Cytogenetic and Genome Research
A broad overview of the structural features and evolutionary dynamics of fish genomes

Molecular Cytogenetics of Fishes

Editor
M.B. Cioffi

Fish exhibit the greatest diversity of all vertebrates, making this group extremely attractive for the study of a number of evolutionary questions. Besides, fish genomes have intrinsic characteristics that may be responsible for this amazing diversity, but little is known about their structure and organization. Major advances in chromosomal studies were achieved in the current ‘molecular cytogenetic era’ based on detecting DNA sequences on chromosomes, parts of chromosomes or even whole genomic DNA by fluorescence in situ hybridization.

In this issue, a collection of review articles is presented together with current research results, demonstrating the advances made using this specific methodology in fish research. The contributions provide a timely update on recent developments in fish molecular cytogenetics, covering topics such as karyotype evolution, sex and B chromosomes, polyploids, and molecular evolution. Researchers, teachers, and students interested in the structural features and evolutionary dynamics of fish genomes will find this publication a valuable source of current knowledge.

Contents
- Preface: Cioffi, M.B.
- Genome Duplication in Early Vertebrates: Insights from Agnathan Cytogenetics: Caputo Barucchi, V. et al.
- Twenty Years of Physical Mapping of Major Ribosomal RNA Genes across the Teleosts: A Review of Research: Gornung, E.
- High Evolutionary Dynamism in 5S rDNA of Fish: State of the Art: Rebordinos, L.; Cross, I.; Merlo, A.
- Telomerices in Fishes: Ocalewicz, K.
- Transposable Elements in Fish Chromosomes: A Study in the Marine Cobia Species: Costa, G.W.W.F. et al.
- Chromosomal Mapping of Repetitive DNA and Cytochrome C Oxidase I Sequence Analysis Reveal Differentiation among Sympatric Samples of Astyanax fasciatus (Characiformes, Characidae): Pansonato-Alves, J.C. et al.
- Chromosomes of Iberian Leuciscinae (Cyprinidae) Revisited: Evidence of Genome Restructuring in Homoploid Hybrids Using Dual-Color FISH and CGH: Pereira, C.S.A.; Rab, P.; Collares-Pereira, M.J.
- Molecular Cytogenetics in Artificial Hybrid and Highly Polyploid Sturgeons: An Evolutionary Story Narrated by Repetitive Sequences: Symonová, R. et al.
- Chromosome Painting Reveals Multiple Rearrangements between Gymnotus cavanum and Gymnotus carapo (Gymnotiiformes, Gymnotiformes): Nagamachi, C.Y. et al.
- Sex-Related Genomic Sequences in Cartilaginous Fish: An Overview: Rocco, L.
- Evolution of the Sex Chromosomes in Salmonid Fishes: Phillips, R.B.
- The Tilapias’ Chromosomes Influencing Sex Determination: Cnaani, A.

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Collaborative and Interactive Research Projects are contributions from investigators who are in need of research materials, or need the assistance of colleagues with specialized expertise, or who have data that is inadequate for a full report but which could be published when combined with data of others.

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Contents

See the journal website for contents
Genetic Heterogeneity and Human Diseases

Editor
Henry Heng

The contribution of karyotype heterogeneity to human diseases is a crucial but overlooked issue. Recent genomic research has revealed high levels of genetic/epigenetic heterogeneity, in particular karyotypic heterogeneity and somatic mosaicism associated with many complex but common human diseases. These important findings challenge the current gene-based concept of many common diseases. To frame this new emerging field, this publication presents pertinent examples linking karyotype heterogeneity to diseases and identifying it in the general population. Specifically, a few key topics essential to understanding karyotypic heterogeneity are discussed, including genomic instability, non-clonal chromosome aberrations, previously unreported/ignored types of chromosome aberrations, cell death heterogeneity and somatic mosaicism. These subjects are discussed with an emphasis on determining the biological implications of genomic heterogeneity and synthesizing these implications into the frameworks of systems biology and genome theory.

