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Inaugural Lectures Series 4

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BIOLOGY

by Professor L. B. Halstead

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IFE AND BIOLOGY

by

L. B. Halstead

Professor of Zoology

An Inaugural Lecture delivered at the
University of Ife, on 14th March, 1972

Inaugural Lectures Series, 4

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AN Inaugural Lecture is an occasion to survey one's field, to explain what it is one does, to demonstrate its relevance and to place one's own contributions into their general perspective. It is in fact an opportunity for a kind of academic licence. However, today I intend to outline my attitude to life, to discuss some general questions, which I believe are important to us and which have implications for Biology at life. I shall illustrate my arguments with examples culled from my observations and experiences here, which though local, may I suspect, have relevance to many young universities in this part of the world.

Life is renowned in history and in art and the presence of a university will surely enhance its reputation.

In a general way, it can be expected that the four areas of life to which the university, and especially the natural sciences, can be expected to make a real contribution to society are health, nutrition, the exploitation of natural resources and culture. It seems reasonable to suggest that the University of life be geared directly to problems presented in these four areas.

Public health, nutrition and the exploitation of natural resources are intimately related and are, of course, the concern of any government, which has the responsibility for formulating and implementing policies in these areas. The universities are quite properly required to train the appropriate personnel in medicine, agriculture and the development of natural resources. This is not all that difficult but there is a "sociological barrier" between say producing doctors, public health officers, nurses, paramedical and other ancillary staff, and effecting improvements in public health. This is where the cultural aspects come in. It is not sufficient to train people in techniques alone, to teach them what ought to be done. Rather they should concentrate on what can be done, always with the longer term ambition of accomplishing what ought to be done. It is vital that primary insistence should be on what is practicable—i.e. what is acceptable to the ordinary man and woman in society.

People have their own way of life, their long-ingrained beliefs and traditions. If a university-trained expert comes along to tell them what they ought to do, he will be listened to with politeness and completely ignored. The expert will become disillusioned and frustrated. Not only will he accomplish nothing, but all the expense, in manpower and material, that went into his training will be wasted.

Advanced technology in itself is not enough. A classic case of the dangers inherent in ignoring a people's traditions is provided from England. In one of the coalfields, a fully automated coal mine was established, which was a technological showpiece throughout the continent of Europe. For the mine to function it had to run twenty-four hours a day, seven days a week. There was only one snag, it did not work. Millions of pounds invested in this venture

were wasted, simply because no-one thought it worth the trouble to consider the miners and their way of life, their traditional Friday night drinking and weekend activities with their families. The miners would not, under any circumstances, relinquish these aspects of their social life and so the automated coal mine became something of a joke. At least it provides a vivid example of what can happen, if a people's traditions are ignored.

Although the implementation of policies is the responsibility of government, the university has an obligation to make certain that the government is fully aware of the nature of the "sociological barrier" and of the possible avenues by which it may be overcome. With the universities providing such a service, enabling government policies to be implemented with the minimum of disturbance, the future of the universities as viable and integral institutions in society would be assured. An example, of the sort of thing I have in mind, is the work of Robin Atkinson, the resettlement architect of the Kainji Dam scheme. Virtually alone on the continent of Africa, the resettlement of 40,000 people of diverse cultures was accomplished with no breakdown of the local economy and with no violence. This was only possible as a consequence of the detailed studies, in depth beforehand, of the way of life of the people, and a detailed programme of dissemination of information.

It is evident that enormous effort must be put into overcoming the "sociological barrier" but this is not a one-way process. Most traditional practices have been built up by trial-and-error over innumerable generations. They have become firmly established, because they are the most appropriate for the prevailing conditions. There is an underlying folk wisdom in most practices that may not be obvious to the expert. Both sides have much to learn and to teach.

An example of the practical value of considering aspects of local culture has been provided here, at Ife, by our small termite research project with its research student S.L.O. Malaka. He is concerned with finding an effective biological control method to protect crops and buildings from termite attack, whilst allowing the beasts to continue the good they do in the soil. Replies to questionnaires he distributed to local farmers repeatedly referred to "local" and "native" methods of termite control. Rather than go around telling farmers what they should be doing, Malaka has been asking them what they do. The result has been the "discovery" of a whole series of biological control methods. These have now to be tested scientifically. The lesson is surely obvious. There is a wealth of knowledge already here waiting to be tapped.

