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PLANT SYSTEMATICS AT PERADENIYA

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ABSTRACT

Systematics is basic to all plant science research, the reliability of which depends on the correct identity of the plant investigated. A plant's scientific name is the key to the literature on it. Alexander Moon published the first flora of Sri Lanka in 1824; then followed G.H.K. Thwaites' "Enumeratio Plantarum Zeylaniae" in 1864 and "A Handbook to the Flora of Ceylon" - an outstanding contribution by Henry Trimen from 1893-1900. Extensive research by these superintendents/directors of the Peradeniya Botanic Gardens brought international fame and in 1901 led to the inauguration of Sri Lanka's second oldest scientific journal "Annals of the Royal Botanic Gardens, Peradeniya", the forerunner to the 'Ceylon Journal of Science' (CJS), published till 1924. The 'CJS, Section B' and 'CJS, Biological Sciences' have superseded this. Over the years, as information on plants accrued, the angiosperms and ferns were revised with funding till 1979 from the Smithsonian Institution, instigated by Prof. B. A. Abeywickrama and supported by Dr. F.R. Fosberg and thereafter by the British Overseas Development Administration. These projects have benefited Sri Lankans in many ways.

INTRODUCTION

Systematics is the branch of Plant Science which concerns itself with the recognition of (establishment of the identity of) different kinds of plants, giving them names (nomenclature) and classifying them according to phylogenetic relationships (Lawrence, 1951).

It is basic to all plant sciences research, whether it is in plant physiology, biochemistry, ecology, etc., and also in some other fields such as natural products chemistry and herbal medicine. The results of research in these subjects can be reliable only if the identity of the investigated plant or plants is correctly established.

The correct scientific name is the key to the literature, which is a storehouse of data previously gathered by generations of research workers and published under the scientific name. This importance of classification is that it is the only way of bringing some order into the vast diversity of plant life. Our minds find it possible to assimilate information about this diversity of plant life only if we first arrange it into separate units, then these units into another set of larger categories, these into still larger ones, and so on. This hierarchical

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arrangement enables us to bring some order into the diversity of plant life, at least in our minds, identify and catalogue it and pass on the information to the users. This in brief is what plant systematics is about.

Systematic studies on the flora of Sri Lanka actually began in Peradeniya long before the University came here. They began about 180 years ago with the establishment of the Peradeniya Botanical Gardens. The British Government of that time opened the Gardens in 1822. The Gardens were actually established first in Colombo, then moved to a site in Kalutara, and finally in 1822 (Stockdale *et al.*, 1922) to its present location in Peradeniya. The first superintendent of the Gardens was an Englishman, Alexander Moon.

This was during the period of colonial expansion by the European powers in the 18th and 19th centuries. One of the first things they did in a new possession was to investigate the plants growing there for their possible use in commerce as sources of food, timber, dyes, medicines, and so on. So they established botanic gardens and encouraged the officers who managed these gardens to investigate the native plants.

Alexander Moon, the first Superintendent of the Peradeniya Gardens, did that to some extent, and wrote a book incorporating the results of his investigations called "A Catalogue of the Indigenous and Exotic Plants Growing in Ceylon" published in Colombo in 1824 (Senadhira, 1995). The systematic arrangement of the plants in Moon's book is according to one of the systems in vogue at the time the book was written but is now considered to be very much antiquated and outdated (Boulger, 1900).

These early European botanists exploring the flora of a new tropical country found large numbers of species previously unknown to science, or very little known. Before they could look into the properties of these new plants or their uses, they had to know what these plants were: they had to identify them, give them names according to a universally accepted system which enabled them to communicate with others, and to classify them. In short, they had to carry out systematic studies on them. They communicated their findings to others by means of articles published in journals or by writing books. These books are commonly known as floras.

