

## Collecting live food with a light trap to feed salamander larvae

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*Ex situ* breeding of new species is like opening a box of chocolates: you never know what you're going to get. To obtain a workable protocol with a good survival rate, there are lots of problems to be solved. One of the biggest challenges when rearing the Great Crested Newt (*Triturus cristatus*) was to deal with extremely cannibalistic behavior of the larvae. If they don't swim in an over-supply of food, they will start to attack each other just a few weeks after hatching.

In 2018, we succeeded in breeding an extremely high number of these highly threatened species (Auwerx J., 2018). Early in Spring, males and females were placed in two artificial ponds decorated with a natural submerged and floating vegetation (e.g. *Myosotis scorpioides*, *Veronica beccabunga*, *Mentha aquatic* and *Rorippa nasturtium*). After fertilization, the females deposited single eggs on the leaves, folding and gluing the leaves into a firm envelope. Twice each week we collected eggs from this 'mesocosm'. No predators (e.g. dragonflies, beetles, frogs etc.) were present in these ponds.

We harvested a total of 2,563 eggs, over a period of sixty-eight days (21 April 2018 until 28 June 2018). The majority of the eggs (around 90 %) were deposited on *Myosotis scorpioides* leaves. Afterwards, these eggs were transferred into a hatchery, where they could develop in a safe and controlled environment. Due to a chromosome abnormality, 50% of the Great Crested Newt eggs died within a week.

In small, heated tanks (20-23°C), the embryonic development took between 250-280 day-degrees (D°) till hatching. A total of 1,196 larvae (46.7%) hatched, and after resorbing the yolk-sac, the larvae were between 10–12 mm in length. Some of the deposited eggs were probably overseen, as an extra 203 free swimming larvae were caught in the mesocosms. Together with the hatched larvae from the picked leaves, a total of 1,399 larvae had to be nurtured with exogenous food.

During the first ten days, we gave the newt larvae freshly-hatched Brine Shrimp (*Artemia nauplii*). The eggshells of the *Artemia* were very accurately removed to prevent the blocking of the digestive system. The newt larvae grew well on this diet until a size of 18-20 mm. At this age, the first signs of cannibalistic behavior occurred. From then on the need for a daily supply of large quantities of living plankton was very high.

### A light-activated trap to collect zooplankton

Light traps are used regularly in aquaculture to collect live food. Many species are attracted to light and are thereby called positive phototactic. We developed a light trap (Vught et al., 2015) based on old technical data sheets in WRP Technical Note FW-EV-3.1 from 1994, and the Quatrefoil trap of Floyd et al. (1984). The bottom of the trap consists of a white board (Trespa 8 mm) panel giving the construction the necessary firmness. Four transparent PVC pipes (300 mm length x 200 mm diameter) are glued perpendicular on the bottom. A rectangular slit of 240 mm by 80 mm was cut in the long side of each tube. These four openings lead to the central space, that in turn can be reached via narrow gaps of 6 mm between the cylinders. The styrodur panel (40 mm thickness) at the top allows the structure to float. A second styrodur panel is used as the lid. This lid supports two intense LED lights (Philips / Paulmann, 1W), hanging in the middle space between the four PVC pipes. The LED lights themselves are placed in a glass testing tube so that they can function underwater. We placed the lights in parallel to compensate for any defects. A 12-volt (7 Ah) battery is fixed on top of the lid. The whole trap has a size of 600 x 600 x 350 mm. The volume in the light trap is about

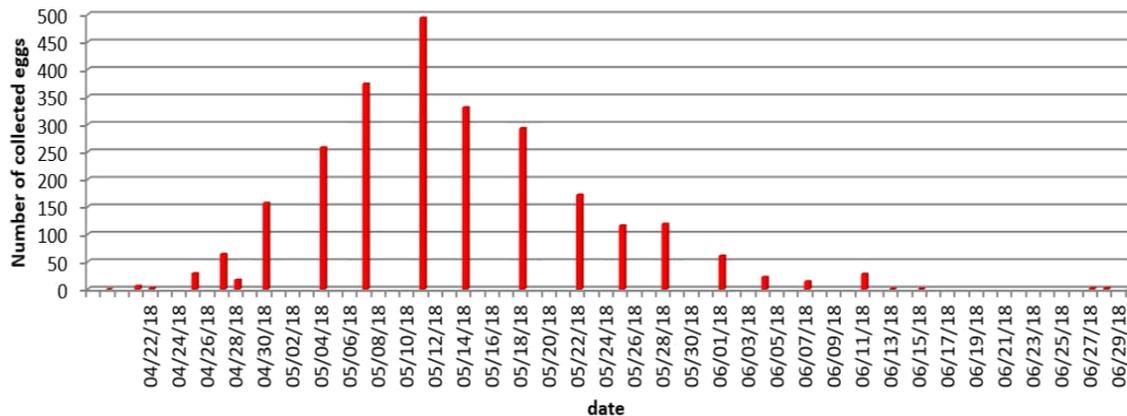


One of the mesocosms at the Instituut voor Natuur- en Bosonderzoek in Belgium. The protected and controlled environment imitates a natural pond. Photo: Johan Auwerx.

