisia virgata* as insect vectors of the virus and devised strategies for their control that the incidence of CSSV was contained.

Around that period also, there were reports of the negative effects of the use of organochlorine pesticides on cocoa mirids which, probably led to the elevation of *Bathycoelia thallasina* to a pest status (Nwana, 1980, 1983, 2002; Youdeowei, 1973). Emphasis was thus placed on mitigating the negative impacts of organochlorine pesticides which were in common use at that time. The importance of taxonomy and systematics to the development and growth of the new field of insect science in Nigeria was recognized by these early entomologists. Though the aspect of insect taxonomy was perceived as very tedious and unpopular area, yet most of the early practitioners were involved in one way or the other with taxonomy probably because there was no other way to investigate any insect without its correct identity determined first. This goes to show how dedicated these early crop of entomologists were to quality research. At this juncture, it is worth mentioning that during this time the number of research publications was low mainly due to the importance placed by these early entomologists on thorough, conclusive and solution yielding researches. This kind of research however required an extended time, hence the relatively low number of publications at that time. Apart from the hard work and dedication of the pioneer Nigerian entomologists, the progressive and sustained development of entomology in Nigeria at that period was also due to the tremendous support they received from both the Nigerian government and the international communities. Expectations were high on them and to a modest extent they strived to meet up with these.

It should not be thought that the practice of entomology in Nigeria during the early years was not without its challenges. The daunting challenge of determining the ecology of cocoa farms which was needed to provide the required support for the cocoa industry was a major challenge. Also, in the area of taxonomy, the poor state of knowledge and dearth of taxonomists was initially a challenge. Nwana (2002) in his inaugural lecture said that his work with other entomologists had generated some 8,705 specimens made up of 147 species from 20 families in the order Heteroptera alone at Agodi, Ibadan. Unfortunately they were only able to establish the specific identity of only

48% of these despite the tremendous assistance received from Professor Ray Kumar, a distinguished taxonomist, then of the University of Ghana, Legon. However, as some of these early workers began to graduate and formally take responsible position in the Research Institutes and Universities, there was a significant increase in the number of articles on Nigerian insects.

However, towards the end of the seventies, a gradual shift in emphasis towards ecology and distribution of insect species began to emerge. This area at first complemented the earlier taxonomy focus but gradually became a major area of interest into which the second generation delved into. The bulk of the third and fourth generations (1980 – 1999) of Nigerian Entomologists were produced by the second generation entomologists. These group of entomologists together with their mentors practiced entomology at a time when the mainstay of the Nigerian economy was no longer Agriculture but crude oil. More focus was thus placed on other areas outside of those the first generations had laid emphasis on. As a result, researches on soil insect pests including termites, use of insects to monitor pollution in riverine areas, insect pests of different crops in storage, medical and veterinary entomology etc., gained more attention than they previously did during this period. Within the last ten years of the 20th Century, public outcry against the use of synthetic insecticides due to their deleterious effects on the environment and on non target organisms reached an all time high. Nigerian entomologists therefore joined the world in seeking alternatives to synthetic insecticides mainly through the use of indigenous plants parts and products.

Entomology in Nigeria: The Present

The advent of the new millennium marked a new dawn for the study of entomology and indeed the entire scientific world. The world had suddenly become a global village, access to research information increased greatly while research contributions took a global perspective. Today, entomology in the developed countries is practiced in such ways that will be termed as unique if not novel in Nigeria. For example, the adaptation of stochastic models to study host-

parasite interactions, the study of insect-to-insect or plant-to-insect chemical communication as chemical ecology, mitochondrial DNA analysis of field population of insects, RNAi researches in insects for the study of pests resistance, the use of DNA sequence alignment for phylogenetic analysis of insects and the employment of cybertaxonomy (Wheeler, 2008) in insect morphology and systematics are just some of the trending ways insect science is done today in those parts of the world.

From the foregoing, little doubt exists as to the advancement and consequent contributions of insect science researches from the developed countries to global development since the commencement of the new millennium. At present, some progress has been made over the years in the study of insect science in Nigeria. The number of entomologists in the country at present is obviously higher than what we had in the earlier years. Likewise, the methods and techniques employed in the past have also been improved upon. Notwithstanding, the present generation of Nigerian entomologists have not been able to make as much contribution to global development as their foreign counterparts. When compared to what obtains in the developed countries, it is evident that we are far behind. In addition, the focus and emphases of earlier generations have not been strengthened while too much focus has been placed on a few areas at the expense of other important aspects of entomology. In fact, it would not be inappropriate to describe insect science research in Nigeria today as lopsided.

Judging from the number of publications from Nigerian entomologists available online, it can be said that advancement is mainly in the areas of insect control both on the field and in storage. Even as wide as the control and management aspect of insect science is, the area of alternative chemical control using botanicals and plant materials has dominated a larger chunk of the Nigerian insect science researches. Other aspects like insect morphology have been reduced to the level of the classroom and have little or no presence in the entomological publications from Nigeria. To buttress this latter point, a search on google for publications on insect morphology by Nigerian scientists using the search words 'Nigerian publications on insect taxonomy and systematics

pdf' as at June 8, 2015 yielded only three publications on the subject – a publication by Dike, M. C. (1990), another by Ewuim *et al.* (2011) and a third by Okiwelu and Noutcha, (2014). A change of search words to 'Nigerian publications on insect morphology pdf' only yielded the work of Akintola *et al.* (2013) and the course wares of some Nigerian Universities on the subject. However, with the search words 'Nigerian publications on plant materials for insect control pdf', several relevant publications by Nigerian entomologists were obtained.

