

Help for a giant: The LIFE+ project for the Giant Freshwater Pearl Mussel (*Margaritifera auricularia*)



Wantzen, K. M.^{*,1, 2}; Soler, J.^{*,1,3}; Boisneau, C.^{*,1}; Guerez, Y.^{*,4}; Jugé, P.^{*,4}; Morisseau, L.^{*}; Richard, N.^{*,1,4}; Sicot, M.^{*}; Prié, V.⁵; Araujo, R.³

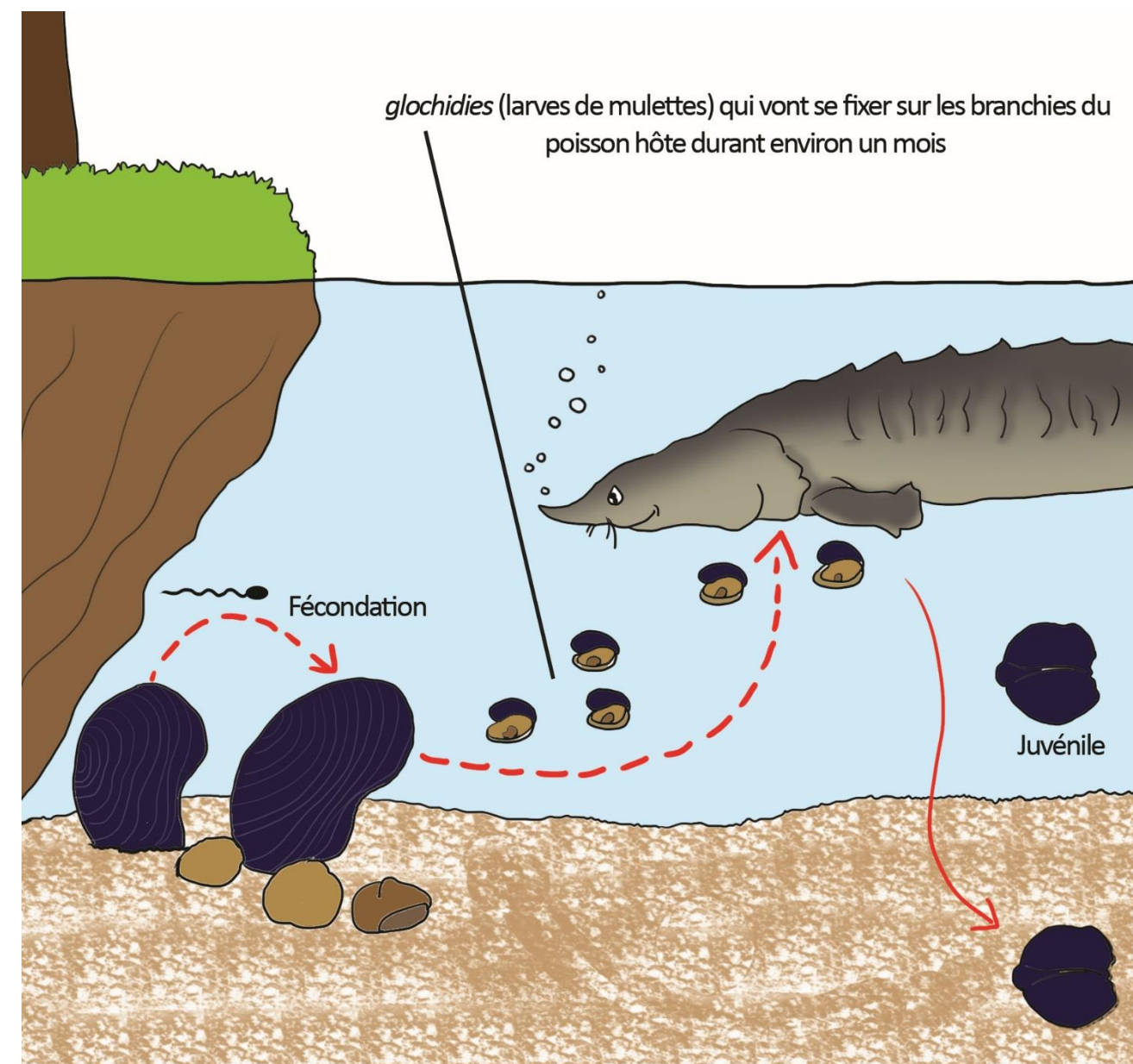


Fig. 1 Left: Life cycle (LIFE project), right: Live *M. auricularia* specimen (P. Jugé)

The Giant Freshwater Pearl Mussel *Margaritifera auricularia*:

- a large unionoid mussel (up to 18 cm shell length)
- obligatory parasitic stage of larvae (glochidia) in fish gills (fig. 1)
- menaced by extinction of its favourite host fish (European sturgeon species), water pollution, and habitat destruction



