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**Gonado-somatic index of migrating
Iberian barbel (*Luciobarbus bocagei*)
and northern straight-mouth nase
(*Pseudochondrostoma duriense*) in
the Tormes River (Salamanca, Spain)**

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We provide preliminary information about the reproductive and biometric traits of the Iberian barbel, *Luciobarbus bocagei* (Steindachner, 1864) and the northern straight-mouth nase, *Pseudochondrostoma duriense* (Coelho, 1985) during their upstream movement in the Tormes River (Fig. 1). Both fish species are considered migratory species (Doadrio *et al.*, 2011). Migratory movements of the northern straight-mouth nase in the Tormes River begin in mid-May and last until mid-July, while the barbel migration starts in late May and spreads throughout June. The spawning of the cyprinids is directly related to water temperature (Santos *et al.*, 2008) and seems to be triggered by temperatures around 15°C (Sanz-Ronda *et al.*, 2013).

This study was carried out from May to July 2015 in San Fernando's fishway (Cespedosa de Tormes, Salamanca). We analyzed 60 fish individuals captured inside the fish-

way, 20 barbels (8 males and 12 females) and 40 nases (12 males, 23 females and 5 unsexed). To study the reproductive traits, 23 ovaries were analyzed (11 of barbel and 12 of nase). The main studied parameters were: gonad-somatic index (GSI), absolute fecundity (AF), diameter of oocytes (\emptyset), the relationship between fork length (FL) and total weight (W), and condition factor (K).

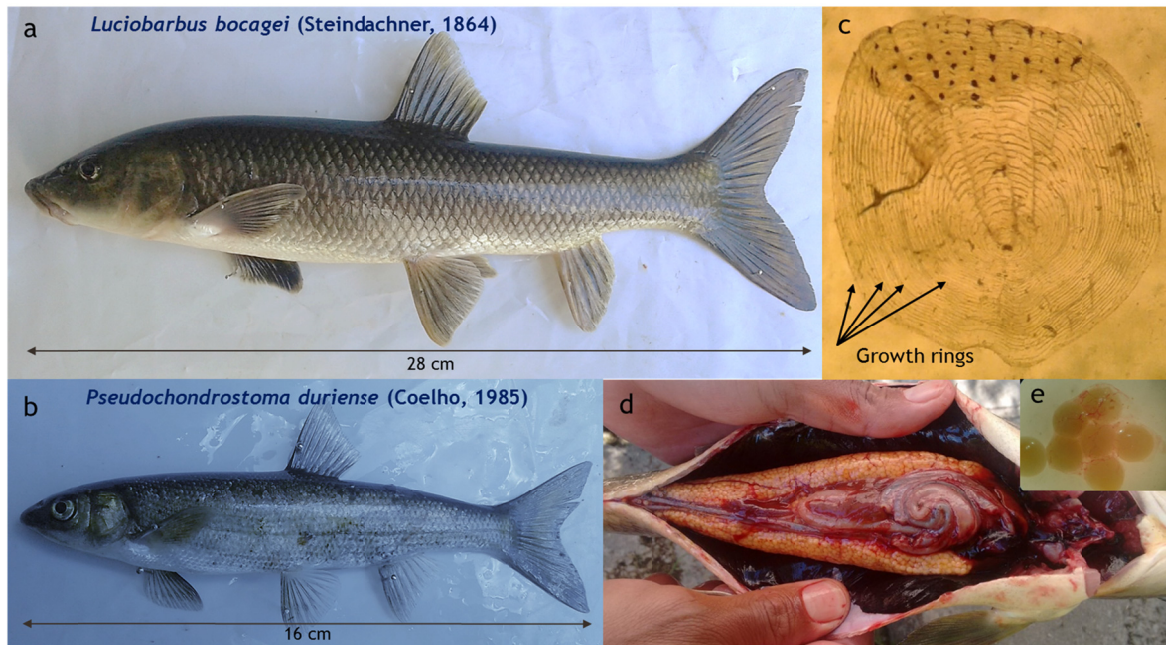


FIGURE 1. *Luciobarbus bocagei* (a), *Pseudochondrostoma duriense* (b), reading growth rings on scales (c), gonads in mature state (d) and oocytes (e).

Analyzed nase individuals were on average 16.5 cm FL (range 14.5-19.7 cm), belonged to five age classes (1+, 2+, 3+, 4+, 5+) and had a mean number of oocytes of 2,318, with a mean \emptyset of 1.89 mm (± 0.10 mm; 95% C.I.). For the barbel, the average FL was 34.7 cm (range 29.4-51.3 cm) with 7 age classes identified (6+, 7+, 8+, 9+, 10+, 11+, 12+). The length-weight relationship identified were $W = 0.0398 * LF^{2.65}$ ($r^2 = 0.94$) for the barbel and $W = 0.0085 * LF^{3.10}$ ($r^2 = 0.90$) for the nase, while the mean condition factor K was 1.15 g/cm³ for the barbel and 1.16 g/cm³ for the nase. The variation of the FL-W slopes fell within the expected range (2.50 - 3.50) *sensu* Froese (2006). However, both FL-W slopes and K values were lower in our sample than those observed in previous studies (Lobón-Cervía & Fernández-Delgado, 1984; Barceló & García, 1986; Miranda *et al.*, 2006). This lower somatic condition observed in our sample could be related to the stress of the movement and reproduction period, because condition varies along the year and is also affected by environmental factors (Oliveira *et al.*, 2002).

The mean number of oocytes in barbels was 18,393, with a mean \emptyset of 2.20 mm (± 0.07 mm; 95% C.I.). The barbel had a length-fecundity relationship represented by the model: $AF = 0.141 * FL^{2.16}$ ($r^2 = 0.50$). In the case of the nase the model was $AF = 0.289 * FL^{3.19}$ ($r^2 = 0.38$). The mean GSI for the barbel was 10.4% (range 7.0-13.9) in females and 3.4% (range 0.6-11.9) in males, while for the nase it was 8.4% (range 6.6-17.2) in females and 2.9% (range 1.8-6.8) in males. The observed GSI and average egg diameter of the barbel were similar to those recorded in the population of the Jarama River (Tagus basin) (Lobón-Cervía & Fernández-Delgado, 1984), although in the Tormes River spawning seemed to happen one month later. Nevertheless, the average number of oocytes in relation to length was a 30% higher in the River Tormes, but this requires further confirmation. Sex ratio found in our study was similar

to those reported for the same species in the Jarama river (Lobón-Cerviá & Fernández-Delgado, 1984) and also for other Iberian barbel species (e.g. Torralva, 1996; Oliva-Paterna *et al.*, 2007). In the case of nase, GSI and mean fecundity figures were about half than those reported for the related species *Pseudochondrostoma polylepis* in the Lozoya River, Tagus basin (Lobón-Cerviá & Elvira, 1981), although egg diameter was slightly larger in the Tormes River.

These results are preliminary and the observed differences with other populations should not be considered conclusive.

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