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Compilation of QTL for resistance to bacterial, parasitic and viral diseases in turbot (*Scophthalmus maximus*)

Silvia Teresa Rodríguez-Ramilo, Roberto de La Herrán, C. Ruiz Rejon, M. Herminda, C. Fernandez, P. Pereiro, B. Novoa, A. Figueras, C. Bouza, M. A. Toro, et al.

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SANTIAGO DE COMPOSTELA
2015

ISGA XII

**INTERNATIONAL SYMPOSIUM ON
GENETICS IN AQUACULTURE XII**

Santiago de Compostela, Spain
June 21st-27th, 2015

ISGA XII - THE INTERNATIONAL SYMPOSIUM ON GENETICS IN AQUACULTURE XII 21st-27th JUNE 2015 IN SANTIAGO DE COMPOSTELA, SPAIN

SUNDAY, 21st JUNE 2015

19:30-21:30	REGISTRATION AND WELCOME COCKTAIL (Assembly Hall of the Law Faculty , Campus Sur, University of Santiago de Compostela)
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MONDAY, 22nd JUNE 2015

08:00-08:30	REGISTRATION
08:30-08:45	WELCOME Presentation of the ISGA 2015 Symposium (Prof. Paulino Martínez) Representatives of the Galician Government and EU Administration, and the Rector of the University of Santiago de Compostela
08:45-09:00	[S1] HISTORY OF AQUACULTURE AND APPLIED GENETICS IN SPAIN (Prof. Paulino Martínez)
09:00-09:45	Opening Conference Prof. John Woolliams (SPONSORED BY Red de Excelencia de Biotecnología en Acuicultura, Aquagenomics-Net - Ministerio de Economía y Competitividad) [S2] GENOMIC SELECTION: FROM LIVESTOCK TO AQUACULTURE APPLICATIONS
SESSION BREEDING PROGRAMS 1	09:45-10:00 [01] CURRENT STATUS OF SELECTIVE BREEDING IN EUROPEAN AQUACULTURE. Janssen K. , Chavanne H., Berentsen P., Komen H.
MODERATOR: Prof. Paulino Martínez	10:00-10:15 [02] EVOLUTION OF <i>C. virginica</i> BREEDING IN CHESAPEAKE BAY, USA: FROM MASS TO FAMILY SELECTION. Moss Small J. , Kube P., Allen Jr. S.K.

<p>SESSION BREEDING PROGRAMS 1</p> <p>MODERATOR: Prof. Paulino Martínez</p>	<p>10:15-10:30</p>	<p>[03] ADVANCED ANIMAL BREEDING IN AQUACULTURE: USING GENOME-WIDE MOLECULAR BREEDING VALUES FOR RAPID ANIMAL IMPROVEMENT IN THE SILVER-LIPPED PEARL OYSTER. Zenger K.R., Jones D.B., Raadsma H.W., Khatkar M.S., Moser G., Taylor J.T., Toole P., Jerry D.R.</p>
<p>10:30-10:50 COFFEE BREAK</p>		
<p>SESSION BREEDING PROGRAMS 2</p> <p>MODERATOR: Prof. John Liu</p>	<p>10:50-11:05</p>	<p>Fishboost EU Project (Dr. Anna Sonesson)</p> <p>[S11] FISHBOOST- AN EU-FP7 PROJECT TO ADVANCE EUROPEAN AQUACULTURE BREEDING FOR SIX FINFISH SPECIES</p>
	<p>11:05-11:20</p>	<p>[04] A COMPARISON OF CLASSIC SELECTION AND MATING METHODS FOR AQUACULTURE BREEDING PROGRAMMES. Saura M., Villanueva B., Fernández J., Toro M.A</p>
	<p>11:20-11:35</p>	<p>[05] GENETIC IMPROVEMENT OF YELLOW PERCH I: PROGRESS AND PROSPECTS. Wang H-P., O'Bryant P., Yao H., Rapp D., Shen Z. and Li Y.</p>
	<p>11:35-11:50</p>	<p>[06] GENETIC GAINS ACHIEVED OVER 10 YEARS OF SELECTIVE BREEDING FOR RESISTANCE TO AMOEBIC GILL DISEASE IN ATLANTIC SALMON (<i>Salmo salar</i>). Evans B.S., Kube P.D., Taylor R.S., Elliott N.G.</p>
	<p>11:50-11:05</p>	<p>[07] GENETICS OF THERMOTOLERANCE IN RAINBOW TROUT, <i>Oncorhynchus mykiss</i>. Dupont-Nivet M., Crusot M., Rigaudeau D., Labbé L., Quillet E.</p>
	<p>11:05-11:20</p>	<p>[08] GENETIC VARIATION IN DEVELOPING ATLANTIC SALMON <i>Salmo salar</i> TO HYPOXIA TOLERANCE. Andrewartha S.J., Hamilton M., Elliott N.G., Frappell P.B.</p>
	<p>11:20-11:35</p>	<p>[09] HERITABILITY OF COPING STYLES IN FARMED EUROPEAN SEABASS. Allal F., Ferrari S., Horri K., Vidal M.-O., Ruelle F., Vandeputte M., Chatain B., Bégout M.-L.</p>
<p>12:35-13:45 LUNCH</p>		
<p>SESSION BREEDING PROGRAMS 3</p> <p>MODERATOR: Dr. Dean Jerry</p>	<p>13:45-14:15</p>	<p>Short review</p> <p>[S5] ASIAN SEABASS GENOME PROJECT: A STATUS REPORT (Prof. Laszlo Orban)</p> <p>[S6] CURRENT STATUS OF THE ASIAN SEABASS BREEDING PROGRAM (Prof. Gen Hua Yue)</p>