What is clearly necessary is to awaken an awareness of the life around us, our environment and cultural heritage.

As a minor contribution to this, L. W. Cahill and I have set up the life branch of the Nigerian Field Society. This society was established many years ago and caters for all people with interests in the fauna, flora, culture, history and past-times of West Africa. The society is essentially recreational with popular lectures and monthly excursions.

Similarly, the university is properly concerned to encourage such interests among the students, to arouse enthusiasm among them in areas outside of detailed academic studies. A series of general studies programmes has been produced, which will be implemented this October. Every student will henceforth learn about African history and culture. Students reading for a degree in one area will be obliged to follow a general course in a quite different discipline. This will widen their horizons and give them an appreciation of different attitudes derived from differing backgrounds.

The motto of the university is *Learning and Culture*. The university has long fulfilled, and continues to fulfil, its responsibilities in the former, it is now realising it must not neglect the latter. The latter, however, has never been neglected by the students. Without wishing to appear partisan, I cannot avoid mentioning a society, a day older than the university, to which both you, Mr. Vice-Chancellor and I are privileged to belong, that has always ensured that Nigeria's culture flourished on this campus.

Indeed our relationship towards our students is a matter to which we must pay very careful attention. Here Professor T. Grillo has shown a realistic and forward-looking approach. He is on record as stating that "it is essential that students must participate in both curricula planning and evaluation".

While this is undoubtedly the right attitude to adopt, there are certain areas in which the staff alone must bear the entire responsibility, in particular the need to maintain the highest academic standards. But just as we must not give students a class of degree that they do not merit, by the same token, we must ensure that we do not prevent the best of our students from achieving what they clearly deserve and would, in fact, obtain in any other institute of higher education. At present Ife has a system of assessment, which I and many external examiners, at least in biology, find invidious. The second year grades are considered in the final assessment for the class of degree and in virtually every case, this is to the detriment of the student.

In the second year the students have to follow a variety of courses. It is not possible for every brilliant student to shine equally in all branches—it is important only that they prove themselves competent and pass all the relevant parts. In the final year, when they specialise, their true abilities come to the fore. At this stage they really mature

and their potential can be fully recognised. Had I taken my first degree here, I would have been denied my class of degree. Last year's external examiner, has begged me to try and do something about this situation, as he considers it to be unfair on the students, as indeed I did when I was an external examiner. Our undergraduates have, I suspect, a built-in disadvantage. I would not say they should be given an unfair advantage, merely that we ought to recognise what we are doing. Standards must never be allowed to fall, but we must not only be concerned with the bottom end of the scale, we must pay most particular attention to the top students. The best students have their rights too!

It is important in any work we do in the university, connected with students, to have some kind of feedback mechanism so that the entire system is prevented from either running off the rails or up cul-de-sacs. This is a fundamental property of all biological systems.

We have recently set up a small Staff-Student Council to provide an avenue of communication between staff and students, for a free interchange on all matters of mutual concern.

From my experience, I have found that when the students are consulted during the early stages of any discussion and the staff are perfectly frank regarding the problems that may arise, the students respond with maturity and responsibility.

Our Council is organised in the following way. To begin with, there are no rules, except that it is concerned only with academic matters. The Council determines its own procedures. It meets at least once a term or whenever the staff or students wish a meeting to be convened. Immediately after every meeting, a report is made available to all staff and students.

Regarding the composition of the Council, the only stipulation is that the majority must be students, who must be elected by the students themselves. It is not possible for the staff to nominate a student member for the Council. Any topic relating to the Department can be brought up for discussion, for example, the quality of the teaching in general or in individual cases, course content or the examination system. It is firmly understood that the staff have an obligation to explain their policies and decisions to the students.

It is important to remind ourselves, on occasions, that the students, we endeavour to teach, are at the height of their intellectual powers. We have long passed ours! But we have the advantage of accumulated experience in our academic disciplines. The excitement in a university, at least as regards our intellectual pursuits, is in this powerful combination of youthful probing minds, with those of maturity and experience. Staff and students should be united in common cause.

In the university our prime concern must be the students and teaching must be our first priority. But teaching and research are not mutually exclusive, they must always go hand in hand. The teacher will derive enormous benefit from his contact with students, by just chatting to them informally about his work. He will find that they will ask him basic questions that will make him think. The students for their part will get some insight into the nature and the excitement of scientific research. The teacher, who is an active research worker, will communicate something of his enthusiasm to his students, which will invigorate the atmosphere of the Department.

