

VIII. THE HERB FLORA OF TAIWAN or
HOW TO MASTER A FLORA WITHOUT TYPES AND WITH ONLY A FEW BOOKS

My visit to and trips in Taiwan, in 1966, brought me into close contact with the wonderfully rich and varied flora of this large island which is fairly easily accessible if one speaks Chinese or is accompanied by Chinese companions, as was my privilege.

As is well known the woody flora of Taiwan is tolerably well known, by the excellent work of Kanehira (1936), followed by the modern works of Prof. Tang-shui Liu (2 vols, 1960-1962) and Prof. Li (1963).

However, the knowledge of the herbaceous and subwoody plants is in a chaotic state, and it seems to me worthwhile to explain this further. The Japanese botanists, Hayata, Masamune, Kudo, Kawakami, Sasaki, Suzuki, Yamamoto, and many others have made many collections, mostly preserved in Japan, and have, Hayata excepted, published lavishly on them in an enormous number of small papers. The material collected is as scattered as the publications. Even in Taiwan itself there are several herbaria, each containing part of the national inheritance, although probably that of Taiwan National University is the richest. It is not in good shape, as many herbaria in the tropics which suffer from the climate and, hence, from mould and insects. Fortunately Dr. DeVol is trying to take measures to improve these conditions.

Though in recent years Dr. Keng made for example a revision of the Euphorbiaceae, there seems to be no directed, correlated attempt towards a "Flora of the Herbaceous Plants of Taiwan", that is, to supplement the work on the Trees.

It is not, of course, that the Taiwan botanists have no use for such a Flora, for both scientific and educational purposes. Contrarily, they are desperate to have a work with which they can identify their Flora. They told me that in their desperation they have taken to studies of pollen which would give to botany in Taiwan a 'modern look'. It seems sufficiently clear that to study and describe pollen one must know first what plant one has: the name of the plant is still the alpha of botanical science. And even if one can refer to voucher specimens: what use is it if the voucher specimens are not identified? How can ecology develop under such circumstances that the plants are not known? How phytochemistry, the knowledge of medicinal plants, etc. etc.? For the development of all these branches of botany the knowledge of the correct plant name is a crucial prerequisite. This statement is important and is well understood in all countries: one should be aware of the botanical inheritance of the ground one occupies. By making this knowledge available one enlarges its potential, facilitating making use of the native flora.

The task is of course not a small one. The Flora alluded to will after revision probably be of the size of 3000-4000 species, somewhat of the order of the herbaceous Flora of Java. The size of such a flora is not prohibitive even for a small team if working under favourable conditions.

But conditions are not favourable. In the first place the number of well-known weedy species is small compared with Java; the majority are indigenous species which require far more botanical study. Secondly, though Hayata made a premature endeavour to compare his Taiwan plants with types of allied species at Kew, there has never been a sufficient degree of correlation with the surrounding floras: those of the mainland China, the Ryu Kyu Islands, the Sino-Himalayan flora, and the Malesian flora. And this is compulsory through the 'strategic' position of Taiwan, situated on the border between the tropical and temperate floras of East Asia. The literature resulting from this position and the lack of correlation in that the Japanese and other botanists have described an enormous number of 'endemic' species. All this preliminary, premature descriptive work lies as a burden on the project; this all must be checked and verified, and eventually be evaluated.

To mention only one example: in Luzon occurs as far as we know the only species of Sedum in Malesia. Merrill has 'optimistically proposed' it as a new (endemic) species, S. australe which, by its epithet being a homonym, was changed into S. ambliflorum R.E.Clausen. I was fortunate in retracing this species in 1953 during a post-Pacific Congress tour in N.Luzon. Now I have collected two Sedums in the Taiwan mountains, I am almost 100 % confident that the Philippine Sedum also occurs in Taiwan and must have been described from that island under an other name. But are we now certain that the same species is not still earlier described from the Sino-Himalaya or Japan?

A most unfortunate circumstance is that the Japanese collections were often poor in quality and even if good, poor in duplicates, and seldom or never distributed to the great West European or American herbaria. They are extremely difficult to localize and often not found at all, or loans are prohibited.

The above-mentioned difficulties are of course well known to the few Taiwan botanists who can devote some time to exploration, because they have to try to name their collections.

Being intimately acquainted with their difficulties I have asked them why they do not set up a work-scheme for a "Herbaceous Flora of Taiwan", supplementary to those of Liu and Li on the woody plants. Their arguments are of several kinds, lack of time by being mainly engaged in teaching, paucity of funds for exploration, etc. But the major objection which paralyses their initiative is that they feel unable to make a

modern flora which requires not only a profuse herbarium of Taiwan plants, but for the composing of which one must also have access to a large library and be able to compare Taiwan sheets with types described from either Taiwan or adjacent East Asian countries.

I fully agree that these are formidable obstacles, realizing besides that heads of botanical departments are nowadays mostly not particularly eager or sympathetic against so-called alpha-taxonomy, but rather eager to work in the 'modern' aspects of biology: cytogenetics, biochemistry, molecular biology, etc. I have no intention whatsoever to deny the extreme value of these sophisticated branches of biology, but it should be well understood that also in these fields Taiwan is one among hundreds of centres where such work is done in the world and, because of the prohibitive costs, can never be unique or compete with most of similar laboratories in Japan, North America, and Europe.

However, a unique bit of botanical research work can be done by Taiwan botanists alone, and that is: provide a work which gives a full insight in its marvellous indigenous flora, a national duty to science.

In order to explain how this can be pursued even with the available means, I must first try to remove an obstacle derived from the lack of sufficient library and limited type specimen facilities in Taiwan itself.

