Imagine living locked in a dark cage without having any control over your life; not being able to choose when and what to eat, how to spend your time, if choosing to get a partner or children. A greatly controversial topic that has risen in recent years concerns the testing of animals when it comes to scientific or commercial needs. Animals have always been key-players within human interactions and obtained crucial roles worldwide, either as pets providing joy, companionship, and laughter or involved in experimental processes for the advancement of science.

In this essay I will provide a brief mentioning on some historical personas who utilized animal experimentation to elucidate medical questions, followed by two examples where animal testing was not included in the first hand, thus leading to unfortunate tragedies marking the human past. Consequently, I will refer to the emergence of the concept of the “Three R’s” (Refinement, Reduction and Replacement). Finally, I shall provide a text of intriguing views on the moral status of animals, including a referral to two ethical schemes. In the end, I shall mention a few arguments for and against animal experimentation and address my own position on the crucial matter.

Animal experimentation has advanced various of medical fields throughout the years and with the right caring perspectives from the scientist, the experimental end points are set beforehand in order to prevent unnecessary suffering and harming. My belief may go alongside Ray Frey’s¹ and Peter Signer’s² firm utilitarian viewpoints, accepting only those experiments whose benefits are expected to outweigh the harms and costs involved; where the interests of animal subjects, such as to avoid suffering, are given the same moral weight that we give comparable human subjects³ ². Through history, the usage of animals for scientific research activities provided beneficial effects to society, in particular advancing of scientific knowledge, human and veterinary medicine.

From the earlier forms of animal researching in ancient Greece, natural philosophers and physicians wanted to increase their knowledge in which complex organisms such as humans and animals functioned. At that time, Greek physician-scientists in order to satisfy their anatomical curiosity performed experiments on living animals in order to understand how and why the body malfunctions, to learn about the development of a disease and the effects of injuries, and to discover better treatments and cures³. For instance, Herophilus (c335 - c280 B.C.) and Erasistratus (c310 - c250 B.C.), pioneers of human anatomical dissection, examined sensory nerves, motor nerves, and tendons in an attempt to understand their functional differences³ ⁴.
Additionally, Galen of Pergamum (129 - 199 / 217 AD), a Greek physician who practiced in Rome during the 2nd century, conducted animal experiments to advance the understanding of anatomy, physiology, pathology, and pharmacology. In particular, he introduced a detailed and descriptive study in *De Anatomicis Administrationibus* (On Anatomical Procedures) of the methods used to identify in-depth the functions of the cardio-pulmonary system. Unfortunately though his experiments were practiced without the benefit of pain management, since anesthetics were not discovered until the mid-19th century.4, 5

Ibn Zuhr, an Arab physician in 20th century Moorish Spain, introduced animal testing as an experimental method for testing surgical procedures before applying them to human patients. Additionally, various scientists often conducted anatomical experiments as public demonstrations; such was the case with Andreas Vesalius (1514-1564) and his students in Padua, Italy. By use of systemic vivisection, Vesalius used a live animal, usually a dog, that would be cut open and, as each organ was located, the students would speculate upon the function.4, 6

Moving forward to the more recent past, the use of animals became important in pharmaceutical drug testing in the 20th century. In 1937, a USA pharmaceutical company prepared a formula of sulfanilamide, a drug used to treat streptococcal infections, by using diethylene glycol (DEG) as a solvent. Unknown to the company's pharmacist and chemist, DEG was poisonous to humans, but they simply added raspberry flavoring and marketed the product as “Elixir Sulfanilamide”. Unfortunately, the formula led to mass poisoning causing the deaths of more than a hundred people. As a result, the public’s protest led to the passing of the 1938 Federal Food, Drug, and Cosmetic Act requiring safety testing of drugs on animals before they could be marketed.7

Despite the introduced regulations, in the late 1950s and early 1960s another drug tragedy occurred. Thalidomide was proclaimed as a “wonder drug” for treating insomnia, coughs, colds, and headaches. Additionally, it was also found to have an inhibitory effect on morning sickness and so was prescribed to thousands of pregnant women. Consequently, more than 10,000 children in 46 countries were born with malformations or missing limbs.7 The two latter incidents are illustrative examples of harm to humans from the use of substances that have not been tested beforehand on animals and may emphasize the significance of animal experimentation to prevent human tragedies in the long run.

