Expansion of the invasive *Pseudorasbora parva* (Cyprinidae) in the Iberian Peninsula: first record in the Guadiana River basin

by

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RÉSUMÉ. - Extension de l'espèce invasive *Pseudorasbora parva* (Cyprinidae) en péninsule Ibérique: premier signalement dans le bassin du Guadiana.

Pseudorasbora parva (Temminck & Schlegel, 1846) est une espèce envahissante dans de nombreux lieux d'Europe. En péninsule Ibérique, jusqu'à présent, *P. parva* avait été seulement signalé dans les rivières de l'Ebre et du Ter, Nord Est Espagne. Cette note constitue le premier signalement de *P. parva* dans le bassin du Guadiana (Sud Ouest Espagne). L'origine de la population est apparemment une introduction accidentelle à partir d'une pisciculture locale. *P. parva* représente une nouvelle menace pour les poissons indigènes du bassin du Guadiana où 12 autres espèces exotiques sont déjà présentes. Un programme d'éradication a été engagé pour essayer d'empêcher sa dispersion dans le bassin du Guadiana et d'autres rivières ibériques.

Key words. - Cyprinidae - *Pseudorasbora parva* - Spain - Guadiana Basin - Introduced fish - First record.

The topmouth gudgeon *Pseudorasbora parva* (Temminck & Schlegel, 1846), a cyprinid of the subfamily Gobioninae, originally had an eastern Asiatic distribution. Their native range includes South-East Siberia, China, Korea and Japan (Bănărescu, 1999). This species has successfully spread by accidental or deliberate introductions across Central and Western Asia, Russia, and Southern and Central Europe, demonstrating its invasive potential (Gozlan *et al*., 2010).

The first confirmed record of *P. parva* in the Iberian Peninsula dates from 2001 in the Ebro River delta (Caiola and de Sostoa, 2002). From then, it has been recorded in the Ebro River further upstream of the delta (Aparicio *et al*., 2012) and in the Ter River, NE Spain (Pou-Rovira *et al*., 2007). The aim of this paper is to report its introduction into a new river basin in the Iberian Peninsula and to call attention to the probable spread to further river basins.

MATERIAL AND METHODS

The Guadiana River basin is located in the southwestern Iberian Peninsula and flows into the Atlantic Ocean through Spain and Portugal. The basin area is *ca*. 67,000 km^2 and has a Mediterranean hydrological regime, with dry summers in which many streams are reduced to isolated pools. A large scale monitoring programme was conducted along the Spanish side of the Guadiana River basin from 2005 to 2010, in which 120 river reaches and 28 reservoirs were regularly sampled. Surveys were carried out in river reaches by single pass electrofishing (300-450 V, 2-6 A, Pulsed DC), and by passive capture methods (trammel nets, fyke-nets and minnow-traps) in reservoirs. All fish captured were identified to species and measured for total length (TL ± 1 mm) in the field.

RESULTS

P. parva was first detected during an electrofishing survey on 6 November 2010 in the Alcollarín River (39º19'21"N; 5º46'36"W), a tributary of the Guadiana River (Fig. 1), where 331 individuals were captured (36.5% of the total catch). Specimens had all of the distinguishing features of the species (Bănărescu, 1999): head flattened anteriorly; mouth in top position; short dorsal and anal fins; caudal fin deeply forked; ventral fins located slightly anterior to the

Figure 1. - Map of the Iberian Peninsula showing the Guadiana River Basin and the capture locality of *Pseudorasbora parva* in the River Alcollarín (▲).