I will do this by taking as an example the position, work and achievement of the late Dr. C.A. Backer. After he arrived in Java about the year 1900 similar conditions prevailed for him as for the Taiwan botanist at the present time. As a teacher in a primary school he set himself the task to write a Flora of Java and had to start almost from scratch as far as the herbaceous flora was concerned. He was also faced with a complete lack of type specimens and with a lack of material from Java itself. Being unable to procure the first, he started with the latter task; namely 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 available he gave them a provisional name, not bothering at that 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 Dr. Bakhuizen van den Brink, 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.

The procedure outlined seems to me quite well to be realized in Taiwan, if at least one qualified botanist with 2 assistants and a professional collector are allowed to devote all their time to this work.

For a prosperous country as Taiwan such a small team devoted to a truly national scientific endeavour as the composition of a "Herbaceous Flora of Taiwan" seems to be no luxury; it is a necessity with high priority.

The budget of this team of four would largely consist of salaries with allowance for travel and investment in literature not available in Taiwan libraries, I estimate roughly in the order of Y 275,000 = US\$ 7,000 per year for ten years. This team should be loosely affiliated to a University but preferably be subordinated to a national body, Research Council or Academy of Sciences, being a national project.

The task of the team can be summarized in the following points:

- 1) Botanical exploration of Taiwan, mainly in the original vegetation, with attention to different 'niches' and different soil types, in both seasons, to cover all species.
- 2) Prepare good field notes, take leisure to make brief descriptions of flowers to supplement later herbarium observations. Collect only fertile material, either in flower or fruit, preferably both; good-sized sheets, no scraps. At least 5 duplicates, preferably more.
- 3) Make one consecutive number series.
- 4) Distribute sets at once, with full labels including field notes; names are all provisional if necessary indicating species by letter or number. After having agreed with the receiving institutes that the condition under which this material is sent that dispatch expense is for receiver, and receiver agrees to provide in exchange all identifications made on the material and supply Taiwan team with literature (reprints, microcards, photostatcopies when desired), thus guaranteeing a profitable exchange.

The receiving institutes should of course in the first place be chosen among those where actual work is done on plants from the East, for example Leyden, Kew, Edinburgh, Tokyo, Kyoto and Harvard. In this way Taiwan plants come also 'in circulation', that is under the eyes of monographers. This again will lead to a large number of foreign contacts, resulting in constantly trickling streams of information going towards the Taiwan team. I have written on this most valuable asset of cooperation between tropical and temperate herbaria before (see refer-

ences) and want to emphasize it again. But it must be understood that the initiative must come from the tropical herbarium!

- 5) Keep a well-spaced book list of all collected numbers, allowing to add later particulars and additional identifications.
- 6) Prepare botanical diagnostic descriptions of the species collected and frame keys to species collected. These must be kept up to date, that is constantly rewritten and improved. Provisionally such species can be indicated with a number (in each genus from 1 or A onwards, or the collecting number can be attached, e.g. *Calanthe* 3463).

Each new collection should be compared with the keys, to ensure that they work and reflect the essential differences.

In this way a continuously improved MS-Flora will be built up.

This will lead ultimately to a complete survey of all species of the flora.

- 7) In out-of-collecting-season time a card system should gradually be built up of references to all species and varieties described from or recorded for Taiwan. On these cards it should be clearly noted (if mentioned) on which evidence (sheets, types) this evidence rests, and where such sheets are located, in order to facilitate the final stage.
- 8) When the team is satisfied to have collected the bulk of the species (which can be observed if new excursions do not yield species not earlier collected), the final state has arrived. Presumably this will not be within ten years. This requires a finalizing of the MS-Flora with the card system and, besides, a fairly intensive study to compare Taiwan species with those of surrounding countries.

Of course many species will have in the course of time already been compared with for example the exhaustive Floras of Japan and Java, and a fairly large number of species are well-known 'wides' which need no such study. But especially the endemic species must be tested to be really good and shown to be different from Sino-Japanese or Malesian taxa.

It will be necessary to borrow material from abroad, but surely it will also infer to have prolonged stays abroad in the great herbaria of Kew, Tokyo, Kyoto, Harvard, Edinburgh, etc. where East Asia is well represented in collections and where active work is performed on the flora of the East. This falls outside the budget but if such a MS-Flora is existent, I am confident that the world will provide for ways and means to let it have the final touch, for the naming, testing, and checking, the final polishing of the correct name-giving.

The reason why I have written this paper is to encourage the young Taiwan botanists and convince them that their case is not so hopeless as they see it. It can be performed with simple means. But the initiative must be theirs.

It may be that there are no promoters to initiate such a financed endeavour. In that case Taiwan botanists should start the same scheme in a more modest way. By their results and perseverance they will surely attract attention to such a degree that after a few years of initial struggle the Government will authorize it towards an official "Flora of Taiwan Team" alluded to above.

I feel I can write on this freely, because in launching the Flora Malesiana I became intimately familiar with the problems involved in such endeavours. Besides, I am a disinterested third party, who had by chance the privilege to enjoy the hospitality and lavish entertainment of our Chinese colleagues in Taiwan. I was genuinely struck by the eagerness of the junior colleagues guiding us up the mountains. This induced me to give a rough outline of what, from my experience, might lead to an improvement of the knowledge of the marvellous flora of this island.

May the seed not have been sown on sterile soil.

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VARIA

Not so much the plants as their describers embitter life. Let us not practise the sport of baptizing.

C.A.Backer, *Brittonia* 3 (1938) 76.