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Vivisection as a pseudoscience

Preface. *This short piece requires an explanation. I had been invited to a meeting and debate on vivisection at an academic institution in German-speaking Switzerland, and I had accepted on condition that my allotted time should have been at least 20-25 minutes. I retired from the event when formally told that I would have got 10 minutes for presenting my case, like the other three speakers (one against, and two pro-vivisection), and apart from the moderated discussion session. I consider vivisection too serious an issue to be discussed under these constraints and in «a smooth, informative and entertaining [sic!] debate», to cite the moderator's statement. So I proposed not to come but to send instead a text that could be read by a Swiss friend in about 10 minutes. My proposal was deemed unworthy of even a reply by the organizers, and was tacitly rejected.*

What follows is the text that I had sent. I have added the references for the publication on this web site.

First of all let me thank those who invited me to this meeting, and please accept my apologies for not being present.

Vivisection, that is invasive experimentation on live animals, is a research practice which has been criticized since about a couple of centuries, including by several eminent scientists. Of course a major objection to it has always been its intrinsic cruelty. And it is a cruelty – don't be mistaken – which begins with the caging of “experimental” animals. It has been known for at least a couple of decades that caged rodents, for instance, become neurotic – or, to use the ethologically appropriate term, they indulge in stereotyped behavioural patterns. This means that the animals the vivisector is experimenting upon are *abnormal* animals because of the very conditions in which they are reared [1,2].

I am not going to describe in detail any of the experimental procedures performed in the past and even today on animals. A great Swiss, Hans Ruesch, first made millions people all over the world, including myself, aware of vivisection as a deep moral and methodological flaw in medical research. He used to say that when exposing vivisection it is unnecessary to exaggerate – for the simple reason that it is *impossible*: in particular, virtually any experiment that, outside of a vivisection laboratory, would be considered as clear evidence of insanity or plain sadism, has indeed been performed somewhere.

However, let me at least mention a very recent example: in China monkeys have been genetically engineered to be chronically insomniac, anxious, depressed, and suffering from other psychiatric symptoms [3]. Perhaps this was the Chinese vivisectors' way of celebrating the second centenary of the first edition of Mary Shelley's *Frankenstein*.

I am not alone in thinking that the vivisectors' readiness to perform painful experiments on sentient beings forfeits their claim to being taken at face value when they protest that their work is needed for the medicine's progress. In other words, the moral outlook of researchers influences not just which experiments they are willing to perform, but also which truths they choose to disclose. It is not only ethics, but the very reliability of research which is at stake.

The basic vivisectionist claim is that animals of non-human species may be used as “models” of human physiology and pathology. In other words, by experimenting on certain animals one can have a portrait of what happens in humans – thus sparing human subjects from superfluous, dangerous, or plainly noxious experimentation.

The idea of animals as scapegoats is not exactly novel, but in this case we are entitled to ask: granted that there is no gods' wrath to be appeased, can we rely at least on the predictive power of animal models with respect to human medical problems?

To answer this crucial question, I will concentrate on a single, but essential issue.

One of the most damning features of vivisection is its *lack of reproducibility* [4,5,6]. Everyone knows that to call an experimental practice “scientific” a minimal condition to be met is that, by following a suitably formulated experimental protocol, everyone must end up by getting the same results. These results may be interesting, fertile, useful – or to have the very opposite qualities. But at least they must be constant and not depend on unpredictable environmental and operational circumstances.

With animal experiments, however, we have just this obnoxious dependence. Here is a list of curious phenomena:

- Notoriously, in different species major differences in the results arise.
- Within the same species, the outcomes depend, sometimes dramatically, on which strain is used.
- Within the same strain results are sensitive to environmental features, such as how the cages are designed and built (for instance which materials are used for the litter).
- Results depend also on the food given to the animals, and also on the frequency and the abundance of meals.
- Results may also depend on *how the experimenters look and smell* (for instance, whether they wear a mask or not).

Let us consider another variable. It has been found that if the sex of the experimental animals is not adequately controlled, one can get widely different results in what would otherwise be described as the “same” experiment – for instance concerning the effects of drugs. In other words: it is not just that mice are inadequate models for humans – even male mice are inadequate models for female mice, and conversely.

One might surmise that we have recognized this fact thanks to animal experiments. Not at all: it is the other way around – under the influence of vivisection for many decades also in clinical trials everything has been done as if, after enrolling men only, one could apply the findings to women. The absurdity has gone to such lengths that even painkillers *developed specifically for women's ailments* have been licensed *after trials on men!* You may guess that customers must have been not very satisfied, and you are right, except that without a serious and pro-active drug surveillance, ineffective and also damaging drugs can stay on the market for a long time – a profitably long time, if you look at it from the producers' viewpoint. In any case, it is only in 2016 (three years ago!) that the US National Institutes of Health has required that account should be taken of the sex of the animals in the experimental designs which it is asked to fund [7].

If you are still willing to grant vivisection the benefit of doubt, let me add another recent discovery: it has been found that the experimental outcomes critically depend also *on how animals are handled*, for instance whether mice are grasped by their tail or otherwise. In 2017 (two years ago) a British newspaper had the following headline: «Scores of scientific studies based on mice thrown into doubt because they were picked up by the tail» [8].

Is this all? No, not quite. Recently a new complication has been recognized: it is not only the sex of the experimental animals which counts – also the experimenter's sex does! You may suspect that this time I decided to make a joke, but I did not: «Ketamine lifts rodents' mood only if administered by male researchers», the austere journal *Nature* announced in that same 2017 [9]. Surely you remember Hans Ruesch's favorite dictum about the sheer impossibility of exaggerating when criticizing vivisection?...

Two points deserve to be stressed.

The first one is that vivisectors have gone on blithely performing and publishing for a century experiments which were dramatically sensitive to variables *which they did not even care to specify in their reports*.

The other point is that there is no natural way to know what to do with these different outcomes when we dare to jump from a species to a different one. In particular: which results are more representative of the human issue? On the other hand, by selecting species, strain, cages, diet, handling, and the looks, smell and sex of the experimenters, you can succeed in “proving” *just anything*. This has been shown to be the case again and again in drug testing and cancer research, not to mention behavioural and neurological research.

To sum up, vivisection is a variety of “science on order” – that is, *it is not science*. Paraphrasing what Cato the Elder is reported to have said of Roman haruspices (those “experts” who gave advice on the basis of inspection of sacrificed animals' entrails), we should be surprised that one vivisector does not burst out laughing when he or she sees another one. In other words, the interesting question is not whether animal models are predictive, because it is clear that they are not, except by chance – but how vivisection could have survived for so long such a huge amount of damning evidence. I think I have just given a main ingredient of the correct answer.

Thank you for your attention.

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Posted: March 6, 2019; March 11: corrected misprints in the refs
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