

## Benthic water bug *Aphelocheirus aestivalis* (Heteroptera: Aphelocheiridae) in the upper Lužnice River basin (Czech – Austrian border area)

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*Aphelocheirus aestivalis* (FABRICIUS, 1794) is a unique water bug species that distinctly differs from others European aquatic bugs in morphological, physiological, and ecological characteristics (e.g., it is the only really benthic nepomorphan bug with plastron respiration). This species is probably univoltine in Northern Europe (DAMGAARD 2005) and semivoltine in Central Europe (PAPÁČEK & SOLDÁN 1996). Although few macropterous specimens are known from Central Europe (AUKEMA et al. 2002), the Czech population is probably completely brachypterous and flightless. *Aphelocheirus aestivalis* is evaluated as a red book species in some European countries and has shown dramatic declines during the last century in some parts of Europe (see DAMGAARD 2005).

We have investigated the occurrence, distribution, habitat and food preference of this species, and the influence of environmental changes on its population in the upper Lužnice River basin in South Bohemia, which is close to the Elbe-Danube watershed and to the Austrian border.

Here, *A. aestivalis* occurs only in the lower part of the river basin, in suitable biotopes of Dračice River (= Reissbach in Austria), of Lužnice River (= Lainsitz) downstream from Suchdol nad Lužnicí, Nová řeka River, and Nežárka River. It inhabits only the rocky and sandy bottom where both, current speeds and dissolved oxygen are high. It was never found in pools or backwaters (see and compare, e.g., MESSNER et al. 1983). Preferred microhabitats are sand and coarse gravel river beds, that overline larger boulders, rocks, dead woods (broken tree trunks or branches) or rootlets of trees growing in banks and sandy places with submerged plants. We have never found it on other sandy or gravelly bottom.

We do not know the original distribution in the upper Lužnice River basin. Though Lužnice River offers numerous suitable sites also upstream from Suchdol nad Lužnicí, we have never found any specimen there and also not in the Koštěnický potok brook, a tributary of Lužnice River downstream from Suchdol nad Lužnicí. In contrast, Nová řeka River, an 450 years old artificial chanel connecting Lužnice and Nežárka Rivers, is inhabited by *Aphelocheirus* in numerous sites. We suppose that Dračice River is the original place of distribution of the species which migrates and inhabits new sites only downstream in the investigated area.

We have also analyzed the insect communities in the sites with occurrence of *A. aestivalis*. We have found 14 species of water insects: *Cloeön dipterum*, *Baetis vernus*, *Ephemera danica*, *Ephemerella ignita*, *Heptagenia sulphurea* (Ephemeroptera); *Isoperla* cf. *rivulorum*, *Leuctra* cf. *albida* (Plecoptera); *Hydropsyche pellucida* or *incognita*, *H. angustipennis*, *Limnephilus* sp., *Molanna angustata*, *Polycentropus flavomaculatus*, *Potamophylax* sp. (Trichoptera). *Hydropsyche* larvae were the dominant and most abundant animals. LEMB & MAIER (1996) showed that larvae of *Baetis* and *Ephemerella* were most vulnerable to *Aphelocheirus* predation and that the predation rate of *Aphelocheirus* increased with prey density (Biber River, southern Germany). For these reasons we suppose that the larvae of *Baetis*, *Ephemerella* (Ephemeroptera) and *Hydropsyche* (Trichoptera) larvae are preferred prey of *Aphelocheirus* in the investigated area.

The Czech name of the Lužnice River indicates that this river is characterized by frequent floods. Most destructive floods were noted in the August 2002 and 2006. Chemical parameters of water especially change after flooding events. For example, the values of nitrates and phosphates can be relatively high in some sites (1,464 mg/l total nitrogen; 97,753 µg/l total phosphor in the Nežárka River by Nový Řadov, 18th August 2006). Still a hundred years ago local ironworks

along the banks of Dračice River contaminated the water by various pollutants. Floods as well as both short and long term changes of chemical parameters are environmental factors that can influence the composition of benthic communities in a substantial way. Since 1987 the senior author had the possibility to study some populations of *A. aestivalis* more or less continually. Populations of this species are relatively stable in all investigated sites and have good recovery ability after floods and relatively good resistance to environmental changes.

The conservation status of *A. aestivalis* in the Czech Republic needs to be questioned. Fifteen years ago this species was recorded in the list of endangered species of former Czechoslovakia (ŠKAPEC 1992). The distribution of *A. aestivalis* seems to show a certain relict characters. It occurs in isolated sites in rivers and brooks, but is relatively abundant in some localities. The dispersal ability of this species is strongly limited by its flightlessness and tight valency on habitats with highly aerated water and with specific bottom structures. Destruction of original habitats is the main reason for emigration or extinction of local *A. aestivalis* population. On the other hand, the cryptic way of life and the difficulties in collecting this species in some sites might be reasons why it could not be detected in some areas and why we suppose that it is rare. It is now known that *A. aestivalis* is a relatively frequent water bug that occurs eventually in dozens of rivers and brooks in the Czech Republic (e.g., Vltava, Lužnice, Nežárka, Jihlava, Chvojnice, Oslava, Morava Rivers in the south). For these reasons, at present *A. aestivalis* seems not to be an endangered species in the Czech Republic.

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