From what I have said so far, I think you will see that I believe teaching to be a most serious matter. From this it follows that the most senior and experienced staff members should be responsible for the most critical aspects of any teaching programme. This means the first year teaching because it is in the first year of the university that the foundation is laid for all the rest.

In the more elementary courses, the lack of suitable teaching aids in biology in this country is a serious problem, but one that is capable of resolution. Not only do we have a responsibility to our own undergraduates in this, we must also consider the needs of the schools whence our students come. Both schools and universities, for example, require dissection guides, to be able to study representative examples of Nigeria's animal life. Dr. A. O. Segun has already provided such guides. Indeed, he has been providing a major service to the teaching community. It is our intention to publish, in the near future, a series of such guides, which will serve not only the needs of Nigeria but in fact the whole of West Africa. Guides to earthworms, the edible land snail, freshwater mussels, land-crabs and, not surprisingly, our Ife campus fruit-bat are already in the process of preparation. The first two are nearing completion and are virtually ready for the press. It is important to remember that these guides represent the first scientific descriptions of the anatomy of these important animals. These books are research publications in a way that guides to the European and North American animals have never been.

This project will perform a signal service to biological education in West Africa, as well as being of great benefit to our own students.

Which brings me to consider the type of research done here. The impression I have recently gained is that many academic staff members, with higher degrees obtained in Europe and America, have been trained in tackling rather limited specialised problems. Here, they struggle to continue their earlier work and are met by frustrations consequent upon the lack of the appropriate sophisticated equipment. Strange as it may seem, these same men supervise student research projects that make real contributions, while they themselves accomplish little. The reason, I think is the brainwashing

they have undergone. The idea inculcated is that to be modern in science you need sophisticated instrumentation, without it you become so old-fashioned so you might as well not bother!

But here's the rub, the same people that make this claim also make jokes of the African scientist who tries to emulate his supposed mentors, on the ground that he is not trying to tackle the scientific problems facing his own country. Yet if he does so, he is met with the contemptuous sneer of being old-fashioned and out of date in this modern world.

If we look round, we find that the most highly respected of Nigerian scientists are those who have withstood the contempt of others and have accomplished what they considered to be relevant in their own context. The moral of this is that training in research, at least in the biological sciences, to be effective should be initiated here, in the conditions under which the researchers will ultimately be working. The time has long passed when it could be said that there were not the facilities in both men and equipment here for the supervision and development of research.

There is no question whether Ife has the personnel to handle many viable research projects. It has. The only problem holding us back is, to my mind, the lack of self-confidence. We insist on research students doing post-graduate course work during their first year. This is a system which may suit America but must we copy it at Ife? It is reasonable to require post-graduate students to follow courses, to rectify some omission or other in their basic training. But my own feeling is that the most effective method for training a student in research is for him to actually start doing it, under the guidance of experienced supervisors. Such people are here and we are faced with the ironic situation that a student cannot be registered for a higher degree unless there are appropriate post-graduate courses listed in the university prospectus. This is a serious matter, because if the university recruits senior research men in a particular field, say for three years, they cannot accept research students until a post-graduate course programme has been devised and been passed by innumerable boards, by which time it will not be possible for a research student to receive adequate supervision because the supervisor will have left at the most critical juncture!

I would like to make a plea for more flexibility in the present system and more realism. The system now supposedly operating contains more fiction than fact. Biological Sciences offers courses which could not all be provided simultaneously even if its staff were doubled. I suspect this situation applies throughout the university. If a suitable biological candidate appears, we can at least register him now. Fortunately, we do not have too many research students at the moment but their numbers will increase and then we will be

in real difficulties. Why not hold the course system in abeyance for the present? I do not understand why we cannot accept suitable candidates for research simply on the grounds that appropriate supervision is available.

One of our tasks is the training of research students for the degrees of Master and Doctor of Philosophy. This training in research must involve the preparation of material for publication. In science a piece of research cannot be said to be done, until it is communicated. The medium of this is publication in either a scientific journal or a book. This involves perhaps the greatest discipline. I have very strong views on this matter, which I have previously outlined in the columns of the scientific journal, *Nature*, but I do not think it will do any harm to reiterate them here.

