

Comparative structural analysis of psychrophilic and meso- and thermophilic enzymes

G. Gianese *et al.*

Proteins: Structure, Function and Genetics, 2002, **47**, 236–249

To arrive at the structural determinants in thermostable enzymes, a systematic search in the protein database reveals several interesting features correlating the living temperature of the source organism and the chemical features of the enzyme molecule. A comparative analysis of the crystallographic structures of a total of 35 homologous psychrophilic, mesophilic and thermophilic enzymes results in a grouping of 7 families containing 7 cold adapted and 28 mesophilic and thermophilic proteins. It is concluded that 'the number of ion pairs, the side-chain contribution to the exposed surface, and the apolar fraction of the buried surface show a consistent decrease with decreasing optimal temperatures'.

Design and performance of a 2-D multiwire position sensitive X-ray detector

S. S. Desai, J. N. Joshi and A. M. Shaikh
Pramana, 2002, **59**, 611–619

Multiwire position sensitive detectors are known for ease of fabrication in large size, high efficiency and resolution, and non-destructive method of detection in comparison to solid-state and scintillation counters. This article describes the indigenous design and fabrication of a 2-D multiwire position detector suitable for X-ray diffraction and small angle X-ray scattering experiments. The detector is filled with its operating gas mixture at an appropriate pressure. The position information is obtained using charge division method. A 5.9 keV X-rays (^{55}Fe) source is used and recorded using a laboratory built data acquisition system. A maximum gain of 5×10^4 is obtained in a detector with an active area of 100 mm \times 100 mm.

Identification of genes involved in *Drosophila melanogaster* geotaxis, a complex behavioural trait

D. P. Toma *et al.*

Nature Genetics, 2002, **31**, 349–353

The specific genes responsible for the complex, polygenic behaviour of geo-

taxis, that was the subject of first genetic analysis of microarrays behaviour in *Drosophila melanogaster*, are not well characterized. This study reports the identification of several genes that are involved in geotaxis in *Drosophila melanogaster*. cDNA microarrays are used to identify the putative genes. This paper is a report of a work that contains genomic and classical genetic approaches for understanding an artificially selected behavioural trait, unifying the Hirschian approach of quantitative analysis and the Benzerian approach of single-gene mutant analysis.

Oscillation frequencies of tapered plant stems

H. Spatz and O. Speck

Am. J. Bot., 2002, **89**, 1–11

Stability of a plant stem against dynamic wind-loads is deduced from the resonance frequency of oscillation. This paper calculates the bending moment on the plant system, treating it as a rigid, slender tapered rod, assuming reasonable and appropriate boundary conditions. The frequency of oscillations under apical wind load is computationally stimulated. Limiting cases of a zero gravity condition for horizontal stem are also discussed. Oscillation of an *Arundo donax* plant system is discussed as a specific example.

Characterization of DNA polymerase delta from a higher plant, rice (*Oryza sativa* L.)

Y. Uchiyama *et al.*

Gene, 2002, **295**, 19–26

The catalytic subunit and small subunits of DNA polymerase delta (pol delta), an enzyme required for DNA replication and repair, is cloned from rice (*Oryza sativa*). The genes were fished out from the total RNA of rice cells using RT-PCR with a highly conserved eukaryote pol-delta peptide as primers for RT-PCR amplification. The expression pattern of the gene was monitored by following mRNA levels and Western blots. The two proteins corresponded to open reading frames of mol wt 124 kDa and 48 kDa for pol-delta1 and pol-delta2 respectively. Analysis of expression of

mRNA established the pattern in various tissues. The results indicate that levels of pol-delta expression are markedly correlated with cell proliferation. Poldelta1 and poldelta2 loci are mapped to chromosome 11 and 3 of rice, respectively.

Detection of coccoid forms of *Sulfitobacter mediterraneus* using atomic force microscopy

E. P. Ivanova *et al.*

FEMS Microbiol. Lett., 2002, **214**, 177–181

The genus *Sulfitobacter*, first established in 1995, comprises Gram-negative, aerobic, readily cultivable marine heterotrophic bacteria that are originally isolated from the Black Sea, the Mediterranean Sea, and the Ekho Lakes in East Antarctica. Cultures of *S. mediterraneus* undergo a morphological transformation from vegetative cells to coccoid cells after attachment to polymeric surfaces. Atomic force microscopy is used to study the multilayered biofilm formed on the polymeric surfaces with varying but defined hydrophobicity. Elucidation of mechanism of surface-induced changes in bacterial cells can provide insights into microbial pathogenesis.

An onion enzyme that makes the eyes water

S. Imai *et al.*

Nature, 2002, **419**, 685

The lachrymatory factor causing irritation in the eyes when onions are chopped is discovered to be synthesized by an enzyme named lachrymatory factor synthase (LF synthase). This new enzyme can be purified from a crude onion preparation using column chromatography, and the gene encoding LF synthase is cloned and expressed in *E. coli*. The recombinant synthase obtained from bacterial sources can carry out the conversion of lachrymatory factor from its precursor *in vitro*. This work contradicts the assumption that the lachrymatory factor in onion is spontaneously produced from its precursor, and also raises the possibility of making a non-lachrymatory onion by down-regulating the activity of the synthase enzyme.