

# Abraham Trembley

Abraham Trembley's discovery of the remarkable regenerative capacity of the hydra caused many to question their beliefs about the generation of organisms. Born 3 September 1710 to a prominent Geneva family, Trembley studied at the Calvin Institute, now the University of Geneva, where he completed his thesis on calculus. He went on to become tutor for Count William Bentinck's two sons, and it was while teaching the boys natural history that Trembley came across a strange organism in a sample of pond water. This mysterious polyp, or hydra, had been previously described by Antoni van Leeuwenhoek, as well as an anonymous English gentleman in 1704, but Trembley was unaware of the polyp's identity and began a series of experiments to determine whether it was an animal or a plant. His investigations were also motivated by his observation that the number of arms on different polyps varied, an irregularity uncommon in animals. Yet Trembley felt that it was an animal.

Trembley decided to cut the polyp in half. He predicted that if the two parts regenerated, the organism must be a plant since animals were not known to regenerate complete individuals. During his observations, he noticed that the polyp moved in a step-by-step way much like an inchworm, which suggested that it was an animal. He was therefore surprised to see that each half of the polyp regenerated into a complete new polyp, which suggested that it was a plant. After detailed observation he concluded that there were no differences between the newly regenerated polyp and one that had never been cut. These results, however, failed to convince him the organism was a plant. On the contrary, the polyp's animal-like movements had convinced him the organism was indeed an animal.

Trembley wrote about his results in a letter to René Antoine Ferchault de Réaumur, whom he had met through his cousin Charles Bonnet in 1741. Réaumur was so excited by the results that he immediately announced them to the Paris Academy of Sciences. By the time Trembley's discoveries appeared in print in volume 42 of the Philosophical Transactions of the Royal Society most of the scientific community was familiar with his polyps. Some had already replicated his experiments and others had investigated the phenomena in other organisms. Charles Bonnet performed similar experiments in worms and published his discovery that some worms displayed the ability of regeneration alongside Trembley's paper. Trembley also published *Mémoires, pour servir à l'histoire d'un genre de polyeps d'eau douce, à bras en forme de cornes*, which presented his experiments and observations in their entirety. The support from the scientific community and wide confirmation of his results led to Trembley's election to the Royal Society in 1743. The same year he was awarded the Copley Medal, a remarkable accomplishment for the previously unknown tutor.

Trembley was an innovator. Determined to understand everything he could about polyps, he conducted almost every sectioning experiment imaginable, including turning them inside-out. Most experiments were conducted in the palm of his hand with a pair of scissors, and occasionally a weak magnifying glass. He sectioned them transversely, longitudinally, into many pieces, and even through developing head buds which led him to create a seven-headed polyp he named "Hydra" after the Greek mythological monster. In his letter to Réaumur in 1741 Trembley described these budding polyps with the French term *Hydre*. Linnaeus used this name to identify the genus, *Hydra*, seventeen years later.

Although Trembley's contributions were recognized and rewarded by the scientific community, his results did not sit well with the preformationists who maintained that the embryo develops from preexisting parts. A religious man, Trembley only once made a brief comment favoring preformationism. He preferred fact collecting to theorizing. Nonetheless, Trembley's observations provided

support for the alternative theory of development, epigenesis, which held that the embryo is not preformed but rather develops gradually. Materialists, such as Julien Offray de La Mettrie, used Trembley's data to support the animal machine concept. Trembley's discovery fueled arguments about epigenesis, preformationism, the animal machine, and the Chain of Being. In addition, *Mémoires* made significant contributions to scientific methodology. Trembley's rigorous approach to experimental repetition, his keen observational sense, and his cautious use of theory set high standards for scientific work.

## Sources

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