Fundam. Appl. Limnol. 189/3 (2017), 177–179
published online 13 February 2017, published in print February 2017

Editorial

Editorial to the Special Issue in Fundamental and Applied Limnology

Biology and Management of Coregonid Fishes –12th ISBMCF

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Coregonid fishes (Teleostei: Salmoniformes: Coregonidae), being among the most successful groups in the subarctic, boreal and subalpine fresh waters of the northern hemisphere, are extremely attractive in two ways: for biological sciences and as a fisheries resource (for example reviews: Hudson et al. 2007; Anneville et al. 2015). A series of International Symposia on the Biology and Management of Coregonid Fishes (ISBMCF) has been organised by leading specialists from Europe, Asia and North America and has always served as a platform to promote studies and knowledge exchange among scientists studying these species in different countries and institutes. This tradition has now existed for almost five decades. The first symposium took place in Canada (1969) (Lindsey & Woods 1970), then after a latent period the tradition was continued in France (1984), and since 1987 Coregonid symposia have been organised regularly every 3 years in Europe or North America. However, during this period they never took place in Russia where a great diversity of coregonids, many of which endemic, has always attracted researchers (Politov 2017, this issue). During the 11th Symposium that took place in Mondsee, Austria in 2011 it was decided to hold the 12th Symposium in 2014 in Russia, in Siberia on the coast of Lake Baikal (cities of Listvyanka and Irkutsk). This special issue presents a set of papers presented during the 12th ISBMCF. For this symposium, the long-lasting tradition of publication in a periodical book was transformed to compiling selected articles into a special issue of a peer-reviewed journal because of the increasing requirement for researchers around the world to publish articles in established journals.

This issue includes 9 papers shedding light on different aspects of coregonid biology and the management of their populations. The review by D. V. Politov "Coregonids of Russia: Evolutionary genetic approach in assessment of the current state of biodiversity" is the first paper in the series and represents a thorough synthesis of the current state of Russian coregonid taxonomy – a valuable contribution for ichthyologists interested in fish diversity and, in particular, for those currently studying the complicated evolutionary history of extant coregonid lineages (Politov 2017, this issue). Coregonid fishes are prone to rapid speciation and adaptive radiation and are characterised by strong morphoecological plasticity, blurring of species borders due to hybridisation and introgression, and reticulate evolution, resulting in the existence of multiple sympatric forms. There is a very high number of intraspecific morphs/ecotypes/incipient species among coregonids.

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www.schweizerbart.de
DOI: 10.1127/fal/2017/1028
1863-9135/17/1028 $ 0.075

The work by N. A. Bochkarev and coauthors represents a comprehensive study of a poorly investigated regional coregonid fauna in one of the largest river systems of the south-eastern part of Russia (Bochkarev et al. 2016, this issue). Ussuri cisco and chadary whitefish are considered to represent a morphologically most primitive *Coregonus* form (Smith & Todd 1992). The authors analyse how current patterns of molecular genetic variability may reflect the origin (sympatric or allopatric) of these two species in the Amur River basin.

Deciphering regional phylogenetic relationships among European whitefish (*Coregonus lavaretus* Linnaeus) populations in the Baltic Sea by Sendek et al. (2016, this issue) illustrates the impact of hybridisation on the process of speciation in coregonids. A combination of probably both natural and artificial introgression is described which highlights the need of detailed knowledge on a considerable number of ecotypes and corresponding genetic diversity.

A number of studies are devoted to the impact of climate change and to anthropogenic pressure on coregonid habitats. Among them is an interesting 'footnote' describing the fluctuating fortunes of vendace in the UK (Winfield et al. 2016, this issue) and a detailed description of the current state of inconnu in Canada (Tallman & Howland 2016, this issue). The bioenergetics simulation study of Eckmann (2016, this issue) also belongs to this group of studies. Analysing the effect of reoligotrophication on fisheries management, the author uses available data on the whitefish stock, catches, and phosphorus concentration of Lake Constance extending back to the early 20th century. The modeling exercise certainly improves our understanding of production mechanisms of whitefish in (re-)oligotrophic lakes. As a result, the author suggests an important topic for future research: how can whitefish population density be manipulated in the desired way? An indirect question also arises: is artificial reproduction justified to maintain population stocks? However, the importance of industrial whitefish aquaculture is without doubt and, although it is still in its infancy on a global scale, it will enjoy significant improvements in the near future because harvests of coregonids from many lakes and reservoirs are decreasing and cannot anymore meet market demands (Anneville et al. 2015). In this light, the study of temperature effects and stocking density on growth of juvenile European whitefish in artificial conditions (Goebel et al. 2016, this issue) is a timely contribution to the aquaculture of coregonids in the Alpine region.

An additional interesting topic, not only in aquaculture but also in agriculture and human and veterinary medicine, is the diversity of organism-associated microbiota (Wong & Rawls 2012). In this field of science the work of Belkova et al. (2016, this issue) focuses on gut bacterial communities of whitefishes and uses Next Generation Sequencing to analyse the microbiomes. More specifically, the study analyses the factors driving the variation in microbial community composition observed between two coregonid species and their hybrids. This field of research is rapidly developing (Zac et al. 2016) and the study represents one of the first on coregonids, highlighting the innovative nature of this contribution to our knowledge on fish-bacteria mutualism. Moreover, it also appears to be the first study addressing this question for coregonids in the framework of a hybridisation experiment.

