development of new (not merely borrowed) technologies could probably be achieved with greater success in areas in which the developed countries might have lower fascination due to non-availability of source-materials like titanium and rare earths, etc. Success stories in these directions would be a source of encouragement for more competitive fields.

The purpose of this brief note is to encourage a continuing debate and effective steps to remedy the situation before it is too late for the 'vision-2020' to be a reality.

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The enigma of insect conservation

Increasing interest in the production of comprehensive mapping schemes involving the most conspicuous groups of insects is a step in the positive direction, since such efforts reflect the nature of the collecting sites as well as the distributional range of species. Though the world plant biomass is 99.9 times that of animals, the latter make up 99.8% of species and among these insects dominate all ecosystems. The significance of plant–insect mutualism cannot be overlooked since pollinating insects maintain plant biomass in as much as plant diversity contributes to pollinator success with resultant interactive increase in biotic richness[1]. Spatial scales in relation to insect conservation becomes relevant and enough evidence exists to show the diversity of scales used from 1, 10 or 100 m to km^2 ranges, the latter often giving a good picture of insects such as butterflies, dragonflies, crickets and grasshoppers. The extent of landscape interference through fragmentation mostly due to deforestation naturally leads to an assessment of available elements of landscapes such as microsites and biotopes within the available plantscape. This is important since the degree of heterogeneity in populations as well as intra- and inter-specific interactions are involved so that consideration of biotopes becomes important, since it covers the physical and biotic components wherein insects live. The need for conservation of small insects which abound in both species and population is equally vital. Within the mapping site specific plantscape and biotopes have to be considered more in view of the fact that many small insects have comparatively small home ranges.

For small-scale environments the term 'microscape' is used, so that the microscape to the plantscape or plant architecture becomes important in insect biodiversity studies, since at scales from metres to kilometres biotopes make up landscape elements so that heterogeneity tends to increasingly contribute to conservation efforts. From the conservation viewpoint therefore, insect habitats from micro- to macro-habitats have to be conserved. Many species which are biotope-sensitive suffer the consequences of anthropogenic factors which induce changes. I had worked in the Thenmalai area of the Western Ghats in the early sixties when the vegetation was lush. Subsequent comparison two or three decades later, particularly of the composition of species of gall thrips and mycophagous thrips, has indicated the virtual disappearance of several species, some of which were good examples of discontinuous distribution. In view of many species being endemic there should be an intensive effort to document all endemic species belonging to diverse insect groups in such areas. There also exists the high levels of genetic variation in natural populations with adaptive responses particularly in relation to sex-related polymorphism and diversity of patterns involved in such polymorphism is often great, calling for the need to keep in mind the existence of such diversities and also involve specialists who alone can predict the occurrence of such diversity[2]. Of equal relevance are species occurring alongside margins of their ranges with differing physical and biotic conditions and these populations are liable to dwindle due to environmental causes. Therefore, conservation of appropriate habitats would appear more meaningful in insect conservation rather than on the basis of species and as has been rightly asserted 'conservation decisions rest essentially on the interpretation of field data into biological reality'[3].

Conservation biology is essentially a 'crisis science' needing specialists to justify the need for conservation in terms of their usefulness. In view of the demarcation of well-defined biosphere reserves, a beginning could be made through integrated efforts to study the range of disturbance levels in these reserves to conserve groups of insect species. Further, the maintenance of biodiversity succession is also an important parameter in natural ecosystems, since insects and plants are more often the primary determinants of succession patterns. It would also be an useful exercise to become involved in long-term monitoring of insects in specific habitats such as in biosphere reserves with emphasis on individual species to know their responses to change, as well as other species in the community.

There is a need to protect water bodies such as lakes and wetlands which are being threatened by various factors and which are sources of insect reservoirs. A comparison of such disturbed water bodies in our own hill resorts all over the country becomes all the more relevant in view of increasing anthropogenic influence.

1. Lawton, J. H., *Annu. Rev. Entomol.*, 1983, **28**, 23–29.
2. Ananthakrishnan, T. N., *Reproductive Biology of Thrips*, Indira Publishers, Michigan, 1985.
3. Mound L. A. and Gaston, K. J., in *Perspectives of Insect Conservation*, Intercept Ltd., Andover, 1993, pp. 185–196.

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