SPECIAL PROCEEDINGS ISSUE

Proceedings from the Marine Biotechnology Conference 2003 (6th International Marine Biotechnology Conference and 5th Asia Pacific Marine Biotechnology Conference)

SEPTEMBER 21–27, 2003 CHIBA, JAPAN





The European Society for Marine Biotechnology

www.esmb.org

The ESMB was established in France on 26th April 1995 to promote marine biotechnology in Europe and to promote closer research collaboration between marine biotechnologists. In addition, the development of methods for effective training and education in the field of Marine Biotechnology is being carried out.

The aim of the Society is to stimulate marine biotechnological research in Europe and as such it is an academic organisation devoted to European and international co-operation within marine biotechnological research and education.

Membership of the ESMB

Subscription fees have been set at £99.00 (99 pounds sterling) for the year 2004 and membership includes the following:

· A year's subscription to Marine Biotechnology, which is the Official Journal of the ESMB

• Free access to Marine Biotechnology online.

- · Reduced conference fees to events supported by the ESMB
- · Input into ESMB policy and feedback / suggestions for meetings and conferences

Limited travel funds for PhD students to attend ESMB Meetings

- · Free advertising of vacancies for studentships and postdoc positions on the ESMB web site
- Discounts on marine biotechnology related books where ESMB have negotiated discounts for its members. For example, a 10% discount of the Handbook on Microalgal Culture: Biotechnology and Applied Phycology.
- · A reduced subscription to Applied Biotechnology, Food Science and Policy

Yes I wish to join ESMB! □

Signed

Please return this completed form with your payment to:

Margaret Searle, Society Secretariat ESMB, Centre for Marine Biodiversity and Biotechnology Division of Life Sciences,

Heriot-Watt University, Edinburgh, EH14 4AS. Fax Nr. 0044 1506 400753. M.Searle@hw.ac.uk Title: □ Prof □Dr □Mr □Mrs □Ms □Miss (please tick as appropriate) First Names : Family Name: Speciality:..... Correspondence Address: Country:..... Post Code:.... Email:..... Cheque for £99.00 (99 pounds sterling) to the order of: ESMB □ Enclosed: Official copy of the bank transfer for £99.00 (99 pounds sterling) order to: □ Enclosed: ESMB, Bank of Scotland, Newington Branch, 51 South Clerk Street, Edinburgh, EH8 9PP Account Number 00690322 Sort Code: 80-02-73. IBAN Number: GB12 BOFS 8002 7300 6903 22. SWIFT BIC: BOFSGB21349 ☐ Credit Card: ☐ Visa ☐ Euro/MasterCard ☐ Switch/Solo ☐ Delta ☐ Electron Card Expiry Date: Issue Number: Credit Card Holder's Name (If different from above): **If paying by credit/debit card, a £5.00 surcharge will be added to cover handling charges**

Date: ___ / ___ / ___

THE OFFICIAL JOURNAL OF

EUROPEAN SOCIETY FOR MARINE BIOTECHNOLOGY JAPANESE SOCIETY OF MARINE BIOTECHNOLOGY

Volume 6, Supplement 1

2004

Preface	Si

Special Plenary Lecture

Marine Biotechnology: A Confluence of Promise	S3
Rita Colwell	

Plenary Lectures

Fifty Years with Microalgae

Shigetoh Miyachi	
Transgenic Fish for Aquaculture: Assessment of Benefits and Risks	S15
Robert H. Devlin	

Structural and Evolutionary Fish Genomics S20
Giorgio Bernardi

Harmful Algal Blooms

Big Genes, Small Molecules—Molecular Basis for Toxicity and	
Biosynthesis of Natural Products in Cyanobacteria	S25
Brendan P. Burns, Falicia Goh, Francesco Pomati, and Brett A. Neilan	

Species-Specific Detection and Quantification of the Toxic

Dinoflagellate *Alexandrium tamarense* by Taq Man PCR Using 5′-3′ Exonuclease Activity S30

Shoko Hosoi-Tanabe, Satoshi Nagai, and Yoshihiko Sako

Macroalgae and Plant Biotechnology

Cytological Observations of <i>Porphyra</i> (Rhodophyta) Thalli with	
Confocal Laser Scanning Microscopy	S37
Akio Shimizu, Kagayaki Morishima, and Ichiro Nakayama	

