

Lazzaro Spallanzani

Lazzaro Spallanzani's imaginative application of experimental methods, mastery of microscopy, and wide interests led him to significant contributions in natural history, experimental biology, and physiology. His detailed and thoughtful observations illuminated a broad spectrum of problems ranging from regeneration to the genesis of thunderclouds.

Born in the small town of Scandiano in northern Italy on 10 January 1729, Spallanzani grew up in a large, wealthy family and attended local schools until he was fifteen. He then studied at a Jesuit seminary in Reggio Emilia where his intellectual abilities earned him the nickname "the astrologer." He matriculated in 1749 at the University of Bologna and began working toward a degree in jurisprudence. His love for the natural sciences and mathematics soon led him to change his focus to philosophy, in which he earned his doctorate in 1754. His philosophical studies encompassed metaphysics and theology, which prepared him to take minor orders and be ordained as a priest in the Roman Catholic Church. Spallanzani's affiliation with the Church provided financial support, but more importantly offered protection from the Italian Inquisition, which often censored work deemed contrary to Catholic doctrine. He continued to officiate mass from time to time until later in life. In 1755 he was appointed to teach humanities at the College of Reggio Emilia and then went on to be professor of philosophy at Modena in the University and College of Nobles. He indicated, however, in a letter to Charles Bonnet, that his teaching responsibilities robbed him of his time, which he preferred to dedicate to scientific pursuits.

Spallanzani read voraciously but was a persistent skeptic, hesitant to believe anything that he could not prove himself. Unconvinced by Needham and Buffon's description of the genesis of animalcules in plant and animal infusions, Spallanzani carefully replicated their study and showed their techniques were inadequate and therefore that their conclusions about the existence of spontaneous generation were unwarranted. He published his results refuting spontaneous generation in 1765 and thereby initiated a lifelong correspondence with Bonnet. An avid and staunch preformationist, Bonnet seized upon Spallanzani's results to support his theoretical inclinations and challenged him to carry on his own work investigating regeneration in flatworms. Spallanzani rose to the challenge and returned Bonnet's letter with an explanation of his many sectioning experiments on a wide variety of animals.

Spallanzani performed hundreds of salamander tail amputations, believing exhaustive repetition was necessary to confirm results. Interested in the origin of regenerating tissue, he closely examined the interface between the stump and the regenerated tail. Observation alone offered no conclusions. He had trouble believing that an organized tail could result from a simple outgrowth, but continued to look for evidence in regenerating tadpole and salamander tails that could support his inclination toward the existence of preformed germs. He openly reported his observations, even those that questioned preformationism, once suggesting that tail regenerates in tadpoles appeared to be the result of an elongation, a comment which surely must have disturbed Bonnet but nevertheless failed to persuade him to consider epigenesis seriously.

Interested in questions about generation, Spallanzani performed the first artificial insemination of a viviparous animal, a spaniel dog, a feat he recognized as one of his greatest accomplishments. These results further convinced him of the ovist preformationist doctrine. He interpreted his many findings as evidence against epigenesis and the role of sperm, which he identified as "animalcules," in generation.

In 1776 Spallanzani accepted a professorship at the University of Pavia where he remained for the next thirty years and published extensively. He was a member of the ten most distinguished Italian

academies and a foreign associate to another dozen scientific societies across Europe. His work has been celebrated for its creative approach and rigorous use of scientific methodologies inspiring many scientists, including Thomas Hunt Morgan, to revisit his studies.

Sources

1. Dinsmore, Charles E., ed. "Lazzaro Spallanzani: Concepts of Generation and Regeneration." in *A History of Regeneration Research: Milestones in the Evolution of a Science*, 67-89. Cambridge: Cambridge University Press, 1991.
2. Dolman, Claude E. "Spallanzani, Lazzaro." *Dictionary of Scientific Biography Volume 12*: 553-67.