

USA and Chad Houseweart and Teresa J. Kenney from the Genome Therapeutics Corporation, USA, describes the use of transposon-based mutagenesis in bacterial functional genomics. The next chapter by Bruno Tinland from Monsanto Europe Africa, Belgium, discusses gene transfer to plants through bacterial vectors. The *Agrobacterium*-mediated gene transfer has been an important tool for plant molecular biologists for the past twenty years. The chapter briefly describes the protocol for gene transfer and also includes the applications of the technique and troubleshooting. The tenth chapter by Simon Swift from the University of Auckland, New Zealand, discusses the signal sensing and signalling genes for Quorum sensing. Quorum sensing is a term used to define the signalling mechanisms in bacteria through which they sense population density and respond to it. Since it is a newly discovered phenomenon, it is gratifying to note that the authors have given details of the methodology, troubleshooting and applications. Details of bacterial strains and plasmids, different sensor genes, etc. have been neatly elucidated in the form of tables.

No book on genomes can be complete without a discussion of microarrays. The eleventh chapter by Michael T. Laub from Harvard University, and R. Frank Rosenzweig from the University of Montana, USA, discusses the use of microarrays in studying transcriptional profiling in bacteria. The rapid sequencing of bacterial genomes (more than sixty bacterial genomes have been sequenced) has necessitated the development of high throughput technologies to study functional genomics. Despite the immense popularity of the technique, the chapter is very brief and does not provide details for the bioinformatics component of microarrays. The next chapter is by Cecile Jourlin-Castelli and Francois Denizot from the Laboratoire de Chimie Bacterienne, IBSM-CNRS, France, and Philippe Bouloc from Laboratoire de Reseaux de Regulations, Institut de Genetique et Microbiologie, Universite Paris-Sud, France. The chapter discusses transcriptome analysis by macroarrays and describes a radioactivity-based technique for comparing the transcriptome of bacteria grown under special conditions or to compare mutant strains. The useful feature of this chapter is the inclusion of details about RNA isolation from bacteria including the precautions that need to be taken. This is

important for any gene expression-based analysis. The thirteenth chapter by Cecile Lelong from the Plasticite et Expression des Genomes Microbiens, France and Thierry Rabilloud from DRDC/BEPC, France, describes the important technique of proteomics and focuses mainly on the immensely popular 2D-gel electrophoresis. It also includes details on protein extraction from bacteria. The next chapter by Shaorong Chong and Francine B. Perler from New England Biolabs, USA, discusses the interesting technique of intein-mediated protein purification. This technique provides an attractive alternative to conventional recombinant protein purification tags such as MBP, GST, etc. Since the technique is relatively new and not well known, sufficient details regarding the principle and the materials required, have been included. The technique itself has been explained lucidly. The final chapter by Gustavo Di Lallo, Patrizia Ghelardini and Luciano Paolozzi from the Dipartimento di Biologia, Universita di Roma 'Tor Vergata', Italy, discusses the efficient two-hybrid assay in *E. coli*. The *E. coli* system presents several advantages over the yeast system, not the least being the ease of manipulation. This system can be used efficiently at least to study bacterial protein-protein interactions.

The book is basically a practical handbook on different techniques to analyse prokaryotic genomes. So, it may be disappointing for someone who is looking for theoretical knowledge. Some chapters lack important details; it might have been a better idea to have covered less topics so that sufficient details could have been included. The text uses very simple language. The subject that the book addresses is extremely important and relevant, given the importance of genomic studies in bacteria. The book is softbound, not too bulky and easy to carry with an attractive cover. All in all, a good guide for anyone starting on bacterial genomics.

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Constructed Wetlands for Wastewater Treatment in Cold Climates. U. Mander and P. Jenssen (eds). 11 Advances in Ecological Sciences, WIT Press, Southampton, Boston, UK. 2003, 325 pp. Price: \$179.

Constructed treatment wetlands (CTW) are defined as engineered wetlands that utilize natural processes involving wetland vegetation, soil, and their associated microbial assemblages to assist, at least partially, in treating wastewater or other polluted water resources. The number of constructed treatment wetlands receiving wastewater from municipal, industrial, agricultural, and storm water sources has increased to more than 8000 sites across the world. The success story of CTWs depends upon appropriate design, siting, pre-treatment, operation and maintenance. These man-made systems are glaring examples of ecotechnology wherein integration of ecological functions provide the option of wastewater treatment, its recycling through conservation, enhancing wildlife abode, and offsetting significant losses in the wetland area. These provide effective wastewater treatment at moderate prices which are simple to maintain for individual residences, cluster of residences, resorts, restaurants, and other businesses that depend upon on-site systems for wastewater treatment.

This edited book consists of seventeen selected papers presented at two international conferences on wetland ecosystems for wastewater treatment: the Symposium 'Perspectives of Constructed Wetlands for Wastewater Treatment in Cold Climates' organized by the editors of this book and the 4th International Conference in Ecological Engineering on 'Managing the Wastewater Resource', organized by the Agricultural University of Norway and the Norwegian Center for Soil and Environmental Research (Jordforsk). In addition, the book included relevant case studies from USA, Poland and Czech Republic presented at an International workshop on 'Nutrient Cycling and Retention in Natural and Constructed Wetlands' held at the Czech Republic, and at an International Conference on 'Wetland Systems for Water Pollution Control', held at Florida, USA. From a large variety of constructed wetlands the subsurface flow wetland systems treating municipal or farm wastewater have been included in this book. The main focus of the seventeen up-to-date articles has been on the potential, and use

of CWs for wastewater treatment in cold climate areas. The central issues focused are the long-term experiences of such wetlands, optimum design to improve purification efficiency, the intensity of the critical processes of organic matter mineralization and nutrient retention during winter, and constructed wetland use for multiple purposes.