Genomic Research Program of the Seaweed Nori (*Porphyra yezoensis*) S40 I. Nakayama, K. Morishima, S. Fukuda, M. Yoshikawa, M. Kawazu, A. Niitusma, T. Kobayashi, and T. Okazaki

Genomic Analysis of Economically Important Seaweeds J. Mark Cock, Catherine Leblanc, Carole Colin, Akira F. Peters, Delphine Scornet, Jonas Collen, Vincent Roeder, Cecile Hervé, Sylvie Roasval, Gurvan Michel, Philippe Potin, Catherine Boyen, and Bernard Kloareg

Role of eEF1A in the Mangrove Plant Bruguiera sexangula Under Salt	
and Osmotic Stress	S48

Asami Nozaki, Akiyo Yamada, Tetsuro Mimura, and Yoshihiro Ozeki

Novel Salt-Resistant Protein, Mangrin, Isolated from a Mangrove	
Plant, Bruguiera sexangula	S52
Akiyo Yamada, Tetsuro Mimura, and Yoshihiro Ozeki	



On the Cover: A couple of long-nose filefish, *Oxymonacanthus longirirostis*, feed on polyps of *Acropora* corals.

S11

Microalgal and Protozoal Biotechnology

Enhanced Production of Polyunsaturated Fatty Acid Docosahexaeno Acid by Thraustochytrid Protists Ruchi Jain, Seshagiri Raghukumar, and D. Chandramohan	ic S59
Multi-Element Analysis of Marine Microalgae Using Particle-Induced X-Ray Emission Toshihiro Obata, Koichiro Sera, Shoji Futatsugawa, and Yoshihiro Shiraiwa	S66
Thraustochytrids, Fungoid Protists in Mediterranean Sandy Shores <i>Lucia Bongiorni and Fernando Dini</i>	S71
Optimization of Astaxanthin Production by <i>Thraustochytrium</i> CHN-1 Through Response Surface Analyses Marvelisa L. Carmona, Yukiho Yamaoka, Virgilio Doquesa, and Takeshi Naganuma	S76
Disease, Defense, and Immunity Analysis of Immune-Related Genes from Common Carp Masahiro Sakai and Ram Savan	S85
Antioxidant Response of Superoxide Dismutase in American White Shrimp (<i>Litopenaeus vannamei</i>) Exposed to Sulfated Polysaccharide and β-Glucan A.I. Campa–Córdova, N.Y. Hernández–Saavedra, R. De Philippis, and F. Ascencio	S91
White Spot Syndrome Virus: Molecular Characterization of a Major Structural Protein in a Baculovirus Expression System and Shrimp Hemocytes Han-Ching Wang, Yun-Shiang Chang, Guang-Hsiung Kou, and Chu-Fang Lo	S95
Positive Biological Actions of Astaxanthin in Rainbow Trout Toshiki Nakano, Miho Wazawa, Toshiyasu Yamaguchi, Minoru Sato, and George K. Iwama	S100
DNA Microarrays of the White Spot Syndrome Virus Genome: Genes Expressed in the Gills of Infected Shrimp Han-Ching Wang, An-Ting Lin, De-Ming Yii, Yun-Shiang Chang, Guang-Hsiung Kou, and Chu-Fang Lo	\$106
Anti-Infectious Immune Gene Expression in Penaeid Shrimp Yannick Gueguen, Julien De Lorgeril, Lorenne Robert, Bernard Romestand, and Evelyne Bachère	S112
Annotation of Two Tapasin Promoters from Rainbow Trout Eric D. Landis and John D. Hansen	S118
Expression Analysis of Immune-Related Genes in Carp Cyprinus carpio L. Tomoya Kono, Hiroki Kuragasaki, Ram Savan, Asmi Citra Malina, A.R. Tassakka, and Masahiro Sakai	S123
Lectins as Recognition and Effector Factors in Innate Immunity of Teleost Fish Gerardo R. Vasta, Eric W. Odom, Hafiz Ahmed, Davin E. Henrikson, and Keiko Saito	S128

