Mining de novo diversity in palaeopolyploids

Owing to lack of efficient sexual system there is little scope to create variation in the species that reproduce obligatorily vegetatively, such as palaeopolyploids/evolutionary hybrids that are common in several monocot families like Agavaceae, Amaryllidaceae, Araceae, Liliaceae, and dicots like Lamiaceae etc. Curiously such obligatorily vegetatively reproducing species are endowed with inherent capacity to accommodate large-scale gain or loss of genetic material on account of their polyploid composition. They harbour individual de novo mutations that go on sequentially accumulated during asexual process. Such somatic mutations that arise de novo could be potential resource of new genomic states, if channelled into the formation of daughter shoots/bud mutations. Thus, there is unique opportunity to attain variation even without sexual recombination in such species through simple means of scoring bud sport mutations. They could become a major resource to realize genetic variation, if their frequency and spectrum could be enhanced in a predictable manner. One of the imminent possibilities to enhance the frequency and spectrum of somatic mutations could be through elicitation of inherent de novo diversity, to realize stable variation.

Taking a palaeo-octaploid species Mentha arvensis (family Lamiaceae, 2n = 8x = 96) as a model system, Lavania et al. (page 939) demonstrate that a simple application of polyploidisation stress during vegetative propagation could enhance the incidence of bud sport formation by five fold, unravel a plethora of hidden variation, and in turn realization of new genetic states through their participation in bud sport formation. This has value in mining of somatic diversity accumulated de novo during growth and diversification in obligatorily asexually reproducing species. The study has practical implications as it suggests a simple means to realize vast variation at whole plant level imitating evolutionary changes without any involvement of sexual process or other cumbersome means of induction of clonal variation. Further, because the bud sport variations are the outcome of in situ somatic selection, their vegetative progenies are expected to be biologically competent unlike the aberrant regenerants originating from in vitro driven variations that generally suffer from aneuploid syndrome.

Trawling and by-catch

Trawling, being a non-selective fishing method, hauls up all the organisms in its path, along with targeted species and therefore remains a controversial fishing method. The impacts of trawling on the physical, chemical and biological environment of the marine ecosystem and the diversity and quantity of by-catch and discards remain poorly documented for the tropical waters. BijuKumar and Deepthi (page 922) analyse reports on the quantum of discards and by-catch due to trawl fishing, physical, chemical and biological implications it has on the marine ecosystem, present by-catch utilization and research on by-catch reduction devices. In India, the by-catch landed at fishing harbours are utilized mainly for the production of manure and animal feeds, which is often considered as wastage of valuable animal protein. Further, the by-catch reduction devices developed indigenously have not been put into practice. The authors also highlight the need for adopting policies and practices that reduce the level of by-catch, the need for ecosystem-based management to ensure long-term sustainability of oceanic resources, and the adoption of a precautionary approach with emphasis on reducing, and if possible avoiding, discards. The need for collecting bench mark data on the quantity and quality of biodiversity associated with trawl by-catch and impacts of trawling on the marine ecosystem in India waters have also been discussed.

Rhombohedral graphite

Parthasarathy et al. (page 995) describe the presence of fluid deposited graphite from a major shear zone in Eastern Ghats mobile belt of Andhra Pradesh. This shear zone bears an economic importance as tungsten and graphite mineralization occur along the shear zone. Though there are few reports of occurrence of fluid deposited graphite throughout the world, the presence of rhombohedral phase, which demonstrates the nature of fluid deposited graphite, is rare in the literature. The authors not only find this rare phase of graphite, but also estimate the peak metamorphic temperature of the host rock. This study reveals the mantle origin of carbonic fluids in the high-temperature shear zone.