<p>SESSION BREEDING PROGRAMS 3</p> <p>MODERATOR: Dr. Dean Jerry</p>	14:15-14:30	<p>[010] GENOTYPE-ENVIRONMENT INTERACTIONS OF CHANNEL CATFISH, <i>Ictalurus punctatus</i>, ♀ X BLUE CATFISH, <i>Ictalurus furcatus</i>, ♂ HYBRIDS-CHANGING CULTURE ENVIRONMENTS-CHANGING CLIMATE. Dunham R.A., Alsaqufi A., Youssef N., Makhubu N.P., Su B., Peatman E.</p>
	14:30-14:45	<p>[011] GENOTYPE-BY-ENVIRONMENT INTERACTION FOR UNIFORMITY OF GROWTH IN RAINBOW TROUT (<i>Oncorhynchus mykiss</i>). Sae-Lim P., Kause A., Janhunen M., Vehviläinen H., Koskinen H., Gjerde B., Lillehammer M., Mulder H.A.</p>
	14:45-15:00	<p>[012] META-ANALYSIS METHODOLOGY FOR SUMMARIZING GENOTYPE-BY-ENVIRONMENT INTERACTIONS ACROSS AQUACULTURE SPECIES. Kause A.</p>
	15:00-15:15	<p>[013] GENETIC PARAMETERS AND GENOTYPE X ENVIRONMENT INTERACTIONS FOR GROWTH IN THE RED ABALONE (<i>Haliotis rufescens</i>). Winkler F., Fariás W., Brokordt K., Herbinger C.</p>
	15:15-15:30	<p>[014] ESTIMATES OF HERITABILITY AND GENOTYPE BY ENVIRONMENT INTERACTIONS IN THE PURPLE FRESHWATER PEARL MUSSEL <i>Hyriopsis cumingii</i>. Li Q., Bai Z., Han X., Luo H., Dong S., Li J.</p>
	15:30-15:45	<p>[015] HERITABILITY AND GXE INTERACTIONS OF DISEASE RESISTANCE TO SUMMER SPAT MORTALITIES IN THE PACIFIC OYSTER <i>Crassostrea gigas</i> USING BAYESIAN MODEL. Enez F., Puyo S., Boudry P., Lapègue S., Gonzalez-Araya R., Guémené D., Chapuis H., Haffray P.</p>
15:45-16:05	<p>COFFEE BREAK</p>	
16:05-17:30	<p>BROKERAGE/POSTER SESSION</p>	
17:30-19:00	<p>ROUND TABLE/WORKSHOP (GBS VS SNP-CHIPS). MODERATOR: DR. ROSS HOUSTON</p> <p>RAD-SEQ - Dr. Luca Bargelloni. Università degli Studi di Padova (IT) AFFYMETRIX CHIP - Dr. Alastair Hamilton. Landcatch Natural Selection Ltd (UK) ILLUMINA CHIP - Dr.Cindy Taylor Lawley. Manager, Market Development Illumina, Inc. (USA) GENOMAGIC - Dr. Gil Ronen, CEO, NRGene (ISR)</p>	

TUESDAY, 23rd JUNE 2015

<p>SESSION ENVIRONMENTAL RISK</p> <p>MODERATOR: Dr. Béatrice Chatain</p>	08:30-08:45	<p>Aquatrace EU Project (Dr. Luca Bargelloni)</p> <p>[S12] THE DEVELOPMENT OF TOOLS FOR TRACING AND EVALUATING THE GENETIC IMPACT OF FISH FROM AQUACULTURE: "AQUATRACE"</p>
	08:45-09:00	<p>[O16] EVALUATION OF THE ERROR RATE AND SOLUTIONS ASSOCIATED TO DOUBLE DIGESTION RAD GENOTYPING BY SEQUENCING IN THREE EUROPEAN MARINE AQUACULTURE SPECIES. Maroso F., Hermida M., Pardo B.G., Martínez P., Bargelloni L.</p>
	09:00-09:15	<p>[O17] IDENTIFYING PARALLEL AND NON-PARALLEL GENOMIC CHANGES BETWEEN INDEPENDENT PAIRS OF WILD/DOMESTIC ATLANTIC SALMON POPULATIONS USING A HIGH DENSITY SNP ARRAY. López M.E., Correa K., Di Genova A., Moore J-S., Perrier C., Bernatchez L., Gilbey J., Soto C., Bassini L., Maass A., Neira R., Figueroa R., Lhorente J.P., Yáñez J.M.</p>
	09:15-09:30	<p>[O18] IDENTIFICATION OF SPECIES-SPECIFIC SNP MARKERS IN TILAPIAS USING DOUBLE-DIGEST RAD SEQUENCING (ddRADseq). Syaifudin M., Bekaert M., Taggart J.B., Hulata G., D’Cotta H., Baroiller J.F., Penman D.J., McAndrew B.J.</p>
	09:30-9:45	<p>[O19] A GENOMIC APPROACH TO THE GENETIC MANAGEMENT OF AQUACULTURE-BASED STOCK ENHANCEMENT IN A MARINE REEF FISH, THE RED SNAPPER <i>Lutjanus campechanus</i>. Norrell A.E., Jones K.L., Saillant E.A.</p>
	09:45-10:00	<p>[O20] ECONOMIC AND ENVIRONMENTAL IMPACTS OF GENETIC IMPROVEMENT IN FISH FARMING DEPEND ON LIMITING FACTORS. Besson M., Vandeputte M., Aubin J., van Arendonk J.A.M., de Boer I.J.M., Quillet E., Komen H.</p>
	10:00-10:15	<p>[O21] MICROSATELLITE ASSESSMENT OF GENETIC DIVERSITY OF WILD AND CAPTIVE POPULATIONS FOR RESTOCKING THE MIGRATORY CURIMBA (<i>Prochilodus argenteus</i>) IN THE SÃO FRANCISCO RIVER (BRAZIL). Lima A.P.S., Oliveira K.K.C., Coimbra M.R.M.</p>
	10:15-10:30	<p>[O22] CAN SELECTIVE BREEDING FOR GROWTH OR FILLET YIELD DECREASE ENVIRONMENTAL IMPACT OF FISH FARMING? A GILTHEAD SEA BREAM (<i>Sparus aurata</i>) CASE STUDY. Haffray P., Acosta Alba I., Cariou S., Bruant J.S., Bugeon J., Vandeputte M., Aubin J.</p>

