

THE PARAMOUNT ROLE OF HERBARIA IN MODERN TAXONOMIC RESEARCH

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ABSTRACT

'Alpha' taxonomy practised in herbaria plays a very important role in botanical research even today as there is no sign of the exploratory phase of botany coming to an end in the near future. Herbaria could act as repositories of voucher specimens. The herbarium taxonomist should be allowed to devote at least some time to carry out revisions and monographic studies on difficult groups of plants even in those herbaria supported by public funds.

We do not intend to defend herbaria or herbarium-based taxonomists in this paper. The contributions of herbaria and herbarium taxonomists to the broad field of Natural History are so well known that there is no need on our part to justify their existence. If there is any doubt in some of you the papers of Beaman (1965), Brennan (1968), Cronquist (1968) and Smith (1966) should be sufficient to dispel such a doubt. What we hope to accomplish in this paper is to draw your attention to some unfortunate tendencies and attitudes that have become rather well established among the botanists of our country. We sincerely hope that our criticism will be taken in the proper spirit in which it is offered.

The most serious of these undesirable tendencies is a superior attitude assumed by most botanists toward their colleagues who work in herbaria and for this reason may be called plant taxonomists or systematic botanists. That this tendency is not confined to our country is apparent from the following observation made by Jeffrey (1968, p. 29): "Botanists whose profession is the classification and naming of plants are known as plant taxonomists or systematic botanists (other names may be applied to them, even by their colleagues, but these are rarely printable!)". It is often implied and even explicitly stated that the days of the 'herbarium taxonomists' are over. No work in systematic botany which does not also carry the stamp of at least one of the so called 'modern methods', it is argued, is worthy of serious consideration. Cytology, cytogenetics, biosystematics, palynology, anatomy including ultra-structure studies, molecular biology, numerical or statistical or biometric procedures and chemosystematics are the 'modern methods'. What we tend to forget in our anxiety to take to the 'modern methods' is the fact that our knowledge of the

World's flora is extremely uneven. Davis and Heywood (1963) classify it in four overlapping phases: 1. the pioneer (or exploratory) phase; 2. the consolidation phase; 3. the biosystematic phase and 4. the encyclopaedic phase. The first two phases may be termed 'alpha' and the remaining two 'omega'. Most of the botanists of this country seem to believe that the 'alpha' phase is over and all of us should switch over to the 'omega' phase using DNA hybridization and electron microscopes (if you are lucky enough to acquire one!). This assumption is entirely erroneous. Kech (1959, p. 77) has estimated that "we shall not be through with our inventory phase in fifty years... we should know the temperate floras of the world rather thoroughly in another 30 or 40 years, and it will be at least twice as long before we can begin to think we know the tropical floras almost as well". Constance (1964) is of opinion that both estimates may prove to be too conservative. As far as India is concerned, the exploratory phase cannot be expected to be over before the middle of the next century. The fact that two new plants were described in recent times on the basis of specimens collected from the very heart of the industrial town Coimbatore should be sufficient argument to show how poorly explored our country as a whole is (Ellis, 1965; Chandrabose, 1968). The situation being such it is most unfortunate that botanists in India show little or no interest in taxonomy or systematic botany. They get carried away by the lure of the gleaming electron microscopes and ultracentrifuges and the DNA. These expensive instruments have acquired a perfunctory value out of all proportion to their usefulness as tools of research. The result is that many institutions invest huge amounts in these instruments without taking the trouble to evaluate their usefulness in relation

to the massive investment involved. The initial cost of a single electron microscope together with the recurring expenses required to keep it in working condition should be sufficient to start and maintain a fairly large herbarium in this country. Once established these herbaria could be used to train graduate students in taxonomy. If the herbarium specimens each under-graduate and graduate student is expected to submit for their final examinations is preserved, these herbaria could grow fairly fast. By taking the students to nearby forest areas instead of summer resorts like Simla and Ooty, plants from different parts of the State (and even adjacent States) in which a University is situated could be easily collected. As Cronquist (1968) points out, local and State floras could emanate from such modest herbaria. The writer of such floras will be doing a valuable service if he finds out what grows in his area, the local distribution of each species, the names of the plants as best as he can from the literature, and provides accurate keys for identification.

