Plantscape and insect biodiversity: Neglected dimensions

Landscape has emerged as a new and exciting level of ecological study providing information on the importance of major groups of animals and plants in maintaining the stability and resilience of natural ecosystems. With spatial dynamics being significant in ecological studies with the availability of remote sensing imagery, landscape studies have assumed further importance, but to make ecological dynamics more meaningful, species abundance and diversity should be more integrated with emphasis on local population dynamics which is influenced by the characters of the immediate environment as well as surrounding landscape. Biodiversity in the context of the landscape provides enhanced opportunities to link population dynamics and ecosystem processes. Terrestrial habitat structure for insects offers varying degrees of complexity in view of the diversity of plant architecture. More complex the architecture, more the diversity in insect abundance and species richness. Insect groups as of others will vary across a landscape, but in relation to insect 'plantscape' or the architecture of plant communities and spatial relationships between plant form is important, since plantscape exerts considerable influence in insect behaviour. Increased scrutiny of the plantscape becomes important for a better appreciation of species guilds or guild composition, since guilds have 'important feedbacks to ecosystem processes and landscape patterns and alteration in habitat naturally results in decreasing biodiversity'.

While biodiversity essentially deals with diversity of genes in populations, diversity of species population in an ecosystem and diversity of ecosystems in a landscape, preservation of biodiversity demands information on the units of biodiversity in relation to different microsites, not to mention the nature of variation in diversity. This calls for an intensive niche-oriented exercise with assemblage patterns in relation to the coexistence of different species at the survey sites. With virtually no concentrated effort being made to involve entomological studies relating to the dynamics of the canopy, bark, litter, galls, rhizosphere, epiphytes, inflorescence, pteridophytes and natural enemy complexes involved in each in forests such as those of the Western and Eastern ghats, the gap in our knowledge is indeed wide. It is here that expertise is called for on diverse groups of insects to be able to identify the microhabitats harbouring the insects, instead of random efforts to collect them in isolation. The exuberance of such microhabitats in forest ecosystems is awe-inspiring as is the complexity with which natural communities are assembled and there can be no better examples than the diversity natural forest litter community which harbours complex food webs and more diverse the plant community, more diverse will be the litter community. My own limited experience working in some areas of the Western ghats over the years has enabled me to identify diverse microsites with Indo-Malayan, Ethiopian and Neotropical elements, some of which are good examples of discontinuous distribution as well as sex-limited polymorphism showing unbelievable phenotypic flexibility resulting in endless patterns.

Needless to emphasize that the patterns of insect diversity reflect the structural role of plants in creating environmental heterogeneity. Such heterogeneity has enabled the persistence of high diversity among diverse species of insects which directly or indirectly depend on plants. The diversity of caterpillars associated with plants is an aspect as important as being able to confidently access the nature of butterfly diversity. The development of environmental versatility is an important criterion in the successful exploration of various habitats by insects and in the process insects develop structural, physiological and behavioural diversities enabling them to respond differently to diverse habitats at different periods of development and under varying conditions. Plants offer microenvironments necessary for a variety of functions. The fluctuations in the habitat combined with the internal environmental factors have positively stimulated the evolution of structurally diverse series of forms. Diversity of resources available in a community determines the variety of opportunities for ecological diversification. Of equal significance is the fact that genetic variability among individuals of the same species can impose differences in size, morphology, behaviour and other phenotypic traits independent of environment conditions as well as impose limits on the range of phenotypic flexibility that can occur. The unbelievably large diversity of ants, membracids, thrips, earwigs, beetles, to mention a few, as well as trophic relationships at the various microsites are aspects worth immediate attention.

The identification of microsites and the knowledge of the adaptive diversity of species in such environments whether it be mycophagous, phytophagous, saprophagous or carnivores appear essential to be able to support the meaningful proposal of developing biodiversity atlases and habitat conservation maps. Significance of the structural components of the habitat would appear important for insect conservation and the analysis of insect diversity elsewhere in tropical forests from the forest floor to the canopy have brought out very valuable information.

Before it is too late there is an imminent need to organize inter-institutional surveys at higher levels with experts on various groups of insects from different institutions at the national level under the aegis of the Zoological and Botanical Surveys with adequate funding from the Ministry of Environment and Forests. In a lighter vein I may mention that such expertise, would while taking care of species nomenclature, also be wary of 'taxanamy' giving meaningful names though not like *Pentadactylorthopteroides vigintioctonigropunctulomaculata*!!

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