

Summary of discussions at SASSBX Workshop on reinvigorating revisionary taxonomic research

Question 1: What are the obstacles preventing you from doing revisionary studies?

1. **The academic merit system at universities discourages taxonomic research**
 - 1.1. Good quality taxonomic studies demand an in-depth analysis of the group under study, using all available tools and characters to understand and delimit species and clades. This work is complex and time consuming but needs to be completed before descriptive/alpha-taxonomic work can commence.
 - 1.2. University performance assessment systems reward a high publication output. This discourages the publication of monographic studies, which typically take a long time to complete, and contain a large amount of information, in favour of dividing large studies into a number shorter papers, resulting in fragmented taxonomic publications.
 - 1.3. Because the analysis of taxa is so complex it requires collaboration of researchers with different skills and expertise to complete. Universities however penalize researchers for collaborating by awarding less research funding/performance credit in response to multi-authored publications than single-authored publications.
2. **There are very limited opportunities for young researchers to enter into taxonomic research and establish a career**
 - 2.1. Educational programmes at universities to train young researchers in the skills and tools to do alpha-taxonomic research have mostly fallen away. Students are no longer trained to do revisionary studies, with the focus shifting towards completing the initial phylogenetic studies needed before revisionary studies can commence. This results in many researchers being trained only in applying phylogenetic tools and techniques who are then unable to follow up phylogenetic studies with revisionary publications.
 - 2.2. Short-term post-graduate studies typically only allow the completion of the phylogenetic component of a revisionary study, and there is little opportunity for students to carry on research projects towards taxonomic revisions after graduation. An attempt to facilitate such opportunities through SABI post-doc grants however failed as no applications were received (this may be related to the grants requiring that the post-docs be positioned at a museum).
 - 2.3. Phylogenetic studies can be published in higher impact factor journals and receive higher citation ratings than revisionary studies. Phylogenetic studies are therefore more valuable especially when young researchers apply for promotion or internal research grants as citation ratings and impact factors of previously published studies are the most important criteria used in evaluating applications.
 - 2.4. As a result, taxonomic research is mostly carried out by older researchers who have already established successful academic careers and have built up a long-term accumulated knowledge base of the groups they specialize on. There is a need for more mentoring of younger scientists to gain the required knowledge and expertise to be able to continue the work of older scientists when they retire. Such programmes however need to be approached with caution as a project in the USA to promote mentoring of younger scientists in taxonomic research (PEET) failed to do so as no positions were created for mentored younger scientists to be able to take up taxonomic research.
3. **Misconceptions regarding NRF funding and rating of taxonomists**
 - 3.1. There is a misconception that taxonomic research is not valued in NRF ratings of scientists. Researchers are not aware that publishing a monographic study leads to immediate recognition as a national or even international leader in their field of study if they choose to take on a group where little or no other expertise exists.

- 3.2. In addition there was also a misconception that adding a revisionary component to research grant applications for phylogenetic studies would disfavour the application.
- 3.3. As a result of these misconceptions, SABI, an NRF fund created to promote taxonomic research in South Africa, failed to really promote and revitalise revisionary studies because few applications with this approach were received.
4. **State run museums and herbaria are in crisis**
 - 4.1. Collections-based research institutions do not face the same constraints of the academic merit system as researchers at universities, however, staff of such institutions are generally (there are a few exceptions) not productive in publishing revisionary research either.
 - 4.2. There is currently a lack of a research culture in state-run museums/herbaria.
 - 4.3. It is generally accepted that national natural history collections are in crisis. Research and maintenance of collections are not part of the management agenda.
 - 4.4. The value of natural history collections to the country is not recognized by political leaders and the current placement of natural history museums under the Department of Arts and Culture is problematic.
 - 4.5. State run museums/herbaria lack the facilities (such as molecular laboratories) to complete high-quality taxonomic research, but attempts by SABI to foster collaborative studies between universities (generally better equipped) and museums through joint research grants had limited success.
5. **Lack of information about research priorities**
 - 5.1. There is a need for an integrated source of information on what taxonomic research has already been done on plant and animal groups, who is busy with research projects, and what the priorities are for further research.

Question 2: What can you suggest as solutions to overcome these obstacles?

1. The failure of the SABI fund to encourage any progress in alpha-taxonomic research indicates that making more funding available will not solve the problem unless other systemic obstacles can be overcome. Many suggestions were made with regards to funding for mentored positions for young researchers, more collaborations between museums and universities, encouraging use of collections, encouraging research at museums, etc., however, all of these have already been attempted through SABI funding and have largely failed to make any real impact.
2. Given that university-based researchers get little reward for publishing revisions, an alternative to traditional taxonomic publications is needed. It was suggested that electronic publication may provide this solution (see further points under Question 3).
3. Experts often privately maintain taxonomic information for their group of interest (e.g. correct names, identification keys and new species descriptions published after the completion of revisions). They need to be encouraged, incentivised and assisted in making this information publicly available.
4. Taxonomic research priorities need to be identified and addressed in a targeted manner. Priorities have been identified for plants, but still need to be done for other groups. Highest priorities can be addressed by making strategic funding available to individuals willing to complete specific projects that would contribute towards reaching research targets, rather than putting out general calls for applications where researchers can choose their group of study.
5. In addition, positions must be created to address knowledge gaps, and filled by individuals willing to take on poorly studied groups. If no suitably qualified candidates can be found, it is still better to employ a person without the necessary qualifications but with a willingness to take on groups in need of study and train such candidates on the job, rather than forcing qualified candidates to take on groups they are not interested in. This is a model that has been successfully implemented at Royal Botanic Gardens, Kew, a highly productive taxonomic research institution.
6. Post-graduate training courses that would provide young researchers with the skills and tools to complete taxonomic revisionary studies need to be reintroduced

7. In collections institutions mentors could be contracted to train young staff how to conduct taxonomic research these should be 2 – 3 year interventions.
8. It was suggested that a task team is formed to address the crisis with the museums. This group needs to look at the reasons for the collapse of maintenance of collections and the research culture at museums, and what the implications are for the country. This message needs to be prepared along with suggested solutions to present to political leaders when the results of the collections survey are made public.
9. Targeted biodiversity surveys of areas under high threat such as Gauteng, KwaZulu-Natal and North West Province could be implemented to address the conservation crisis in these regions. Experts from a range of taxonomic groups could be invited and incentivised (travelling costs and other funding) to participate in surveys and contribute data to conservation initiatives.

Question 3: How can we best facilitate the dissemination of the products of taxonomic research?

1. The consensus among participants was that collation of existing taxonomic information and electronic dissemination of this information through the internet is the best way forward.
2. SANBI is requested to set up an electronic portal where taxonomic information on South African biodiversity can be collated and made available to users and the public.
3. The proposed model of operation is a multi-participatory one where experts can compile, upload and curate information about their group(s) of interest themselves, rather than being dependent on a central curator.
4. The question of duplication of other information and similar systems already available on the internet was discussed:
 - 4.1. There is a need for locally relevant information – most other projects such as GBIF, Encyclopaedia of Life, etc. has a global focus, and it is often difficult to retrieve information about South African species alone.
 - 4.2. Focusing on local (South African) biodiversity means that the task of curation is more manageable.
 - 4.3. Wherever possible, links to other relevant information and resources already available on the internet should be available through the SANBI portal, rather than duplicating existing infrastructure and data.
5. Such a portal could also act as a source of information on research needs, and enabling contact and collaboration between researchers studying the same groups.
6. Means of providing incentives/credit to researchers for contributing to the information portal need to be created.