

A PROPOSAL FOR CAPACITY STRENGTHENING: INSECT TAXONOMY IN AFRICA

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Introduction

Taxonomy is perhaps the oldest branch of biological science having its origin in the curiosity of the early naturalists who sought to discover and name the biota of the earth. It has long been considered an old-fashion discipline and discriminated against in terms of funding support for human resources development and capacity strengthening by way of physical infrastructural facilities. Over the last three decades, mankind has been bedeviled by the topical issue of global change and its concomitant effect in terms of an increasing loss of biological diversity. This has led to the emergence of Conservation of Biodiversity as a vibrant aspect of science that has continued to attract considerable attention and funding from the international community. However, biological diversity entails the species richness of the ecosystem, the structure of their populations, their interrelationships and interactions with their habitats. It is the large storehouse of genes from which the emergent discipline of biotechnology will depend for advancing resources exploitation. Given this definition, a critical role for taxonomy in the conservation of biological diversity is readily discernible as no one conserves what is not known.

Critical role of taxonomy in biological diversity

That there could be a taxonomic impediment in the realization of the objectives of the Convention on Biological Diversity (CBD) has been amply demonstrated in Decision II/2 of the CBD SBSTTA of 1996 which states thus: “*Capacity building for taxonomy should be linked to the effective implementation of the Convention of Biological Diversity, particularly the national identification of areas of high diversity; improving the understanding of ecosystem functioning; giving priority to threatened taxa, taxa that are or may be of value to humanity, and those with potential use as indicators for conservation and sustainable use of biological diversity*”. This has been the basis for the formulation of the concept of a Global Taxonomic Initiative (GTI). As noted by Cresswell (2000), the deliberations of the fourth Conference of Parties (COP IV) in Bratislava in 1998 highlighted the need for fundamental taxonomic knowledge of biological diversity to underpin the key objectives of the CBD.

Insects are presumed to constitute about three-fourths of all living animals on earth. They fill many niches in both terrestrial and aquatic ecosystems; and a good number of them are celebrated pests of agricultural, medical and veterinary importance. Existing knowledge on insect biodiversity is poor and no one knows exactly how many species of insects exist. Widely divergent estimates have been provided including up to 30 million species (Erwin, 1982), 12.5 million (Hammond, 1992), and 5-15 million (Stork,1997). More startling still is the simple fact that less than a million species have actually been described; and a large majority of the undescribed species are in the third world. According to Slater (1984), it is there that most of the species of the world occur, and only a very small proportion has been described. It is also generally believed that enormous gaps exist in the understanding of the phylogeny of various groups, especially that are predominantly tropical. These are either simply unknown or known from very fragmentary information obtained through itinerant collections that provide data of very little value in interpreting evolutionary trends.

Sub-saharan Africa is prominent in the group of third world countries where the dearth of knowledge on insect biodiversity is very acute. The region is also generally depauperate in taxonomic knowledge of various groups of living organisms; and most especially, insects. This is so because for decades past, most of the countries have relied on the benevolence of their colonial

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masters/developed countries institutions for free biosystematic services in the form of identification of insects, mites, other arthropods, fungi, nematodes etc. even after independence. As observed by Jones (1993), this is now fraught with problems with the free services no longer available as the resources of the benevolent developed country institutions become stretched in the face of contemporary events. For instance, there has been an upsurge of environmental and biodiversity programmes worldwide. There has also arisen the imperative to adopt integrated pest management systems for both pre- and post-harvest crop production (with classical biological control as a component); and many countries have become committed to Agenda 21 and the Biodiversity Treaty of UNCED. All these will mean a heavy demand for the taxonomic expertise of the developed country institutions which they can ill afford free. They also underscore the crying need for a capacity building effort on biosystematics in sub-saharan Africa.