The preparation of old-fashioned Ph.D. theses results in university libraries accumulating, over the years, hundreds of copies. At the University of Reading—a small English University—there are one hundred and twenty feet of shelving bearing theses; in the larger industrial universities of Britain the numbers must be astronomical. Each of these theses represents three years full-time research financed by government or industry and three years supervision by a senior member of the university staff, as well as accessory technical assistance and the constant use of expensive equipment and consumables. Each Ph.D. must cost several thousands of pounds. In all too many instances, the return for this outlay is a thesis on a library shelf and a piece of paper for the candidate, which ensures that he will command a higher salary than he could otherwise have done.

This seems unnecessarily and excessively expensive. Indeed, I know of cases where research students have gained their Ph.D's and only later have discovered that the identical research had been carried out in another university, again for a Ph.D.!

It is our hope that all research conducted in Biological Sciences for either an M.Phil or a Ph.D. will have to be written up in a form suitable for publication. If not already published, such papers should be in press or at least have been submitted to a reputable journal. By this means, a return for the large financial outlay will be guaranteed and the candidates will be trained to conduct research realistically.

On the grounds of cost-effectiveness, obligation to the scientific community and the self-interest of the candidates we commend this system, which is explicitly encouraged in Ife's regulations. We hope it will become the rule rather than, as at present, the exception.

This brings me to a matter which may seem trivial. It is not. A certain proportion of our budget should be devoted to buying reprints of the publications of the staff and students. It is by means of exchanging reprints with other research workers and institutions that information is disseminated. This costs money but it has bene-

ficial consequences that are immeasurable. We hope to distribute our results to all the major centres in the world. This is one sure way of putting life firmly on the map of international science. It is one of our determined aims—the more people know of our activities the greater will life's reputation become and the greater the financial support we can call upon from outside. In effect, we are merely asking the university to make a modest investment in us—the returns will be incalculable. If we produce the goods, we want the university to help us tell the world about it.

So far, I have discussed a number of general and rather domestic questions. But it is just such issues that will determine the effectiveness or otherwise of our general scientific progress.

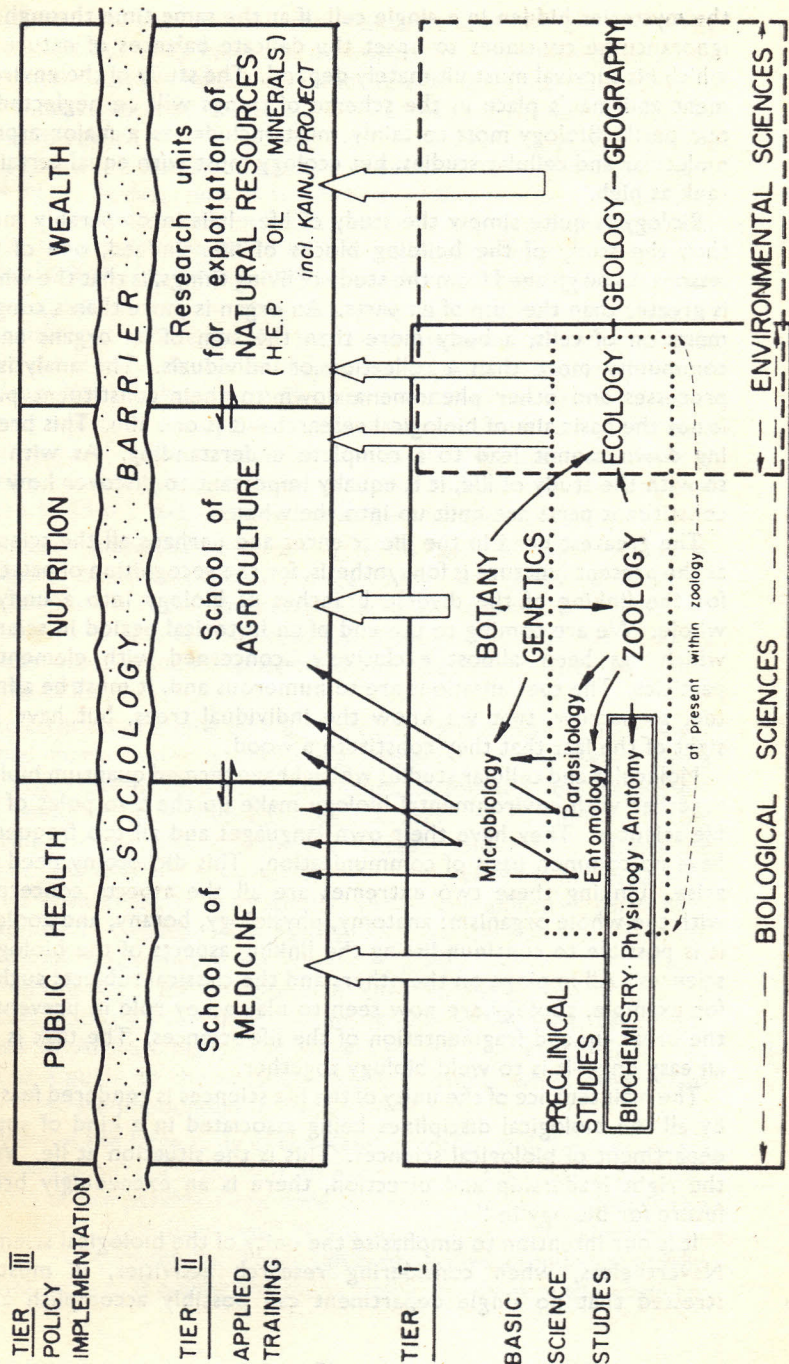
One can visualise the organisation of the natural sciences, in its broadest interpretation, in three tiers. The foundation consists of basic science studies: biology, chemistry, physics, geology and so on. These subjects deal with vocational training in specialised branches to produce microbiologists, biochemists, parasitologists, fishery biologists, hydrologists, oil geologists and many others.