A flora is a book usually devoted to the plants of a particular region, *e.g.* a continent such as Europe, a country like India or Sri Lanka, or a smaller region like the Kandy District or the University Campus. Usually it deals with only a segment of the Plant Kingdom, flowering plants, ferns or algae, not all the plants found in an area. All possible information about the chosen group in the area is given in the flora. It gives for each kind of plant (species) the complete scientific name, reference to the author of the name and his original publication, other names by which the plant may have been known at different times, a full description of the plant, local names given to it, the geographical area where this kind of plant may be found, its ecology, uses, and so on.

The word 'flora' also means all the plants found growing in a particular place, like the word 'fauna', which means all the animals found in an area.

After Moon, there was much activity, with work on the systematics of the Sri Lankan flora mostly by two Englishmen working in Peradeniya who were superintendents or directors of the Gardens, George Gardner and G.H.K. Thwaites. Thwaites wrote a book published in 1864 containing all that was known about our flora at that time with its title in Latin "*Enumeratio Plantarum Zeylaniae*" (Senadhira, 1995). They were followed by Henry Trimen, the author of the outstanding work "A Handbook to the Flora of Ceylon", published between 1893 and 1900 in five volumes with 100 colour plates. It was to some extent based on the work of Gardner and Thwaites.

In the introduction to his book Trimen says (1893) his aim in writing it was "to enable the user of the book to ascertain the name of any plant growing wild and to intelligently investigate its properties and uses". So Trimen had in mind the usefulness of the plants as well as their systematic arrangement and scientific names. That was also the direct contribution to the economic development of the country made by plant systematics at that time.

In Trimen's days and also in the days of his predecessor Thwaites and of Willis who succeeded him, Peradeniya was internationally recognized as a flourishing centre of scientific study. The output of research was such that around the turn of the last century, in 1901, Willis, Trimen's successor, inaugurated a scientific journal, the *Annals of the Royal Botanic Gardens, Peradeniya*, for the publication mainly of articles by the Peradeniya scientists. This journal, which I believe is the second oldest scientific journal in Sri Lanka, and the first to be published by the Government, was the forerunner of the "Ceylon Journal of Science". It continued publication until 1924, when it was superseded by the *Ceylon Journal of Science, Section B, Botany*. Now it is the "Ceylon Journal of Science, Biological Sciences". In fact, the papers to be presented here at these research sessions are to be published in that journal, almost a hundred years after it was founded.

Trimen's book was an outstanding contribution to plant systematics. It was one of the great floristic works of that time, and it served the needs of scientific workers and the general public for almost a century. It was written in keeping with the standards of that time, but since then much new information has accumulated about the plants themselves, their position in systems of classification in the light of changing concepts regarding such matters, and their correct identity and name. Also, it was long out of print, and when a copy became available in the international market, which happened rarely, it was priced beyond the reach of the ordinary Sri Lankan botanist. So a reprinting or better still a revision of the entire book became necessary.

Professor B.A. Abeywickrama of the Ceylon University had long cherished the idea of such a revision, and when he came up to Peradeniya as Head of the Department of Botany of the new Faculty of Science in 1962 it was

foremost in his mind. However, his multifarious duties at the University at that time prevented him from undertaking this task by himself. Fortuitously, in 1967, the Smithsonian Institution initiated a number of research projects in this country in cooperation with Sri Lankan institutions and scientists. Some of these projects investigated several problems in ecology, with the eminent tropical botanist Dr. F.R. Fosberg as Principal Investigator. Professor Abeywickrama too was associated as Co-Principal Investigator.

During the course of this work the shortcomings of Trimen's book became apparent, and Professor Abeywickrama suggested to Dr. Fosberg the idea of collaboration between Peradeniya and the Smithsonian Institution to revise Trimen's Flora. Dr. Fosberg readily agreed and put forward to the Smithsonian such a proposal, which was accepted. This was for a joint project between the Smithsonian Institution, the University of Peradeniya and the Sri Lankan Government Department of Agriculture. Financial support was made available from PL 480 funds, and it was possible to start work in 1968 (Fosberg, 1980). All credit to Professor Abeywickrama for his part in initiating this project.

