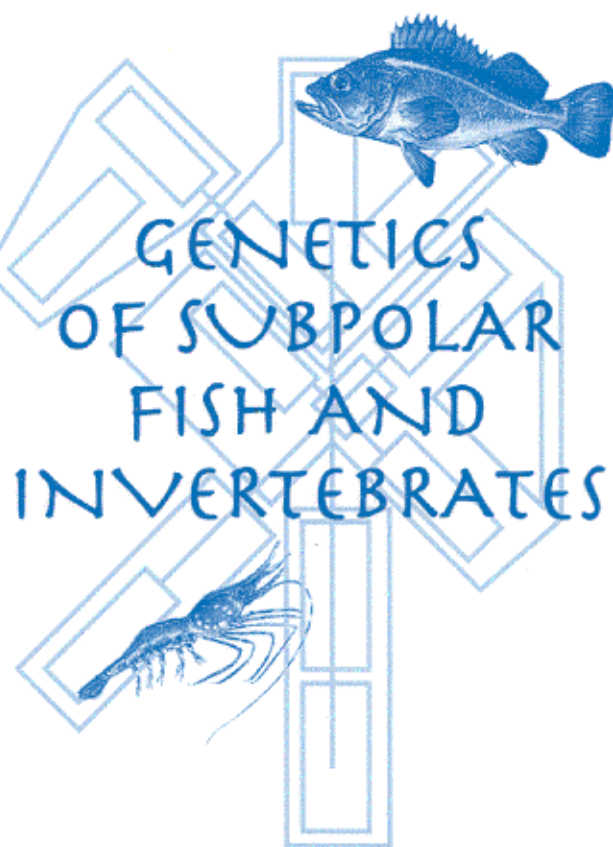


Genetics of Subpolar Fish and Invertebrates

edited by

Anthony J. Gharrett, Richard G. Gustafson, Jennifer L. Nielsen,
James E. Seeb, Lisa W. Seeb, William W. Smoker,
Gary H. Thorgaard and Richard L. Wilmot



Kluwer Academic Publishers

CONTENTS

Genetics of Subpolar Fish and Invertebrates

Guest Editors: Anthony J. Gharrett, Richard G. Gustafson, Jennifer L. Nielsen, James E. Seeb, Lisa W. Seeb, William W. Smoker, Gary H. Thorgaard & Richard L. Wilmot

Acknowledgements

ix

Introduction

Introduction to genetics of subpolar fish and invertebrates, by A.J. Gharrett, S. Keller, R.G. Gustafson, P. Johnson, J.L. Nielsen, J.E. Seeb, L.W. Seeb, W.W. Smoker, G.H. Thorgaard & R.L. Wilmot

1

Keynote

Using haplotype trees for phylogeographic and species inference in fish populations, by A.R. Templeton

7

Genetics of populations: freshwater and anadromous species

Migration of Pacific Rim chum salmon on the high seas: insights from genetic data, by L.W. Seeb, P.A. Crane, C.M. Kondzela, R.L. Wilmot, S. Urawa, N.V. Varnavskaya & J.E. Seeb

21

Genetic population structure of chum salmon in the Pacific Rim inferred from mitochondrial DNA sequence variation, by S. Sato, H. Kojima, J. Ando, H. Ando, R.L. Wilmot, L.W. Seeb, V. Efremov, L. LeClair, W. Buchholz, D.-H. Jin, S. Urawa, M. Kaeriyama, A. Urano & S. Abe

37

Smaller effective population sizes evidenced by loss of microsatellite alleles in tributary-spawning populations of sockeye salmon from the Kvichak River, Alaska drainage, by C. Habicht, J.B. Olsen, L. Fair & J.E. Seeb

51

Microsatellite DNA data indicate distinct native populations of kokanee, *Oncorhynchus nerka*, persist in the Lake Sammamish Basin, Washington, by S.F. Young, M.R. Downen & J.B. Shaklee

63

Genetic structure of wild chinook salmon populations of Southeast Alaska and northern British Columbia, by C.M. Guthrie III & R.L. Wilmot

81

Population structure and stock identification of steelhead trout (*Oncorhynchus mykiss*) in British Columbia and the Columbia River based on microsatellite variation, by T.D. Beacham, K.D. Le & J.R. Candy

95

A comparison of genetic variation between an anadromous steelhead, *Oncorhynchus mykiss*, population and seven derived populations sequestered in freshwater for 70 years, by F. Thrower, C. Guthrie III, J. Nielsen & J. Joyce

111

Genetic integrity and microgeographic population structure of westslope cutthroat trout, *Oncorhynchus clarki lewisi*, in the Pend Oreille Basin in Washington, by S.F. Young, J.G. McLellan & J.B. Shaklee

127

Microsatellite variation in populations of Atlantic salmon from North Europe, by V. Wennevik, Ø. Skaala, S.F. Titov, I. Studyonov & G. Nævdal

143

The rainbow smelt, *Osmerus mordax*, complex of Lake Utopia: threatened or misunderstood?, by R.A. Curry, S.L. Currie, L. Bernatchez & R. Saint-Laurent

153

Genetics of populations: marine species

Mitochondrial DNA variation in northwestern Bering Sea walleye pollock, *Theragra chalcogramma* (Pallas), by V.A. Brykov, N.E. Polyakova, T.F. Priima & O.N. Katugin