At the same time they relate closely to further vocational studies. In medicine and agriculture, the second tier—training for the direct and immediate application of knowledge acquired. The third and final tier is the actual implementation of policies which involves overcoming the sociological barrier, which I discussed at the beginning of this lecture.

The Faculty of Health Sciences, the Kainji Research Project and the Faculty of Agriculture are all concerned with the direct application of knowledge for the welfare of the population, in both the long and the short term. These aspects of university activities have a degree of urgency about them. However, the workers in these fields do not begin immediately, they require a basis from which to start. They need knowledge and training in tackling problems—a strong background in the biological and environmental sciences is a prime necessity.

Not so very long ago in an article, in the *London Times* entitled "A New Approach to Biology", it was stressed that a new School of Biological Sciences at a university will concentrate its teaching and research on cell and molecular biology. Indeed, this is a trend common to perhaps the majority of biology departments in Europe and America. There can be little doubt that significant advances in our understandings of the fundamentals of life will accrue from these endeavours. But, it is important always to remember that this is not any means the whole of biology. It must be stressed over and over again, that it will not benefit mankind one iota, if he can unlock

THREE-TIER DIAGRAM: NATURAL SCIENCES AT IFE, NIGERIA.



the mysteries hidden in a single cell, if at the same time through his ignorance he continues to upset the delicate balances of nature on which his survival must ultimately depend. The study of the environment and man's place in the scheme of things will be neglected at our peril. Biology most certainly must include, as a major aspect, molecular and cellular studies, but ecology must with equal certainty rank as high.

Biology is quite simply the study of life. It is incomparably more than the study of the building blocks of life. Indeed, one of the lessons, to be gleaned from the study of living things, is that the whole is greater than the sum of its parts. An organ is more than a conglomeration of cells, a body more than the sum of its organs and a community more than a collection of individuals. The analysis of processes and other phenomena down to their constituent parts is not the basic aim of biological research—it is one aim. This breaking down cannot lead to a complete understanding. As with life so with the study of life, it is equally important to discover how the constituent parts are built up into the whole.

The greatest need in the life sciences and perhaps all the sciences at the present juncture is for synthesis, for the recognition of patterns for the linking of the diverse branches of biology into a unifying whole. We are coming to the end of an historical period in science, which has been almost exclusively concerned with elementary particles. The specialisations are so numerous and, it must be admitted, so narrow, that we know the individual trees, but have lost sight of the fact that they constitute a wood.

Molecular and cellular studies which I have termed quantum biology together with environmental biology make up the two poles of the life sciences. They have their own languages and all too frequently have no common basis of communication. This dichotomy need not arise. Linking these two extremes are all the aspects concerned, with the whole organism: anatomy, physiology, botany, and zoology. It is possible to continue listing the linking aspects of the biological sciences. All impinge on the others and the classical subjects such as, for example, zoology are now seen to play a key role in preventing the break-up and fragmentation of the life sciences. The task is not an easy one—it is to weld biology together.

