

2. Animals experiments resumed in the 1500s

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Experiments on living animals

Animal testing resumed during the Renaissance period (14th century to the 17th century). The Renaissance was a period of rebirth of sorts as some things returned to the political-traditions of the Age of Antiquity. Many of the scientific methods used during the Age of Antiquity were reintroduced during the Renaissance. Animal experiments were thus rediscovered in the 16th century and have been conducted ever since.

The Belgium physician Andreas Vesalius (1514-1564) founded modern anatomical science in the middle of the 16th century. It was his intention that university students could supplement reading textbooks with dissections of human corpses. He also believed that dissections could serve a scientific purpose by providing students the opportunity to see for oneself whether the information in the textbooks was true. These books often referred to Galen's old experiments. Andreas Vesalius had difficulty obtaining enough human cadavers, usually due to religious problems with acquiring them, and therefore, he supplemented with animal corpses. However, he did not stick to dissecting dead animals but also resumed conducting vivisections similar to those from the Age of Antiquity. In his 1543 anatomical masterpiece "De Humani Corporis Fabrica", Andreas Vesalius included a detailed description of vivisection techniques, which was supplemented by an illustration of a vivisection of a bound pig. Andreas' need to conduct his own dissections was reinforced by anatomical mistakes he found in Galen's old descriptions.

This also inspired physician William Harvey (1578-1657) to conduct experiments on living animals. He found Galen's description of the circulatory system to be incorrect while testing on animals and humans. Due to his experiments on snakes, among other things, he was able to publish "Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus" (An Anatomical Exercise on the Motion of the Heart and Blood in Living Beings) in 1628. This work became a revelation for many concerning how animal experimentation can provide new insight into human anatomy and physiology.

Animals as mechanical beings

Just as in the Age of Antiquity, animal experiments during the Renaissance were conducted without the use of anesthesia or analgesia, and the experiments must therefore have been an extremely grotesque experience for the **animals**. What did the researchers think about this?

Particularly, Rene Descartes (1596-1650), physician and philosopher, gained importance because his view of animal suffering due to testing on animals during the Renaissance period. His mechanical view of the animals, the so-called "Animal Machine" notion, postulated that animals are like small machines. Therefore, animals appear to be able to feel pain but in reality, they feel nothing, and animal whining sounds can be compared to the sound of a mechanical bell.

Rene Descartes defended his postulate by claiming that animals cannot think or behave rationally, just as he believed that they had a soul. Rene Descartes was a lead scientist of his time and as such, many scientist decided to follow him and his way of thinking, while others followed the

philosopher Baruch de Spinoza (1637-1677). Baruch argued that since their nature is fundamentally different from our own, then we can use animals as we wish.

Animals as feeling beings

150 years later, British Jeremy Bentham (1748-1832) formulated a response to Rene Descartes. Bentham argued that the deciding factor was not whether the animals can think or act rationally, but rather if they can suffer: "The question is not, Can they reason? Nor, can they talk? But, Can they suffer?"

This raised the question of which animals can feel and which ones cannot, and this is still a topic of discussion. Today, nobody would question if a dog or animal can feel pain, but where should we draw the line? What about a fish or spider? Do they feel pain? Jeremy Bentham gained long lasting importance regarding how to view animal experiments and helped found the ethical viewpoint of Utilitarianism. The introduction of anesthesia and painkillers for research animals in the end of the 19th century, allowed researchers to improve animal welfare during experiments for the first time. The modern experimental physiology

The French physician, Claude Bernard (1813-1878), established the modern experimental physiology in 1865 when he published the book "An Introduction to the Study of Experimental Medicine". In this book, he described methods to test hypotheses on animals. The book was the start of a new era in which animal experimentation became an important part of medical and physiological research. Claude Bernard was a skilled scientist and through his many experiments, he proved, among other things, the pancreas' function in digestion. However, at the same time, Claude Bernard was also publicly criticized for conducting grotesque experiments on animals. Therefore, he also indirectly contributed to the emergence of the critical view of animal experiments, from which animal welfare organizations grew. This occurred not only in France but also in England and Denmark. During this time, his wife and daughter also left him in protest of his animal experiments.

Charles Darwin

In 1859 in England, naturalist Charles Darwin (1809-1882) published his groundbreaking work "The Origin of Species", in which he presented the theory of evolution. In 1875, he publicly advocated for animal experiments, when activist Frances Power Cobbe (1822-1904) and her newly founded Victoria Street Society (known today as the National Anti-Vivisection Society) tried to convince the British Parliament to impose a ban on animal testing.

Charles Darwin defended animal testing because he believed that they were necessary for science. However, due to an exchange of letters with British zoologist Ray Lankester (1847-1929), we now know that Darwin was actually somewhat ambivalent about the use of experimental animals. The thought of animals suffering kept him up at night. In 1876, England introduced the so-called "Animal Cruelty Act", the world's first law to protect experimental animals, which was in force until 1986. Victoria Street Society was not successful in banning animal testing altogether but they did manage to get it regulated by law.

Denmark followed England with legislation

England was the first to introduce legislation to protect experimental animals but Denmark followed suit a few years later. In 1879, Animal Protection Denmark (Dyrenes Beskyttelse) led the fight against animal testing by publishing the pamphlet "Torture Chambers of Science".

Physiologist Peter Panum (1820-1885), who conducted experiments on animals, published a response: "To clear up some misunderstandings about vivisections and animal protection in Denmark", in which he acknowledged that the experiments were cruel, but in his opinion, also necessary in order to achieve better medical treatments. The sometimes-heated debate for and against animal testing resulted in the introduction of the Danish law "Law about vivisection" in 1891.

Animal testing in Nazi-Germany

Animal welfare was high on the Nazi-party priority list, and shortly after taking power in Germany Adolf Hitler (1889-1945) introduced a far-reaching animal protection law. Personally, Adolf Hitler was fond of animals, and he did not like when they experienced suffering. Initially, he wanted to ban all animal experiments, which Hermann Göring (1893-1946) announced in the summer of 1933. In addition to the cruelty of animal testing, the Nazis also propagated that animal experimentation belonged to a certain kind of Jewish research that contradicted real German medicine.

However, Adolf Hitler's personal physician convinced him that an animal testing ban would weaken German research. Therefore, the proposed ban on animal testing was replaced by strict legislation to protect the research animals. Elements of the 3R principles were included in this legislation – including that alternatives should replace the use of living animals in education and that the number of used animals should not extend beyond what was necessary for the research. After World War 2, it became apparent that the Nazis had used concentration camp prisoners as human experiments by conducting grotesque experiments on them. The international community therefore introduced a convention, which, among other things, ensured that human experimentation must only take place on voluntary participants and that experiments must be tested on animals before humans in order to assess the risk(s) to humans.

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