Survival modelling of *Lymnaea stagnalis* under chemical pressure

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Content: The General Unified Threshold model of Survival (GUTS) provides a theoretical framework for analysing stressor effects on survival over time through consistent mathematical equations based on different assumptions about the stressor quantification, the compensatory processes and the nature of the death process. The key GUTS feature is that mortality is estimated when the dose metric exceeds a certain threshold. Several GUTS flavours can be derived according to the assumption underlying the death process: (i) the threshold is distributed within a population, and when exceeded, the individual dies (individual tolerance, IT); (ii) there is one common threshold for all individuals, and when exceeded, the probability to die increases (stochastic death, SD); (iii) a unification of both previous assumptions (GUTS proper). While more realistic, GUTS proper requires the estimation of one additional parameter. The aim of this internship is to model survival of *Lymnaea stagnalis* after long-term exposure to concentration ranges of three different toxicants (Cd, TBT and prochloraz). For this purpose, a battery of 49 datasets is already available, coming from two ring-tests performed between 2012 and 2015 by 16 participating laboratories. The two R packages ('morse' and 'GUTS') will be compared in exploring the appropriateness of the various GUTS flavours for such data. The between laboratory variability will be quantified on parameters of the different models. At last, the influence of the exposure duration (28 or 56 days) on the LC50 estimate will be investigated.

Required skills: statistical inference, dose-response modelling, Bayesian approach (appreciated), R software, English writing and speaking.

Supervision: Pr. Sandrine CHARLES (LBBE, Université Lyon 1, France) & Dr Virginie DUCROT (Bayer Crop Sciences, Monheim, Germany)

Duration: 6 months, from January the 1st to June the 30th of 2017.

Average bonus: ~ 535 € per month.