The maintenance of the unity of the life sciences is rendered feasible by all the biological disciplines being associated in a kind of super-department of biological sciences. This is the situation at Ife. With the right leadership and direction, there is an exceedingly bright future for biology in Ife.

It is our intention to emphasise the unity of the biological sciences. Nevertheless, when considering research activities, it must be stressed that no single department can possibly accomplish all it

would like. We have limited resources and these must be used to the greatest effect. They must not be dissipated by spreading ourselves too thinly over the entire spectrum of our particular discipline. It is imperative to concentrate our resources, so that we achieve the optimum return for our efforts. The time has long past, when we could afford the luxury of every individual following his own personal bent. Today, such is the nature of the problems being faced that we need to work in teams. Only by the combination of our united talents can we hope to compete effectively in the international arena. We have simply to decide on our priorities.

Having said this, I am obliged also to say that I am preaching to the converted. Here, at Ife, the brightest jewel in the biological crown is the Kainji Research Project team, which Professor Imevbore has lead with enthusiasm and inspiration over many years, often meeting and overcoming great difficulties. Needless to say, the core of our research interests must remain Kainji. We have in this, already existing research project, a firm foundation and it is on such that we can build the strongest and most permanent edifices.

Professor Imevbore has working in his team biochemists, microbiologists, botanists, zoologists, geologists and even sociologists. The close and friendly co-operation across disciplines is a model we must strive to emulate. Indeed, Kainji unites and, I suspect, has by its benevolent influence prevented the fragmentation of biological sciences at Ife.

The creation of a new lake by impounding the mighty river Niger has had many consequences, some immediate, some longer term. First, Nigeria now has a major inexhaustible source of power; people have been displaced but have new sources of livelihood; fishing flourishes on the lake, providing a valuable source of much-needed protein. But it is not as simple as this. The way of life of the Niger's fish has been changed dramatically; some have adjusted, some have not adjusted. Gradually life has had to adapt to the new situation. The Kainji researches have closely followed these developments from before the river was dammed, through the period of flooding and continuously ever since. Kainji is one of the most effectively studied of Africa's man-made lakes and the results obtained will serve as a guide to the possible course of events when other man-made lakes are impounded in tropical Africa.

In view of the large scale of the Kainji research and the concomitant financial support, there is an ever-present temptation to think in terms of comparable large scale projects. It is easy to forget the long uphill struggle from small beginnings that preceded the present favourable circumstances. There can easily evolve a tendency, indeed one sees hints of it among the more junior members of the academic

staff, to look first to supposedly charitable grant-awarding bodies in America and Europe. This whole idea of first looking outside for help instead of to oneself is part of a general disease, a cultivated helplessness, to say nothing of the lessening of respect that develops in the patron.

In any event, before long this situation will be a thing of the past. As Professor Adebayo Adedeji, now Federal Commissioner for Economic Development and Reconstruction, has emphasized African countries must begin to seek for technical assistance among themselves, rather than looking to European countries all the time. The current four-year national development plan indeed stipulates that eighty percent of the required finances must come from local sources. Nigeria in fact plans to step up its aid to other African countries.

Nigeria is one of the potentially richest countries in Africa and it is, hence, a little incongruous to maintain the pose of being a poor indigent relation.

Although it is our determined intention to build up terrestrial ecology to the level of the already established aquatic, we have begun this from modest beginnings with our termite research project, initially in co-operation with Southampton University. We feel it is vitally important to establish a secure foundation as the basis for future expansion. We will only feel confident in applying for substantial financial support from outside, once we have proved we are capable of doing the job.

There is no doubt that the termite research project is already firmly established as a viable concern. Termites cause damage to buildings, stored foods and growing crops, that must be measured in hundreds of millions of pounds every year in Nigeria. Yet, paradoxically, termites do much good by aerating the soil and bringing minerals from deeper to more superficial levels. The problem is to stop the harm but not the good. Application of persistent insecticides to the soil will create serious long-term problems, which are now becoming glaringly apparent in Europe and America. The aim is to discover biological controls that do not disturb the delicate balance of nature. For this it is necessary to understand some fundamental aspects of termite feeding and behaviour. Such studies are now in hand. In the meantime, termites munch on. Problems cannot wait. In fact, the termite research project has provided help for the university farm regarding the destruction of its coconut seedlings, and has made proposals for the preservation of the isolated trees around the university buildings. These attractive features of the campus are doomed as a consequence of the voracious attention of termites.