167

Analysis of the genetic structure of northwestern Bering Sea walleye pollock, <i>Theragra chalcogramma</i> , by E.A. Shubina, M.N. Mel'nikova, A.I. Glubokov & B.M. Mednikov	177
Genetic population structure of Pacific hake, <i>Merluccius productus</i> , in the Pacific Northwest, by E. Iwamoto, M.J. Ford & R.G. Gustafson	187
Population structure of Alaskan shorttraker rockfish, <i>Sebastes borealis</i> , inferred from microsatellite variation, by A.P. Matala, A.K. Gray, J. Heifetz & A.J. Gharrett	201
Evidence for two highly differentiated herring groups at Goose Bank in the Barents Sea and the genetic relationship to Pacific herring, <i>Clupea pallasii</i> , by K.E. Jørstad	211
Sub-arctic populations of European lobster, <i>Homarus gammarus</i> , in northern Norway, by K.E. Jørstad, P.A. Prodöhl, A.-L. Agnalt, M. Hughes, A.P. Apostolidis, A. Triantafyllidis, E. Farestveit, T.S. Kristiansen, J. Mercer & T. Svåsand	223

Genetics of populations: methods and applications

Detecting specific populations in mixtures, by J.H. Reynolds & W.D. Templin	233
Sampling issues affecting accuracy of likelihood-based classification using genetical data, by B. Guinand, K.T. Scribner, A. Topchy, K.S. Page, W. Punch & M.K. Burnham-Curtis	245
Moderately and highly polymorphic microsatellites provide discordant estimates of population divergence in sockeye salmon, <i>Oncorhynchus nerka</i> , by J.B. Olsen, C. Habicht, J. Reynolds & J.E. Seeb	261
Forensic DNA analysis of Pacific salmonid samples for species and stock identification, by R.E. Withler, J.R. Candy, T.D. Beacham & K.M. Miller	275

Genetic variability: fitness and adaptation

Outbreeding depression in hybrids between spatially separated pink salmon, <i>Oncorhynchus gorbuscha</i> , populations: marine survival, homing ability, and variability in family size, by S.E. Gilk, I.A. Wang, C.L. Hoover, W.W. Smoker, S.G. Taylor, A.K. Gray & A.J. Gharrett	287
Effects on embryo development time and survival of intercrossing three geographically separate populations of Southeast Alaska coho salmon, <i>Oncorhynchus kisutch</i> , by K.L. Granath, W.W. Smoker, A.J. Gharrett & J.J. Hard	299
Major histocompatibility complex loci are associated with susceptibility of Atlantic salmon to infectious hematopoietic necrosis virus, by K.M. Miller, J.R. Winton, A.D. Schulze, M.K. Purcell & T.J. Ming	307
Quantitative trait loci analyses for meristic traits in <i>Oncorhynchus mykiss</i> , by K.M. Nichols, P.A. Wheeler & G.H. Thorgaard	317

Genetic variability: phenotype and maintenance of variation

The mating system of steelhead, <i>Oncorhynchus mykiss</i> , inferred by molecular analysis of parents and progeny, by T.R. Seamons, P. Bentzen & T.P. Quinn	333
Polygamous mating and high levels of genetic variation in lingcod, <i>Ophiodon elongatus</i> , of the Strait of Georgia, British Columbia, by R.E. Withler, J.R. King, J.B. Marliave, B. Beaith, S. Li, K.J. Supernault & K.M. Miller	345

Aquaculture genetics: interactions of cultured and wild fish

Differential reproductive success of sympatric, naturally spawning hatchery and wild steelhead, <i>Oncorhynchus mykiss</i> , by J.E. McLean, P. Bentzen & T.P. Quinn	359
Genetic variation within and between domesticated chinook salmon, <i>Oncorhynchus tshawytscha</i> , strains and their progenitor populations, by J.E. Kim, R.E. Withler, C. Ritland & K.M. Cheng	371

Lopsided fish in the Snake River Basin – fluctuating asymmetry as a way of assessing impact of hatchery supplementation in chinook salmon, <i>Oncorhynchus tshawytscha</i> , by O. Johnson, K. Neely & R. Waples	379
Temporal comparisons of genetic diversity in Lake Michigan steelhead, <i>Oncorhynchus mykiss</i> , populations: effects of hatchery supplementation, by M.L. Bartron & K.T. Scribner	395

Aquaculture genetics: applications

Genetic selection and molecular analysis of domesticated rainbow trout for enhanced growth on alternative diet sources, by K. Overturf, D. Bullock, S. LaPatra & R. Hardy	409
Improvement of sperm motility of sex-reversed male rainbow trout, <i>Oncorhynchus mykiss</i> , by incubation in high-pH artificial seminal plasma, by T. Kobayashi, S. Fushiki & K. Ueno	419
Temporal and spatial occurrence of female chinook salmon carrying a male-specific genetic marker in the Columbia River watershed, by T.R. Chowen & J.J. Nagler	427

Phylogenetics

Molecular systematics and evolution of the growth hormone introns in the Salmoninae, by R.B. Phillips, M.P. Matsuoka, N.R. Konkol & S. McKay	433
Karyological differentiation of northern Dolly Varden and sympatric chars of the genus <i>Salvelinus</i> in northeastern Russia, by S.V. Frolov & V.N. Frolova	441
Differences between two subspecies of Dolly Varden, <i>Salvelinus malma</i> , revealed by RFLP-PCR analysis of mitochondrial DNA, by A.G. Oleinik, L.A. Skurikhina, S.V. Frolov, V.A. Brykov & I.A. Chereshevnev	449
Use of microsatellite locus flanking regions for phylogenetic analysis? A preliminary study of <i>Sebastes</i> subgenera, by T. Asahida, A.K. Gray & A.J. Gharrett	461