Endocrinology	
Estrogen Receptor Binding Assay for Evaluation of Endocrine-Disrupting Chemicals on Marine Fish Makoto Nakai, Hirofumi Yokota, Hiroshi Urushitani, Daisuke Asai, Yoshinao Katsu, Chisumi Eto, Yoshikuni Yakabe, Taisen Iguchi, and Yasuyuki Shimohigashi	S137
Rapid Feeding on Live Organisms of the Phototrophic Ciliate Mesodinium rubrum by Farrer's Scallop Chlamys farreri Wonho Yih, Hyung Seop Kim, Geumog Myung, and Young Geel Kim	S142
Functional Analysis of the Insulin-Like Growth Factor-1 Receptor Gene Promoter in the Zebrafish (Danio rerio) Gen-Hwa Lin, Mark Hung-Chih Chen, Hong-Yi Gong, Dennis Jine-Yuan Hsieh, Cliff Ji-Fan Lin, and Jen-Leih Wu	S146
Molecular Mechanisms of Biodefense in Kuruma Shrimp Marsupenaeus japonicus Takashi Aoki, Achara Rattanachai, Namiko Tomura, Keisuke Watanabe, Toshiaki Itami, Yukinori Takahashi, Tsuyoshi Ohira, and Ikuo Hirono	S153
Deep-Sea Ecosystems	
Microbial Diversity in Deep-Sea Sediments Collected from Different Pacific Stations Meixiang Xu, Peng Wang, Fengping Wang, and Xiang Xiao	S161
The Deep-Sea Floor, Nature's Largest Bio-Reactor: Methods and Tools to Study, Protect, and Use it Hans Amann, Michael Maggiulli, Thjunjoto, John Parkes, and Derek Martin	S168
Scyphopolyps of Sanderia malayensis and Aurelia aurita Attached to Tubes of Vestimentiferan Tubeworm (Lamellibrachia satsuma) at Submarine Fumaroles in Kagoshima Bay Hiroshi Miyake, Jun Hashimoto, Mitsuko Chikuchishin, and Tomoyuki Miura	S174
Thermophiles and Piezophysiology Effects of High Hydrostatic Pressure on Transcriptional Activity of RNA Polymerase of Deep-Sea Piezophilic Bacterium	
Shewanell violacea DSS12 Hiroaki Kawano, Kaoru Nakasone, Fumiyoshi Abe, Masamitsu Matsumoto, Chiaki Kato, Ron Usami, and Koki Horikoshi	S181
Microbial Diversity of Bacterial Mat Samples Collected at a Depth of 3100 m in the Japan Sea Shizuka Arakawa, Chiaki Kato, Takako Sato, Yuichi Nogi, Yasuhiko Yoshida, Ron Usami, and Koki Horikoshi	S185
Effects of Pressure on the Structure and Activity of Isopropylmalate Dehydrogenases from Deep-Sea <i>Shewanella</i> Species	S190

Linda M.I. de Poorter, Yasuo Suzaki, Takako Sato, Hideyuki Tamegai, and Chiaki Kato