Concerns regarding animal cruelty and the humane treatment of animals, led to the awareness of regulating the use of animals in experiments. The publication of “The Principles of Humane Experimental Technique” by W.M.S. Russell and R.L. Burch in 1959 marks the birth of the principles of the “Three R’s”: Replacement, Reduction and Refinement. The principles have subsequently become embedded in national and international legislation regulating the use of animals in scientific procedures, in order to achieve approaches of more humane experimental techniques. Russell and Burch saw replacement as the ultimate goal for laboratory animal based research, education and testing, with the other two, reduction and refinement, being more readily achievable in the short term.4

Nowadays, the principles of the “Three R’s” have been increasingly implemented as a basic framework for conducting high quality science and developing alternative means on improving animal welfare. For this reasoning:
Replacement, advocates the search for methods that avoid or replace the use of animals and can include whenever possible the use of human tissue and cells, mathematical and computer models, established cell lines, or immature forms of vertebrates, or invertebrates, such as *Drosophila* and nematode worms.

- Reduction, advocates the search for methods that obtain comparable levels of information from fewer animals or obtaining more information from the same number of animals, such as including improved experimental design and statistical analysis.

- Refinement, advocates the search for methods that minimize the pain, suffering, distress or lasting harm that may be experienced by animals, such as using appropriate anesthetics and analgesics.

Therefore, these principles encourage alternatives to animal testing, since total elimination of the latter can significantly set back the development of vital medical devices, medicines and treatment. Moreover, employing the principles alongside the use of animals for scientific research, aims to improve the welfare of the animals that are used in testing and indirectly supporting moral conscience.

When thinking about the human-animal relationship, two main questions arise within my intellectual grasp, including: what is the correct understanding of the moral status of animals; and what are the morally relevant differences between animals and humans. The latter questions may be considered relevant to discussions aiming towards the intuitive sense that there is “something” that separates us from animals, and that “something” is adequate to how we ought to treat them. There are distinct ethically moral frameworks that may aid in rationalizing the ethical truth of using animals in research, or for that matter, of when using animals for satisfying the human purpose.

Rene’ Descartes (1596-1650), a French philosopher and scientist, imprinted the fact that animals were little more than machines, without minds and incapable of experiencing pain. This viewpoint could be considered a direct relief rationale of humans’ obligations towards animals. Many other scientists of the 17th and 18th centuries acknowledged that animals felt pain, but those who experimented with animals justified inflicting pain based on a literal interpretation of man’s dominion over animals, in the context of the importance of their work. Charles Darwin’s writings were influential in the topic of an ideal moral status of animals, because his work emphasized the similarities between animals and humans rather than the differences.

Consequently, two basic ethical schemes are considered to be influential and representative aspects of forming a moral perspective towards the usage of animals in research. The utilitarian scheme and deontological scheme are approaching questions differently, but their conclusive remarks are in many respects similar. Both not only provide a sharply contrasting way of looking at questions of right and wrong, but also are the bases for two of today’s most influential thinkers proposing a higher moral status for animals (i.e., Peter Singer and Tom Regan).

