

General summary

„It is unwise to intrude the suggestion of parthenogenesis, even of a modified sort, into vertebrate literatures. The phenomenon is so at variance with what is known and beleived about vertebrates development that I am sure no vertebrate morphologists would admit for a moment that the natural development from egg to sexual maturity of an individual vertebrate without the direct inclusion of the male element is within the realm of probability“, reacted the morphologist Howell (1933. *Science* 77: 389-390) sarcastically on the discovery of the first recognized asexual vertebrate, a live-bearing fish *Poecilia formosa* (Hubbs et Hubbs 1932. *Science* 30: 628-630).

„The examples of parthenogenesis has been reported in almost all vertebrate groups,“ (Lampert 2008. *Sexual Development* 2: 290-301).

The ongoing effort to explain the widespread occurrence of sexual reproduction among animals is often called the “queen of problems in evolutionary biology”, and there is still no consensus regarding the explanation. Simultaneously, asexual reproduction exists among some animals. Here, the ‘asexuality’ refers to any reproductive process that does not involve sex (Mendelian meiosis is missing), except self-fertilization. One individual produces a progeny genetically identical to its parent, except those sites with somatic mutations. After recognition of asexuality, the significant effort was put into comparisons of both reproductive modes. Here, vertebrate complexes where sexual and asexual reproduction coexists have been recognised as especially interesting models, since one may directly appreciate the effect of the same factors on both types of reproduction. The phylogenetically related taxa in hybrid complexes reasonably good fit to the assumption of „all else being equal“ (Maynard Smith 1986. Oxford University Press) allowing for direct comparison, since a comparison between phylogenetically unrelated taxa opens risks that inferred differences are rather due to long independent evolution than given by a different reproductive mode. European spined loaches the genus *Cobitis* represent intriguing hybrid complex to study this.

Cobitis taenia hybrid complex includes small bottom-dwelling fishes that inhabit non-Mediterranean Europe, with recognized both sexual and asexual mode with clonal, sperm-dependent reproduction (gynogenesis). At least six parapatric species are known to hybridize reciprocally and repeatedly, producing numerous gynogenetic lineages with various genotype compositions and ploidy levels. Phylogenetic relationships and evolutionary history seem to be extremely complex task in *Cobitis* and proposed Dissertation Thesis aims to contribute by several pieces to the puzzle. However, even several proposed „pieces“ evidently cut down the rigid assumption of a simple bifurcating „tree of life“. The evidence of reticulations and introgression

by ongoing genetic exchange is thus better metaphored by a „web of life“ (sensu Arnold 2006. Oxford University Press.), reflecting intricated flow of evolutionary novelties and ways of speciation events.

The introduction chapter of Dissertation Thesis (in Czech) aims to emphasize relationships among the phenomena of sexuality, hybridization, asexuality and polyploidy, followed by the set of four original publications and two manuscripts (in English).