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Cryptic species: a case study of the *Cytherissa* flock from Lake Baikal

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The current biodiversity has developed through evolutionary processes over hundreds of millions of years. Theory predicts that the chance for ecological specialisation through divergent natural selection is larger if new ecological niches appear (Schluter 2000; Dieckmann et al. 2004; Gavrilets & Vose 2005; Hendry et al. 2007). This is one of the explanations why ancient lakes are hot spots of biodiversity (Martens et al. 1994; Martens 1997). The speciosity, and the variability in phenotypes and niche variety of endemic species flocks in these ancient lakes are spectacular. Such species flocks have often originated through explosive and adaptive radiations. However, also lacustrine radiations without apparent niche diversification and with putative non-adaptive components have been described (Schön & Martens 2004). In recent non-marine ostracods, ancient lakes contain one quarter of all known species (Martens et al. 2008). Lake Baikal, situated in the Great Eastern Siberian Rift, is the largest and the deepest of all extant ancient lakes. The *Cytherissa*-radiation (Ostracoda, Cytherideidae) from this lake is one of the most species-rich flocks and contains 47 (sub-) species (Mazepova 1990). Preliminary results on genetic diversities indicate that the *Cytherissa* morphospecies are not monophyletic and might thus contain cryptic species (Schön & Martens in prep.).

Here, we describe a research project on cryptic species in the Baikalian Cytherissa species flock, which started at the end of 2010. The book by Mazepova (1990) is the only publication available to identify ostracods from Lake Baikal. Its drawings of the *Cytherissa* valves from light microscopic investigations will be used for preliminary species identification. Valves are routinely used to identify recent and fossil ostracods, while differences in hemipenis structure, which are subjected to sexual selection, can indicate reproductive isolation of recent species. New morphological data of *Cytherissa* species have been acquired by Scanning Electronic Microscopy (SEM) of valves and soft parts (especially hemipenis and chaetotaxy), the latter with "critical point drying" (Nation 1983). In addition, soft parts, and in particular the hemipenis have been drawn in detail.

The genetic identification of cryptic species is now in progress. DNA has been extracted from individual ostracods and the nuclear ITS1/ITS2 and LSU regions and the mitochondrial markers COI and 16S are currently amplified by PCR and sequenced.

New mitochondrial markers with higher resolution are also in development. The obtained DNA sequence data will be used to estimate genetic diversities and phylogenetic relationships at the intra- and supraspecific level of selected species complexes and all morphologically identified species.

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