Contents
Preface: Heng, H.H.Q.
• Karyotype Heterogeneity and Unclassified Chromosomal Abnormalities: Heng, H.H.Q.; Liu, G.; Stevens, J.B.; Abdallah, B.Y.; Horne, S.D.; Ye, K.J.; Bremer, S.W.; Chowdhury, S.K.; Ye, C.J.
• Genomic Heterogeneity in Acute Leukemia: Paulsson, K.
• Somatic Cell Genomics of Brain Disorders: A New Opportunity to Clarify Genetic-Environmental Interactions: Iourov, I.Y.; Vorsanova, S.G.; Yurov, Y.B.
• Trisomy 21 Mosaicism: We May All Have a Touch of Down Syndrome: Hultén, M.A.; Jonasson, J.; Ivarsson, E.; Uppal, P.; Vorsanova, S.G.; Yurov, Y.B.; Iourov, I.Y.
• Never in Neutral: A Systems Biology and Evolutionary Perspective on how Aneuploidy Contributes to Human Diseases: Pavelka, N.; Rancati, G.
• Identifying Early Events of Gene Expression in Breast Cancer with Systems Biology Phylogenetics: Abu-Asab, M.S.; Abu-Asab, N.; Loffredo, C.A.; Clarke, R.; Amri, H.
• The Hypergenome in Inheritance and Development: Sgaramella, V.

Author Index

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Original Articles

79 Unusual Maternal Uniparental Isodisomic X Chromosome Mosaicism with Asymmetric Y Chromosomal Rearrangement

87 Distribution of MLH1 Foci in Horse Male Synaptonemal Complex
Al-Jaru, A. (Dubai/Preston); Goodwin, W. (Preston); Skidmore, J.; Khazanehdari, K. (Dubai)

95 De novo Reciprocal Translocation t(5;6)(q13;q34) in Cattle: Cytogenetic and Molecular Characterization
De Lorenzi, L. (Milan); Rossi, E. (Pavia); Gimelli, S. (Geneva); Parma, P. (Milan)

112 Construction of Chromosome Markers from the Lake Victoria Cichlid Paralabidochromis chilotes and Their Application to Comparative Mapping
Kuroiwa, A. (Sapporo); Terai, Y. (Yokohama/Kanagawa); Kobayashi, N.; Yoshida, K.; Suzuki, M.; Nakanishi, A. (Yokohama); Matsuda, Y. (Nagoya); Watanabe, M. (Yokohama); Okada, N. (Yokohama/Tainan)

121 Molecular Characterization of Repetitive DNA Sequences from B Chromosome in Plantago lagopus
Kour, G.; Kaul, S.; Dhar, M.K. (Jammu)

Case Reports

129 Secondary Complex Chromosome Rearrangement Identified by Chromosome Analysis and FISH Subsequent to Detection of an Unbalanced Derivative Chromosome 12 by SNP Array Analysis

134 Chromosome 16 Abnormalities in Embryos and in Sperm from a Male with a Fragile Site at 16q22.1
Martorell, M.R. (Girona); Martinez-Pasarell, O.; Lopez, O.; Polo, A.; Sandalinas, M.; Garcia-Guixé, E.; Bassas, L. (Barcelona)

140 45,X/46,X,r(Y)/46,X,dic r(Y) Karyotype in an Azoospermic Male: A Case Report
Dong, Y.; Yu, X.W.; Wang, R.X.; Li, L.L.; Jiang, Y.T.; Liu, R.Z. (Changchun)

Commentary

145 Inverted Segment Size and the Presence of Recombination Hot Spot Clusters Matter in Sperm Segregation Analysis
Bhatt, S.S.; Manvelyan, M. (Jena); Moradkhani, K. (Nantes); Hunstig, F.; Mrasek, K. (Jena); Puechberty, J.; Lefort, G.; Sarda, P. (Montpellier); Seise, A.; Liehr, T. (Jena); Pellestor, F. (Montpellier)

94 Erratum