

XII. PROBLEMS IN THE ORGANIZATION OF PLANT TAXONOMIC WORK

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SUMMARY

The final volume of the four-volume Tree Flora of Malaya is just being completed in 1987. This project has taken 22 years, for an area that is geographically small and floristically relatively well-known.

This paper is concerned with the slow rate of taxonomic progress in the tropics which makes taxonomic projects increasingly difficult to promote and organize.

It is suggested that the problems may be overcome by demystifying taxonomy. This involves acknowledging that a significant component of taxonomic decisions are subjective, egoistic and arbitrary, that no taxonomic decision or treatment can ever be final, that the principle of one correct name per species is not always tenable, and that stability in scientific nomenclature is unattainable. — Paper presented at the XVI Pacific Science Congress, Seoul, Korea, August 20–30, 1987.

INTRODUCTION: THE TREE FLORA OF MALAYA

Towards the end of 1987 the final volume of the Tree Flora of Malaya was just being completed. This is a four-volume work covering 99 families of trees of the Malay Peninsula ('Malaya' in the phytogeographical sense). The project was started in 1965 when Britain provided Malaysia with the services of Dr. T. C. Whitmore to initiate the project and to train two local botanists, Mr. K. M. Kochummen and myself. It was anticipated that the project would last no longer than 10 years 'so as not to discourage those waiting to use the results or those paying to keep the project going' (Ng & Whitmore, 1966). After all, we had H. N. Ridley's 5-volume Flora of the Malay Peninsula (1922–1925) as a precursor, which had, in its turn, G. King and J. S. Gamble's Materials for a Flora of the Malayan Peninsula (1889–1936) as its partial precursor (See Ng, 1983). We also had the ongoing Flora Malesiana project as an umbrella regional project orchestrated from Leiden. In our Institute itself, the most important tree family, the *Dipterocarpaceae*, had already been monographed by C. F. Symington in the five years before the Japanese invasion of Malaya. While Symington was working on the Dipterocarpaceae (which was published by the Japanese military administration in 1943) Prof. E. J. H. Corner was busy at the Singapore Botanic Gardens writing his incomparable Wayside Trees of Malaya, which was published in 1940.

What actually happened was that our flora took 22 years instead of the projected 10.

Whitmore edited volumes 1 and 2, and authored or co-authored 28 families in 6 years before retiring from the project. Kochummen authored or co-authored 26 families, and retired from the Institute in July 1986; he contributed his last chapter after official retirement. I authored or co-authored 20 families and edited volumes 3 and 4; my efforts for volume 4 were essentially voluntary as I was no longer Forest Botanist after 1978. Sixteen other botanists, local as well as overseas, contributed as sole or joint authors: P. F. Cockburn, B. Everett, R. D. Hoogland, H. Keng, R. Kiew, A. Latiff, D. J. Mabberley, J. F. Maxwell, C. M. Pannell, G. T. Prance, F. E. Putz, L. G. Saw, E. Soepadmo, B. C. Stone, K. M. Wong, and S. K. Yap.

Although we ran over schedule by over 100%, this was not a complete disaster considering that nearly every other tropical flora is in trouble, including Flora Malesiana which may never get finished at all.

Looking back over these past 22 years, I cannot help but feel that tropical plant taxonomy is being strangled by some of its own concepts or misconceptions.

In this paper, I would like to offer some reflections on the nature of the work we do in producing a flora and the factors that can make such work sterile and stultifying. I fear that unless we are critical enough to question the myths permeating the practice of taxonomy we will not be able to prevent the decline of taxonomy in the tropics, where taxonomy is most badly needed.

LOCAL IN RELATION TO REGIONAL FLORAS

When we began in 1965, we were quite apologetic about doing a local flora for Malaya (Ng & Whitmore, l.c.) because at that time, the prevailing expert opinion was that the only scientifically respectable taxonomic endeavours were the regional monographs such as those for Flora Malesiana. It was argued that local floras in advance of the Flora Malesiana would be premature, unstable, and a waste of effort. Local floras done after the Flora Malesiana would in contrast be worthwhile since the names and taxonomic entities (taxa) would have been stabilized across the entire region.

We now see that taxonomy is relatively healthy in terms of numbers of practitioners and demands for their services only wherever local taxonomic work has been actively pursued. It is dead or moribund whenever people have been waiting for the grand regional works to be delivered. This state of affairs is evident not only in our region, but throughout the world. It looks as if the grand regional taxonomies without local taxonomies are like trees without roots. Local taxonomists are evidently the main clients, interpreters, and supporters of grand taxonomies and the latter cannot long persist without the former.

DEFINITIVE VERSUS PROVISIONAL WORKS

It is the dream of many taxonomists to produce a definitive work that will stand the test of time. In practice, every taxonomic work, without exception, has been lacking in something or other. All the chapters in Volumes 1–3 of the Tree Flora of Malaya were ripe for revision before Volume 4 was completed. Even the families already revised in Flora Malesiana are ripe for revision.

