Viewpoint

Should we thank our laboratory animals for giving their life for science?

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Almost all national laws require an ethical evaluation of *in vivo* studies (i.e. studies conducted on animals), which is based on a cost-benefit analysis. An experiment involving animals is acceptable if the benefits to human society (health, environment, knowledge) outweigh the harm to the animals. It is a rational way to proceed in a situation where non-human organisms are used for the benefit of humankind.

The cost benefit assessment is made possible if a 3R approach (Replace, Reduce and Refine) to animal experiments has been done [1]. The researcher must make sure that the *in vivo* study proposed cannot be done by any other alternative (Replacement), that the use of a minimal number of animals is planned (Reduction) and that any pain, suffering or distress is kept at a minimum (Refinement).

Of the two arms of the cost-benefit assessment, benefits for society are well celebrated. Scientists receive a Nobel Prize, others give their name to research institutions or buildings, and many of them have their picture in the newspapers, on television, and on the Internet, or are invited for interviews. These benefits are possible at the expense of the harm caused to the animals. When scientific achievements are celebrated, sacrifices are also implicitly honoured, but remain unspoken.

It could be now time to reconsider the issue of the harm to animals not only at the level of rational outcomes but also from a perspective of compassion and empathy. The 3R's are carried out before and during the experiment. What other R's could we develop after the experiment is finished and the animal has endured the harm caused by it?

There is the *R as Retirement* that animal protectionists have labelled the 4th R. This is already applied in some cases like relocating laboratory dogs or primates to homes where they can spend the rest of their life without any hassle.

We propose to extend the concept of retirement to the more embracing *R as Remembrance* (how animals contributed to Science). I briefly give three examples.

The first example, space conquest, illustrates well the fact that the sacrifice of animals has been beneficial to humans, particularly during the first flights with their numerous failures [2]. Many animals like mice, rats, guinea pigs, newts, frogs, and fish were launched into space and died. Several of them have been honoured, such as the famous dog Laika. In 1957, it was the first live organism to orbit the Earth. In 1997, it was honoured on a plaque commemorating fallen Russian cosmonauts. Its own statue was erected in 2008.

In the USA, Miss Baker, a squirrel monkey made the cover page of the June 15th issue of *Life magazine* in 1959 with Able, a companion monkey, when they returned from a short trip into space. She died in 1984, at the age of 27 and her memorial can be found at the entrance of the U.S. Space and Rocket Center in Huntsville, Alabama.

At that time, the erection of a statue or a memorial to honour animals and people was more a military attitude than a scientific one. Space exploration was a technological and ideological race between the USA and former USSR in the middle of the Cold War. The research programmes were high priority for science but also for armies and political institutions. All means were used to be the first to conquer space. The sacrifice of animals was seen as a patriotic action and ritually honoured with medals, statues and retirement plans for monkeys, as these animals were considered to be heroes of the Nation. Although in the case of Laika, it took time to know the circumstances of her death and to admit that her sacrifice was to be considered as similar, if not equal, to that of a human being.

The second example demonstrates that a memorial to laboratory animals can be used as a symbol of cruelty against animals and not as praise for their courage [3]. The statue of the Brown Dog of Battersea Park, London, UK, illustrates perfectly the case. At the turn of the last century, two anti-vivisectionists, Louise Lind-af-Hageby and Leisa K. Schartau, denounced how badly experiments were done on a stray brown dog. The National Anti-Vivisection Society took this opportunity to launch a campaign against Stirling and Bayliss, two endocrinologists of King's College and University College London. This controversy culminated in the trial of Bayliss in November 1903.

Even after being defeated, the Brown dog defenders unveiled the statue of the Brown dog 3 years later, on September 15th, 1906. On the plaque of the statue was the following epitaph:

«In Memory of the Brown Terrier Dog done to Death in the Laboratories of University College in February 1903, after having endured Vivisection extending over more than two months and having been handed from one Vivisector to another till Death came to his Release.

Also in Memory of the 232 dogs vivisected at the same place during the year 1902. Men and Women of England, how long shall these things be?» [4]
This was the start of the «Brown Dog riots» lasting for 4 years till the authorities decided to remove the statue from the park. It literally disappeared on March 10th, 1910. A new memorial was unveiled on December 12th, 1985 in Battersea Park. In 1992, due to renovation of the park, the statue was moved to a less open space in the same park.
The last example relates to spirituality and rituals. Marguénand refers to a monument in a Buddhist temple at Mount Köya, Japan, that researchers have dedicated to all animals sacrificed for the benefit of science [5]. This evokes the American Indians, Inuits and other populations that performed rituals before and after killing animals to thank them for providing food, clothes, material for building instruments and art craft.
How about today in our post-industrial and high-tech societies? I think there are many opportunities for scientists to apply the *R as Remembrance*. Just think of the fantastic revolution that the genomic era has opened and the contribution that animals make to this field. Creativity of scientists should not be only restricted to their own field of research but should invest deeply the 3Rs before and during experimentation as well as the 2 additional R's after completion of the studies.
By considering the *R as Remembrance*, scientists would recognise the value of animals (even mice, often considered as pests) to scientific progress not only by praising benefits to humans but also to honour the sacrifices endured by these animals. Scientists would add empathy and compassion to the rationale discourse they produce when defending animal experimentation and finally they would enhance their personal responsibilities toward animals.

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