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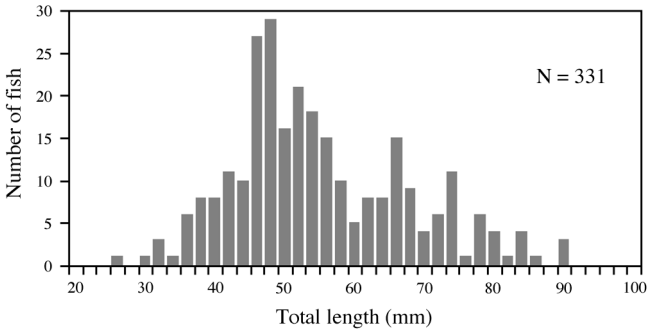

Figure 2. - Length frequency distribution (total length, mm) of *Pseudorasbora parva* captured in the River Alcollarín.

dorsal fin; lateral line complete with 35-38 scales; body colouration yellowish green to silvery with violet reflections; a dark midlateral stripe throughout the sides (in most of individuals). Total length ranged between 26-90 mm (54.5 ± 12.6 mm, mean ± SD; Fig. 2).

Other species captured at this site were Southern Iberian spined-loach (*Cobitis paludica* de Buen, 1930), Iberian arched-mouth nase (*Iberochondrostoma lemmingii* Steindachner, 1866), tench (*Tinca tinca* L., 1758), Eastern mosquitofish (*Gambusia holbrooki* Girard, 1859), calandino (*Squalius alburnoides* Steindachner, 1866) and Southern Iberian chub (*Squalius pyrenaicus* Günther, 1868). The Alcollarín River was an intermittent stream at time of sampling. Fish were collected at isolated pools of 4.8 m mean width, 0.04-0.46 m depth, over a cobble and silt bottom.

DISCUSSION

The presence of *P. parva* is probably due to a recent introduction in the Guadiana basin. We did not detect this species in previous surveys (years 2005-2009) and their distribution is still quite restricted because it was not captured in the downstream sites of the Alcollarín River. The origin of the population seems to be an accidental introduction from a local fish farm, where specimens of *P. parva* could have been inadvertently imported, mixed with stocks of *T. tinca*. Introductions of *P. parva* associated with aquaculture have been extensively reported in Europe (Gozlan *et al*., 2010) and even in the Iberian Peninsula (Caiola and de Sostoa, 2002). Although the species cannot be yet regarded as established in the new area, the large number of individuals captured and the multimodal length-frequency distribution with at least two, maybe three-year classes (Fig. 2), suggest that successful reproduction has already occurred.

The spread of exotic fishes in the Iberian Peninsula is one of the main negative factors affecting the conservation of native species (Elvira, 1998). The Iberian Peninsula is a major hotspot of European freshwater fish biodiversity, with most of primary freshwater fishes being endemic, particularly in the Guadiana basin, where only one out of eleven primary freshwater native species is non-endemic (Doadrio, 2001). In addition to *P. parva*, another 12 exotic or translocated species are currently present in the Guadiana basin (Doadrio, 2001; Hermoso *et al*., 2008): bleak (*Alburnus alburnus* L., 1758), black bullhead (*Ameiurus melas* Rafinesque, 1820), chameleon cichlid (*Australoheros facetus* Jenyns, 1842), goldfish (*Carassius auratus* L., 1758), carp (*Cyprinus carpio* L., 1758), pike (*Esox lucius* L.,1758), Eastern mosquitofish, Pyrenean gudgeon (*Gobio lozanoi* Doadrio and Madeira, 2004), channel catfish (*Ictalurus punctatus* Rafinesque, 1818), pumpkinseed (*Lepomis gibbosus* L., 1758), largemouth bass (*Micropterus salmoides* Lacepède, 1802) and roach (*Rutilus rutilus* L., 1758).

In the Guadiana basin, *P. parva* could be a potential competitor with native species (Leunda, 2010), of which 73% are already threatened (Doadrio, 2001), with special concern for the endangered jarabugo (*Anaecypris hispanica* Steindachner, 1866). Furthermore, *P. parva* has been reported as a vector of parasites such as *Sphaerothecum destruens* and *Anguillicoloides crassus* (Gozlan *et al*., 2010), which add an additional threat to native fish. In the first stages of invasion, successful eradication of *P. parva* is possible (e.g. Britton and Brazier, 2006), but if the species becomes established in a wide area, it will be very difficult or impossible to eradicate it. Management authorities have already initiated some actions to control and eventually eradicate *P. parva*, such as electrofishing removals, and their effectiveness will be assessed in the upcoming years.

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