Funding support for taxonomy

For some three decades now, there has been an increasing global concern among biologists on the need for an improved funding for biosystematic work. Thus, in 1973, the General Assembly of the International Union of Biological Sciences (IUBS) approved a resolution urging all governments, especially those providing technical assistance to developing countries, to strengthen taxonomy and especially the infrastructure required for training taxonomic manpower. Similarly in 1980, the Association of African Insect Scientists (AAIS) made far reaching recommendations for the improvement of biosystematic research and services in Africa. These among others included the development of infrastructural base and indigenous manpower (Akingbohunge, 1981). At the final plenary session of the 1984 International Congress of Entomology in Hamburg, Germany, a resolution was also passed urging all governments to provide budgetary allocation for training and employment of biosystematists. Subsequently, the International Advisory Council for Biosystematic Services in Entomology (IACBSE) was formed to foster the ideals of the resolution. IACBSE tried in this respect by setting up a worldwide network comprising representatives from different regions to push the idea of taxonomic capacity strengthening globally. Its various project proposals including research and training especially for the developing countries however did not materialize. Thus, it wound up at the 1988 International Congress of Entomology in Vancouver, Canada. Rather fortuitously, a rebirth of the ideals of IACBSE occurred a few years later eventually leading to the formation of BioNET-INTERNATIONAL (Jones and Cook, 1993). Further crystallization of the idea of the organization led to the establishment of various networks worldwide to facilitate South-South and North-South collaboration in the development of biosystematics.

Current status of insect taxonomic capacity strengthening in Sub-saharan Africa

The preceding paragraphs shows clearly that a lot of concern has been shown for the poor state of taxonomic knowledge and expertise in developing countries; and some positive steps have been, and are still being taken to ginger up funding support for taxonomy in order to remedy the situation. Thus far, some dividends have accrued from these steps as evident in the development of the Department of Entomology in the National Museums of Kenya (NMK) as a regional centre for taxonomic research and identification services for eastern Africa; and the rapidly evolving Insect Museum of the International Institute of Tropical Agriculture Substation, Cotonou, Republic of Benin. (IITA). But for most of the other sub-saharan African countries, very little progress has been made; and what is prevalent are poorly curated reference collections mostly of insect pests, many of which are very small holdings in some University/Research Institute Departments without any resident taxonomist. Even in the case of NMK and IITA, the number of resident taxonomists is abysmally low though perhaps understandably so in the latter case. This dearth of taxonomic personnel capable of carrying out taxonomic research to unravel the vast array of African biota, especially the insects, will continue to constitute perhaps the greatest impediment to the conservation of biodiversity in the continent. Some short courses have been run to offer some training in the identification of pest organisms. For example, the International Institute of Entomology, London (IIE) has for long been running series of annual short courses ranging from

one to many weeks covering taxonomy of insects, nematodes, fungi and other microorganisms of economic importance. A similar Eastern African Training Course on Insect Identification and Biosystematic Services is also run by NMK periodically. However, these courses can only equip the trainees with knowledge on routine identification services and the identification of some broad groupings such as Orders and Families. They cannot make the trainees to become research taxonomists; and besides, many of the trainees are primarily applied entomologists who only go back to their institutions to continue with their pest control work after the training, hardly ever again doing any taxonomic identification.

Proposal for an African Regional Postgraduate Training Programme in Insect Biosystematics

The emerging picture from the above analysis is that there is a dire need for a crash programme for the training of research taxonomists in sub-saharan Africa, especially in respect of insect taxonomy. Previous attempts at capacity strengthening in terms of personnel for insect taxonomy in the region have concentrated largely on training for identification services. This is even in contemporary times being exacerbated by the development of multimedia interactive keys (albeit by the research taxonomists of the developed countries). Taxonomy however involves the hierarchical arrangement of organisms after appropriate nomenclature. Thus, identification presupposes the existence of classification which clearly is the preoccupation of research taxonomists. It is therefore advocated that an African Regional Postgraduate Programme in Insect Biosystematics (ARPPIB) be initiated following after the model of the existing African Regional Postgraduate Programme in Insect Science (ARPPIS) which has been used over the years for correcting the dearth of applied entomologists that was once prevalent in many sub-saharan African countries. The opportunity offered by BioNET-INTERNATIONAL through its LOOPS and their NETWORKS can be put to advantage in this respect to foster an effective South-South and North-South cooperation in nurturing the training programme. Broadly speaking, it will involve the following:

