In this issue

Accelerator mass spectrometry

Willard Libby’s introduction of the radiocarbon dating technique using the $^{14}\text{C}$ isotope was the first sign that nuclear chemistry was to have a wide-ranging impact on disciplines as diverse as archaeology, palaeontology, biology and geology. The award of the 1960 Nobel Prize in chemistry to Libby was clear recognition that radioisotopes and their detection were to acquire major importance in the years to come. Earlier Victor Hess’ experiments in balloon flights with sealed ionization chambers showed that ionization increases with altitude, demonstrating the existence of cosmic rays, an achievement that fetched him the 1936 Nobel Prize in Physics. Cosmic rays, of course, interact with surface constituents on earth, generating long lived cosmogenic radionuclides, including $^{14}\text{C}$. Today the need to detect very small levels of isotopic species in a wide array of biological and geological samples is felt by researchers working on a remarkably wide range of problems. Conventional mass spectrometers have inherent limitations of sensitivity which restrict their use in isotope detection. Nuclear physics has provided a major breakthrough with the development of accelerator mass spectrometers which have spectacular sensitivity. Necessarily, such instruments fall into the category of ‘major facilities’ (big science), which by their very nature can be located and managed at very few locations. In this issue (page 18), Mahapatra, Gopalan and Somayajulu describe the Accelerator Mass Spectrometer (AMS) Facility set up at the Institute of Physics, Bhubaneswar. The AMS facility has been built around the tandem pelletron accelerator at Bhubaneswar and will be the first facility of its kind in India. Expected to be operational in a few months, the facility hopes to attract researchers from all over the country and as the authors point out, there will be ‘excellent opportunities for modern research in geology, geophysics, climatology, oceanography, archaeology, limnology and biomedicine’. It is to be hoped that results of original research using accelerator mass spectrometry will be found in the pages of this journal in the not-too-distant future.

P. Balaram

Osmotropatаксis

On page 48 of this issue, Avinash Deep Singh Bala, Punita Panchal and Obaid Siddiqi describe a simple and elegant method to study osmotropatаксis, the mechanism used by larvae of Drosophila to move towards odours they like and away from those they dislike. Osmotropatаксis, as the authors describe, involves the comparison of sensory inputs from two bilaterally placed sense organs and turning clockwise or counter-clockwise until the two sense organs are placed symmetrically with respect to the stimulus. By simply placing an odorant at one corner of a petri plate and several larvae at the opposite corner, and tracing the tracks of the larvae as they move, the authors analyse the pattern of orientation of the larvae. The method permits the study of responses to different chemicals, different concentrations, single larvae, mutants, surgically manipulated larvae and so on. It is the kind of experiment that makes you wonder why you did not think of it yourself. Exactly twenty years ago, Veronica Rodrigues and Obaid Siddiqi published a similarly simple and elegant method for studying the response of adult Drosophila to odorants, in the Proceedings of the Indian Academy of Sciences (Experimental Biology), (1978, B87, 147–160). That paper has gone on to become a near classic, having been cited almost a hundred times and has inspired a growing number of studies on the genetics and developmental biology of the chemosensory pathway in Drosophila. The present paper is likely to enjoy a similar reputation in the years to come as it opens the way for the analysis of larval osmotropatаксis by genetic and developmental approaches. Even more importantly, this paper shows that high technology and large grants are neither necessary nor sufficient for good science.

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