There is another aspect of the exploratory phase which has been often overlooked. Constance (1957) and Davis and Heywood (1963), while conceding that the pioneer phase of systematics is not within sight of completion, go on to state that it is a moot point whether taxonomists will record the remaining undescribed taxa before other people succeed in destroying them. We agree. However it appears to us that those determined to destroy the wild species of unexplored and underexplored areas have a definite advantage over the ecologists, conservationists and taxonomists who are trying their best to preserve what remains of interest to the students of Natural History. Reviewing the status of the endangered plant species and their habitats we (Subramanyam and Sreemadhavan, 1970, p. 112) urged: "In countries whose floristic composition is imperfectly known and where extensive development is taking place, extensive and intensive explorations should be conducted without further delay". Such explorations, especially the intensive studies, are not necessarily the monopoly of government research organizations like the Botanical Survey of India, the National Botanic Garden or the Forest Research Institute. The various Universities, where botany is taught as a postgraduate subject, could achieve so much with so little effort, if only they take some interest. There is very little time to be lost. A recent press report reads as follows (*Hindu*, June 18, 1970):

"ARABLE FOREST AREAS FOR LANDLESS POOR IN KERALA". Trivandrum, June 17. The Kerala Cabinet today decided to appoint a *Special Conservator of Forests* for clearing about 50,000 acres of *arable lands within the reserve forests* expeditiously with the object of completing the assignment of these lands to the landless poor by June 1971" (italics ours). This news item gives a clear indication of the shape of things to come.

Another unfortunate tendency on which we would like to comment is the attitude of many botanists toward voucher specimens. Some of them appear to us to be almost allergic to the very idea of keeping voucher specimens. When an enquiry is made about a voucher they visibly redden and show annoyance. One of us (Sreemadhavan, 1969) made an abortive attempt to draw the attention of the botanists who had assembled for the Science Congress Session at Bombay last year to the importance of voucher specimens. Botanists who clamour for 'modern methods' seem to have forgotten the caution advocated by the late Professor I. W. Bailey. He had written in the very first issue of *Phytomorphology* (1951, p. 68-69): "If comprehensive summations of evidence from all parts of the plant are indispensable in attaining a truly natural classification of plants,—there are many practical difficulties that deserve attention. The most serious of them is the difficulty of obtaining material suitable for microscopic study and from plants *whose identity is capable of subsequent verification*. At present herbarium specimens bearing a collector's name and number, provide the only extensive potential source of accurately identifiable material. Even in the case of woods and other economic products only a beginning has been made in assembling special collections with herbarium vouchers. *Failure to preserve such vouchers in the past makes uncertain and unverifiable much of the morphological literature, particularly that concerning species and even genera*" (italics ours). Recently we examined two international periodicals which publish the results of morphological and cytological studies. We were surprised to find the percentage of papers carrying references to herbarium vouchers to be so low as 10.6 and 16 respectively. Hence we would like to take this opportunity to urge our colleagues, especially those who study plants which could be preserved in the form of herbarium specimens, to deposit at least one voucher specimen in a herbarium of repute, preferably one listed in the *Index Herbariorum* Part I (Lanjouw and Stafleu, 1964).

One final point on which we would like to say something is the role herbaria should *not* be expected to play. Botanists from many Universities, people connected with various industries—pharmaceutical industries in particular, and even some private individuals are under the mistaken impression that Herbaria, especially those under the care of Botanical Survey of India, are simply there for the purpose of providing identification of plant specimens (one crumpled leaf!) and plant products (samples of crude drugs) and the supply of miscellaneous information on various aspects of the plant world. Some of the requests are for the supply of varying quantities of plant materials. Professor A. C. Smith spoke eloquently on this subject when he addressed the Tenth Conference of Directors of Systematic collections (1966, p. 204): “Why do you permit your staff members to become servants? Did they acquire their training and their Ph.D.s so they could provide tourists with names for scraps of plants they picked up in Greek gardens last summer? Or so they could name the insects that infest an orchard in Wisconsin? Or so they could devote full time to identifying material upon which other scientists in other fields will base their “original” research studies? Some scientists are perfectly willing to spend 100% of their effort in just such menial tasks, contributing nothing to our knowledge of evolution and biogeography. If you have such scientists on your staff, don’t encourage them to continue as servants; fire them. Fire the pedestrian and employ the imaginative; that is my advice on this level” Even Brenan of the Royal Botanic Garden, Kew, who concedes that the purpose of the public supported national herbaria is the accurate identification of plants and plant materials, and making of this information available stresses the need for basic research (Brenan, 1968). Without active basic research leading to the taxonomic revision of important, neglected or difficult groups of plants, identification may be often difficult or impossible. Every request addressed to the poorly staffed herbaria requesting for miscellaneous information which the writer of the request himself could get from the volumes of the *Wealth of India*, comes in the way

of the progress of the herbarium taxonomists’ work. Hence we most humbly request the botanists from Universities, and others interested in plants to make a serious effort to identify the plants and send the specimens to national herbaria only when the plant cannot be identified by the use of local or regional floras.

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