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# The red neon, *Paracheirodon axelrodi* (Schultz, 1956), is able to survive in distilled water

[1,2]I. Valentin Petrescu-Mag, and [3]Dan Rasiga

[1] University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania, EU;
[2] SC Bioflux SRL (Research Society), Cluj-Napoca, Romania, EU,
[3] Babeș-Bolyai University, Cluj-Napoca, Romania, EU.
Corresponding author: I. V. Petrescu Mag: zoobiomag2004@yahoo.com

**Abstract.** In the current paper we report on the ecophysiological adaptation of the red neon to extremely low water hardness (nearly zero). Such adaptations of aquatic vertebrate species (either fish or frogs) to extreme environmental conditions show a large plasticity of this group even if, by definition, the aquatic environment is quite stable and homogeneous.
**Key words:** ecophysiological adaptations, red neon, extreme environment, low hardness.

**Rezumat.** În această lucrare se relateaza despre adaptarea ecofiziologica a neonului roșu la apă de o duritate extreme de scăzută (aproape zero). Astfel de adaptări ale vertebratelor acvatice inferioare (fie pești sau broaște) la condiții de mediu extreme demonstrează o plasticitate mare a acestui grup chiar dacă, prin definiție, mediul acvatic este unul destul de constant și omogen.
**Cuvinte cheie:** adaptări ecofiziologice, neon roșu, condiții extreme, duritate scăzută.

**Letter.** *Paracheirodon axelrodi* (Figure 1, left, to not be confused with *P. innesi* (Myers, 1936), Figure 1, right) is a small member of Family Characidae (under 2.5 cm SL). It is a pelagic, non-migratory, freshwater fish which generally occur in waters with the following parameters: pH range 4.0-6.0, dH range 3–12, temperature 20-27°C. It is found mainly in shoals in the middle water layers. Feeds on worms and small crustaceans (Mills & Vevers 1989). Breeding in captivity is possible but rather difficult and most specimens in the aquarium trade are caught in the tributaries of the Rio Negro and Orinoco (Froese & Pauly 2009). Eggs hatch in 24 to 30 hours and fry are free-swimming after 3 to 4 days in captivity (Mills & Vevers 1989), depending on water temperature (personal obs., data not shown). The red neon is one of the most popular and beautiful aquarium fishes. In aquarium, as in the wild, it feels better in large conspecific groups. Due to the fact they are small sized, there are no limits for aquarium size.

In the current paper we report on the ecophysiological adaptation of the red neon to extremely low water hardness (nearly zero).

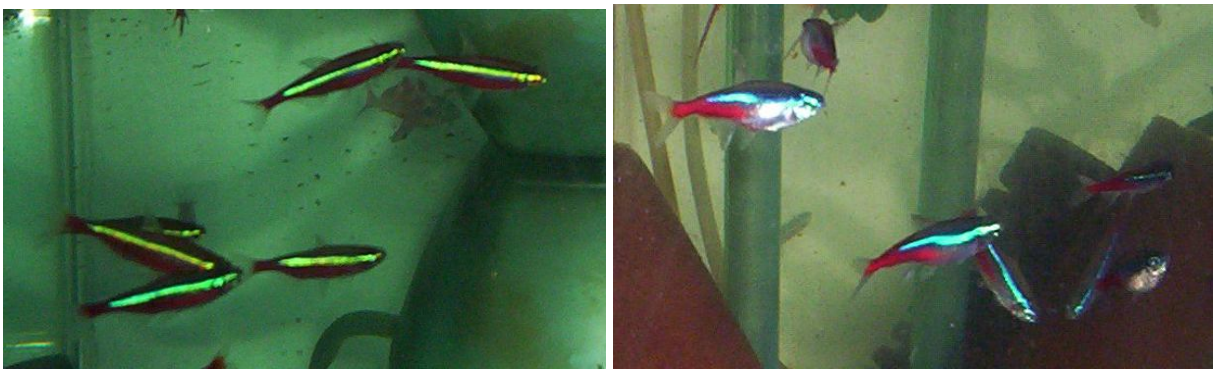

Figure 1. The red neon (*P. axelrodi*) and the neon tetra (*P. innesi*) (Photo by Dan Rasiga, original).

Failed reproduction and mass mortality of fry of the species *P. axelrodi* led us to lower gradually the water hardness in breeding tanks. Some empirical experiments carried out on our hatchery have shown that the species can survive for hours and even days in distilled water, the environment in which it is difficult even for bacteria to live. Moreover, the best results were obtained in breeding conditions in which nuptial parade was held in distilled water. Partial hardening of the water must be begun during embryogenesis, by adding water with tannins (to keep a low pH value).

Such adaptations of aquatic vertebrate species (either fish or frogs) to extreme conditions: very low hardness (this case), wide range of salinity (Appelbaum & Arockiaraj 2009), extremely high pressure (Petrescu-Mag et al 2007a), subzero temperatures (Petrescu-Mag et al 2007c), heat shock (Sas et al 2009; Petrescu-Mag et al 2008) show a large plasticity of this group even if, by definition, the aquatic environment is quite stable and homogeneous.

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Authors:
Ioan Valentin Petrescu-Mag, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, 3-5 Calea Mănăştur Street, Cluj-Napoca 400372, Cluj County, Romania, European Union.
Second adress: Bioflux SRL, 54 Ceahlău Street, Cluj-Napoca 400488, Cluj County, Romania, European Union, e-mail: zoobiomag2004@yahoo.com or scientific.bioflux@gmail.com
Dan Rasiga, Babeş-Bolyai University, "Alexandru Borza" Botanic Garden, Republicii street no 42, Cluj-Napoca 400015, Cluj County, Romania, EU, e-mail: dagisar@yahoo.com or rasiga_dan@yahoo.com


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