

***Evolution of Physiological
and Biochemical Traits
in Fish***

SYMPOSIUM PROCEEDINGS

Vera Val

Rick Gonzalez

Don M^{ac}Kinlay

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Don MacKinlay, SEP DFO, 555 West Hastings St.,
Vancouver BC V6B 5G3 Canada
Phone: 604-666-3520 Fax 604-666-6894
E-mail: mackinlayd@pac.dfo-mpo.gc.ca

Website: www.fishbiologycongress.org

PREFACE

Fish are the most diverse group among living vertebrates and such diversity is probably the result of an enormous adaptive radiation occurred during its evolutionary history. The organization of different fish orders, families and genera was traditionally made by the studies of morphological and anatomical aspects during more than a century. The strength of such studies has been confirmed, with few exceptions, by molecular approaches at species levels (Avice, 1994). Molecular data have been effectively applied at all ecological levels, from populations to orders, being also very useful in investigations of zoogeographic distribution of populations, species and genera (Stepien and Kocher, 1997).

The reconstruction of phylogenies at any biological level requires different methodologies, which may vary according to the problem to be studied. Once fish fossil records are more complete, problems regarding differential rates of base substitution (differences in “molecular clocks”) in fish can be solved with rigorous studies of DNA sequences. Thus, comparisons of fish groups with different population sizes, or occupying different environments, or having different life histories (reviewed in Kocher and Stepien, 1997) may solve problems about differential evolutionary rates.

The use of molecular data is based on the assumption that much of molecular evolution is non-adaptive, i.e., neutral. On the other hand, morphological rely on characters subject to natural selection (i.e., adaptive characters). Although there have been some collision between the two scientific methods in the past, the future is pointing to a more synergistic approach in the study of fish systematic phylogenies. Thus, comparisons between molecular-based and morphological-based taxonomic hypothesis are a hope for our understanding about the evolutionary forces that gave origin to the great diversity of modern fishes.

The following articles in these proceedings were chosen to show that studies of physiological and biochemical processes, which are most certainly affected by natural selection, might also help us in the task of describing evolutionary history of fish groups. The readers and the symposium attendants will be able to recognize that the study of evolution in this group relies, necessarily, on discovering the main processes that allowed them to be well organized and adapted for life in a myriad of environmental conditions. Finally, we hope to remind in this section that adaptation remains as important as ever.

We take this opportunity to thank the participants of this symposium and the support they have had to produce the information presented here and attend the Congress.

Symposium organizers:

Vera Maria Fonseca de Almeida-Val
Laboratory of Ecophysiology and Molecular Evolution
INPA, Manaus Brasil

Rick Gonzalez
Dept. of Biology
University of San Diego
San Diego, CA U.S.A.

Don MacKinlay
Fisheries and Oceans Canada
Vancouver, Canada

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Don MacKinlay
Congress Chair

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