The work of revision was done by an international team of specialists in the various families represented in our flora. They carried out field study in all parts of the country and herbarium study in the National Herbarium in Peradeniya.

Smithsonian funding of the Flora Revision Project came to an end in 1979. Printing of the volumes of the Revised Flora began in 1980. At the end of the Smithsonian-funded project 70 families of flowering plants still remained to be studied, that is, about 40% of the number of families in our flora. Neither the funds nor the required expertise for their revision was available in Sri Lanka. So for about eleven years the revision work was at a standstill, and only the printing of the completed manuscripts went on.

Then in 1990 the British Overseas Development Administration (ODA) agreed to support the completion of the Project (Clayton, 1994). The remaining work of revision was done mostly by scientists of the Kew Herbarium in England, and came to a successful conclusion with all families revised and the last of the 14 volumes of the revised Flora was published in 2000. The index to all 14 volumes is now with the printer. Trimen's book deals with only the flowering plants of Sri Lanka, and so does the Revised Flora. ODA agreed to fund work on the ferns of Sri Lanka as well for a further volume. The work has been completed, and the fern volume will be published soon.

The two Flora Revision Projects (The Smithsonian-funded and ODA-funded) involved the cooperation of 64 botanists from 27 different institutions in many countries. Apart from the results of their labours which make up the volumes of the Revised Flora, the projects brought many benefits to us.

These are:

- (i) A succession of young Sri Lankan graduates had the opportunity of making a valuable contribution to the work. They had the invaluable

experience of working with some of the most outstanding experts of our time in this branch of study. They are now pursuing useful careers in this or related fields here in Sri Lanka and in other countries.

- (ii) In the course of their herbarium work the flora workers annotated the specimens with their corrected, up-to-date names, or confirmed the existing ones, thus increasing the value and usefulness of the specimens. The projects also added about 50,000 new specimens of Sri Lankan plants collected in the course of the work to the National Herbarium.
- (iii) The fieldwork involved in the flora revision helped to draw attention to the remarkable diversity and wealth of our plant resources and at the same time to the degradation of the natural vegetation and the resulting disappearance or increasing rarity of some of our species.
- (iv) The flora revision generated a fresh momentum to Sri Lankan studies in plant systematics. Most of our universities now have trained taxonomists in their staff, so before long we should have a set of young trained people to keep up the momentum.

The completion of the flora revision is certainly not the end of floristic studies in this country. The study of a country's plant life is a continually advancing and never-ending process, as Trimen has said in the introduction to his book.

What the revision of Trimen's Flora has done is to bring together current knowledge gained from the study of our plant life to form an up-to-date knowledge base. It is now left to others to investigate groups that interest them and so build on this base and advance our knowledge of our plant life and plant resources.

A great deal of new information is now becoming available using new methodology, *e.g.* molecular biology techniques such as DNA sequence and cladistic methods. For instance, direct sequencing data used to elucidate flowering plant evolution has since the year 1998 made our ideas about the circumscription of several plant groups obsolete (APG, 1998). This kind of work is expensive and for us to continue systematic work in the present situation requires considerable funding which is hard to come by unless some funding agency recognizes the importance of continuing systematics research at Peradeniya.

In addition to the flowering plants and ferns there are other groups, the liverworts and mosses, algae and lichens which have never been studied in this country to the same depth. Among them there may be species that will one day prove to be very valuable natural resources. It is to be hoped that means will be found to look into these groups as well, to produce a complete Flora of the country.

Dr. Fosberg, in his foreword to the first volume of the Revised Flora, has said he hoped that after the publication of all the volumes, simplified versions could be prepared, for school use and the use of non-botanists. One such book has already been published by a group of Peradeniya botanists, "A Field Guide to the Trees and Shrubs of Sri Lanka" (Ashton *et al.*, 1997), aimed at botanists and non-botanists alike, and retaining the flavour of the Revised Flora. It is hoped that there will be more such publications.

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