- a) Identification of biodiversity monitoring projects that are of crucial importance and requiring immediate attention.
- b) Providing Fellowships for postgraduate studies to be undertaken with research topics in the selected biodiversity monitoring projects.
- c) Designating appropriate host country University where ARPPIB will be based for purposes of programme administration and course delivery for the students; and hooking up a number of other participating universities with it in a consortium arrangement.
- d) Recruitment of students from African countries with an appropriately selected biodiversity monitoring project.
- e) Participatory teaching of postgraduate courses by qualified staff in the consortium of Universities within the ARPPIB.
- f) Establishment of an exchange visitorship to allow staff of appropriate taxonomic institutions within the NETWORKS of BioNET-INTERNATIONAL LOOPS to be involved in (e) above as may be required from time to time.
- g) Co-supervision of the research projects of students by appropriately designated staff drawn from the staff in (d) and (e) above .
- h) Establishment of student exchanges in form of short term visitorships to give students the opportunity of utilizing and understudying the reference collections /other facilities in the appropriate countries of the BioNET-INTERNATIONAL LOOPS where the Co-Supervisors of their research projects are based.

- i) Development of adequate level of internet connectivity to facilitate (e) and (g) through the use of CD-ROM, teleconferencing and other germane distance learning tools.

Organization of the proposed ARPPIB

It is suggested that a University with a core of taxonomists and an approved postgraduate programme that can be adapted for ARPPIB be selected to serve as the host institution within each of the three NETWORKS comprising the African LOOP of BioNET-INTERNATIONAL (i.e. WAFRINET, EAFRINET and SAFRINET). All other Universities in the sub-region will be hooked up to the host institution in the form of a consortium for the training and research of the postgraduate students in the ARPPIB. Competent staff for teaching the approved courses will be drawn from the host institution and its consortium of other Universities. Additional staff to complement any deficiencies can be drawn from any of the two other NETWORKS or from any NETWORK within any of the developed country LOOPS of BioNET-INTERNATIONAL. Supervisors for the research projects of the students will similarly be selected as above except that Supervisors chosen to complement deficiencies in research specialization shall be designated as Co-Supervisors collaborating with an appropriate staff within the consortium of Universities in the ARPPIB to supervise the work of the affected student. The student recruited for the ARPPIB will be expected to carry out research on a particular biodiversity monitoring project in his/her own country. For a Ph.D. programme, the first year of the student will be devoted to completing all prescribed courses and also defining a research topic. The second and third years will be devoted largely to field and complementary laboratory works. Part of the fourth year may be spent in a developed country institution to utilize appropriate reference collection and other facilities to fine-tune the completion of the thesis work, and as well understudy the general aspects of the reference collection. At the end of the fourth year, the student will normally be expected to complete the thesis and submit to the appropriate University. A similar arrangement as above shall be made for M. Sc. students but the scope of courses and research work shall be scaled down appropriately to a period of two years. Type specimens accruing from the research projects of the students will be deposited at designated taxonomic centres in their countries while voucher specimens will be given to other designated centres within the NETWORK and also the institution of the Co-Supervisor of the student.

Conclusion

The ARPPIB given adequate donor funding support to facilitate fellowships, exchange visitorships and some equipment /supplies, can within a period of five to ten years yield a sizeable crop of Insect Taxonomists in sub-saharan Africa. The multiplier effect will also be quite substantial and will ensure sustainability of biosystematic services in Africa with great dividends accruing for conservation of biodiversity in the continent.

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