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Endler's research interests have included development of the amphibian model for in vivo investigation of the action of ultra high dilutions. Trained as a biologist, he is board member of the International Group for Research on Infinitesimal Doses (GIRI). Trained as a psychotherapist, he is currently also investigating the interaction between homeopathy practitioners and their clients.

Highland amphibians and extremely diluted thyroxine

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Introduction: After more than two decades of experimental work on a model with amphibians and extremely diluted thyroxine, we now can refer to an independent metaanalysis by B. Harrer from Berlin on the international replication record of that model (Homeopathy 2013; 102: 25-30). A detailed account of the difficulties of this line of research has been published previously. One experiment found to be reproducible both by ourselves (i.e. the initial team) and by independent researchers inquires into the effect of thyroxine (T30x) (an ultra-high dilution obtained by 30 successive steps of tenfold dilution according to instructions of homeopathy) v analogously prepared water (W30x) in amphibians from *highland* biotopes. The purpose of Harrer's study was to replicate this experiment and to perform a metaanalysis reanalyzing the results reported by the initial team and by the independent researchers between 1991 and 2012.

Methods: (A): The experiment was replicated by Harrer himself. *Rana temporaria* were taken from an alpine biotope and were treated with T30x or W30x from the 2-legged stage on by adding 3microL of probe dilutions per animal to the basin water at intervals of 48h. Two end-points were considered: first, entry into the 4-legged stage, and second, tail reduction. The experiment was performed blind.

(B): A reanalysis was performed of the results reported by the initial team (based at that time at Graz University and the Graz Boltzmann Institute) and the independent researchers including Harrer himself (R. van Wijk from Utrecht University, H. Lassnig from the Federal Institute of Veterinary Medical Investigation Graz, C. Zausner-Lukitsch from Vienna University, G. Bach, at the suggestion of KIKOM, Bern University, Harrer from Patienteninformation fuer Naturheilkunde Berlin).

Results: (A) As in previous experiments, a clear trend was found of T30x animals developing more slowly (i.e. up to 6 h within 3 days) than W30x animals. Due to the small number of animals, the differences were not statistically significant ($p > 0.05$). The effect size, however, was large ($d > 0.08$).

(B) A total of 22 experiments were performed between 1991 and 2012, 15 by the initial team and 7 by altogether 5 independent researchers. In most of these experiments (the sole exception being two performed and reported by ourselves) a trend was found of T30x-animals being slower than W30x-animals. The differences in the individual sub-experiments, each involving 60–100 animals per group, were mostly not statistically significant ($p > 0.05$). The pooled results of the initial team and those of the independent researchers did show significant differences ($p < 0.01$ in either case). Pooled T30x values obtained by the initial team were 10.1% smaller than W30x values (100%) ($p < 0.01$ and $d > 0.08$), and pooled T30x values from the 5 independent researchers were 12.4% smaller ($p < 0.01$ and $d > 0.08$). Analogously, the number of animals entering the juvenile stage with reduced tail was smaller for T30x than for W30x.

Conclusion: A metamorphosis hormone diluted beyond Avogadro's limit using a process derived from homeopathy produced a clear trend of metamorphosis inhibition. This was observed by 7 researchers from Austria, Germany, Switzerland and the Netherlands.