Piezophiles: High-Pressure-Adapted Marine Bacteria

Chiaki Kato, Takako Sato, Yuichi Nogi, and Kaoru Nakasone

S195

Effects of Rare Codons on Heterologous Expression of Proteins from the Archaeon Sulfolobus solfataricus in Escherichia coli Seonghun Kim and Sun Bok Lee	S202
Marine Microbial Biotechnology Growth Hormone (IAA)-Producing Bacteria and Streptomycetes and Their Biofertilizer Effect on Mangrove Seedling Avicennia officinalis L.	S209
Kandasamy Dhevendaran, M. Sukumaran, and M.I. George Kutty	
Research on the Marine Microorganisms Which Produce Bioactive Substances in Bioconsortia Koji Nagai, Yasuyo Takeda, Nakako Arao, and Ken-ichi Suzuki	S214
Pilot System for Mass Degradation of Jellyfish by Marine Bacterial Enzyme Toshiharu Yanagawa, Toyoki Kawabata, Yasuyuki Ogushi, Susumu Kohno, Koji Ozaki, Koji Nagao, Yoshio Morikawa, Tatsuo Miyoshi, Daiki Hoshii, Yoshihiro Nishikawa, and Takeshi Naganuma	S218
Tropical UV-Tolerant Bacteria May Provide a Pharmacomimetic Model for Anti-Aging Research and Cancer Prevention Walter C. Dunlap, Akio Fujisawa, Yorihiro Yamamoto, and Masayasu Inoue	S223
Anti-Adhesive and Immunostimulatory Activities of Marine Microalgal and Cyanobacterial Sulfated Polysaccharides F. Ascencio, M.A. Guzman-Murillo, and R. de Philippis	S231
Hydrogen Production from Volatile Fatty Acids by Rhodobacter sphaeroides RV Takeshi Nishizato, Shuichi Karita, Hiroya Nakano, Tatsuki Wakayama, Jun Miyake, and Masakazu Goto	S235
Enhanced Recoverability of Marine Bacteria Using Cell-Free Supernatants Youji Wachi, Liming Yan, David R. Adams, and J. Grant Burgess	S240
Feeding-Deterrent Activity of Phenylpropanoids from the Red Alga <i>Tichocarpus crinitus</i> Against the Sea Urchin <i>Strongylocentrotus intermedius Takahiro Ishii, Tatsufumi Okino, Minoru Suzuki, Kazunari Kuramata.</i>	S247
Overcoming the Supply Problem for Marine Pharmaceuticals Sustainable Exploitation of the Bioactive Potential in Marine	
Organisms: Case Study of the Sessile Filter Feeder Sponges Werner E.G. Müller	S255
Application of Different Algorithms for Growth Optimization of Marine Bacterium (<i>Halomonas marina</i>) Kai Muffler and Roland Ulber	S262
Biotransformation Studies of the Manzamine Alkaloid Noer Kasanah, Karumanchi V. Rao, Muhammad Yousaf, David E. Wedge, Russell T. Hill,	S268

Continued

Solving Limited Supplies of Marine Pharmaceuticals Through the Rational and High-Throughput Modification of High-Yielding Marine Natural Product Scaffolds Pennaka Hari Kishore, Muhammad Yousaf, Karumanchi V. Rao, Michelle Kelly, Russell T. Hill, Scott G. Franzblau, and Mark T. Hamann	S273
Symbiosis	
Physiologic Characteristics of <i>Symbiodinium</i> Taxa Isolated from the Same Host	S283 `
Masaharu Ishikura, Kiyoshi Hagiwara, Kiyotaka Takishita, and Tadashi Maruyama	
Molecular Analysis of a Florida Keys Sponge: Implications for Natural Products Discovery Julie J. Enticknap, Robin Thompson, Olivier Peraud, Jayme E. Lohr, Mark T. Hamann, and Russell T. Hill	S288
Intragenomic Sequence Variation in 18S rDNA of the Symbiotic Dinoflagellate, Genus Symbiodinium from Porites lutea Hiroko Yokouchi, Haruko Takeyama, Hiroki Taniguchi, Makoto Omori, and Tadashi Matsunaga	S294
Biofouling	
Changes of Biofilm-Forming Bacterial Community on Acrylic Surface Emerged in Seawater	S303
Kae Kyoung Kwon, Yoo Kyung Lee, Jae Hyun Park, Kyeung Hee Cho, and Hong Kum Lee	
Biofilm-Forming Bacteria on Copper Panels Exposed in the Arabian Sea	S306
Kurissery R. Sreekumari, Kanavillil Nandakumar, and Arun B. Wagh	
Biofouling Mitigation by Pulsed Laser Irradiation: II. In Vitro Studies on the Larvae of the Fouling Barnacle Balanus amphitrite Kanavillil Nandakumar, Hideki Obika, Akihiro Utsumi, Toshihiko Ooie, and Tetsuo Yano	S313
Complete Mitochondrial Genome of the Sessile Barnacle <i>Tetraclita</i> japonica Rowshan Ara Begum, Kohei Tsuchida, Toshiyuki Yamaguchi, Mutsumi Nishida, and	S318
Shugo Watabe	
Aquaculture and Its Environmental Impact	
Seedling Production and Generation Succession of the Pacific Bluefin Tuna, <i>Thunnus orientalis</i>	S327
Yoshifumi Sawada, Shigeru Miyashita, Osamu Murata, and Hidemi Kumai	
Bioactive Peptides and Proteins Identification of Differentially Expressed Genes Involved in Atlantic Salmon (<i>Salmo salar</i>) Host-Pathogen Interaction Using Microarray	
Technology S.E. Douglas, J.C. Belanger, S.C.M. Tsoi, J. Williams, and K.V. Ewart	S335

