

Taxonomic entomology: Research and education in India

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Sound taxonomy is the foundation of all meaningful research in biology. It has great relevance in various fields like biodiversity, ecology, agriculture, medicine, etc. Very little contributions are made by Indian workers to the taxonomy of Indian insects. While some orders like Hymenoptera, Diptera and Hemiptera are better worked out, others are not. There are several problems to overcome in Indian taxonomic research. More funding, introduction of taxonomy in the curricula of UG and PG students of biology, training in taxonomy, enough library facilities for taxonomic literature, enough journals to undertake large revisionary works and the need for more identification service centres and repositories are all essential for the development of taxonomic research in India.

Sound taxonomy is the basis of all meaningful research in biology. Before undertaking any kind of research on any organism, it is absolutely essential to know its correct name. The name is a label using which various pieces of information on an organism are retrieved and stored¹. Taxonomy has great relevance to various fields such as biodiversity, ecology, agriculture, conservation, medicine, fisheries, etc.

When compared to developed countries, taxonomic research in India is greatly neglected. One of the reasons for this state is that it has become fashionable to treat taxonomists as being incapable of analytical thought and deductive logic, by biologists working in physiology, genetics and molecular biology².

On the contrary, research in taxonomy needs hard field-oriented work involving dangerous situations. A taxonomist often needs several hours or days, looking through his microscope for identifying a single specimen. He needs dedication and intelligence for analysis of various characters. To identify a species authentically, expertise developed through years is called for.

Past and present status

During the pre-independence days, foreign workers mainly studied the taxonomy of Indian insects, though pioneers like Ramakrishna Ayyar, Narayanan, Pruthi, Mani and a few others also made such studies. During the post-independence

period, though more students undertook taxonomic research, not much encouragement was given to them. At present, the Zoological Survey of India (ZSI), Kolkata, Indian Agricultural Research Institute (IARI), New Delhi and a few universities and institutions carry out taxonomic research on Indian insects to a limited extent. Figure 1 shows the percentage of world species of insects discovered so far from India at the species level. The major contribution by Indian workers is given in Figure 2.

Future prospects

In this context, it is worth quoting the late Gahan³ who stated in the context of writing on the taxonomy of world insects:

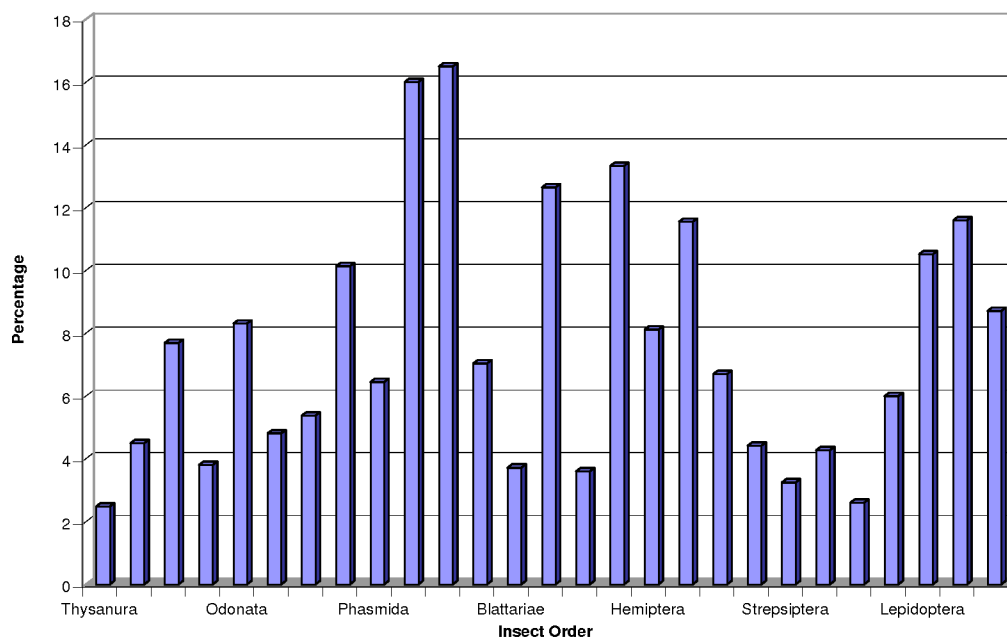


Figure 1. Percentage of world species of insects in India.