Here we have a minor case history of what can happen when the ecology of a habitat is interfered with. When the bush is cleared the

termites' natural enemies, and most of the plant debris on which the termites feed are removed. In order to survive, the termites have no alternative but to attack that which remains—the large isolated ornamental trees. Eventually with a high wind, because they are eaten up from inside, the trees will fall down and the manner of this will not take into account the susceptibilities of either persons or property. A number of vehicles will meet their demise beneath a palm tree.

This situation just outside this lecture hall emphasises the vital importance of ecological studies. The campus is aesthetically pleasing, now. In a few years time, many of its most attractive features will have vanished. If it is in the high forest zone and if the policy to transform major areas of the campus into parkland or "formalised savanna" is pursued, then it must be pointed out that the cost of maintenance will become a crippling burden on the university. Erosion from increased run-off will devastate the land of the campus, unless expensive drainage systems are installed.

A more recent example of ecological management, again at present on a modest scale, is given by our fruit-bat colony of at least 750,000 individuals. The straw-coloured fruit-bat, *Eidolon helvum*, is both an asset and a nuisance. The constant noise and damage to the trees is to be deplored. On the other hand, fruit-bats are popular palatable protein. They are hunted assiduously with catapult and gun. Guns disturb residents as well as bats, catapults disturb bats and break windscreens.

At present an attempt is being made to protect the bat colony and it is partially successful. Without the disturbance of incessant hunting, they spend their days asleep causing the minimum of nuisance and damage. The presence of £N50,000 worth of high quality meat on the campus cannot and, indeed should not, go unremarked.

The colony is cropped weekly, in selected areas, for food and also for university teaching and research purposes. I sincerely hope that the area bounded by Road 2, Road 4 and the Staff Club track will be designated a nature reserve and hence the bat colony may be preserved for our benefit.

Later in co-operation with Professor A. A. Adegbola of the Department of Animal Science in the Faculty of Agriculture and Professor G. R. Howat of Food Technology, we hope to conduct detailed studies on the domestication and/or cropping of grass-cutters (*Thryonomys*) and bush-buck.

These animals are familiar as providers of exceedingly nutritious delicious meat and the more we can learn about them the more likely is there the chance of turning them into regular domesticated animals. From my own experience the most tender and tasty meat in Nigeria is bush-meat.

This is not, of course, the whole story, grass-cutters and other rodents are serious pests as they do considerable damage to farm crops, especially seedlings, as well as to stored produce (even museum specimens!). Dr. E. E. Okon is developing his earlier studies on bio-acoustics with a view to applying this new science to the biological control of rodent pests.

Although I have only mentioned three ecological areas with which Biological Sciences is currently concerned, it must not be forgotten that there are many others.

There are, however, certain other areas such as the Blood Group Laboratory and a number of biochemical and genetic studies that are concerned directly with medical questions, and which properly belong in the new Faculty of Health Sciences. It is illogical, at the present juncture, for Biological Sciences to attempt to run research projects on human blood in conjunction with local hospitals. Such projects should be incorporated into the appropriate divisions of Health Sciences.

In proposing such divorces, I do not advocate the wholesale dismemberment of biology. I envisage the closest of co-operation with Health Sciences, especially as the entire rationale of this new faculty is ecological. I would not have been surprised if the term Human Ecology had been applied to it. I realise that this may have aroused certain emotions in members of the Faculty of Social Sciences who have long championed the subject of human ecology at Ife.

One of the most necessary prerequisites for the success of research in all branches of ecology is a natural history museum, a matter stressed by Professor Olaniyan in his Inaugural Lecture as Professor of Zoology at Lagos. Such a museum provides essential reference collections for biologists and geologists. Furthermore, it can become a window on the natural history heritage of this country. Under its auspices, the university will be able to make significant contributions to the education of the community, regarding the natural history resources of the country. Similarly, the museum will have an important role to play in the teaching of our undergraduates.

