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Special Issue on Stickleback Behavior and Evolution: Preface

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Special issue on stickleback behavior and evolution

Preface

Biologists have long used model organisms to learn about the molecular, cellular and developmental mechanisms for the generation of organismal form and function, as well to understand the evolutionary causes and consequences of these mechanisms. These two uses of models align well with Tinbergen's (1963) schema of proximate and ultimate biological questions concerning Darwin's famously tangled bank. Despite their use for each type of inquiry, single models are seldom studied for both. The Fifth International Conference on Stickleback Behavior and Evolution, held on the campus of the University of Alaska Anchorage between July 30th and August 4th, 2006, drew biologists from around the world happy to use stickleback to tackle biological questions at all levels. The Conference was attended by 90 participants from a dozen countries around the world, and the 58 papers and 23 posters were replete with new advances. Stickleback have been particularly useful for studies of behavior, ecology, physiology, life history, evolution and the origin of species. Research presented at this meeting highlighted continuing advances in these areas, and also showed the utility of stickleback for fruitfully attacking proximate questions as well. Participants learned about the latest work on the ecology of migration, variation in behavior and life history, new morphometric and genotyping technologies, the molecular and physiological analysis of sexual differentiation, and the genetic basis of reproductive behavior, morphology and coloration — to name just a few! Also discussed was the significant progress on the threespine stickleback genome sequencing project, which was proposed just three short years before, in 2003 at the previous Conference in Strömstad, Sweden. Fittingly, the sequence is of a single stickleback female from an Alaskan lake that many participants had the opportunity to visit during a field trip.

Gathered in this volume are 15 papers that cover a wide range of the research topics represented at the Conference. Appropriately for a meeting de-

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voted to an organism that has contributed so much to the study of ethology, the first seven papers present work on behavior at Tinbergen's proximate (Bernhardt & von Hippel; Hoffmann et al.) and ultimate (Frommen et al.; Kitano et al.; Jones et al.; Foster et al.) levels. Beginning this set is an overview of the impact of the late George Barlow's work on the field of ethology. George was an honored guest at the Conference, and his presence was a highlight for many participants. Also presented here are papers that examine niche space using stable isotopes (Reimchen et al.), long term demographic variation in a single population (Wootton), and broad patterns of life history variation (Baker). The stickleback–*Schistocephalus* system is emerging as an excellent model for host–parasite interactions, and two papers (Barber et al.; Heins & Baker) cover recent developments. Stickleback are also becoming a good model for understanding the evolution of developmental processes, and Kimmel et al. present new research in this area on head skeletal evodevo. Lastly, a paper by von Hippel highlights the special characteristics, and challenges for conservation, of the threespine stickleback radiation in Alaska. The points raised therein can be applied to many other unique and threatened stickleback systems throughout the world.

The presentation of stickleback research advances in this volume could not have occurred without the hard work of numerous people. First, the editors of *Behaviour* expended great effort to help add these papers to the large and growing stickleback literature. For their help, I thank Johan van Rhijn, Brian Wisenden, and especially Paul Albers, whose hard work made this volume become reality. In addition, I thank the co-organizers of the Conference, Frank von Hippel, Susan Foster and Michael Bell for their roles as associate guest editors for subsets of the manuscripts. Particular thanks goes to Frank von Hippel, members of his laboratory and the University of Alaska Anchorage for hosting an excellent meeting. Lastly, I thank the numerous reviewers who provided extensive comments on all of the papers, making each, and the volume as a whole, much better.

The progress in stickleback research has been stunning, but much more is left to do. For example, although we are beginning to understand the developmental genetic basis of variation in some morphological characters, numerous other stickleback traits (e.g., life history and physiology), have received scant evodevo attention as of yet. I know that this situation will soon change, and research in these and other areas will be rapid and exciting. Much of this

progress will be on display at the Sixth International Conference on Stickleback Behaviour and Evolution to be held in at the University of Leicester, England, in the summer of 2009. I am very much looking forward to learning about new breakthroughs that come from using stickleback to address both proximate and ultimate questions, and seeing how research on this small fish continues to help us untangle Darwin's bank.

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Reference

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