10:30-10:50		COFFEE BREAK	
<p>SESSION BREEDING PROGRAMS 4</p> <p>MODERATOR: Dr. Marc Vandeputte</p>	10:50-11:05	Short review	
		[S7]	BREEDING PROGRAMS IN FISH AQUACULTURE: HISTORICAL CONTEXT AND PERSPECTIVES (Prof. Roberto Neira)
	11:05-11:20	[023]	GENETIC PARAMETERS FOR THE OPERCULUM AND JAWS DEFORMITIES IN LARVAE OF GILT HEAD SEABREAM, <i>Sparus aurata</i> . Batargias C. , Fragoulis S., Loukovitis D., Tzokas K., Koumoundouros G.
	11:20-11:35	[024]	EFFECTS OF STRAIN ON GROWTH PERFORMANCES OF TRIPLOID THAI WALKING CATFISH, <i>CLARIAS MACROCEPHALUS GÜNTHER, 1864</i> . Chatchaiphan S., Srisapoome P., Na-Nakorn U.
	11:35-11:50	[025]	GENETIC PARAMETERS FOR UNIFORMITY OF HARVEST WEIGHT IN THE GIFT STRAIN OF NILE TILAPIA ESTIMATED USING DOUBLE HIERARCHICAL GENERALIZED LINEAR MODELS. Marjanovic J. , Mulder H.A., Khaw H.L., Bijma P
	11:50-12:05	[026]	RESPONSE TO SELECTION FOR HARVEST WEIGHT IN A FAMILY BASED SELECTION PROGRAM OF GILT HEAD SEABREAM (<i>Sparus aurata</i>). Thorland I. , Kottaras L., Refstie T., Dimitroglou A., Papaharis L., Rye M.
	12:05-12:20	[027]	THE EFFECT OF PARENTAL RELATEDNESS ON THE FITNESS IN NEXT GENERATION OF THE GUPPY <i>Poecilia reticulata</i> . Ismail M.S., Nakajima T., Nakajima M.
12:20-13:35		LUNCH	
<p>SESSION BREEDING PROGRAMS 5</p> <p>MODERATOR: Dr. Beatriz Villanueva</p>	13:35-13:55	Short review	
		[S8]	SELECTIVE BREEDING IN NILE TILAPIA: ACHIEVEMENTS AND FUTURE DIRECTIONS. Komen H. , Benzie J.
	13:55-14:10	[028]	GENETIC PARAMETERS IN ATLANTIC SALMON FOR GROWTH RATE AND CARCASS QUALITY TRAITS RECORDED AT THE SAME BODY WEIGHT OR THE SAME AGE. Kristjánsson Ó. , Gjerde B., Lillehammer M., Jónasson J.
	14:10-14:25	[029]	NEGATIVE GENETIC CORRELATION BETWEEN RESISTANCE AGAINST <i>Piscirickettsia salmonis</i> AND HARVEST WEIGHT IN COHO SALMON (<i>Oncorhynchus kisutch</i>). Yáñez J.M. , Barría A., Dufflocq P., Oyarzún M., Neira R., Newman S., Lhorente J.P.