Entomology in Nigeria: The Future

The future of entomology in Nigeria would be greatly moulded or affected by several factors that range from science and practice to infrastructure and attitude. It is projected that insect science would explode in the coming years with great relevance to virtually all areas of our national development. This is because the science and practice would have gone through a revolution to the extent that new approaches to handling all issues would emerge. For Nigeria to catch up there would be a need for a paradigm shift to the emerging trends of the future. It is however unfortunate to note that we do not seem as a nation to appreciate this fact. Some of the challenges that appear to corroborate this non-preparedness may include the following; yet they are critically needful for national development.

Poor funding for entomological research must improve: Although this may not be limited to entomological research alone; support for critical and high tech research in entomology had dwindled to very critical levels just as it is for education in Nigeria. Most researchers working in both Universities and Research Institutes in Nigeria are poorly funded. There appears also to be no serious coordination in the funding of research to answer national questions; yet there is the Agricultural Research Council of Nigeria (ARCN) to coordinate this nationwide. It is only by keeping most of the researcher's pocket out of his research that he will be able to delve into researches that have more quality but which are expensive.

Poor and moribund state of research facilities must be resuscitated: Infrastructural decay for research has remained a major setback for quality research in Nigeria. This has made the depth and scope of research investigations to be either very shallow or not conclusive. Yet, quality researches need to answer basic national questions reliably to be relevant.

Research integrity and reliability must improve: Perhaps one of the major issues facing the research outputs from the Nigerian Agricultural Research system is the poor integrity and esteem of the research outputs. This is probably hinged on the poor state of research facilities including the national electricity power supply system, poor funding among other challenges. The implications are that international references to researches for Nigeria would be low as well as not trusted.

Researches for staff promotion nay national development had persisted and must abate: One of the major challenges of uncoordinated research output is the fact of emergence of fake and predatory journal outlets for publications. Since most Nigerian researchers especially the younger ones probably fund their researches themselves, the quality of such endeavours would always be low and sometimes the data presented would lack integrity and would have little esteem. This is probably to the extent that several self funded individual researches are directed at gathering papers for promotion only rather than for the purpose of answering key national questions for development. Such research output as these lack merit and usefulness. A classic example is the wave of publications on the use of plant extracts for control of storage insects without detailed study of the active principal components and their interactions with other chemicals and the environment. Yet, there is a preponderance of such researches today and the relevance of such had been called to question in many fora.

Poor mentoring must improve: Perhaps one of the strengths of the pioneer crop of entomologists in Nigeria that were earlier identified is the fact that their emergence was borne out of mentorship.

This attitude of mentorship appears to be not so prominent in our research institutions today and we would advocate an improvement in this area.

Prominence at the national front must be encouraged: The practice of entomological science in Nigeria appears to have lacked its usual luster and prominence in national issues. The usual warning signals on invasive species, comments on national challenges and several relevant issues which were hallmark of excellent practice appeared to have been dropped and gone. Yet these were only supposed to be the general practice.

Professionalization of the science of entomology: Unfortunately, an attempt was made to register the Entomological Society of Nigeria (ESN) as a professional body in Nigeria between 2004 and 2008 but this idea never saw the light of day. The militating factors include lack of understanding of the role of the professional entomologist in nation building. Yet in developed countries, the entomologist played key roles. For example, each state of the USA statutorily has a State Entomologist who functions effectively as a professional pest management consultant to the state and by inference to the nation. The ESN as a body of professional entomologists has the option of professionalizing for the purpose of public health rather than as an advocacy or enforcement group through the Federal Ministry of Agriculture, Health or Environment.

Poor training conditions need to improve: This is also one major challenge that could militate against the future of entomology in Nigeria. The quality of Ph.D. research had been compromised in several research establishments and institutions on account of poor staffing, inadequate funding, inbreeding and lack of exposure. It is noteworthy that there are Professors of Entomology in Nigeria who had never gone outside Nigeria to attend any conference whether major or otherwise. The implication of this lack of exposure is poor quality delivery and little or no productivity.

Poor motivation for scientific advancement: This has been identified as major among the

reason for poor enrolment in entomology. Several areas of specialization abound in the field of entomology as earlier noted ranging from veterinary, agriculture, medical, environmental to forensic and each of these has great prospect of relevance to national development.

All these are potential pitfall areas that could keep us behind as a nation from achieving the lofty goal of a body of professional providing solution to key national questions.

CONCLUSION

An attempt has been made in this paper to define the relevance of the science of Entomology and to enunciate its essence in terms of what the relevance of this science had been in the past, its potentials in the present and the prospects for the future. Having said all, it is hoped that some insight has been gained from past experiences and that by making a conscious and deliberate effort as individuals and as a body, we shall all work hard to reposition insect science in Nigeria and by so doing play a significant part in shaping our tomorrow, our future.

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