Unlike in tropical climate, the constructed wetlands face two main difficulties in cold climates. First the lack of hydraulic continuity due to freezing temperature that changes the viscosity of the wastewater and, second the inadequate treatment purification processes due to absence of warmth. Nevertheless, the outcome of this book recommends that several effective measures be implemented to guarantee the functioning of purification processes in winter too.

In cold climates, the selection of constructed wetland type is of great importance. Experiences suggest that planted soil filters with not only vertical but horizontal flow also are the most suitable ones for cold regions, removing biochemical oxygen demand (BOD), suspended solids, faecal coliform bacteria and nitrate very effectively. Living reeds are important if only to provide litter on which aerobic biofilms grow. Phosphorus removal is proposed to be reliable only with specialized media in the bed, and ammonia removal requires specialized treatment. There is no strong evidence for reduced performance during cold weather and cold climate does not restrict the use of constructed wetlands for wastewater purification if proper design considerations are observed. Cold climates, however, require larger and deeper systems than those found in warm climates.

In cold regions, the treatment wetland must have a septic tank and an aerobic pre-treatment step of gravel-bed prior to reed-bed discharge and finally to an infiltration gravel bed. This design meets the secondary treatment standards for TSS, BOD and faecal coliform bacteria. The reduction in BOD loading possibly reduces clogging around the inlet of the constructed wetland. Nutrient removal has been somewhat poorer than expected. Horizontal flow systems are an appropriate technology for high-stability elimination of chemical oxygen demand (COD) and BOD but nutrient removal only amounts to average values of 30–50%. To achieve higher elimination rates, vertical flow systems have been developed. Chapter 6 suggests an

alternative to pre-treatment system which can be the multistage (hybrid) constructed wetland combining the well-aerated vertical flow beds (mineralization of organic matter, nitrification, phosphorus adsorption), horizontal flow beds (denitrification), and free-water surface beds (additional N removal, polishing). The crop of plants on the gravel-bed performs the potential role in enhancing the microbiological processes occurring in the gravel-bed and associated biofilms. An important role that they play, not related to the improvement of water quality, is in enhancing the aesthetics of systems by creating an environment attractive to birds, reptiles and amphibians, Chapter 5 reviews that additional species should be evaluated for use in cold climate wetland performance. Norwegian experience indicates that by simple design measures, such as increased depth of the system and adjustment of the water level, potential hydraulic problems during the winter can be avoided. For additional safety, straw can be used for insulation for a few years, until sufficient plant debris is produced by the system itself. Several light-weight aggregates (LWA) with high initial hydraulic conductivity and high rate of phosphorus adsorption seems to be the most effective filter media for constructed wetlands in cold climates (chapter 14). LWA are made from clay or shale by heating to temperatures above 1000°C and have been successfully applied in constructed subsurface flow wetlands in Norway. High hydraulic conductivity, combined with high phosphorus removal and good insulation properties, have characterized LWA. New results show that LWA exceeds sand systems for nitrogen removal.

The selected papers in the book were peer-reviewed. This valuable book, no doubt, will be immensely useful to researchers, planners, engineers and decision-makers in the fields of applied ecology, ecotechnology, wastewater treatment management, and environment impact assessment. The book represents a good contribution and deserves to be placed in libraries where this low-cost ecotechnology is at the door-step for take-off on a mass scale level.

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Four Decades of Marine Geosciences in India – A retrospect. Geological Survey of India, Special Publication No. 74, 2002. 325 pp. Price: Rs 575.

This special publication of the Geological Survey of India incorporates papers presented in a national seminar held at Mangalore, during 14–16 March 2001. The volume highlights the advancement of knowledge in the field of marine geosciences since Indian geoscientists started making forays into this domain. The present volume, as the title indicates is a retrospect measuring the efforts made to understand the geology of the sea floor especially the part adjacent to India's territorial boundaries. A long shoreline braces peninsula India, and the country has a long history of having maritime interest. Importance of marine geosciences lies not only in the exploitation of mineral resources present in the seabed; but the information on the seabed morphology is also considered vital from the point of view of the national security. This is true especially when we consider the territory represented by the chains of islands far from the mainland.

The volume includes fifty-one papers covering varied aspects of marine geology. Most of the contributions are from the Geological Survey of India, while a few are from other government organizations and university departments. Considering the fact that the efforts in the field of marine geosciences were initiated only four decades ago, it is invigorating to note the progress made in the field of marine geosciences in India mainly under the leadership of the Geological Survey of India.

The papers are grouped under eight heads. A shorter grouping avoiding the use of diverse criteria would have been more appropriate though this is not a very serious handicap. Thematically, the papers cover four important geological aspects, namely, seabed morphology, sedimentation and stratigraphy, palaeogeography and Quaternary processes and mineral resources. There are also a few papers dealing with the important aspect of coastal management.

Knowledge and understanding of the physiography of the seafloor falling within the 'Exclusive Economic Zone' (that extends up to 200 nautical miles from the territorial sea limit) is quite essential for proper exploitation of natural resources. If the inclusion of very few