<p>SESSION BREEDING PROGRAMS 5</p> <p>MODERATOR: Dr. Beatriz Villanueva</p>	14:25-14:40	[030] PARENTAGE ASSIGNMENT IN SALMON USING HIGH DENSITY SNP PANELS: A SIMULATION STUDY. Grashei K.E. , Kjøglum S., Moen T., Ødegård J.
	14:40-14:55	[031] SHRIMP BROODSTOCK MANAGEMENT FOR THE CONTROL OF GENETIC DIVERSITY AND INBREEDING. Pérez-Enríquez R. , Robles-Cota C., Peiro-López J., Haffray P.
	14:55-15:10	[032] ESTIMATES OF GENETIC VARIABILITY AND INBREEDING IN SELECTED POPULATIONS OF EUROPEAN SEA BASS. Hillen J. , Carr A., Hellemans B., Ogden R., Taggart J., Vandeputte M., Vergnet A., Volckaert F.A.M., Aquatrace consortium, Coscia I
	15:10-15:25	[033] GENETIC SIGNATURES OF SELECTION AND ASSOCIATION ANALYSIS OF THE DOMESTICATION EVENT IN SOUTH AFRICAN ABALONE, <i>Haliotis midae</i> . Rhode C. , Dale-Kuys R., Vervalle J., Bester-Van der Merve A., Roodt-Wilding R.
	15:25-15:40	[034] GENOME-WIDE SNPS PROVIDE INSIGHTS INTO FINE-SCALE POPULATION STRUCTURE AND VARIABILITY IN THE FIJIAN BLACK-LIP PEARL OYSTER <i>Pinctada margaritifera</i> . Lal M.M. , Southgate P.C., Jerry D., Zenger K.R.,
	15:40-15:55	[035] GENETIC STRUCTURE BASED ON MICROSATELLITES AND COLOR VARIANCE ANALYSIS FOR A BRIGHT RED CLAM, <i>Paphia amabilis</i> (PHILIPPI, 1847) Yu F., Li Q.Z., Wu X.X., Luo B., Zhu J., Wang Y
15:55-20:15	BOAT TRIP AND VISIT TO MUSSEL FACILITIES	

WEDNESDAY, 24th JUNE 2015

<p>SESSION GENOMES AND GENETIC ARCHITECTURE 1</p> <p>(SPONSORED BY NRGENE)</p> <p>MODERATOR: Prof. Rex Dunham</p>	8:30-9:00	Invited Conference
	09:00-09:15	[S3] GENOMIC ADVANCES AND APPLICATIONS IN AQUACULTURE (Prof. John Liu)
		[036] SECOND-GENERATION LINKAGE MAPS REVEAL ERRORS IN THE ASSEMBLY OF THE PACIFIC OYSTER (<i>Crassostrea gigas</i>) GENOME AND FACTORS AFFECTING MAP LENGTHS AND MARKER ORDERS. Hedgecock D.

<p style="text-align: center;">SESSION GENOMES AND GENETIC ARCHITECTURE 1</p> <p style="text-align: center;">(SPONSORED BY NRGENE)</p> <p>MODERATOR: Prof. Rex Dunham</p>	09:15-09:30	[037] IDENTIFICATION OF SINGLE NUCLEOTIDE POLYMORPHISM MARKERS ASSOCIATED WITH BACTERIAL COLD WATER DISEASE RESISTANCE AND SPLEEN SIZE IN RAINBOW TROUT. Liu S. , Vallejo R.L., Palti Y., Gao G., Marancik D.P., Wiens G.D.
	09:30-09:45	[038] A HIGH DENSITY GENETIC LINKAGE MAP FOR RAINBOW TROUT (<i>Oncorhynchus mykiss</i>) CONTAINING 47,839 SNPS. Baranski M. , Palti Y., Moen T., Grove H., Guangtu G., Lien S., Liu S., Rexroad C.
	09:45-10:00	[039] GENE MAPPING IN THE SENEGALESE SOLE (<i>Solea senegalensis</i>). Rodríguez M.E., Portela-Bens S., Merlo M.A., Cross I., Rebordinos L.
	10:00-10:15	[040] GENETIC LINKAGE MAP AND QTL ANALYSIS OF GROWTH RELATED TRAIT IN PACIFIC BLUEFIN TUNA. Uchino T. , Hosoda E., Nakamura Y., Sekino M., Fujiwara A., Yasuike M., Sugaya T., Tanaka Y., Kumon K., Sano M., Sakamoto T.
	10:15-10:30	[041] MARKERS FOR RESISTANCE TO WHITE SPOT SYNDROME VIRUS IN BLACK TIGER SHRIMP (<i>Penaeus monodon</i>) AND CORRESPONDANCE TO cSNPS IN WHITE SHRIMP (<i>Litopenaeus vannamei</i>). Robinson N. , Baranski M., Gopikrishna G., Vinaya Kumar K., Shekhar M.S., Gopal C., Panigrahi A., Balasubramanian C.P., Ashok Kumar J., Rajendran V., Moghadam H., Aranguren F., Salazar M., Gitterle T., Vijayan K.K.
	10:30-10:45	[042] EXTENT OF GENOME-WIDE LINKAGE DISEQUILIBRIUM IN FARMED ATLANTIC SALMON (<i>Salmo salar L.</i>) USING HIGH-DENSITY GENOTYPES. Yáñez J.M. , Correa K., López M.E., Lhorente J.P., Figueroa R., Bassini L., Di Genova A., Maass A.
	10:45-11:00	[043] USE OF NEXT-GENERATION SEQUENCING IN THE PACIFIC OYSTER TO DISCOVER AND GENOTYPE SNP MARKERS FOR BUILDING THIRD-GENERATION LINKAGE MAPS. Arias-Pérez A. , Hedgecock D.
11:00-11:20	COFFEE BREAK	

