

**Structure and development of the reproductive system
in *Aphelocheirus aestivalis* (Hemiptera: Heteroptera:
Nepomorpha: Aphelocheiridae)**

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Abstract. We study the histology, ultrastructure and morphological arrangement of male and female reproductive system of *Aphelocheirus aestivalis* (Fabricius, 1803) in the nymphs of instar 1-5 and variously aged apterous adults. The anlage of gonads becomes well apparent already in instar 1, testicular follicles and ovarioles start to differentiate in instar 2, and their entire differentiation is finished in instar 3. Paired accessory mesadenia, dichotomically branched in adult males, differentiate in instar 2 as well. The anlage of male ectodermal accessory gland is formed during instar 3, while spermatheca and bursa copulatrix start to invaginate in instar 4. Morphological differentiation of germ cell descendents as well as formation of the germarial trophic core from a membranous labyrinth in females occurs in late instar 4 and instar 5. Spermatogenesis shows a unique character within the whole Nepomorpha: it is a permanent, multi-waved process, as all developmental stages of male germ cells are found throughout the year. Vitellogenesis starts in adult females 3-4 weeks after the last moulting but apparently stops during winter. The timing of crucial reproductive processes in *A. aestivalis* seems to be rather different from most aquatic bugs; permanent, spring-to-autumn gradual spermatogenesis and physiological ability to copulate, and the presence of mature spermatozoa in the spermatheca of teneral, newly hatched females indicate possible semivoltinism in the life cycle. Three new apomorphies (type of spermatogenesis and secondary seminal vesicles in males, and a cuticular brush in bursa copulatrix in females) of the Aphelocheiridae are defined.

Key words. Heteroptera, Aphelocheiridae, *Aphelocheirus aestivalis*, nymphs, adults, gonads, efferent ways, development, morphology, histology, ultrastructure, spermatogenesis, oogenesis, reproductive strategy, anagenesis, Czech Republic