Ife has long been committed to the establishment of a natural history museum and at the beginning of this session recruited Mr. B.H. Newman from the British Museum of Natural History. His encyclopaedic knowledge and vast experience over two decades in all matters relating to natural history museums augurs well for the future success of this venture. The theme of the museum is to be the Ecology of Nigeria. The first part of this is an exhibition of Lake Kainji, which is now well-advanced. Behind-the-scenes curatorial work, which forms the scientific basis and value of a museum are also well in hand. The internationally famous Rosevear Collection

of Small Mammals, housed in Ife, is now in the process of curation, so that researchers from other places will be able to study the material. The Ife Natural History Museum is already becoming an integral part of boiology at Ife.

In conjunction with the Natural History Museum, it should be remembered that we already possess one of the world's most imaginative Zoological Gardens, planned and executed by Mr. L. W. Cahill who came to us from being Director of the Zoological Gardens at Calgary, Canada. Mr. Cahill has not only developed the Zoological Gardens but has maintained the extensive Nature Reserve which is justly the pride of the campus. (Indeed the ascent of Hill Three via the Chimney is an unforgettable and exhilarating experience).

With such expertise at our command, it is small wonder that the ecology of Nigeria and, of course, the Ife Campus itself should exercise our minds.

At this stage of the proceedings, however, I think I should confess that I am not an ecologist. But as I hope I have made clear I am a vehement supporter of this particular subject. I have not come here to develop my own specialities. To my mind one of the most important issues in any institution of higher education is continuity.

All too often one finds the same pattern being repeated. An energetic man is appointed, develops his own speciality, and builds up a flourishing school. Then he leaves. There is a vacuum, there is no longer any direction, the once flourishing school loses its impetus and becomes moribund. Morale sinks. In fact, over and over again, there is a lack of continuity. To my mind this is the hall-mark of failure.

Let met be frank, I have only come to join in Ife's endeavours in biology because I believe that the policies to be pursued are the right ones. Having said this, I find it is impossible to resist the temptation of recording my activities during December last year. In the company of Dr. Ian Wilson and Mr. S. L. O. Malaka, I spent a fortnight in the Sokoto region looking for prehistoric reptiles of seventy million years ago. A few scraps had been discovered in the 1920's and published by Professor W. E. Swinton in 1930.

Professor Swinton guided me in my early researches on fossils and it seemed to me a good idea to spend the Christmas vacation hunting for fossil reptiles, as a relaxation from university committees! So off we went and came back with the most perfect, in fact the only complete, fossil reptile skull to have ever been found in West Africa. This will surely have pride of place in Ife's Natural History Museum.

There is a recognition that Nigeria's antiquities represent a valuable heritage of this land. A heritage that should not be wantonly removed by collectors from other continents.

Nigeria should retain the treasures of its past. In much the same

way, I believe the treasures of its still more ancient past should also be preserved within its borders. However, it is necessary for scientific materials to be made available internationally. I consider that, for example, scientists should be free—indeed should be encouraged—to visit Nigeria and collect fossils, as they already do. But I think it is important that such materials should only be removed from Nigeria on the strict understanding that when the researches are completed the specimens will be returned to Nigeria. In this way, the country's heritage is not eroded away and at the same time materials are made freely available to the scientific community. Although my work on fossils has no immediate value to the economy, it does help enrich our awareness of Nigeria's ancient history. In the not too distant future the Ife Natural History Museum will mount a full-scale expedition to collect further specimens.

My main research interest, as has now become apparent is on bones and teeth, also on the biochemistry of fossil proteins and the microstructure of vertebrate hard tissues. For the past decade I have been on the staff of the Royal Dental Hospital of London, where I shall be spending this coming summer to complete my text-book on *Vertebrate Hard Tissues*, which will encompass molecular and cellular aspects, as well as the tissues themselves. Although I am committed to the development of ecology at Ife, I do not intend to neglect my own speciality, as I consider it does have a place in the scheme of things. Indeed, consideration of the past history of life on this planet can give a hint of possible developments in the future. These, when spelt out, may even appear to be of sufficient relevance and immediacy that they are interpreted as subversive and revolutionary. I can only conclude this, as I was banned from South Africa as a consequence of lecturing on the past and future of man to the geology students of Natal University.

But I have spoken long enough. I have outlined in some detail my views about life and biology. We are determined that life will be pre-eminent in the biological sciences. We are confident in our collective ability.

We do not expect to be assessed on what I have said today, we do expect to be judged on results.

