

## Future of taxonomy in the 21st century – whither or wither

I appreciate Mariappan and Balasundaram<sup>1</sup> for taking a lead in highlighting flaws in taxonomical literature which have not only led to wrong scientific interpretations, but also monetary loss. Mistakes of this kind are a result of poor knowledge on the subject, because of which we are unable to estimate how many species of animals and plants exist today.

We often talk of biodiversity loss, but unless we have a detailed account of the existing species the loss cannot be pinpointed. Numerous examples can be cited where wrong classification has led to misinterpretations. Taxonomy plays an important role in the management of pests and weeds. To illustrate this point, *Salvinia molesta* (kariba weed), native of Brazil, is an aquatic fern and one of the world's worst weeds. The environmental damage caused by it has been enormous. It chokes lakes, reservoirs, slow-moving rivers, irrigation systems, rice paddies, fishponds, etc. with continuous metre-thick mats of dense vegetation. In addition to rendering the water useless for normal use, its presence can lead to the breeding of mosquitoes. Initially, the weed was identified as *Salvinia auriculata*. A weevil, *Cyrtobagous singularis*, from Trinidad was used in Africa to control it, but the effort failed. Later, this weed was identified as *S. molesta*, whose growth in Queensland was controlled by *Cyrtobagous* from Brazil. It is evident from these examples as to how effective control or mitigation measures could be implemented<sup>2</sup>.

Similarly, identification of an effective biological control agent for *Azolla* depended on expert taxonomic work. Floating water fern/fairy fern (*Azolla filiculoides*) has for years been a highly effective invasive species in South Africa, creating problems in inland waterways. The weevil, *Stenopelmus rufinasus* was found effective in cleaning up sites heavily infested with *Azolla* within months. Proactive taxonomy of biotypes of whiteflies *Siphonius phillyreae* and *Bemisia tabaci* causing viral epidemic in crops in Argentina allowed effective implementation of biological control programmes via natural enemies such as *Encarsia hispidia*, *E. protransvena* and *E. transvena*<sup>3</sup>.

In spite of its importance as an inevitable field for all types of research, taxonomy faces many challenges and remains a neglected subject. There is no national repository centre, museum, or maintenance of taxonomic collections. Many museums have no curators and several universities have no faculty positions for taxonomists. A demand for taxonomy is on the rise in the wake of the global biodiversity crisis. There is a need to promote scientific identification and documentation requires immediate attention. Due to lack of infrastructure at academic institutions and a well-structured research programme, seldom are students willing to pursue taxonomy. There are a handful of job openings for taxonomists and pay scale is low. Further, inadequate funding in taxonomy largely diverts stu-

dents to studying phylogeny. It is also difficult to publish in the field as there are only a few journals dedicated to taxonomy research. The miniscule journals however do not accept large revisionary work or monographs.

This calls for building a network among institutions and organizations involved in taxonomic collections. It is high time that the national institutes and funding agencies encourage taxonomic work and provide financial assistance to strengthen the knowledge base in taxonomy.

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## Lack of efficacy of MVA85A TB vaccine candidate: potential outcomes

It is disturbing to see the leading vaccine candidate against tuberculosis (TB) shows a near total lack of efficacy in the recently concluded phase 2b trial in Cape Town, South Africa<sup>1</sup>. The implications of these results are many and enormous – some of them are enlightening and will give us constructive future evidence towards conduct of similar exercises<sup>2</sup>. The immediate and most profound of these is that the immunogenicity parameters

measured in earlier human studies<sup>3</sup>, calibrated and optimized for the phase 2b trials, have been clearly shown in this study to have no correlation with protection against clinical disease per se. This implies that these markers/methods are questionable and should not be used as the primary end point determinants any more. The use of these antigens as vaccine candidates is limited. Earlier vaccine candidates evaluated with the

same markers and determined as unsuitable need to be relooked again. Any of them may well be the answer to our need for a vaccine, their initial bid for this being rejected by faulty measures.

In every vaccine development programme, establishment of an end-point is critical for assessing the performance of the vaccine. The best end-point is the incidence of clinical disease (against which the vaccine is directed) in vaccinated and