

Relevance of interlinked plant and pollen resource collections

The focus of this correspondence is on the challenges in creating and conserving interlinked plant and pollen resource collections that are vital in enhancing the quality of research. It also aims to add to the points raised by Arti Garg¹ on the relevance of pollen herbaria.

Pollen studies have become an integral part of reconstructions of past land cover, vegetation and agricultural land use. Studies of pollen in honey (melissopalynology) can be a powerful quantitative tool to understand the foraging preferences of bees and has pertinent applications in pollination studies of both cultivated crops and native vegetation. Since it is often not possible to identify source plants in sediment samples based on pollen studies, it becomes necessary to identify the pollen taxa and relate them with the source plants that may have yielded them². Hence, the need for an extensive reference slide collection of pollen further to a reliable herbarium – another important resource collection for research.

Occasionally, plants indicated by a pollen taxon can differ regionally. An example: the pollen taxon Amaranthaceae (periporate) recorded inland includes a number of dryland herbs of this botanical family, whereas the same pollen taxon is likely to be *Suaeda maritima* in a mangrove. The triporate pollen of *Casuarina* in Peninsular India is more likely *Myrica* in East Africa. Regionally relevant and interlinked plant and pollen herbaria offer a powerful tool for the intensive light microscopic studies of regional pollen morphologies to shed light on plant–pollen relationships.

Eric Grimm (senior palynologist, Illinois State Museum, USA) once remarked to us, ‘it would seem that pollen morphology recapitulates phylogeny’. Although palynology cannot substitute studies such as molecular phylogeny, it can offer pointers to directions in which such studies may be carried out.

The Caryophyllales consisted of many families, including Caryophyllaceae, Chenopodiaceae and Amaranthaceae. Palynologists have since long coupled Chenopodiaceae and Amaranthaceae as one pollen type. The justifiable response

of plant taxonomists to such a multi-hierarchical listing ends up as a frustration on the limits of palynology. The recent inclusion of plants of Chenopodiaceae in Amaranthaceae in the APG III system of classification³ gives an opportunity to reconsider such a ‘limitation of palynology’. Frequently, taxonomic recombinations based on phylogenetic decisions make sense palynologically. One more example for this argument: the distinction of certain genera (*Celtis* and *Trema*), originally belonging to Ulmaceae, into a separate family Celtidaceae⁴ and the subsequent placement of these genera in Cannabaceae in the APG III system of classification. Indeed, the pollen of *Celtis* (triporate, psilate-scabrate) is more similar to those of *Cannabis* and *Humulus*, rather than *Holoptelea*, which continues to remain in Ulmaceae with other taxa such as *Ulmus* to which it is palynologically similar (oblate, stephanoporate, coarsely regulate). Regional and interlinked plant and pollen herbaria are pertinent here too, in understanding plant affinities in systematics and cladistics.

Researchers and institutions have unfortunately not paid much attention to establishing and maintaining such collections. What is striking is that first, far too few such institutional collections occur in India. Of the nine mentioned by Garg¹, only one has more than 22,000 voucher specimens (accounting for about 15,000 species) and another about 5000. It is heartening to know that a new pollen reference collection will be established at the Environmental Resources Research Centre, Thiruvananthapuram¹.

With the rapid deforestation and loss of species in the past decades and the projected rapid urbanization of India in the following decades, these collections are barely representative of the rich plant biodiversity of the country. Given the magnitude of the task, is this enough for a tropical country with high biodiversity?

A nationally coordinated action to establish several such collections in different institutions all over India in a networked manner, using a homogeneous preparation protocol and optimal storage conditions ensuring longevity of the collection⁵, is but necessary. In fact, this

implies not only setting up such interlinked plant and pollen herbaria, but also training students and researchers in palynology and in the curation of such collections. This can be a good impetus to foster interdisciplinary and multidisciplinary collaborative research projects where palynological expertise is key.

Given the experience of those institutions where such ‘collections’ had been started in hindsight nearly 50 years ago, it is also vital to keep in mind that support for maintenance and curation remains available. In the current environment of crunches in research funding, it is pertinent that ‘... to retain its value, a reference collection of pollen requires adequate and continued curation over its lifetime, with corresponding budgetary support. For collections of 10 to 20 thousand slides, the equivalent of a half-time appointment as curator is minimal, with the additional support of a part-time student assistant. Such an expenditure is unwarranted if the collection is not in active use, yet the collection and its value are likely to survive longer than the palynologists and laboratory groups that initiated and used it. As with other orphaned but valuable research collections, finding practical ways to share a local reference collection of pollen with users elsewhere is an urgent need⁵.

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