

Protectionism and natural history research in India

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'... I have no doubt that but for the methodical collecting of specimens in my earlier years – several thousands, alas – it would have been impossible to advance our taxonomical knowledge of Indian birds – as the various regional surveys have done – nor indeed of their geographical distribution, ecology and bionomics' (p. 195).

'For me wildlife conservation is for down-to-earth practical purposes. This means – as internationally accepted – for scientific, cultural, aesthetic, recreational and economic reasons, and sentimentality has little to do with it. I therefore consider the current trend of conservation education as given to the young on ground of ahimsa alone – something akin to the preservation of holy cows – unfortunate and totally misplaced . . .' (p. 233).

—Sálim Ali¹ in *The Fall of a Sparrow*

Systematic characterization and quantification of biodiversity is an essential prerequisite for its conservation, management and sustainable utilization. As natural habitats are being fragmented and more and more life forms are facing a bleak future countrywide, at no time in history has it been more imperative for us to switch over from mere protection of biodiversity to its conservation: the latter entails active scientific management measures, whereas the former is largely an issue of policing²⁻⁵. Enactment and implementation of imprudent and counter-productive legislations such as the Biological Diversity Act, 2002 (refs 6–8) are not only impeding urgently needed, scientifically formulated conservation programmes, but also making research a criminal activity in India. The implementing agencies (originally meant for dealing with unlawful activities), armed with such anti-science, draconian regulations, conveniently refuse to differentiate between sampling by well-experienced field biologists and poaching by criminals. In such a milieu, it is not surprising that the very first individuals arrested and convicted as per the Biological Diversity Act are not poachers, but practising taxonomists whose work is of immense value in the conservation of biodiversity^{9,10}!

Sound taxonomy is the basis of all meaningful research in biology¹¹. Insects are one of the most diverse, but least known groups, among animals. Approximately 60,000 species of insects are identified and named in India and it is estimated that a minimum of 4–6 lakh or more Indian species are yet to be discovered. At the present rate, the magnitude of work needs a few thousand years¹¹. In recent years, research in insect systematics has dwindled at an alarming rate in India and the number of practising taxonomists has come down drastically and only very few trained taxonomists are engaged in active research. The present crop of manpower available for systematics needs to be enhanced several times to fulfil the primary task of inventorying our insect fauna. Very few publications of the magnitude and scope of the *Fauna of British India* series have come out in recent years. Indian taxonomic publications are mainly single species descriptions, and faunistic contributions on collections of a particular group made in a politically (as distinct from natural or zoogeographic) defined area, whereas revisions of genera and suprageneric taxa are few and far between for a variety of reasons. Barring a few, several major groups of insects have been neglected as a result of which we do not have the expertise to carry out even routine identifications of several economically important groups of insects. Sohi and Mann¹² listed just 53 Indian insect and mite taxonomists who were 'likely' to offer identification services. In terms of training, methodology, competence and output, very few of our taxonomists measure up to international standards. As a result of this, entomological publications from this region are either delayed for want of correct identifications or based on wrong identities and records.

No country has ever possessed sufficient expertise to identify nearly all 1400 families of insects and 350 families of plants. There is a great dearth of experts for a vast majority of insect groups globally and all the more so in India¹³. A typical case is the shortage of experts on the long horn beetle family Cerambycidae. This is one of the largest and eco-

nomically important families of animals as several of them are devastating pests in agriculture and forestry. There is no single expert who can deal with the world fauna of Cerambycidae. A handful of experts partially deal with the sub-families at the international level. The latest monograph on Indian Cerambycidae dates back to 1906 (ref. 14) and hundreds of species are yet to be named and described. No one in India has ever done any serious work on this fascinating group of beetles. So far the world taxonomists have addressed this problem by best using the tradition of collegiality and reciprocity existing in the taxonomic world⁷.

