

Interdisciplinary Approaches in Fish Skeletal Biology



Mosaics of the Roman villa of Milreu (Estoi) located 7 km from Faro/Ossonoba in the Roman Lusitania, south of Portugal

**First Meeting
27-29 April 2009
Tavira, Portugal**



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Welcome from the organisers

An increasing number of biological disciplines focus on fish skeletal biology, including paleontology, morphology, developmental biology, systematic, genomics, proteomics, regenerative medicine, and aquaculture. The first International Workshop on "Interdisciplinary Approaches in Fish Skeletal Biology" aims at joining experts from these, often separated, research communities and promote exchange in ideas, concepts and methodological approaches applied to fish skeletal research. This should contribute to the advancement of research in all sub-disciplines and implement the basis for new interdisciplinary collaborations in this field. We heartily welcome all participants and we thank everybody for contributing to make this workshop a reality.

We hope that you will all have an exciting, fruitful and joyful meeting.

M. Leonor Cancela and P. Eckhard Witten

Scientific committee

Ann Huysseune

Jean-Yves Sire

Harald Rosenthal

Brian K. Hall

Tom Hansen

Santosh P. Lall

António Jacinto

Local committee

Ricardo B. Leite

Anabela Bensimon-Brito

Paulo J. Gavaia

Vincent Laizé

Programme overview

	Monday 27.04.2009	Tuesday 28.04.2009	Wednesday 29.04.2009
09:00	09:20 Welcome	Oral session 4 PHENOTYPIC PLASTICITY I	Oral session 8 UNRAVELLING THE CAUSES OF SKELETAL PATHOLOGIES
09:30	Opening lecture		
10:40	Coffee break	Coffee break	Coffee break
11:00	Oral session 1 EVOLUTION OF TEETH AND DERMAL SKELETAL ELEMENTS	Oral session 5 SHAPING THE SKELETON WITH NUTRITIONAL FACTORS	Oral session 9 THE GENETIC AND DEVELOPMENTAL BASIS OF SKELETOGENESIS I
12:40	Lunch	Lunch	Lunch
14:00	Oral session 2 THE FISH SKELETON: A BIOMEDICAL PERSPECTIVE	Oral session 6 PHENOTYPIC PLASTICITY II	Oral session 10 THE GENETIC AND DEVELOPMENTAL BASIS OF SKELETOGENESIS II
15:40	Coffee break Poster session 1	Coffee break Poster session 2	Coffee break
17:30	Oral session 3 BASIC PROCESSES THAT SHAPE THE TELEOST SKELETON	Oral session 7 ANALYTICAL VISUALISATION OF SKELETAL DEVELOPMENT	Plenary discussion 16.00 - 19.00
20:00	Dinner	Dinner	Barbecue

Detailed programme

DAY 1: MONDAY APRIL 27

09.20 **WELCOME BY THE ORGANISERS**

OPENING LECTURE

Chair: Wilga CD

09.30 **Charles Darwin, embryology, evolution and skeletal plasticity**
Hall BK

10.40 Coffee break

ORAL SESSION 1. EVOLUTION OF TEETH AND DERMAL SKELETAL ELEMENTS

Chair: Yelick P

11.00 **Evolution of development for patterning fish dentitions**
Smith MM

11.25 **A revised hypothesis on the evolutionary origin of the vertebrate dentition**
Huyseune A, Sire J-Y, Witten PE

11.50 **Variability of the pharyngeal dentition in *Barbus intermedius* (Teleostei; Cyprinidae): Genetic, hormonal and environmental factors**
Shkil FN, Levin BA, Abdissa B, Smirnov SV

12.15 ***Actinodin*, a new fish-specific gene family essential for actinotrichia formation**
Zhang J, Wagh P., Sanchez-Pulido L, Padhi BK, Andrade-Navarro MA, [Akimenko M-A](#)

12.40 Lunch break

ORAL SESSION 2. THE FISH SKELETON: A BIOMEDICAL PERSPECTIVE

Chair: Sire J-Y

14.00 **Fish as model organisms to uncover new Gla proteins of interest for human biology**
Cancela ML, Viegas CSB, Laizé V, Simes DC

14.25 **Craniofacial and tooth development and regeneration**
Connolly M, Albertson RC, Lee Y, Fraher D, Stewart-Swift C, Huyseune A, [Yelick PC](#)

14.50 **Genetic screens to identify gene functions essential for bone formation**
Huitema L, Schulte-Merker S

15.15 **Biomedical research using Bone Morphogenetic Proteins: from fish to man**
Mallein-Gerin F

15.40 Coffee break and posters

POSTER SESSION 1.

