

The Human Genome: Structure and Function

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The year 2001 will be remembered for many years as the year when the first drafts of the human genome sequence have been published. These reports are the results of an international collaboration supported by the human genome project that started worldwide in 1990–1991. Alternatively, the year 2001 should also be celebrated as a centennial after the rediscovery of Mendel's laws that introduced the concept of "GENE" as a control element of inheritable phenomena. The "GENOME" is also a concept of genetics introduced later as a set of genetic substances, i.e., genes that specify one particular organism such as human, mouse, yeast, and etc. In other words, genome is a set of genes that control various activities of cell survival and proliferation, and is inherited by the next generation through special mechanisms.

Today, we know that genes (then genomes) consists of a

chemical substance called nucleic acid, DNA, that was first discovered over a hundred years ago, and its structure was determined by Watson and Crick about fifty years ago. Since then, the structure and function of nucleic acids have been the major target of molecular biology or molecular genetics. The complete determination of the genome sequence of humans and other organisms together with development of various technologies will clearly affect many fields of life sciences.

As an organic molecule, the DNA molecule is susceptible to various chemical reagents that may cause mutations in the DNA sequence. Chemical reagents also affect gene regulatory mechanisms through cellular processes. In this workshop, we will discuss on these topics starting from the structure of the human genome itself, which tells us a lot about ourselves, to the mechanisms of genomic functions.

Response of Periphyton to Heavy Metals Resuspended by Dredging: An In situ Microcosm Bioassay Study

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Ponggol estuary located on the northeastern coast of Singapore is heavily impacted by anthropogenic activities such as reclamation, construction and shipping activities. Year-round fortnightly monitoring carried out from July 1999 to June 2000 for 5 types of heavy metals, viz., Sn, Pb, Ni, Cd and Cu, recorded very high concentrations in the particulate fraction and in sediments, when compared to the dissolved fraction in water. Intense dredging operations undertaken in the estuary is believed to resuspend the heavy metal rich sediments in the overlying water column. To ascertain this impact, in-situ microcosms were set up using periphyton, which is important in the overall carbon budget of an ecosystem.

Periphyton settlement slides, left in the field for 3 days were retrieved and exposed to different concentrations of heavy metals, observed during the monitoring study. Changes in chlorophyll a concentrations, taken as the measure of periphyton biomass, were recorded over 3 days of samplings. Results from this experiment show drastic reduction in biomass of up to 95–100% for concentrations reported for the particulate fraction and sediments when compared to the control, indicating the impact of such high levels of heavy metals on the resident biological communities. Interesting results from this study suggest that periphyton can be used as a potential bio-indicator of heavy metal pollution.

Studies on Hazardous Chemicals along the Strait of Malacca and Their Ecological Effect

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The Straits of Malacca is one of the busiest straits in the

world. It links the east and the west in terms of the transporta-