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Read This Before Ordering the Fish!

Bruce F. Bowden*

Biomarkers in Marine Organisms: A Practical Approach

Eds P. Garrigues, H. Barth, C. H. Walker and J.-F. Narbonne

> Elsevier: The Netherlands 2001, 572 pp. ISBN 0-444-82913-X Hardcover, 274.50 USD.

Biomarkers in Marine Organisms: A Practical Approach is a collection of papers that report the results of two major European research projects on the use of biological markers to evaluate environmental contamination in marine ecosystems. The authors of the individual papers (chapters) present results from many marine, water management, biology, toxicology and cell biology laboratories throughout the U.K., Italy, France, the Netherlands, Spain, Russia, Turkey, Belgium, and Germany (and the U.S.A.). Chapters are formatted as biological research publications, and detailed experimental procedures are provided in Technical Annexes.

The book covers a range of biochemistry and cell biology, and toxicology (and chemistry) topics, which are summarized below:

- Studies on the cytochrome P450 monooxygenase system in molluscs were conducted at locations characterized by an oil spill (Spain), long-term industrial pollution (Venice lagoon), and a contaminated site in the North Sea.
- Cytochrome P450 was isolated and characterized from sea bass after induction by environmental contaminants.
- The development of a cytochrome P450 biomarker from a sea grass, and inhibition of cytochrome induction in black sea bream hepatocyte cultures by heavy metals are reported.
- Changes in metallothionein levels in mussels in response to exposure to copper, zinc and cadmium are reported from an Italian laboratory study.
- Metallothionein cDNA has been cloned from the gills of U.K. shore crabs; the cloned metallothionein cDNAs are similar or identical to cDNAs from other sources.
- DNA damage and chromosomal alterations in mussels are compared for contaminated and non-polluted sites along the Italian coast. DNA fragmentation and immunotoxic (phagocytosis) effects in mussel gill and fish liver are also reported for samples from the Baltic and Mediterranean Seas. Phagocytosis activity was quantified by the activity of mussel hemocytes.

- The distribution of selected polycyclic aromatic hydrocarbons (PAH) in sediments and mussels at different European coastal sites is used to predict their origin (petrogenic, pyrolytic or diagenic). Selective oxidation of certain PAH in mussels (and enzyme induction under pollution conditions) is used to explain different levels of specific hydrocarbons in mussels compared with sediment samples from the same site.
- Biochemical responses in Mediterranean crabs after PAH exposure are also reported.
- The detection of DNA adducts (by a ³²P-postlabelling technique) in mussels that had been exposed to PAH (particularly benzo[a]pyrene) for both field and laboratory experiments is reported.
- Field studies to monitor the biological effects of pollution included the measurement of enzyme activities for the microsomal mixed function oxidase system, particularly ethoxyresorufin-*O*-deethylase in fish and acetylcholine-esterase inhibition. Research concerning mutation studies in the *ras* oncogene as well as DNA adduct measurement and pathological changes in fish is also reported.
- Cholineesterase activity in mussels and fish has been used as a bioindicator of pollution.
- Cholineesterase and carboxyesterase studies in mussels and red swamp crayfish are also used to assess pesticide exposure.
- Sea urchin bioassays that measured chemiluminescence and glutathione levels in developing larvae after exposure to polluted sediments, are compared with conventional bioassays (developmental defects, fertilization and offspring success, and cytogenetic abnormalities).
- Sea urchin and sea star bioassays were also used to assess pollution-related effects in a North Sea field study. Individual metal ion concentrations in sediment and pore water samples are compared with metal ion and polychlorobiphenyl concentrations in female sea star pyloric caeca and gonads.
- Biomarker measurement and chemical contamination data determined in mussels from the Baltic Sea, Mediterranean Sea and Atlantic Ocean are compiled and statistically treated to get a Multimarker Pollution Index that allows sites to be ranked according to a pollution scale from one to five.
- Microbial loads (*E. coli*, enterococci and coliphages) are reported for various stations in the Baltic and Mediterranean Seas.

The criterion that was used to order the chapters eluded me, and the order of the above summary differs from the book chapters. Reports on unrelated bioassays follow each other while those that describe similar or related work are randomly placed. The English style varies widely from chapter to chapter, but without exception is technical, with acronyms specific to the chapter topic. Although a list of abbreviations is provided at the start of the book, many abbreviations are missing from the list, while several appear twice. Some chapters provide their own abbreviation list, while others use unlisted abbreviations that are explained only when first used.

With a recommended retail price of US\$274, despite its size, this is an expensive collection of scientific papers that

would primarily be of interest to those involved in monitoring marine pollution using biochemical or biological methods. Overall the text has not been well edited; it contains many typographical and grammatical errors, and I only recommend it to those directly involved in the specific research areas.

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