Fig. 3 Adult *M. auricularia* releasing glochidia (Soler et al. 2018)

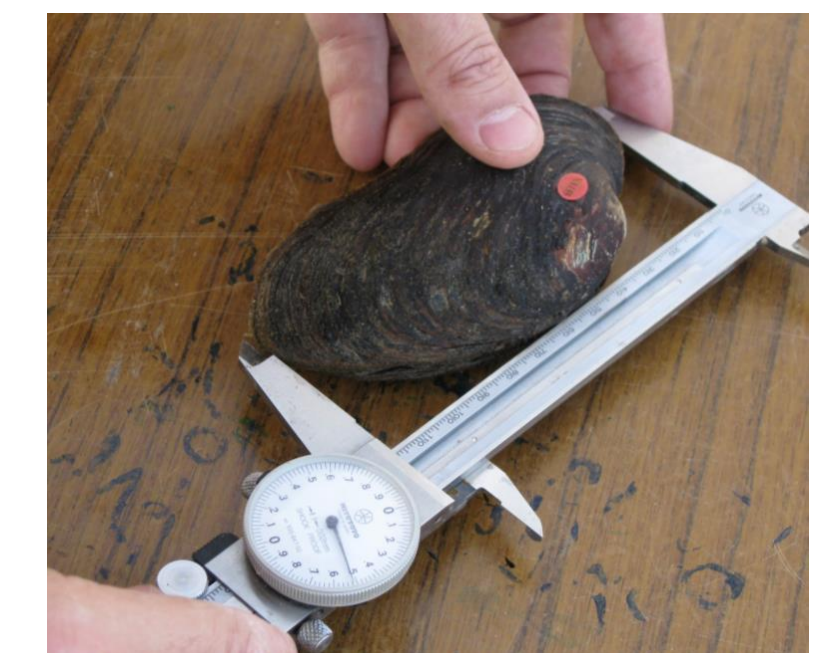
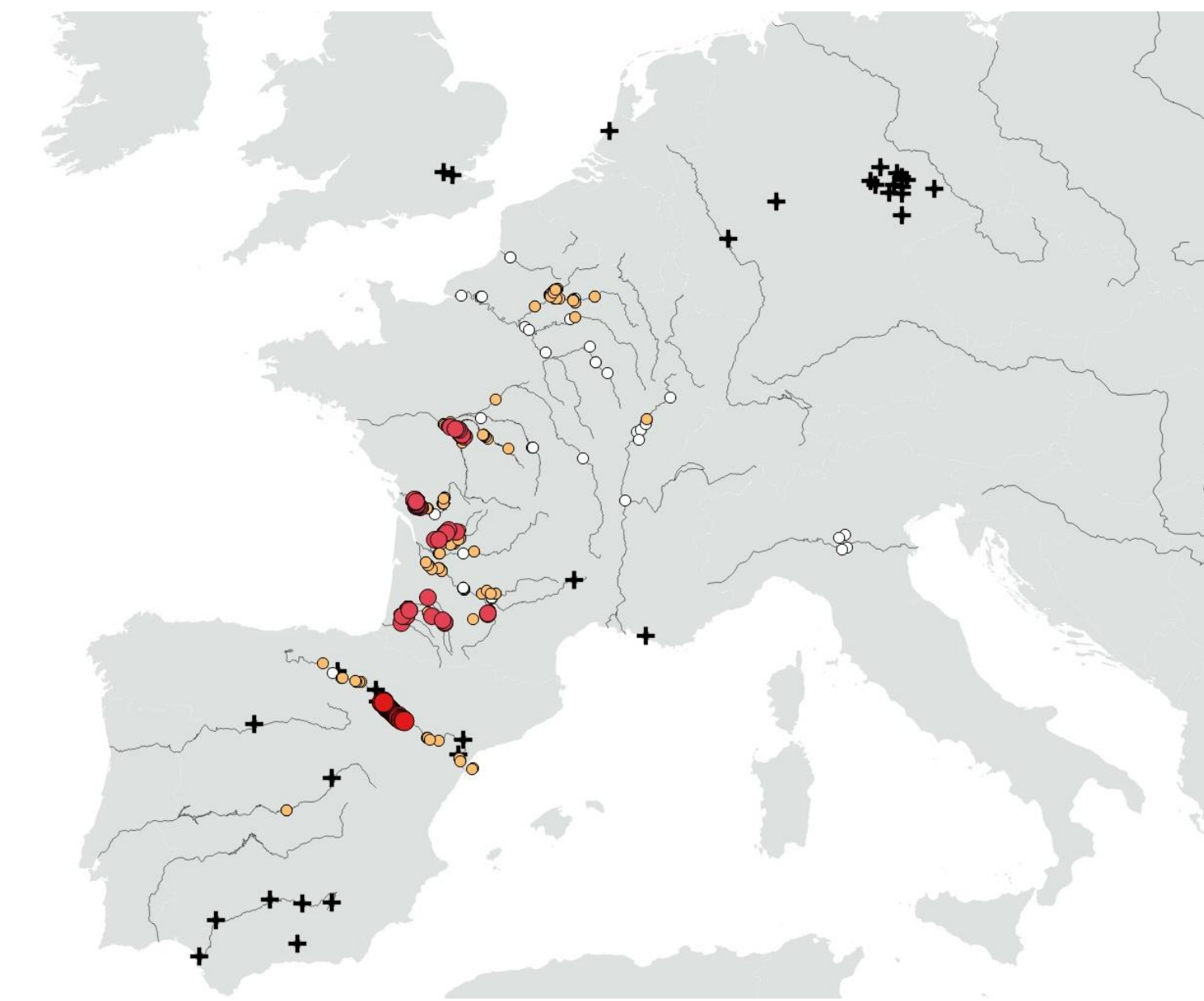
The LIFE+ Project "Conservation of the Giant Pearl Mussel in Europe" (LIFE 13 BIO/FR/001162)