On the one hand, utilitarian theories are consequentialist; relying on the consequences of a correct action and based on weighing of all the goods and harms. Jeremy Bentham (1748-1832), an early utilitarian, argued that animals deserved moral consideration because of their ability to feel pain: “The question is not, can they reason? nor, can they talk? but, can they suffer?”. In other words, a proper balancing of goods and harms accounts for an animal’s ability to feel pleasure and pain. Additionally, Peter Singer is a contemporary utilitarian who believes
“the greatest good of the greatest number”, is the only measure of good and ethical behavior and that not all organisms deserve moral consideration\textsuperscript{2}. He has argued strongly (e.g., in Animal Liberation) that human use of animals in research, and otherwise, is not justified if animal pain and interests are properly considered, and is due to “speciesism”, a prejudice, like racism, which humans hold against non-human animals\textsuperscript{9,10}.

On the other hand, deontological theories are non-consequentialist; relying on features other than consequences in determining right vs. wrong action. Immanuel Kant (1724-1804) with his “categorical imperative”, to never treat people as a means to one’s own ends, poses a strong contrast to utilitarian perspectives. He particularly excludes animals from the latter imperative attitude because of animals’ lack of rational will\textsuperscript{4}. In “The Case for Animal Rights”, the American philosopher Tom Regan argues that non-human animals bear moral rights and as “subjects of a life” they have the right to require respectful treatment. In that sense, it can be considered as wrong to use animals for our own purposes, just as it is wrong to use humans without their informed consent\textsuperscript{4,9,10}.

A variety of arguments for and against the practice of animal testing may be considered. Nevertheless, the two views of pros and cons over the ethics of animal experimentation represent two positions at the opposing ends of the spectrum:

Some people can argue that all animal testing should be terminated because it is wrong to treat animals merely as tools for advancing knowledge. This viewpoint supports the fact that an animal should have as much right as a human being to live out a full life, free of pain and suffering. Additionally, some substances tested might never be used for anything useful and therefore the animals undergoing the experiments die in vain without any direct benefit to humans in the end. To extend that, animals and humans are never exactly the same and as a result the reaction of a drug in an animal’s body is probably after all different from the reaction in a human’s body. The main criticisms here is that animal testing might be unreliable due to the animals’ unnatural environment and stressful conditions in the laboratory. As a consequence, the reactions to the drugs can be different from an actual reaction in animals’ natural environment, which further weakens the validity of animal testing.

In opposition, others argue that animal experimentation can offer great scientific resources through animal models, despite the fact of acknowledging that it is wrong to unnecessarily abuse animals. This viewpoint can be regarded a major argument for animal experimentation, as many medical treatments have been made feasible and improved human health, including cancer drugs, antibiotics and vaccines. Moreover, animal testing aids in ensuring the safety of drugs and unknown substances humans use or are exposed to regularly. This can be accounted as a direct aspect of reducing human harm, even prior to commencing human clinical trials, and improving the quality of human life\textsuperscript{11}.

I believe in the end that animal testing should be utilized with a partial extend and carefully practiced within the medical society. Despite the fact, myself as a vegan and a passionate lover of animals, I can agree that using animals for researching purposes may be beneficial for improving the world of medical caring for the human well-being, the thoughts of the latter statement leave me with a devastating “after-taste” feeling. I feel over-whelmed when looking upon a few inspirational quotes from great supporters of animal rights in the history of animal exploitation. Mark Twain (1835-1910) said: “I am not interested to know whether vivisection produces results that are profitable to the human race or doesn’t...The pain which it inflicts upon un-consenting animals is the
basis of my enmity toward it, and it is to me sufficient justification of the enmity without looking further”. Albert Einstein (1879-1955) said about vivisection: “Nothing is of such high importance as to justify such unethical methods”, and Mahatma Gandhi (1869-1948) called it "the blackest of all crimes". I would strongly support in that case any alternatives (e.g. computer modeling and cell cultures) used whenever possible and expanded to address a particular scientific question in order to protect the animals’ experiential quality of life.

All in all, it all comes down to personal choice. While there is a wide range of pros and cons of animal experimentation, the ethical aspect overshadows both of them, which indicates that emotion may be the definitive determining factor in whether a person believes the benefits of using animals in research outweighing the problems associated with the practice.

References: