

## Plants respond to highly diluted homeopathic medicine

Ücker A, Baumgartner S, Martin D et al. Critical evaluation of specific efficacy of preparations produced according to European Pharmacopeia monograph 2371. *Biomedicines*, 2022; **10(3)**:552.

### Synopsis

Homeopathic medicines are prepared using a multi-step process of alternating succussion (vigorous shaking) and dilution. Exactly how these highly-diluted preparations work is not yet clear, leading to debate around their mechanism of action and whether such medicines can have true biological effects. Plant experiments are therefore particularly interesting for homeopathy research because the placebo effect can be completely excluded.

In 2022, a laboratory-based experimental study investigated the effect of homeopathic medicines on plants "stressed" (slightly poisoned) by arsenic. This study, conducted at the University of Bern, Switzerland, confirms the results of an earlier, similar study in 2010. *Lemna gibba L.*, commonly called Duckweed, is a small, floating aquatic plant found in ponds and lakes. This plant is often used in conventional laboratory research because it reacts to even the slightest impurities. Mild poisoning with arsenic causes growth disorders and structural changes - both of which can be easily observed and measured.

In this study by Ücker et al., the duckweed was first stressed with arsenic at concentrations which significantly inhibited plant growth, but did not prevent the duckweed from recovering. The plants were then randomised into two groups – one treated with homeopathically-prepared arsenic (the homeopathic medicine *Arsenicum album*) and the other control group receiving only water. The study found that treatment with homeopathic *Arsenicum* led to a significant increase in growth compared to the control group i.e. it brought the duckweed back to a healthier state.

The rigorous methodology used involved stressing the duckweed with one of two arsenic concentrations (158 mg/l or 250 mg/l). This resulted in a reduced relative growth rate (2% at 158 mg/l arsenic and 10% at 250 mg/l arsenic) compared to untreated plants, as well as clearly recognisable morphological changes.<sup>1</sup>

After 48 hours, the plants were divided into groups and further cultured. The treatment groups received *Arsenicum* in one of 8 different strengths (potencies): D17, D18, D21, D22, D23, D28, D30, D33. The growth rates of duckweed were documented for two treatment periods (0-3 days and 3-9 days). For this purpose, the duckweeds were photographed at different times and their surface area determined. To determine the effect of homeopathic treatment, the relative growth rates of duckweed treated with *Arsenicum* were compared with those of the control group.

The study found that the plants exposed to higher arsenic concentrations responded more to the homeopathic treatment than those that were less damaged. This was reflected in a significant improvement in growth rate compared to the control group (+0.89%;  $p = 0.04$ ),

which was detectable three to nine days after exposure to the homeopathic remedies. No difference in growth rate was seen between succussed and unsuccussed water in the control groups. This supports the hypothesis that the effects of the homeopathic preparation are due to a specific medicinal action, not just the result of adding any succussed liquid.

The high-quality experimental design and statistical methods used in the study ensure that the results are not false positives. To rule out the possibility that the results were simply due to chance, or any other external factor which could influence the results, a sequence of five independent individual experiments was conducted twice, with each experiment being blinded and randomised.

This study is of particular importance because it replicates an earlier study by Jäger et al. in 2010<sup>2</sup>, increasing the reliability of the findings, and further eliminating the possibility that the results occurred by chance.

This latest study by Ücker et al. confirms that duckweed poisoned with arsenic responds to treatment with homeopathic *Arsenicum* and provides further scientific evidence that homeopathic medicines have specific biological effects that are not due to a placebo effect.

## References

1. Ücker A, Baumgartner S, Martin D et al. Critical evaluation of specific efficacy of preparations produced according to European Pharmacopeia monograph 2371. *Biomedicines*, 2022; **10(3)**:552.
2. Jäger, T, Scherr, C; Simon, M et al. Effects of Homeopathic Arsenicum album, Nosode, and Gibberellic Acid Preparations on the Growth Rate of Arsenic-Impaired Duckweed (*Lemna gibba* L.). *Sci. World J*, 2010; **10**: 2112–2129.