<p>SESSION GENOMES AND GENETIC ARCHITECTURE 2</p> <p>(SPONSORED BY GRUPO PESCANOVA)</p> <p>MODERATOR: Prof. Roberto Neira</p>	11:20-11:40	<p>Short review</p> <p>[S9] A REVIEW OF SHELLFISH BREEDING PROGRAMS (Prof. Standish Allen)</p>
	11:40-11:55	<p>[044] BLUNT SNOUT BREAM, <i>Megalobrama amblycephala</i>, GENOME REVEALS THE EVOLUTION AND ADAPTATION TO HERBIVOROUS DIET. Liu H., Wang W.</p>
	11:55-12:10	<p>[045] GENOME SEQUENCING OF THE TURBOT (<i>Scophthalmus maximus</i>; Pleuronectiformes) A FLATFISH OF HIGH AQUACULTURE VALUE. Figueras A., Corvelo A., Robledo D., Hermida M., Pereiro P., Gómez J., Carreté L., Bello X., Marcet-Houben M., Forn-Cuní G., Abal-Fabeiro J.L., Pardo B.G., Taboada X., Fernández C., Alvarez-Dios J. A., Gómez-Tato A., Viñas A., Maside X., Gabaldón T., Novoa B., Bouza C., Alioto T., Martínez P.</p>
	12:10-12:25	<p>[046] GENOME SEQUENCING OF 12 PUFFERFISHES. Hosoya S., Tasumi S., Kobayashi H., Kikuchi K.</p>
	12:25-12:40	<p>[047] DE NOVO GENOME ASSEMBLY OF THE AFRICAN CATFISH (<i>Clarias gariepinus</i>). Kovács B., Barta E., Pongor S. L., Uri Cs., Patócs A., Orbán L., Müller T., Urbányi B.</p>
12:40-13:50	<p>LUNCH</p>	
<p>SESSION GENOMIC SELECTION AND MAS</p> <p>(SPONSORED BY ILLUMINA)</p> <p>MODERATOR: Prof. Laszlo Orban</p>	13:50-14:05	<p>[048] ACCURACY OF POPULATION-WIDE AND WITHIN-FAMILY GENOMIC SELECTION IN ATLANTIC SALMON. Sonesson A.K., Meuwissen T.H.E., Baranski M., Moghadam H., Lillehammer M., Norris A., Bakke H., Lund V.</p>
	14:05-14:20	<p>[049] GENOMIC SELECTION FOR BCWD RESISTANCE IN RAINBOW TROUT USING RADSNP AND SNP GENOTYPING PLATFORMS, SINGLE-STEP GBLUP AND BAYESIAN VARIABLE SELECTION MODELS. Vallejo R.L., Leeds T.D., Liu S., Gao G., Welch T.J., Wiens G.D., Palti Y.</p>
	14:20-14:35	<p>[050] WITHIN-FAMILY GENOMIC SELECTION IN AQUACULTURE BREEDING PROGRAMMES. Saura M., Villanueva B., Fernández J., Toro M.A.</p>
	14:35-14:50	<p>[051] DEVELOPMENT OF GENOMIC RESOURCES AND WHOLE GENOME PREDICTION IN PACIFIC WHITE-LEG SHRIMP (<i>Litopenaeus vannamei</i>). Jerry D.R., Raadsma H.W., Khatkar M.S., Prochaska J., van der Steen H., Jones D.B., Zenger K.R..</p>

<p>SESSION GENOMIC SELECTION AND MAS</p> <p>(SPONSORED BY ILLUMINA)</p> <p>MODERATOR: Prof. Laszlo Orban</p>	14:50-15:05	<p>[052] QTL-SELECTION CONTRIBUTES TO INCREASED RESISTANCE TO CARDIOMYOPATHY SYNDROME (CMS) IN ATLANTIC SALMON (<i>Salmo salar</i> L.). Kjøglum S., Moen T., Korsvoll S.A., Ødegård J., Santi N.</p>
	15:05-15:20	<p>[053] GENOTYPING-BY-SEQUENCING USING CUSTOM ION AMPLISEQ™ TECHNOLOGY AS A TOOL FOR GENOMIC SELECTION IN ATLANTIC SALMON (<i>Salmo salar</i>). Baranski M., Jowdy C., Moghadam H., Norris A., Bakke H., Sonesson A., Meuwissen T., Lillehammer M., Lund V.</p>
	15:20-15:35	<p>[054] EFFECT OF IMPUTED MARKER GENOTYPES ON ACCURACY OF GENOMIC SELECTION IN AQUACULTURE POPULATIONS. Vela-Avitúa S., Ødegård J.</p>
	15:35-15:50	<p>[055] CANDIDATE GROWTH GENES IDENTIFIED BY QTL FINE MAPPING IN BIGHEAD CARP <i>Aristichthys nobilis</i>. Sun Y.H., Liu H.Y., Feng X., Yu X., Fu B.D., Tong J.</p>
	15:50-16:05	<p>[056] ESTIMATES OF HERITABILITY FOR DISEASE RESISTANCE TO SRS USING GENOMIC RELATIONSHIPS PREDICTED USING HIGH DENSITY SNP DATA IN ATLANTIC SALMON AND RAINBOW TROUT. Martínez V., Santi N., Odegard J., Moen T.</p>
	16:05-16:20	<p>[057] A GENOME-WIDE ASSOCIATION STUDY FOR SEX DETERMINATION IN ATLANTIC SALMON. Covello-Soto L., Morán P., Kent M.P., Saura M.</p>
16:20-16:40	<p>COFFEE BREAK</p>	
16:40-17:45	<p>BROKERAGE/POSTER SESSION</p>	
17:45-19:15	<p>ROUND TABLE (TECHNOLOGICAL TRANSFER). MODERATOR: MS. ROSA FERNÁNDEZ (CETMAR)</p> <p>Ms. Ana Riaza, Stolt Sea Farm S.A. (ES) Dr. Marine Herlin, Culmarex S.A. (ES) Dr. Pierrick Haffray, SYSAAF, Syndicat des Sélectionneurs Avicoles et Aquacoles (FR) Dr. Anna Kristina Sonesson, Nofima (NO) Mr. Courtney Hough, Federation of European Aquaculture Producers and European Aquaculture Technology Platform (EU)</p>	