ORAL SESSION 3. BASIC PROCESSES THAT SHAPE THE TELEOST SKELETON

Chair: Schulte-Merker S

17.30 **The unobtrusive majority: Mononucleated bone resorbing cells in fish and mammals**
Witten PE, Huyseune A

17.55 **Is cartilage required to regenerate dermal bone in the zebrafish caudal fin?**
Afonso N, Fonseca M, Sousa S, Jacinto A

18.20 **Hyoid and pharyngeal arch function during ventilation and feeding in elasmobranchs**
Wilga CD

18.45 **Dealing with stress: opercular bones in suction feeding fishes**
Adriaens D, Leysen L, Dierick M, Roos G, Christiaens J, Van Wassenbergh S, De Clerck N, Van Hoorebeke L

20.00 Dinner

Day 2. Tuesday April 28

ORAL SESSION 4. PHENOTYPIC PLASTICITY I

Chair: Palmeirim I

- 09.00 **Epigenetic effects on musculoskeletal development**
Kranenborg S, van der Meulen T, van Turhout MC, van Leeuwen JL
- 09.25 **The effect of increased mechanical forces on the development and evolution of intramuscular bones in fish**
Danos N
- 09.50 **Drastic shift in the number of lateral line scales in cyprinid fishes as a result of heterochronies: experimental data**
Levin BA, Smirnov SV
- 10.15 **Bipartite life cycle of coral reef fishes promotes increasing shape disparity of the head skeleton during ontogeny**
Frédéric B, Vandewalle P

10.40 **Coffee break**

ORAL SESSION 5. SHAPING THE SKELETON WITH NUTRITIONAL FACTORS

Chair: Rosenthal H

- 11.00 **Role of dietary phosphorus, vitamin C, vitamin A and lipid peroxidation in the pathogenesis of skeletal abnormalities in Atlantic halibut (*Hippoglossus hippoglossus*)**
Lall SP, Lewis LM
- 11.25 **Bone tissue originated from endochondral ossification is more sensitive than intramembraneous bone to vitamin A dietary unbalances in Senegal sole early juveniles**
Fernández I, Gisbert E
- 11.50 **Skeletal evaluation and technical improvements to decrease the incidence of skeletal deformities in *Solea senegalensis*, Kaup**
Gavaia PJ, Richard N, Dâmaso L, Dinis MT, Pousão-Ferreira P, Engrola S, Conceição L, Cancela ML
- 12.15 **Studies on the appearance of skeleton anomalies in red porgy: effect of culture intensiveness, feeding habits and nutritional quality of live preys**
Izquierdo MS, Roo J, Socorro J, Fernandez-Palacios H

12.40 **Lunch break**

ORAL SESSION 6. PHENOTYPIC PLASTICITY II: SKELETAL RESPONSES TO DEFINED ENVIRONMENTS

Chair: Boglione C

- 14.00 **Skeletogenesis and bone mineralization in developing sea bass (*Dicentrarchus labrax*) larvae**
Darias MJ, Lan Chow O, Mazurais D, Cahu C, Zambonino-Infante JL
- 14.25 **Skeletal anomalies and fluctuating asymmetry in farmed rainbow trout (*Oncorhynchus mykiss*, Walbaum 1792)**
Pulcini D, Boglione C, Palamara E, Cataudella S
- 14.50 **Effect of hatchery environment on cranial morphology and developmental stability in Atlantic salmon (*Salmo salar* L.) from North-West Russia**
Yurtseva A, Lajus D, Artamonova V, Makhrov A
- 15.15 **Effect of rearing technique over skeletal deformities incidence and osteological development in red porgy *Pagrus pagrus* (Linnaeus, 1758) larvae**
Roo FJ, Hernández-Cruz CM, Socorro JA, Fernández-Palacios H, Izquierdo MS

15.40 **Coffee break and posters**

POSTER SESSION 2.