Maybe the authors did not spend enough time? I reject this argument because, beyond a certain minimum time depending on the size of the group or family studied, I cannot see any correlation between additional time spent and improvement in quality of work. Some monographs that took 10–50 years to complete are the most tedious, pedantic, and devoid of inspiration. Some monographs never get finished. In the meantime, science suffers in many ways. Other taxonomists may avoid a group that somebody else reserved. People wait indefinitely for the definitive work to emerge. People learn to live without it, just as many states have learnt to exploit their plant resources without the benefit of taxonomic knowledge. Taxonomy is finished when people have no use for it.

Maybe there are not enough scientific resources? It is difficult to accept this, too. Ridley wrote the Flora of the Malay Peninsula all by himself after he had retired from the Colonial Civil Service. Corner wrote *Wayside Trees of Malaya* almost as a hobby since he was offi-

cially a mycologist. Mr. C. A. Backer did the Flora of Java all by himself as a hobby. Indeed, there are probably more professional taxonomists now than there have ever been in any other period of world history. Yet effective productivity is down.

Maybe too many taxonomists have been wasting time trying to build dream edifices when our clients need stepping stones. I suggest that the ideal of the definitive work has slowed down work everywhere without resulting in anything definitive. Perhaps the way to restore a sense of balance and vitality is for taxonomists to view their efforts realistically as a series of ever-improving models, to be used, tested, and improved in stages through feedback and interaction. The faster we make our work available, the faster is the feedback and interaction.

TAXONOMY WITHOUT TYPES

In 1967, the late Prof. C. G. G. J. van Steenis wrote a splendid article entitled 'The herb flora of Taiwan, or How to master a flora without types and with only a few books', in which he advised botanists in Taiwan how to do meaningful taxonomic work when the type specimens are overseas and inaccessible. Nearly all tropical countries are in the same situation as Taiwan, so this advice applies to many of us. Basically, Van Steenis held up as a role model the example of Backer, a primary school teacher, who took it upon himself to write a Flora of Java, starting from nothing.

He proceeded 'to make himself profuse well-annotated collections', and got in this way thoroughly acquainted with their structure and their variability. With a very limited number of books he gave them a provisional name, not bothering at the time about the intricacies of synonymy and nomenclature. In this way he succeeded after some two decades of thorough exploration, collection, and study, to know exactly *how many species occurred in Java* and how they could be distinguished. He made the descriptions of these species, with the keys, all as a one-man job. This work is the main body of his Flora of Java.

By the distribution of duplicates, the consultation of literature, information from outside, etc., he found gradually improvements in the nomenclature, but the *number of species he had remained the same*. Much later this nomenclature was brought up to date by Prof. R. C. Bakhuizen van den Brink f., but this nomenclatural aspect is only polishing a body of facts which was a trustworthy, solid mass of knowledge he had gathered himself in his fanatical ambition to achieve something.

I might add that by now many of the names brought 'up to date' by Bakhuizen f. will need to be changed again but the scientific work of discriminating and describing the species has been done well. As a lesson in taxonomic strategy this account has no equal. If only we had primary school teachers like Backer in the various parts of Malaysia, Indonesia, and the Philippines.

WHAT'S IN A NAME?

The concept of one correct scientific name for each species has held sway for a long time. Finally, taxonomists are realizing that the ideal is not achievable. Horticulturists, being more practical, have long gone their own way with horticultural names.

Prof. V. H. Heywood (1986) had this to say: 'as botanical research continues, names constantly change, sometimes even back and forwards, as fashions in botany swing from one position to another. There is at present no one organization for Europe analyzing each

of these changes and recommending whether each be followed. Even if there were such a centre, not all botanists would agree with its proposals. It is quite possible in botany for there to be more than one nomenclaturally correct name for one plant, one chosen by one botanist, one by another, each denoting a different rank or a different genus for the same taxon. It is a matter of botanical judgement whether or not to accept *Leopoldia* or to sink it in *Muscari*, not a matter of nomenclatural rules.'

For stability in nomenclature, Heywood proposed the adoption of Standard Names, defined as names used in an agreed standard work. Acceptable/Alternative Names would be taxonomic synonyms available for use if desired. For Malaya, we have already decided to stick to *Eugenia*, not *Syzygium*, and we will continue with *Podocarpus* and *Casuarina* in the traditional sense.

I believe Standard Names will contribute greatly towards a reconciliation between taxonomy and its clients who have long been baffled and irritated by names changes.

THE LIMITS OF TAXONOMY

In our attempts to organize plants into their natural species we have to depend on herbarium samples, only occasionally supplemented by studies on living plants. Some samples are adequate. Some are not. But we make do with what is available, sometimes describing a 'species' from a single specimen.