THURSDAY, 25th JUNE 2015

<p>SESSION FUNCTIONAL GENOMICS 1</p> <p>MODERATOR: Dr. David Penman</p>	8:30-9:00	<p>Invited Conference</p> <p>[S4] INTEGRATING EPIGENETICS INTO AQUACULTURE RESEARCH (Dr. Francesc Piferrer)</p>
	09:00-09:15	<p>[058] THE EFFECTS OF EARLY LIFE STRESS ON THE EPIGENOME AND TRANSCRIPTOME OF ATLANTIC SALMON (<i>Salmo salar</i>). Moghadam H., Tveiten H., Robinson N., Andersen Ø., Burgerhout E., Johnsen H.</p>
	09:15-09:30	<p>[059] GENOME-WIDE ANALYSIS OF DNA METHYLATION OF ATLANTIC SALMON IN RESPONSE TO STRESS. Covelo L, Reyes D., González R., Pérez-Figueroa A., Morán P., Vidal R.</p>
	09:30-09:45	<p>[060] GENE EXPRESSION PROFILES DEFINING HOST RESISTANCE TO INFECTIOUS PANCREATIC NECROSIS VIRUS IN ATLANTIC SALMON FRY. Houston R.D., Taggart J.B., Bishop S.C., Bron J.E., Bekaert M.B.</p>
	09:45-10:00	<p>[061] GENE EXPRESSION PROFILE ANALYSIS OF MANILA CLAM (<i>Ruditapes philippinarum</i>) HEMOCYTES AFTER A <i>Vibrio alginolyticus</i> OR <i>Perkinsus olseni</i> CHALLENGE USING AN IMMUNE-ENRICHED OLIGO-MICROARRAY. Moreira R., Romero A., Milan M., Bargelloni L., Novoa B., Figueras A.</p>
	10:00-10:15	<p>[062] COMPARATIVE ANALYSIS OF MICRORNAs TRANSCRIPTOME EXPRESSION IN CHITRALADA, RED STIRLING AND IN CROSSBRED NILE TILAPIA (<i>Oreochromis niloticus</i>) USING HIGH THROUGHPUT SEQUENCING. Herkenhoff M.E., Bovolenta L.A., Dias M.A.D., Hilsdorf A.W., Pinhal D.</p>
	10:15-10:30	<p>[063] FROM TILAPIA'S COMPARATIVE TRANSCRIPTOME ANALYSIS TO CHARACTERIZATION OF NUTRIENT TRANSPORTERS. Rozenberg P., Ronkin D., Nitzan T., Seroussi E., Doron-Faigenboim A., Cnaani A.</p>
	10:30-10:45	<p>[064] TRANSCRIPTOME AND MICRO-RNA ANALYSIS REVEALS NOVEL INSIGHTS INTO DEVELOPMENT OF INTERMUSCULAR BONE IN TELEOSTS. Gao Z.X., Wang W.M., Yi S.K., Wan S.M., Chen B.X.</p>
	10:45-11:00	<p>[065] STRESS SPECIFIC GENE EXPRESSION PATTERNS IN RELATION TO EARLY LIFE STRESS IN THE GILTHEAD SEA BREAM (<i>Sparus aurata</i>). Sarropoulou E., Tsalafouta A., Sundaram A.Y.M., Papandroulakis N., Oulas A., Leithaug M., Gilfillan G.D., Kotoula G., Pavlidis M.</p>