'The tremendous worldwide interest in the economic entomology has resulted in swelling the number of economic workers to a veritable army, while the number of systematists has apparently not kept pace'. This statement is still very much relevant today in the Indian context after 77 years, where the relatively small number of Indian taxonomists are confronted with several thousands of species and Gahan's 'veritable army' of economic workers has improporionately increased several-fold. So, there is no wonder if a large percentage of determinations are left with only generic names and many species' names end with a question mark. Thus we have to go a long way to have a sound taxonomic knowledge of the fauna of Indian insects. According to Roonwal⁴, approximately 1,00,000 species of insects occur in India and a recent global biodiversity assessment⁵ estimates it to be 10 to 15 times more than this number. Though Alfred *et al.*⁶ listed about 155 Indian experts in the taxonomy of various insects, I believe that there are at present hardly 100 Indian workers who are really competent, capable and actively engaged in the taxonomic studies of Indian insects. The number needs to be multiplied many times if the fauna is to be explored, taxonomic research conducted and identification manuals published. Our resources are limited and the task is tremendous.

Problems to overcome

Funding: One of the most important problems in the field of taxonomic research is finding financial support. Sufficient financial support should be given to universities to promote the development of taxonomic specialist cadres⁷. Scholarships and fellowships should be given to students who take up taxonomy for their doctoral research. Funding agencies can give such fellowships to students and grants for research projects on taxonomy. In addition to these, enough funds should be earmarked and set apart for taxonomists to visit international centres of taxonomic research in India and abroad.

Introduction of taxonomy in the curriculum and syllabus: Taxonomy should be introduced as a compulsory subject at graduate and post-graduate levels. At present, in the syllabi for students of biology and life sciences, adequate importance is not given for taxonomy in India. Taxonomy can be offered as a special subject or as a separate core subject.

Training in taxonomy: Short-term training courses for identifying and studying various families of insects can be offered to students and working entomologists. Such courses will help these trainees to initiate taxonomic research on insects.

Such training courses have been offered by universities and research institutions abroad. It would be desirable if such courses are regularly conducted in all regions (north, south, east and west) of the country.

Library facilities: Studying the taxonomy of any group of insects requires availability of all relevant literature, including earlier publications. No research paper becomes outdated in taxonomy. Unfortunately, most papers published by foreign scientists on the taxonomy of Asiatic insects are published abroad and are not easily available in our country. The services rendered by Indian National Scientific Documentation Centre (INSDOC) is not adequate to cater to the needs of Indian workers. More funds and facilities should be provided for procuring such literature by libraries in India.

Publication of research papers: At present, there are only one or two journals in India for exclusively publishing taxonomic papers. Unfortunately, these journals often take more than a year or two to publish papers due to the large backlog or other constraints. Other journals which accept taxonomic papers do not accept large revisionary work or monographs. The journal, *Oriental Insects*, published from USA by V. K. Gupta, caters to the needs of taxonomists