Furthermore, while some species are sharply delimited from all others by certain unique features, others obviously are not, and the taxonomist has to make numerous comparisons, dissections, and measurements in order to discover the limits between species.

In my experience, roughly 25% of the species in any family practically sort themselves out by possession of unique features. The taxonomist makes 25% initial progress with little effort. Another perhaps 50% need careful study before satisfactory solutions are found; satisfactory in the sense of the solution being repeatable or confirmable independently by other taxonomists. Another 25% are really difficult and two taxonomists may not come to exactly the same conclusions. This last 25% can result in much wastage of time and minimum real progress. The Law of Diminishing Returns does not exempt taxonomy. As Editor, I have always had problems whenever two taxonomists have claimed an interest in the same group of plants. Never have I found two who fully agreed with each other, and the percentage disagreement may range between 5 and 30%.

There is a psychological factor involved in taxonomic decisions. The taxonomist may subscribe to certain ideas on evolution, morphology, plantgeography, ecology, etc., which may colour eventual decisions. Another taxonomist with a different set of ideas will not see things the same way.

Taxonomists also suffer from mental blocks that are impossible to explain. For example, when I was studying the Ebenaceae of Malesia as a Ph.D. candidate, I had as my guide and foil the voluminous 1937 *Revisio Ebenacearum Malayensium* of Dr. R. C. Bakhuizen van den Brink Sr., written in exhaustive detail, in scholarly Latin. Within a few months I had taken out three rare species (known only by their type specimens) which did not look right: *Diospyros hierniana* Bakh., *D. micromera* Bakh., and *D. sororia* Bakh. With the help of other botanists these were assigned, without any doubt, to *Salacia grandiflora* (Celastraceae), *Cleistanthus nitidus* (Euphorbiaceae), and *Ilex borneensis* (Aquifoliaceae), respectively (Ng, 1970). How a painstaking scholar like Bakhuizen Sr. could have made such a mistake is beyond explanation.

However, I was soon to commit an error in the Ebenaceae myself by describing a new species, *Diospyros kochummenii* Ng (1977) based on abundant specimens collected in many parts of Malaya. A few months later, it suddenly occurred to me that these specimens matched *D. singaporensis* Bakh., known only from the type specimen collected from a cultivated tree in the Botanic Gardens, Singapore, without any indication of origin. I had the specimen with me as a Ph.D. candidate for three years but had convinced myself quite early that since the specimen was known only from a botanic garden plant, it must have been of foreign (non-Malayan) origin, therefore was not relevant to Malaya.

These examples suggest that we must always be wary of rare species only known by their types. Until another specimen has been matched to it, a type, being a sample of one, is hardly creditable as a 'species'.

In the course of studying each family for the Tree Flora of Malaya, I have had the occasion to stick one name on a specimen, only to substitute another name on another day. Eventually all the really difficult problems are resolved and the final labels are stuck on. One might wonder how much of the final resolution is verifiable fact and how much is opinion that could have gone one way or another according to the way the taxonomist rationalizes the situation.

When taxonomists were few, the taxonomic community routinely accepted the latest works as the best and previous authors readily submitted to the later ones, in genteel fashion. Hence *Wormia* became *Dillenia*, without a fight. However, when taxonomists are more numerous, more narrow or specialized (some work on one genus or family for their whole lives) and are under pressure to prove their scientific originality by differing from their predecessors, we need to exercise more caution. New taxonomic proposals, especially those involving the lumping and splitting of genera, with the resulting chaos in nomenclature should be viewed with scepticism. Such changes should be placed under probation until tested and adopted by the standard flora of the area concerned.

CONCLUSION

The plant resources of the tropics need to be managed upon a basis of scientific knowledge sustained by public appreciation. To create this situation, floristic information needs to be presented in timely and accessible packages.

In the developed, temperate regions of the world, there are all kinds of floras available, some covering a whole continent, others covering a single country, or state. Some cover specific habitats, e.g. alpine, desert, or deciduous woodlands. Some deal with weeds, others with wild flowers, and so on. Their presentation becomes more attractive with each new production, which in turn stimulates more interest and greater effort, in an upward spiral of feedback and improvement.

Tropical regions, in contrast, are badly served by taxonomy, and such works as are available are often difficult to use. Behind the wall of nomenclatural legalism and technical jargon, far worse in taxonomy than in any other discipline, one has to search hard to find indications of the joy and beauty of botany. For this reason, Corner's *Wayside Trees of Malaya*, of which the third edition is about to be published, stands out as a beacon, free of nomenclatural legalism, technical jargon, and pedantry, but full of biological understanding. In tropical botany there is so much to do, and so little time, that those involved really should select approaches that will make maximum contribution to the knowledge, understanding, and appreciation of plants in the minimum time. My greatest difficulties, as Editor

of a multi-author flora, were with authors who would not subscribe to the philosophy of the common approach adopted for the project.

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