11:00-11:20		COFFEE BREAK	
SESSION SEX CONTROL 1 MODERATOR: Dr. Francesc Piferrer	11:20-11:40	Short review	
		[S10] RECENT ADVANCES IN ANALYSING SEX DETERMINATION IN FISH (Dr. David Penman)	
	11:40-11:55	[066] INCIPIENT TRANSITION OF A SEX DETERMINING GENE IN <i>Takifugu</i> PUFFERFISH. Ieda R., Hosoya S., Tasumi S., Suzuki S., Kikuchi K.	
	11:55-12:10	[067] SEX CHROMOSOME EVOLUTION AND MECHANISM FOR SEX DETERMINATION AND REVERSAL REVEALED BY WHOLE-GENOME SEQUENCING AND METHYLATION SEQUENCING IN HALF-SMOOTH TONGUE SOLE <i>Cynoglossus semilaevis</i> . Chen S.L. , Zhang G.J., Shao C.W., Huang Q.F., Liu G., Song W.T., Sha Z.X., Xie M.S., Liu Y., Wang N., Yang C.G., Hu Q.M., Scharf M., Tang Q.S., Wang J.	
	12:10-12:25	[068] EPIGENETIC CHANGES OF SEX GENES INDUCE SEX REVERSAL IN BARRAMUNDI <i>Lates calcarifer</i> . Domingos J.A. , Budd A.M., Banh Q.Q., Zenger K.R., Jerry D.R.	
	12:25-12:40	[069] FAST TURNOVER OF SEX DETERMINATION AND GENOMIC INCOMPATIBILITIES IN HYBRIDIZING SCULPINS (<i>Cottus</i>). Cheng J. , Nolte A.W.	
12:40-13:50		LUNCH	
SESSION SEX CONTROL 2/ BIOTECHNOLOGY MODERATOR: Dr. Elena Sarrapoulou	13:50-14:05	Parasite EU project (Dr. Ángel González)	
		[S13] BIOBANKING: THE PRESENT AND FUTURE OF FRESHWATER AND MARINE SAMPLING COLLECTION	
	14:05-14:20	[070] INVESTIGATING THE GENETICS OF SEX DETERMINATION IN EUROPEAN SEA BASS (<i>Dicentrarchus labrax</i>) USING RAD-SEQ. Palaikostas C., Bekaert M., Taggart J.B., Gharbi K., McAndrew B.J., Chatain B., Penman D.J. , Vandeputte M.	
	14:20-14:35	[071] DOES EARLY GROWTH PLAY A ROLE IN THE SEX DETERMINATION OF EUROPEAN SEABASS <i>Dicentrarchus labrax</i> ? Vandeputte M. , Horri K., Allal F., Ferrari S., Vidal M.O., Ruelle F., Bégout M.L., Chatain B.	

<p>SESSION SEX CONTROL 2/ BIOTECHNOLOGY</p> <p>MODERATOR: Dr. Elena Sarrapoulou</p>	14:35-14:50	[072] GENE EXPRESSION ANALYSIS AT THE ONSET OF SEX DIFFERENTIATION IN TURBOT (<i>Scophthalmus maximus</i>) AT DIFFERENT REARING TEMPERATURES. Robledo D. , Ribas L., Cal R., Sánchez L., Piferrer F., Martínez P., Viñas A.
	14:50-15:05	[073] FEMALE SPECIFIC MARKERS AND ATTEMPTS OF ALL-FEMALE PRODUCTION IN HALF-SMOOTH TONGUE SOLE <i>Cynoglossus semilaevis</i> . Zhang Q. , Wang X., Yu H., Wang Z., Qi J., He Y.
	15:05-15:20	[074] INVENTING TETRAPLOID BREEDING FOR ANIMALS USING THE EASTERN OYSTER <i>C. virginica</i> AS THE MODEL. Allen Jr. S.K. , Kube P., Small J.
	15:20-15:35	[075] ENVIRONMENTAL DNA (eDNA): A NEW FORENSIC TECHNIQUE TO DETECT PATHOGENS IN FARMED FISH. Gomes G.B. , Miller T.L., Hutson K.S., Jerry D.R.
	15:35-15:50	[076] A BAC TRANSGENIC ANALYSIS OF THE <i>asip1</i> LOCUS REVEALS DEVELOPMENTAL MECHANISMS OF DORSO-VENTRAL PIGMENTATION IN FISH. Cal L. , Gómez-Marín C., Gómez-Skarmeta J.L., Cerdá-Reverter J.M., Kelsh R.N., Rotllant J.
	15:50-16:05	[077] VERIFICATION OF ISOGENIC NATURE OF CLONAL LINES IN THE ATLANTIC SALMON (<i>Salmo salar</i>) THROUGH ddRADseq. Oral M. , Taggart J.B., McAndrew B.J., Penman D.J., Fjelldal P.G., Hansen T.
16:05-20:00	VISIT TO STOLT SEA FARM S.A. FACILITIES	
21:00-24:00	GALA DINNER (Not Included in the registration fee)	

FRIDAY, 26th JUNE 2015

<p>SESSION FUNCTIONAL GENOMICS 2</p> <p>MODERATOR: Prof. Laura Sánchez</p>	09:15-09:30	[078] TISSUE-SPECIFIC TRANSCRIPTOMES OF <i>Mytilus galloprovincialis</i> REVEAL NEW FUNCTIONS. Moreira R. , Canchaya C., Novoa B., Posada D., Figueras A.
	09:30-09:45	[079] APPLICATION OF RNA-SEQ IN INVESTIGATING A MAJOR PARASITIC DISEASE OF TURBOT (<i>Scophthalmus maximus</i>), ENTEROMYXOSIS. Ronza P. , Robledo D., Losada A.P., Bermúdez R., Pardo B.G., Martínez P., Quiroga M.I.