Quality taxonomic research requires collaboration and cooperation among specialists and institutions across the globe^{7,15} as biological diversity is a transnational and global phenomenon resulting from common descent. The type specimens of even closely related species may be held in museums in different continents and the occurrence of taxa breaching political boundaries of nation states makes biological systematics truly international in theory and practice. This is well illustrated by the simple example of biological nomenclature as every scientific name is universal and is governed by international codes of nomenclature. As in the case of naming, biological classifications too need to be drawn with an international perspective by pooling inputs such as specimens and expertise from across political boundaries. The international treatise on 'Removing the taxonomic impediment'¹⁶ to which India is a signatory, calls for promoting international collaboration in taxonomy.

Measures for conservation of any organism should be based on a thorough understanding of its biology and the tactics may vary from one species to another¹³. There is no technique that can be universally employed and a strategy that is beneficial in a given situation may have disastrous consequences on a different system. For example, exclusion of grazing is a common practice adopted by the guardians of protected areas in India, but the very same measure had negative implications on the ecology of the Keoladeo Ghana National Park in Bharatpur¹⁷.

Our conservation policies are still pivoted around the protocols developed for conserving a few charismatic taxa, originally meant for the colonial purpose of protecting game animals. This prompts the application of the same yardsticks for the protection of tigers as well as tiger beetles. In the case of large mammals like tiger, every individual is precious and individual protection matters a lot, whereas the same becomes ludicrous and absurd in the case of insects and other lesser known invertebrates. Because of their small size, extreme abundance, and enormous fecundity, population density of most insects will be very high¹³. They have different life stages as egg, larva, pupa and adults, of which the first three are generally cryptic and adults alone are noticed. So, even the most experienced and seasoned collector will be able to catch not more than a negligible number of individuals whose sacrifice is inevitable, but unlikely to materially affect their population levels. As the number of systematic entomologists is far less compared to other biologists, serious sampling for research is done only by a small number of people in any part of the world. Moreover, a taxonomist will be highly selective in sampling to save time and energy, as he or she will be working only on a single family or subfamily of insects. Quite often, the total biomass of insects sampled by a scientist is less than that eaten by an insectivorous bird in a whole day! Many a time, an insect needs to be examined under a microscope just to place it in a family and most often its ultrastructure, including genitalia, needs to be examined for accurate species identification. It is needless to say that collection of insects is an essential prerequisite for any serious research in entomology and there is no known case of insects becoming extinct or endangered due to sampling for scientific research. Habitat destruction and indiscriminate use of pesticides (more than 40,600 tonnes of pesticides are applied annually in the country)¹⁸ are the most important factors that lead to extinction of insects. Hence, conservation policies with a thrust on habitat protection rather than mere species are essential.

Unfortunately, there are many instances of over-enthusiastic individuals (even among biologists) as well as misinformed organizations in the bandwagon of conservation who oppose sampling of insects for research. However, their otherwise well meaning intentions re-

quire sympathetic appreciation and instillation of awareness as this would create hurdles in the conservation of the biota that they wish to protect! The usual reasons given out for the opposition of sampling of biota are: (i) killing is unethical even if it is for research, (ii) biological material of Indian origin if taken out of the country may lead to patenting and the consequent loss of intellectual property rights. Regarding the first argument, we would like to state that the entire system of biological classification is based on dead specimens and killing is unavoidable in several other branches of fundamental and applied biology too, as rightly pointed out by none other than the doyen of conservation, the late Sálím Ali¹. The second argument raised even by apex bodies like the National Biodiversity Authority (there are taxonomists and other scientists in the NBA too!) is the most ludicrous as fundamental research generates only knowledge and not wealth. Whatever knowledge generated is in the public domain and is accessible to everybody. As pointed out earlier^{7,8}, the question of patenting arises only when the biological material has commercial value and is available in quantities amenable for mass production and utilization. Classical taxonomists use only dead specimens of little or no commercial value and that too in limited numbers. Taxonomists and natural history museums are not involved in such commercial ventures but they generate and disseminate knowledge based on the material under their care and take care of the specimens for posterity. The most effective method to prevent patenting of traditional knowledge is to document and make it available in the public domain as proven by the cases of basmati rice, neem and turmeric.

