

## First record of *Orconectes juvenilis* (Hagen, 1870) in eastern France: update to the species identity of a recently introduced orconectid crayfish (Crustacea: Astacida)

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### Abstract

In 2005 a new, non-indigenous crayfish species was discovered in the Dessoubre River (eastern France). The species was initially considered as *Orconectes rusticus* (Girard, 1852). However, an examination of form I males caught in 2007 revealed that the species is in fact *Orconectes juvenilis* (Hagen, 1870), a closely related congener of *O. rusticus*. According to our knowledge, this is the first record of *O. juvenilis* outside the North American continent. The ecological implications as well as the possible impact on the native European crayfish are discussed briefly.

*Key words:* non native crayfish, *Orconectes*, France, pond introduction

In November 2005 a previously unknown *Orconectes* species was discovered in the Dessoubre River, a tributary of the Doubs (C. Rossignon pers. com. 2005). The origins of introduction were two ponds (UTM: 32T, 324734, 523051; Rosureux), adjacent to a restaurant which advertises crayfish as a delicacy. Since the ponds are in close proximity to the Dessoubre River, it is likely that some crayfish escaped upon stocking.

Initially, the introduced species was identified erroneously as rusty crayfish [*Orconectes (Procericambarus) rusticus* (Girard, 1852)], a common and largely translocated species in North America (cf. Souty-Grosset et al. 2006). In August 2007 we collected several specimens from the restaurant ponds, including seven form

I males. The form I males were subsequently compared to preserved *O. rusticus* specimens and identified as *Orconectes (Procericambarus) juvenilis* (Hagen, 1870; Figure 1), a species closely related to *O. rusticus* (Taylor 2000). *Orconectes juvenilis* resembles the habitus of *O. rusticus* and only differs from rusty crayfish in form I gonopod characteristics: In *O. juvenilis* the terminal elements of form I gonopods are more elongated and the ratio of central projection length to total gonopod length is greater (Taylor 2000, see Taylor and Schuster 2004 for gonopod terminology). *Orconectes juvenilis* has been only recently elevated to species rank (Taylor 2000), thus justifying the misidentification as *O. rusticus* of the former collected specimens.

In 2006 only a few adult specimens were found in the Dessoubre River along a 700m stretch, while the restaurant ponds showed high densities of *O. juvenilis* of all size-classes (Daudey 2006). In August 2007 the ponds were dominated by young of the year crayfish, indicating successful reproduction and recruitment. From September 5 to October 12,

2007 an attempt was made to eradicate the pond population by intense trapping (80 trap nights per pond; one 'trap night' equals one trap set for one night). The trapping effort yielded 716 crayfish, ranging from 5 to 17 g wet weight. Crayfish with a wet weight of more than 10 g accounted for 54 % of the total catch (T. Perrine, N. Guibert and C. Rossignon pers. com. 2007).



Figure 1. *Orconectes juvenilis* form I male. Photo by Chris Lukhaup

However, these numbers are presumably biased towards larger size classes, since juveniles do not readily enter traps (France et al. 1991; Frutiger et al. 1999). As Holdich et al. (1999) pointed out, it is probably impossible to eradicate a crayfish population solely by trapping (cf. Hein et al. 2006).

Little is known about the ecology of *O. juvenilis* (e.g. Dickey and McCarthy 2007). Within its native range, *O. juvenilis* inhabits a variety of lotic habitats (Taylor and Schuster 2004) and lakes (Rorer and Simmons 1975). Form I males can be found year-round and egg laying takes place in spring (Taylor and Schuster 2004). Since *O. juvenilis* was long considered a synonym of *O. rusticus* (cf. Taylor and Schuster 2004), we assume that their ecological traits might be in a comparable order of magnitude: *O. rusticus* is considered a keystone species in littoral habitats (Lodge et al. 1994; Momot 1995; Dorn and Wojdak 2004). Its presence can inflict

perturbing effects upon multiple trophic levels of native freshwater communities (e.g. Charlebois and Lamberti 1996; Dorn and Mittelbach 1999; Dorn and Wojdak 2004; McCarty et al. 2006).

The introduced population of *O. juvenilis* also poses a serious threat to the native European crayfish fauna since it might carry the crayfish plague [*Aphanomyces astaci* (Schikora 1906)], a disease that causes dramatic mortality in the susceptible European crayfish species (Souty-Grosset et al. 2006). *Orconectes juvenilis* may also outcompete the native European crayfish due to its presumably faster life cycle, high fecundity and higher pollution-tolerance (cf. Rorer and Simmons 1975; Vigneux 1997). This may be especially true for the imperiled white-clawed crayfish [*Austropotamobius pallipes* (Lereboullet, 1858)], which is still present in some headwaters of the Dessoubre river (Daudey 2006). Since the *O. juvenilis* population is still spatially restricted, we argue that it may be

advisable to consider eradication of the population by different means than solely trapping. We stress, that any range expansion of *O. juvenilis*, especially in the Dessoubre River, should be followed carefully.

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