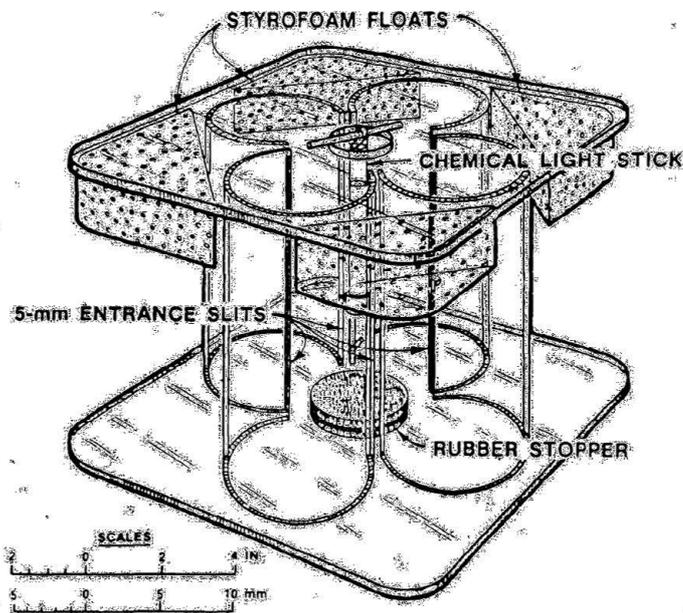


Twice each week eggs were collected by picking the folded leaves. This photo shows the harvest for one day. Photo: Johan Auwerx.

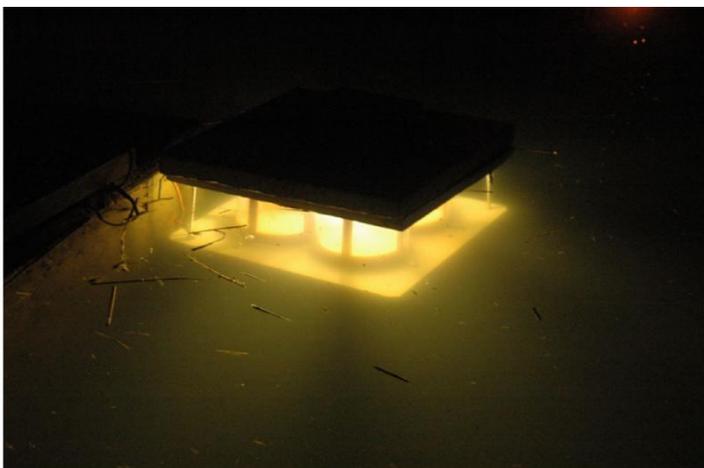
## date / number of collected eggs



The number of Great Crested Newt (*Triturus cristatus*) eggs collected during the reproduction season.



A light trap for phototactic fish larvae (WRP Technical Note FW-EV-3.1 (1994)).



The light trap in operation. The intense lighting is visible in clear water for more than five meters. Photo: Johan Auwerx.

50 liters, and the intense lighting is visible in clear water for more than five meters.

The light source in the middle attracts the zooplankton, which then swims through the narrow gaps between the four transparent tubes. These narrow openings prevent the escape of plankton from the trap.

We placed our light trap in the ponds (0.086 ha) in the evening and the next morning the living plankton was scooped out with a fine-mesh aquarium net. The water in the pond was very clear and the aquatic vegetation was not yet developed due to the early time of the year. The attraction of the light source is therefore large.

With one light trap, we were able to collect between 100-120 g (wet weight) of cladocerians and / or copepods each day. As we have twenty-six ponds, plankton with a good size was always available.

Thanks to the food collected with the trap, we could provide an abundance of living food to the salamander larvae on a daily basis. They grew fast during the first four to six weeks and cannibalism was only being detected in a few batches, however losses were high when cannibalism did occur. Shortly before metamorphosis, at lengths between 40-75 mm, the juveniles were transferred to their new habitat in the wild. Finally, 1,229 of the 1,399 larvae were successfully raised and released in nature.

### Bibliography

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