Biodiversity (Population Genetics) and Conservation

Genetic Differentiation and Dispersal Potential in Marine Fishes Peter J. Smith, N. Taniguchi, and S. Chow	S343
Emerging Legal Regimes Regulating Bioprospecting for Thermophiles and Hyperthermophiles of Hydrothermal Vents D.K. Leary	S351
Population Genetics and Special-Specific Markers of Tropical Abalone (Haliotis asinina) in Thailand Sirawut Klinbunga, Piti Amparyup, Supaporn Thamrungtanakit, Anchalee Tassanakajon, Ikuo Hirono, Takashi Aoki, Padermsak Jarayabhand, and Piamsak Menasveta	S360
Expressed Sequence Tag Analysis of Ovaries and Testes from Tropical Abalone (Haliotis asinina) Piti Amparyup, Sirawut Klinbunga, Rachanimuk Preechaphol, Anchalee Tassanakajon,	S365

Bioremediation and Monitoring

Degradation of Hydrocarbons by Thermotolerant Strain of Alga	
Prototheca zopfii: Its Performance at Elevated Temperatures and	
Phylogeny of Genus Prototheca	S373
Ryohei Ueno, Nobutaka Hanagata, and Naoto Urano	. +
Microbial Reductive Dechlorination of Organochloride Pollutants	

Microbial Reductive Dechlorination of Organochloride Pollutants	
in the Marine Environment	S378
Joy E.M. Watts, Sonja K. Fagervold, Gregory S. Miller, Charles E. Milliken,	
Harold D. May, and Kevin R. Sowers	

Eukaryote Genomics

Ikuo Hirono, Takashi Aoki, and Padermsak Jarayabhand

Phylum, or the Power of Marine Genomics	S387
Werner E.G. Müller, Matthias Wiens, Teresa Adell, Vladislav A. Grebenjuk, and Isabel M. Müller	
Genetic Variability of MHC Class II β1 Genes in Far Eastern Dace,	
Tribolodon hakonensis	S398
Jun Kasamatsu, Yutaka Watanabe, and Naoto Hanzawa	

Sponges (Porifera): Genome Repertoire of the Earliest Metazoan

Origin and Evolution of the Genomic Region Encoding RAF1,	
MKRN2, PPARG, and SYN2 in Human Chromosome 3p25	S404
Shunnosuke Abe, Shigeki Chiba, Neena Mishra, Yasutaka Minamino, Hiroko Nakasuji,	
Masanori Doi, and Todd A. Gray	

Masanori Doi, and Todd A. Gray	
Establishment of Transgenic Medaka Line Expressing Japanese	
Flounder Tissue Inhibitor of Metalloproteinase as a Model for	
Suppression of Post-Mortem Meat Tenderization	S413
Haruhiko Toyohara, Masaya Takagi, Masatomi Hosoi, Masato Kinoshita, Ikuo Hirono, Takashi Aoki, and Satoshi Kubota	

Expressed Sequence Tag Analyses of Common Carp	
(Cyprinus carpio L.)	S418
Ram Sayan Tamona Kono Hirabika Sakata and Macabira Sakai	