<p>SESSION FUNCTIONAL GENOMICS 2</p> <p>MODERATOR: Prof. Laura Sánchez</p>	09:45-10:00	[080] EXPLORING THE GENETIC BASIS OF RESISTANCE TO PANCREAS DISEASE IN ATLANTIC SALMON (<i>Salmo salar</i>). Gonen S. , Baranski M., Thorland I., Norris A., Grove H., Arnesen P., Bakke H., Lien S., Bishop S.C., Houston R.D.
	10:00-10:15	[081] ANNOTATION OF <i>Seriola lalandi</i> REFERENCE TRANSCRIPTOME OF LARVAE AND DIFERENTIAL GENE EXPRESSION BETWEEN NORMAL AND SKELETAL DEFORMED INDIVIDUALS. Patel A. , Hernandez E., Barra V., Martinez V.
	10:15-10:30	[082] ALLELE SPECIFIC EXPRESSION ON LIVER AND HEAD KIDNEY OF <i>Salmo salar</i> WITH DIFFERENTIAL SUSCEPTIBILITY TO THE CHALLENGE WITH <i>Piscirickettsia salmonis</i> . Dettleff P. , Martinez V.
	10:45-11:00	[083] POPULATION GENETICS AND TRANSCRIPTOMICS OF MANILA CLAM (<i>Ruditapes philippinarum</i>) AND CARPET-SHELL CLAM (<i>R. decussatus</i>): IMPLICATIONS FOR AQUACULTURE. Saavedra C. , Milan M., Cordero D., Leite R., Peña J.B., Delgado M., Liu B., Ruesink J., Cancela L., Bargelloni L., Patarnello T.
	10:45-11:00	[084] IDENTIFICATION OF BACTERIAL COMMUNITY COMPOSITION IN TILAPIA BIOFLOC SYSTEM UNDER DIFFERENT ENVIRONMENTAL CONDITIONS USING PCR-DGGE TECHNIQUE. Suloma A. , Mabroke R.S, Tahoun A.M., Zidan A.N., El-Menofy W., Adam M. and El-Shafiey M.H.M.
10.45-11.05	COFFEE BREAK	
<p>SESSION BREEDING PROGRAMS 6</p> <p>MODERATOR: Prof. Uthairat Na-Nakorn</p>	11:20-11:35	[085] GENETIC VARIATION IN PACIFIC OYSTERS (<i>Crassostrea gigas</i>) FOR RESISTANCE TO <i>Ostreid herpesvirus-1</i> . Kube P.D. , Dove M.C., Cunningham M., Kirkland P.D., O'Connor W.A., Elliott N.G.
	11:35-11:50	[086] A FIRST STEP FOR SUSTAINABLE BREEDING PROGRAMMES IN PIKEPERCH (<i>Sander lucioperca</i>) THROUGH THE EVALUATION OF THE GENETIC VARIATION IN DOMESTICATED BROODSTOCKS AND NATURAL POPULATIONS. Tsaparis D., Kyriakis D., Ekonomaki K., Darivianakis S., Fontaine P., Tsigenopoulos C.S.
	11:50-12:05	[087] RECORD OF LACK OF INTERMUSCULAR BONES IN SPECIMENS OF <i>Colossoma macropomum</i> (Characiformes): UNUSUAL PHENOTYPE TO BE INCORPORATED INTO GENETIC IMPROVEMENT PROGRAMS. Perazza C.A., Menezes J.T.B., Silva L.A., Pinaffi F.V., Ferraz J.B.S., Hilsdorf A.W.S.

12:05-13:00	General Assembly of International Association of Genetics in Aquaculture, closing ceremony, awards and selection of venue for ISGA XIII
13:00-14:10	LUNCH
17:00-19:00	VISIT TO SANTIAGO DE COMPOSTELA

SATURDAY, 27th JUNE 2015

9:00-19:00	GALICIAN TOURIST TOUR
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Posters



COMPILATION OF QTL FOR RESISTANCE TO BACTERIAL, PARASITIC AND VIRAL DISEASES IN TURBOT (*Scophthalmus maximus*)

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The culture of turbot is a well-established process. However, several infectious diseases caused by bacteria, parasites and viruses represent one of the most relevant limiting factors, causing severe economic losses. Consequently, one of the main objectives of genetic breeding programs in turbot industry is to reduce disease-related problems (mortality, slow growth, etc.). The objective of this study was to identify specific and general disease-resistance genomic regions related to the main pathogens for turbot culture. For this purpose, a comparison between QTL detected for resistance and survival time to the bacteria *Aeromonas salmonicida* (furunculosis), the parasite *Philasterides dicentrarchi* (scuticociliatosis) and the haemorrhagic septicaemia virus (VHS) was carried out. Eleven full-sib families of approximately 100 individuals each were analysed. Four families were evaluated for resistance to furunculosis, 3 families were tested for VHS, and 4 families were analysed for scuticociliatosis. All individuals were analysed with the same consensus genetic map. Several linkage groups (LG1, LG5 and LG6) showed QTL associated to the response to the three pathogens, suggesting genomic regions involved in general immunity. Notwithstanding, some disease specific genomic regions were also detected for furunculosis (LG12 and LG18), scuticociliatosis (LG3, LG7, LG10 and LG23) and VHS (LG8, LG20 and LG21). Additionally, other linkage groups shared common QTL for furunculosis and scuticociliatosis (LG4, LG9, LG11, LG13 and LG16), and for scuticociliatosis and VHS (LG2, LG15 and LG17). No QTL involved in the resistance/survival to any of the three pathogens were detected in LG14, LG19 and LG22. A gene mining approach identified candidate genes related to general or specific immunity. These findings will aid to develop marker assisted selection programs to improve turbot production.

Keywords: quantitative trait loci, molecular marker, general immunity, specific immunity, marker assisted selection

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