The list of insects to be protected as per the Wild Life (Protection) Act, 1972 (ref. 19) is a classical case to illustrate the need for research in our protected areas. Evidently, this list is based on little scientific data and is totally unrealistic. For example, 15 names from the *Fauna of British India* volume on Chrysomelidae²⁰ appear as 'endangered' in Schedule II (ref. 21). Interestingly, all of them belong to the single subfamily Alticinae (the family Chrysomelidae is classified into 10–20 subfamilies by various workers). Out of the 15 names, one is a junior synonym of another species in the same list and five species occur in south India. Four of them

(*Clitea indica*, *Nisotra cardoni*, *N. madurensis* and *N. semicoerulea*) are common pests of cultivated plants and at times need control measures. It is clear that this list is arbitrary and it is based on little scientific data. Such lists are scientifically incorrect and counterproductive.

India, as a nation, needs to realize the pivotal role of science in the conservation of its natural heritage. We should also fulfil our commitments in fostering systematic biology¹⁶ and grow out of the prejudices and misconceptions that have led to the recent unfortunate incidents in Darjeeling²² which have seriously dented the image of India in the eyes of the international science community. Currently it is impossible for a scientist who is not a citizen of India to get a permit to sample and work on Indian insects. We need to amend the Biological Diversity Act and Wild Life (Protection) Act to facilitate quality taxonomic studies on Indian fauna and need to correct and fine-tune the bureaucratic system which makes it impossible for a scientist to get a collection permit to study Indian biota.

Many countries with vibrant science communities follow liberal and pragmatic policies vis-à-vis insect collection. Non-commercial collection of insects on forest lands for recreational purpose does not warrant a permit in the United States²³. Research permits for insect collection in the US National Parks are issued through a simple online procedure²⁴. Any individual, irrespective of nationality, may apply for a permit if she or he has qualifications and experience to conduct scientific studies or represents a reputed scientific or educational institution. The collected material is considered as the property of the National Park on long-term loan to the permittee. In India quite often a doctoral student has to wait for years expecting the permits to conduct research in a protected area, after submitting an application and paying an exorbitant fee. A report of the select committee of the British House of Lords on Science and Technology reiterates the importance of taxonomy and underscores that country's commitment to foster systematic biology²⁵. Collection of specimens in the protected areas in UK is governed by general legislations like the Wildlife and Countryside Act, 1981 (ref. 26) that neither discriminate scientists based on nationality nor strangle scientific freedom. But Germany is emerg-

ing as a dark example in the West as scientists in that country are up in arms against irrational legislations that throttle critical enquiry in the natural world²⁷.

India has always welcomed the erudite and all of us appreciate the contributions of international scholars towards the understanding of our languages, culture, history and economy. Many of the outstanding contributions on the natural history of independent India too are from international workers. The recent revision of the birds of the Indian subcontinent²⁸, monographs on tiger beetles²⁹, flea beetles³⁰ and the larvae of Cerambycidae³¹, revision of *Aphthona* (Chrysomelidae)³² and *Catalogue of the Oriental Diptera*³³ are a few examples. Legislations like the Biological Diversity Act and the paranoiac permit raj have taken the country behind the iron curtain at least in the case of natural history research. Let us be rational and reasonable. Let us build state-of-the-art repositories for biological material, invite reputed scientists from all over the world to help us in inventorying our rich natural heritage and build scientific collections for posterity. It is high time we came to grips with the grim reality that the fossilized 'official' scientists closeted in a few national organizations alone cannot help us to meet all our knowledge requirements in characterization and conservation of our biodiversity. Opening up natural history research in India to reputed international scientists would infuse new life into the field and definitely enhance research both qualitatively and quantitatively.

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