Fish Molecular Biology Tbx24, Controlling Somite Segmentation, Is Induced by Fgf Signal S425 Kazuo Araki, Hiroyuki Okamoto, Yasutoshi Yoshiura, and Hiroyuki Nagoya Alterations in Gene Expression in the Brain of White Catfish (Ameiurus catus) in Response to Cold Acclimation S431 Arif M. Kocabas, Rex A. Dunham, and Zhanjiang Liu Generation of a Transgenic Zebrafish Model Overexpressing Heat Shock Protein HSP70 S439 Michiaki Yamashita and Misako Hojo Medaka Genome Mapping and Sequencing S445 T. Sasaki, S. Asakawa, A. Shimizu, S.K. Ishikawa, S. Imai, H. Himmelbauer, H. Mitani, M. Furutani-Seiki, H. Kondoh, M. Schartl, H. Hori, A. Shima, and N. Shimizu Cloning and Expression of foxD1 in Medaka S449 Hiroyuki M. Okamoto, Hiroyuki Nagoya, Ikuo Hirono, Kazuo Araki, and Takashi Aoki In Vivo Regulation of the CDC48 Gene Promoter in Zebrafish **Embryos** S455 Shintaro Imamura, Nobuhiko Ojima, and Michiaki Yamashita Genomic Structural Analysis of Pufferfish (Takifugu rubripes) Skeletal Myosin Heavy Chain Genes S462 Daisuke Ikeda, Melody S. Clark, Chun-Shi Liang, Philip Snell, Yvonne J.K. Edwards, Greg Elgar, and Shugo Watabe Preliminary Microarray Analyses of Gene Expression in Zebrafish Treated with Xenobiotic and Bioactive Compounds S468 Siew Hong Lam, Sinnakarupan Mathavan, Yan Tong, Jing Hu, Cecilia Lanny Winata, Serene Lee, Lance D. Miller, Edison T. Liu, and Zhiyuan Gong Possible Role of Mx, an Interferon-Inducible Gene, in Antiviral Response in Teleosts S475 Christopher Marlowe A. Caipang, Tsuyoshi Ohira, Ikuo Hirono, and Takashi Aoki Genomics and Bioinfomatics: **Future Prospects** Proteome Analysis of Marine Cyanobacteria Based on Total Genome Information S483 Claudia Steglich, Julia Kehr, and Wolfgang R. Hess Invertebrate Molecular Biology Development of Expressed Sequence Tags from Eastern Oyster (Crassostrea virginica): Lessons Learned from Previous Efforts S491 Eric J. Peatman, Xianchao Wei, Jinian Feng, Lei Liu, Huseyin Kucuktas, Ping Li, Chongbo He, David Rouse, Richard Wallace, Rex Dunham, and Zhanjiang Liu cDNA Clonings of Shell Matrix Proteins from Scallop Shell S497

Yasushi Hasegawa and Kohji Uchiyama

Artic ocher Paper quest natur

journ for the fresh

In cours many dealir clonis the in

Subs

Offi

Pers

post pers Subs to: S Seca 348-Ame Cus 49-6

Inst poss scri regi pay filln USA nals rate will pate dlin Aus pric Plea Gm 691, 345.

Cha All codd Price avai Ann Aler that jour and Link Prire Pos Jou

Structural Characteristics of Cellulase from Pacific Abalone (Haliotis discus hannai)	S502
Ken-ichi Suzuki, Takao Ojima, and Kiyoyoshi Nishita	
Isolation and Characterization of Differentially Expressed Genes in Ovaries and Testes of the Giant Tiger Shrimp (<i>Penaeus monodon</i>) Rungnapa Leelatanawit, Sirawut Klinbunga, Narongsak Puanglarp, Anchalee Tassanakajon, Padermsak Jarayabhand, Ikuo Hirono, Takashi Aoki, and Piamsak Menasveta	S506
Role of Taurine in Osmotic Adaptation of Marine Mussel (Mytilus galloprovincialis) Haruhiko Toyohara and Masatomi Hosoi	S511
Marine Molecular Ecology/Gene Discovery	
Differential Expression and Function of Copper-Zinc Superoxide Dismutases Under Metal Stress in Marine Yeast	
(Debaryomyces hansenii) Norma Y. Hernndez-Saavedra and Rogelio Ramírez-Serrano	S519
Chitinase-Producing Marine Bacteria Isolated from Jeju Island Yoo Kyung Lee, Kyeung Hee Cho, and Hong Kum Lee	S524
Conversion of Organic Compounds and Production of Organic Iodines by Iodide-Oxidizing Marine Bacteria Hiroyuki Fuse, Hiroyuki Inoue, Katsuji Murakami, Osamu Takimura, Yukiho Yamaoka	S528
Fish Cytokine Gene Discovery and Linkage Using Genomic Approaches Jun Zou, Steve Bird, Chris Secombes	S533
National Developments in Marine Biotechnology	
An Overview of Aquaculture Development in Malaysia Anuar Hassan	S543
Marine Biotechnology of the Blue Revolution Patrick Takahashi, Tadashi Matsunaga	S547
Current Drivers for Setting National Agendas for Marine Biotechnology in Latin America and the Caribbean:	
A View to 2010 H.O. Halvorson, F. Quezada, R.B. Johnson	S550

Indexed in Current Contents $\protect{@}/\protect{Agriculture}$, Biology & Environmental Sciences, and in BIOSIS