ORAL SESSION 7. ANALYTICAL VISUALISATION OF SKELETAL DEVELOPMENT

Chair: Winkler C

- 17.30 **Micromorphology of the tessellated skeleton of cartilaginous fishes**
Dean MN, Claeson KM, Summers AP
- 17.55 **Synchrotron microcomputer tomography for the non-destructive visualization of the fish skeleton**
Epple M, Neues F

- 18.20 **Changes in vertebral structure during growth of reared rainbow trout, *Oncorhynchus mykiss* (Walbaum): a new approach using modeling of vertebral bone profiles**
Deschamps M-H, Girondot M, Labbé L, Sire J-Y
- 18.45 **Visualization of skeletal deformity in live marine fish larvae by fluorescent calcein staining**
Haga Y, Masui S, Fujinami Y, Aritaki M, Satoh S

20.00 **Dinner**

Day 3. Wednesday April 29

ORAL SESSION 8. UNRAVELLING THE CAUSES OF SKELETAL PATHOLOGIES

Chair: Izquierdo MS

- 09.00 **Dietary fatty acids and inflammation in the vertebral column of Atlantic salmon (*Salmo salar*) smolts: A possible link to spinal deformities**
Gil-Martens L, Lock EJ, Fjellidal PG, Wargelius A, Araujo P, Torstensen BE, Witten PE, Hansen T, Waagbø R, Ørnsrud R
- 09.25 **Modeling the relationship between rearing methodology and morphological quality in farmed gilthead seabream (*Sparus aurata*, L. 1758): an application of self organizing map to the study of anomalies in shape and number of skeletal elements in gilthead seabream juveniles**
Prestinicola L, Russo T, Palamara E, Cataudella S, Boglione C
- 09.50 **MMP-13 (matrix metalloproteinase 13) may be a potential indicator of chronic inflammation in compressed vertebrae of Atlantic salmon (*Salmo salar* L)**
Wargelius A, Fjellidal PG, Grini A, Gil-Martens L, Kvamme B-O, Hansen T
- 10.15 **The effect of vertebral deformities on growth in Atlantic salmon (*Salmo salar* L.)**
Hansen T, Fjellidal PG, Yurtseva A, Berg A

10.40 **Coffee break**

ORAL SESSION 9, THE GENETIC AND DEVELOPMENTAL BASIS OF SKELETOGENESIS I

Chair: Smith M

- 11.00 **Monitoring BMP signaling during skeletal development in zebrafish**
Schilling T, Alexander C
- 11.25 **Sparc (osteonectin) functions in morphogenesis of pharyngeal skeleton and inner ear**
Rotllant J, Liu D, Yan Y-L, Postlethwait JH, Westerfield M, Du S-J
- 11.50 **Osterix regulates bone formation in medaka**
Renn J, Winkler C
- 12.15 **Function and regulation of *dlx* genes in the pharyngeal arches of zebrafish**
Ekker M, Sperber S, MacDonald R, Saxena V

12.40 **Lunch break**

ORAL SESSION 10, THE GENETIC AND DEVELOPMENTAL BASIS OF SKELETOGENESIS II

Chair: Akimenko MA

- 14.00 **The function of the Egr1 transcription factor in cartilage formation and adaptation to microgravity in *Danio rerio***
Muller M, Dalcq J, Pasque V, Aceto J, Motte P, Martial JA
- 14.25 **The zebrafish as a model to study the genes underlying postembryonic development of the skeleton**
Harris M, Rohner N, Nusslein-Volhard C

15.40 **Coffee break**

PLENARY DISCUSSION

Chairs: Cancela ML & Witten PE

16.00 **Future Interdisciplinary Approaches in Fish Skeletal Biology**

20.00 **Barbecue – Conference party**