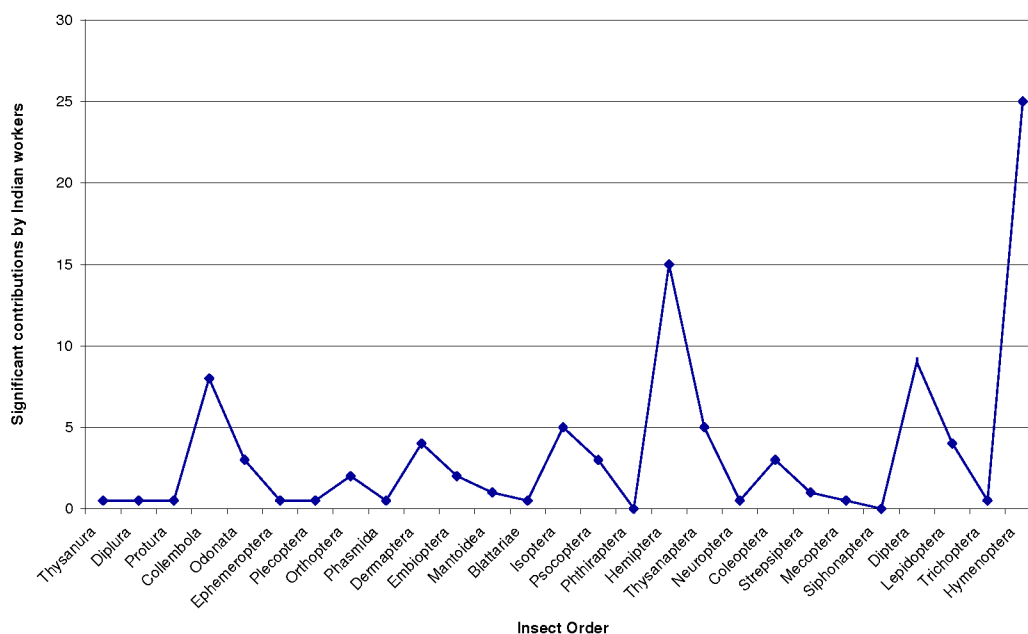


Figure 2. Major contributions to the taxonomy of Indian insect fauna by Indian workers.

of India to a great extent. We need more such journals in India, to publish large revisionary work, etc. without charging too much.

Role of repositories: At present, we have only 3 main repositories in India, viz. ZSI, IARI and Forest Research Institute, Dehradun. My own experience has shown that unlike many major world museums, our national institutions are very unhelpful in loaning materials of specific groups, requested by bonafide taxonomists. If these institutes can loan material to bonafide workers as all international museums do, it would result in the advancement of taxonomic research. Thus both the museum and the taxonomist will be benefited. The loaning institute can enrich its identified collections and the researchers also stand to gain.

Identification service: At present, there are only two major national centres in India, which do identification services on a large scale, viz. ZSI and IARI. Unfortunately, even these centres do not have specialists on several insect groups and the services rendered by them are inadequate. Apart from these national centres, there are a few specialists scattered all over the country who also do identification services. Till recent times, most Indian workers were mainly depending on the CAB International Institute of

Entomology for identifications. Since this institute has started charging heavily for each identification, it has become almost impossible for many workers to bear such expenses. In this context, it would be desirable to start one or two additional identification centres in the country (one should be located in southern India, which lack such centres). These centres should also make every effort to coordinate and get help from various specialists available in the country. These centres can also serve as national repositories. Adequate funding should be provided for establishment of such identification centres, which should be provided with adequate manpower, a library, collection and necessary equipments.

Conclusions

Approximately 60,000 species of insects are identified and described in India and a few groups have so far been painstakingly catalogued and monographs published on them. It is estimated that a minimum of 4,00,000–6,00,000 or more Indian species are yet to be discovered. The magnitude of work needs a few thousand years, if we continue at the present rate. In this context, I would like to quote Gupta⁸: 'The objective should be to document the faunal diversity before it is gone. In tropical countries where resources are limited, instruments are

costly and without repair services, the priority should be to understand the biota and utilize it for the benefit of mankind. If we set our priorities straight and make a beginning, I am sure that we will succeed. We have lost valuable time, but it is better to be late than never'.

1. Narendran, T. C., *Resonance*, 2000, **5**, 60–68.
2. Gadagkar, R., *Scampus*, 1998, **98**, 5
3. Gahan, A. B., *Proc. Entomol. Soc. Wash.*, 1923, **25**, 69–78.
4. Roonwal, M. L., *Hexapoda (Insecta India) Madras*, 1989, **1**, 1–2.
5. Heywood, V. H. (ed.), *Global Biodiversity Assessment*, Cambridge University Press, 1995, pp. 1125.
6. Alfred, J. R. B., Das, A. K. and Sanyal, A. K. (eds), in *Faunal Diversity in India*, Zoological Survey of India, Kolkata, 1998, 1–497.
7. Ananthkrishnan, T. N., *Curr. Sci.*, 2000, **79**, 10.
8. Gupta, V. K., *Insect Sci. Appl.*, 1987, **8**, 407–412.

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