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CHARR

A perspective on *Salvelinus* research

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On the bi-centenary of his birth and coincidentally, on the 150th anniversary of publication of the most important publication in the science of biology ("On the Origin of Species"), it was appropriate that scientists gathered to discuss advances in research on a group of fishes that exemplify the variation in form, function and ecology that inspired Charles Darwin.

Fish in the genus *Salvelinus*, collectively known as charr, thrive where no other fish live, in freshwaters of the highest northern latitudes, the highest altitudes and the greatest water depths, as well as freshwater and marine systems; charr specialise in the extreme.

For the 6th time since 1981, biologists covering a broad range of disciplines gathered to share their most recent studies on this genus in the 6th International Charr Symposium. The 5 previous meetings were held in Winnipeg (1981), Sapporo (1988), Trondheim (1994) Trois-Rivières (2000) and Rejkavik (2006). Over 4 days in June in 2009, 120 biologists from 17 countries met in Stirling, Scotland, to listen to 86 verbal presentations, to read 30 poster presentations and to discuss, plan and occasionally argue over, past present and future research.

Guest editors: C. Adams, E. Brännas, B. Dempson, R. Knudsen, I. McCarthy, M. Power, I. Winfield / Developments in the Biology, Ecology and Evolution of Charr

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It is clear, both from the programme of this meeting and a quick examination of recent publications, that *Salvelinus* has been, and remains, one of our most important model fish species across a broad range of disciplines. Study of the genus is enabling significant contributions to our understanding of how to manage fragile freshwater fisheries; it provides invaluable insights into aquaculture processes; it is yielding important information on cold water physiology; it has played an important role in the development of population genetics and in our comprehension of the mechanisms of how simple aquatic ecosystems work. It is increasingly playing a role in studies focussing on climate variability and change in aquatic systems. This is particularly evident in studies with Arctic charr owing to its circumpolar distribution and occurrence in High Arctic, Arctic, sub-Arctic, and temperate environments. There have been great strides in the science in all of these fields and a significant amount of this progress has been the result of studies conducted on charr; many of the advances in these fields were presented to conference.

However, above all other, there is one feature of *Salvelinus* that provokes those who study it, inspires those who observe it, and challenges those who think about it; its diversity. The variation within the genus, within species and, not infrequently, within populations, would undoubtedly have fascinated Darwin. Variation in morphology, physiology, colouration, life-history strategy, ecology, spawning strategy, habitat use, growth and behaviour were all subjects highlighted in presentations at conference. A keynote speaker, Anders Klemetsen, argued that Arctic charr must be considered the most variable of all known vertebrates; no-one was able to present an alternative candidate species.

Although challenging, inspiring and fascinating, it is not the extreme levels of within-species variation that would have interested Darwin, it would have been the question: How did this variation arise?

It is this question and numerous related and more specific questions, that has been fuelling some of the most interesting research on the processes in evolution over the last few years. Charr studies have made very significant contributions to this field and recent progress was presented at this meeting. Amongst the most important findings this particular strand of charr research has recently shown that the conditions for sympatric divergence can occur in the wild, that individual niche specialisation combined can and does drive the generation of phenotypic variation and that ontogenetic processes can play a part in the early stages of speciation. It was thus appropriate that on the field excursion following the conference, those that were able to attend, saw all three of the sympatric morphs of Arctic charr from Loch Rannoch.

This special issue of Hydrobiologia mirrors the diversity within the species, in the diversity of the research which they support, providing a snapshot of the state of the art across a wide range of disciplines.