- performs artificial reproduction (> 30.000 juveniles, so far)
- studies conditions for juvenile rearing, reproductive biology, habitat ecology, and suggest habitat management strategies



Fig. 5 Juvenile Siberian sturgeon used for artificial rearing (J. Soler)

As long as the favourite host fish (European sturgeon species) are absent, captive Siberian sturgeons (*Acipenser baerii*) are used for artificial reproduction (fig. 5).



- + Fossil data
- Historical data
- Recent data – shells only
- Recent data – live

Fig. 2 left: Fossil and extant occurrence of *M. auricularia* in Europe (Prié et al. 2018), right: Measuring a *M. auricularia* specimen (© J. Soler)

- one of the rarest bivalves worldwide, "critically endangered"
- previously occurring in many large rivers of Europe
- today, it only occurs in France and Spain (fig. 2)
- our studies indicate that some natural reproduction has taken place after the extinction of the sturgeon in the studied rivers



Fig. 4 Left: Glochidia of *M. auricularia* (P. Jugé), right: Glochidia in gills (J. Soler)

Artificial reproduction:

- sampling of glochidia, infection of fish in the laboratory (fig. 3, 4)
- artificial rearing of juveniles (currently, mortality is still high)
- release of juveniles and glochidia-bearing host fish into the wild (projected)



Fig 6 Stickleback: proven, alternative host fish for *M. auricularia* (M. Merkel)

Alternative host fish species for *M. auricularia* native (fig. 6) can be used for on-site infection with glochidia and then released into the wild, as an additional reinforcement of the mussel populations.

Conclusions:

- Even specimen from over-aged (ca. 70y old) populations can be used for artificial reproduction
- Discovery of alternative host fish may "bridge the gap" until the recovery of sturgeon host fish
- Artificial rearing still needs to be improved

Further reading:

Prié, V., Soler, J., Araujo, A., Cucherat, X., Philippe, L., Patry, N., Adam, B., Legrand, N., Jugé, P., Richard, N. & Wantzen, K. M. (2018) Challenging exploration of troubled waters: a decade of surveys of the giant freshwater pearl mussel *Margaritifera auricularia* in Europe, *Hydrobiologia* online <https://link.springer.com/article/10.1007/s10750-017-3456-0>

Soler, J., Wantzen, K. M., Jugé, P. & Araujo, R. (2018) Brooding and glochidia release in *Margaritifera auricularia* (Spengler, 1793) (Unionoida, Margaritiferidae) *Journal of Molluscan Studies* 84(2):182–189, <https://doi.org/10.1093/mollus/eyy008>

Soler, J., Boisneau, C., Wantzen, K. M. & Araujo, R. *Gasterosteus aculeatus* Linnaeus, 1758, a new host fish for the endangered *Margaritifera auricularia* (Spengler, 1793) (Unionoida, Margaritiferidae) *Journal of Molluscan Studies*

Authors' affiliations:

* EU LIFE+ Project « Grande Mulette » LIFE 13 BIO / FR / 001162, <http://life.univ-tours.fr>, lifegrandemulette@univ-tours.fr

1) CNRS UMR 7324 CITERES and Département d'Aménagement et de l'Environnement, Université de Tours, France, <http://citeres.univ-tours.fr/>

2) UNESCO Chair River Culture, <http://www.unesco-chair-river-culture.eu/>

3) Museo Nacional de Ciencias Naturales-CSIC, Madrid, Spain, <http://www.mncn.csic.es/>

4) CETU Elmis Ingénieries, <https://www.univ-tours.fr/recherche/valorisation/structures-de-transfert-de-technologies-et-d-expertises-cetu-/elmis-ingenieries-333005.kjsp>

5) Biotope Consultants <http://www.biotope.fr>

