

Lectotypification of plant names

Many publications on lectotypification of 'species' are coming up in different periodicals. We would like to point out that 'species' do not have type(s); they have circumscription and only the names have types. What is circumscription? It is an attribute or a set of attributes that characterize the taxon, and exclude it from all other taxa. Thus, a heading such as 'lectotypification of species' is not correct. This was first pointed out to one of us (S.B.) by late Dan H. Nicolson in 1992. However, such inappropriate titles appear even in reputed taxonomic journals.

Lectotypification is essential to fix the application of a name but in a proper manner. It helps us ascertain the identity of a plant. We often receive manuscripts on lectotypification for review, where the authors state 'As part of the revisionary studies in India... lectotypification of some "species" is necessary'. Unfortunately in many cases we have noticed that no revisionary study was actually carried out by the authors. In reality, it takes several years to revise even a small taxonomic group. Lectotypification of names should be carried out only after detailed taxonomic studies, preferably after revising a plant group. Without in-depth taxonomic studies one cannot have a clear concept on the morphological

variations of a taxon and to judge which 'original material' would be the best for designating a lectotype. Simply lectotypifying a name when there are more than one specimens used by the author of a name is not of much importance, because it does not affect application of the name. The prime importance of lectotypification of a name lies when the 'original material' consists of heterogeneous elements, or there is complexity in typification. In such cases, a designated lectotype fixes the correct application of the name. One should refer to *Taxonomic Literature* (2nd edn; TL-2) and its supplements (http://www.sil.si.edu/Digital_Collections/tl-2/search.cfm) to find out where the types of the author of a name can be found and communicate with the curators of all the herbaria concerned. Sometimes, 'original material' can also be found in some other herbaria not mentioned in TL-2. Simply looking at the images in a few virtual herbaria to lectotypify a name is not desirable. Further, authors should keep in mind that the images available on-line may not include all the type specimens available in that particular herbarium. They should also communicate and find out whether the images of the uploaded type specimens are the only ones available in that par-

ticular herbarium, or there are more images that are yet to be uploaded. Besides, they should have proper concept on 'original material' while lectotypifying a name, because in some cases lectotype can be designated from the uncited specimens and cited and uncited illustrations that comprise the remaining 'original material', if such exist.

Thus lectotypification should be carried out cautiously after a comprehensive study of a particular plant group and after a thorough search of type specimens in all the relevant herbaria.

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Role of Ph Ds in India

This is with reference to the letter titled 'A Ph D may not be enough' by Mahanty¹. The author has provided a baseline analysis about the scope and prospects of Ph Ds in India with special reference to job opportunities in the changing global scenario. He has further cautioned aspirants about the pros and cons of a Ph D degree in the industrial world and has mentioned that industrial firms often do not hire Ph Ds and instead consider/prefer lower qualified aspirants. Agreed that there might be challenges for Ph Ds in getting employment opportunities according to their expertise, especially in the industrial world, but it is also true that globally employment chances are becoming limited in every field/area due

to multiple factors, including population pressure, urbanization, inflation, resource depletion, conflicts, changing needs and necessities, etc. and this is irrespective of one's academic credentials. But there is always enormous scope for Ph Ds, especially in countries like India which are going through an evolving phase, particularly in the research domain.

Gupta and Dhawan² found that there is a strong need to encourage industry participation in research in different fields of science and technology (S&T) by involving it in the national network and sectoral programmes of the country; and both research and development (R&D) institutions and universities as well as the Indian industry need to work in tan-

dem and be encouraged to undertake programmes of relevance.

According to the vision document prepared by the Science Advisory Council to the Prime Minister, Department of Science and Technology, Government of India³, India can become a leading global force in science only when a massive increase in S&T education, both in quality and quantity is ensured and we need to produce at least 15 lakhs graduate scientists, 3 lakhs post-graduate scientists and 30,000 Ph Ds per year by 2025.

The report of the National Knowledge Commission⁴ that India needs 1500 new universities by 2015 also justifies the importance of having more Ph Ds because higher qualified human resource

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like a Ph D is a benchmark of universities to produce quality research and skilled manpower according to the changing trends in all the sectors, including the industry.

Further, according to a Council of Scientific and Industrial Research report⁵, a premier national R&D organization which provides S&T-based services to industry and other stakeholders, among other targets, we need to produce 1200 Ph Ds in S&T each year. Albeit being the world's second populous country after China, during 2004–2006 India produced 1 research scientist for every 7100 people; China 1 in 1080, South Korea 1 in 240 and Sweden 1 in 163. The status of areas like Gross Enrolment Ratio (GER), research citations, world ranking of Indian universities/institutions, etc. is also not healthy and appreciable. In order to compete at the global level, besides applied aspects, we need to ensure transparency, quality, interdisciplinary/multidisciplinary approaches in our research so that a skilled human resource is created. India can become a leading knowledge provider in the world only when a large and technically sound S&T resource is created, where the role of Ph Ds shall be sine qua non and unavoidable. It may be true that industries mostly need/prefer graduates/postgraduates, but to nurture a quality graduate/postgraduate we need quality teachers/academicians/researchers, for which Ph Ds suit the best. So indirectly industries also rely on Ph Ds who nurture and train their human resource to earn global accreditation.

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3. Science Advisory Council to the Prime Minister, India as a global leader in science, Department of Science & Technology, Government of India, 2010.
4. National Knowledge Commission, Report to the Nation 2007, NKC, Government of India, 2007.

5. Council of Scientific and Industrial Research, CSIR@80: Vision & Strategy 2022, CSIR, New Delhi, 2011.

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Response:

In an earlier correspondence, I had mentioned why a Ph D may not be enough for ensuring employability to young Indian researchers¹. The concern over the employability of Ph Ds has increased in recent times largely because of the huge increase in their number and preference of lesser degree holders over Ph Ds in industries. Of course, there are reports on the need for about 1200 science and technology (S&T) Ph Ds per year². However, such predictions are based on the fact that about 1500 new universities will be opened by the year 2015, which has been far from reality³. Although there are lesser number of Ph Ds per people in India, in comparison to countries like China, Korea and Sweden, research in these countries is funded equally by private industries as much as by the publicly funded organizations. But in India, research works are largely funded by the Union Government and there is little involvement from the industry. Again, although the funding for research and development has increased in the recent years, it is not at par with the expectations. For instance, the research budget for the year 2015–16 was Rs 419 billion (a 3–4% increase than the previous year); a large part of the fund was compensatory to the national inflation rate (5%)⁴.

The major issue for employability of Ph Ds has been the quality of the research work. As has been mentioned by

Dutta⁵, research scholars, under stressful conditions are often in a hurry to somehow complete their research work and get a degree. Such research work can have high academic significance, but finds little importance in terms of translation into a product of societal application. Again, carrying out research work through outsourcing has arisen as a major obstacle in skill development of research scholars. Also, because of outsourcing research, Ph D students are less exposed to cutting-edge technologies which leaves them less knowledgeable and consequently less employable⁶.

In such an uncertain scenario, where a little fluctuation in national economy can leave many people unemployed, those pursuing Ph D will have to find their own niche. Ph D scholars need to focus more on skill development and will have to prove their relevance and irreplaceability in the industry as well as in academia. Again, in a time when the Union Government is promoting start-ups and self-employment, Ph D scholars need to focus more on the translational potential of their research rather than to serve the purpose academic interest.

1. Mahanty, A., *Curr. Sci.*, 2015, **108**(9), 1577.
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6. Tayyab, S. and Boyce, A. N., *Curr. Sci.*, 2014, **106**(6), 789.

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