Finally, the analysis of the structure of the inner ear of several Lake Baikal coregonid species completes this impressive series of papers. The authors present morphological correlates of functional characteristics of hearing in whitefishes that differ in lifestyle and show a high level of adaptation to their respective ecological niches (Sapozhnikova et al. 2017, this issue).

The Organising Committee of ISBMCF-2014 thanks all participants who attended the first international coregonid meeting in Siberia, Russia, despite long distances from their home institutes and in times of political unrest unfortunately hindered the attendance of many scientists from countries traditionally represented at ISBMCF symposia. Many thanks also go to those who provided manuscripts to this special issue. We believe that this volume will enable the continued distribution of knowledge on coregonid fishes and will inspire new studies on this interesting group that has become a keystone for taxonomists, evolutionary biologists, nature conservationists and fishery managers.

On behalf of the Organising Committee,
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References

Anneville, O., Lasne, E., Guillard, J., Eckmann, R., Stockwell, J. D., Gillet, C. & Yule, D. L., 2015: Impact of Fishing and Stocking Practices on Coregonid Diversity. – Food and Nutrition Sciences **6**: 1045–1055. doi: 10.4236/fns.2015.611108

Belkova, N. L., Sidorova, T. V., Glyzina, O. Y., Yakchnenko, V. M., Sapozhnikova, Y. P., Bukin, Y. S., Baturina, O. A. & Sukhanova, L. V., 2016: Gut microbiome of juvenile coregonid fishes: comparison of sympatric species and their F1 hybrids. – Fundamental and Applied Limnology **189** (3): 279–290. doi: 10.1127/fal/2016/0804

Bochkarev, N. A., Zuykova, E. I., Abramov, S. A., Podorozhnyuk, E. V. & Politov, D. V., 2016: The sympatric whitefishes *Coregonus ussuriensis* and *C. chadary* from the Amur River basin: Morphology, biology and genetic diversity – Fundamental and Applied Limnology **189** (3): 193–207. doi: 10.1127/fal/2016/0801

Eckmann, R., 2016: The impact of density-dependant growth on whitefish production in re-oligotrophic lakes – a bioenergetics simulation study. – Fundamental and Applied Limnology **189** (3): 249–256. doi: 10.1127/fal/2016/0800

Goebel, S. E., Baer, J. & Geist, J., 2016: Effects of temperature and rearing density on growth of juvenile European whitefish (*Coregonus macrophthalmus*) in aquaculture. – Fundamental and Applied Limnology **189** (3): 257–266. doi: 10.1127/fal/2016/0803

Hudson, A. G., Vonlanthen, P., Müller, R. & Seehausen, O., 2007: Review: The Geography of Speciation and Adaptive Radiation of Coregonines. – Advances in Limnology **60**: 111–146.

Lindsey, C. C. & Woods, C. S. (eds), 1970: Biology of Coregonid Fishes. – University of Manitoba Press, Winnipeg, pp. 1–560.

Politov, D. V., 2017: Coregonids of Russia: Evolutionary genetic approach in assessment of the current state of biodiversity. – Fundamental and Applied Limnology **189** (3): 181–192. doi: 10.1127/fal/2017/0814

Sapozhnikova, Y. P., Belous, A. A., Makarov, M. M., Glyzina, O. Y., Klimenkov, I. V., Yakhnenko, V. M. & Sukhanova, L. V., 2017: Ultrastructural correlates of acoustic sensitivity in Baikal coregonid fishes. – Fundamental and Applied Limnology **189** (3): 267–278. doi: 10.1127/fal/2017/0810

Sendek, D. S., Bochkarev, N. A., Zuykova, E. I., Politov, D. V., Wanzenböck, J., Himberg, M. & Titov, S. F., 2016: Signs of introgression of Baikal omul (*Coregonus migratorius*) or Arctic cisco (*C. autumnalis*) into European whitefish (*C. lavaretus*) in the eastern Baltic Sea. – Fundamental and Applied Limnology **189** (3): 209–225. doi: 10.1127/fal/2016/0791

Smith, G. R. & Todd, T. D., 1992: Morphological cladistic study of coregonine fishes. – Polskie Archiwum Hydrobiologii **39**: 479–490.

Tallman, R. F. & Howland, K. L., 2016: Factors that influence productivity and vulnerability of Inconnu, *Stenodus leucichthys nelma*, populations in Canada. – Fundamental and Applied Limnology **189** (3): 235–247. doi: 10.1127/fal/2016/0815

Winfield, I. J., Fletcher, J. M. & James, J. B., 2016: The 'reappearance' of vendace (*Coregonus albula*) in the face of multiple stressors in Bassenthwaite Lake, U.K. – Fundamental and Applied Limnology **189** (3): 227–233. doi: 10.1127/fal/2016/0799

Wong, S. & Rawls, J. F., 2012: Intestinal microbiota composition in fishes is influenced by host ecology and environment. – Mol. Ecol. **21** (13): 3100–3102.

Zac, S. W., Burns, A. R., Stagaman, K., Wong, S., Rawls, J. F., Guillemin, K. & Bohannan, B. J., 2016: The composition of the zebrafish intestinal microbial community varies across development. – ISME J. **10** (3): 644–654. doi: 10.1038/ismej.2015.140

Manuscript received: 07 February 2017; Manuscript accepted: 07 February 2017.