



## OF OXYMORONS AND OSTRICHES\*

*At the 10<sup>th</sup> International Congress on Production Animal Diseases I gave a talk entitled 'Scientific attitude in farm animal veterinarians - an educational objective?'. I could have used a more challenging formulation: 'Veterinary science: an oxymoron?'. An oxymoron is a type of paradox, a figure of speech, which combines two terms ordinarily seen as opposites, such as pretty ugly, plastic glass, soft rock, and - the one I like best - military intelligence. Is veterinary science an oxymoron? Would it be a contradiction in terms to aim at a scientific mindset in the veterinary clinician, the practitioner?*

*The veterinarian derives his or her satisfaction from recognizing a known disease pattern and applying standard, well-tried procedures. This person's attitude is that of an experienced professional that inspires trust in the client, who is the only person to satisfy. The farm animal veterinarian's mindset is confident, the 'leitmotif' is professional authority.*

*The researcher, on the other hand, is faced with a situation he or she identifies as novel. An observation prompts him to formulate an explanatory hypothesis that needs to be falsified (see below); this approach is creative, continuously self-critical, the objective is to choose analytical and experimental procedures, the proper combination of which should yield results to refute the hypothesis. The research worker wants to satisfy his curiosity and to publish the findings to reach a critical community of peers. The required mindset is critical, the 'leitmotif' is doubt.*

*Let me carry this a bit further: what reason could there be to indoctrinate an otherwise successful veterinary professional with the continual self-examination that characterizes the researcher? If the client notices this uncertainty, he may want to look for a better animal doctor, who knows what he is doing. In other words: the scientific mindset would affect the vet's earning capacity, his or her market value, so to speak...*

*I started my lecture last month with this provocative contraposition, which was of course meant to mislead the audience; I spent the remaining 20 minutes to make a case for the opposite: that a scientific attitude would indeed make all the difference, make our farm animal vet a better professional. The most difficult part was to avoid the pitfall of presenting the viewpoint of the Graduate School Animal Health (GSAH); after all, the attitudes I was discussing are to be conveyed to the average student, in the undergraduate curriculum, not in the Ph.D. track. There, they are an absolute requirement.*

*Our former Faculty Council - the governing body consisting of scientific staff, supporting staff and students - has given this very issue some thought and formulated in its 112th Meeting on October 16, 1980: 'Veterinary education constitutes the training in a scientific profession'. Does it really?*

### **What is scientific?**

*Four years ago, Sir Karl Popper passed away at the age of 92. He is this century's authority on the theory of scientific endeavor, and his thought is encapsulated in this statement: Science is fallible. To many, this comes as a surprise - but scientific theories are indeed only hypotheses, and most will be falsified and replaced one day. Not the confirmation of a theory is a scientific achievement, but its falsification. This critical attitude enables the scientist to know the shortcomings of a theory and understand it better. By proposing better theories, he is contributing to scientific progress. A worker frantically piling one heap of evidence upon the other would appear rather a believer than a heretic. And it is the heretics that have changed our world. Not only in science.*

*Popper labeled his philosophy 'evolutionary epistemology', because he regarded the growth of human knowledge as a gradual process of refinement. Theories that can withstand attempted refutations will survive and become preserved (but only for the time being) - those that are falsified will be replaced. It is Darwin's 'survival of the fittest' with an epistemological twist: we retain scientific theories that survive our most critical tests. Epistemology, by the way, is the branch of philosophy that studies the nature of knowledge, its presuppositions and foundations, and its extent and validity; I had to look it up in an encyclopaedia.*

*Popper's view replaced the confirmability option. Obviously, universal propositions, such as 'All cows have udders', cannot be tested (one cannot examine every cow on this planet), and are therefore not conclusively verifiable. Theories are often bold conjectures, and scientists should be encouraged in their construction - no matter how far they deviate from the tradition. But*

*growth of knowledge happens only through the elimination of error, through the refutation of hypotheses that are either logically inconsistent or empirically, experimentally refuted.*

*For those interested in epistemological issues, there is a Sir Karl Popper Society, with noble objectives, the first of which being to 'promote, explore and defend the heroic and critical ethos of science through philosophical debate'. Have a look – there are many sites on the Internet.*

### **What is education?**

*The Faculty Council chose its wording carefully, and the cornerstones of its axiomatic statement are 'scientific' and 'education'. There is a difference between teaching and education, a difference similar to that between learning and experiencing. To teach a student the Krebs cycle requires didactic skills, which a senior staff member can learn; to have the student experience academic attitude requires personal stature, which must be acquired. Experience is made, it cannot be taught, and it is personal. In my (highly personal) view it is the master-disciple relationship, the admiration and idolization that makes young students define their goals, develop their sense of self-determination. This is why I do not believe in a dissociation of education from research – Wilhelm von Humboldt's principle revisited.*

*As long as our students are merely taught, by well-trained, 'flow' -qualified readers and professors, following sound, logical curricula, they will not be educated, irrespective of our good intentions. The undergraduate curriculum as presently implemented at the Utrecht Veterinary Faculty has the laudable objective of acquainting the vet in spe with problem-solving techniques. Problem-based learning (PBL) as inaugurated in some Ivy League universities has become a paradigm of academic teaching. Techniques, teaching – nothing about education! In the meanwhile, PBL has been abandoned by yesteryear's fore-runners, which retreated to old-fashioned seminar and coursework. The results were not worth the efforts. The key issue in the academic environment is to foster scientific creativity, an objective as elusive as its definition. I think we can agree on the minimalist view that creativity constitutes a special form of problem solving; which only makes us ask: what is a problem? Here I can base my statement on an authority (Dunker, 1945) who declared: 'A problem arises when a living organism has a goal but does not know how this goal is to be reached'.*

*Most chimps can solve the banana problem – there is no training required - and be creative! But then; for the primate the problem is obvious - to get the fruit dangling from the ceiling, in a room with only some boxes present. This may not be a flattering analogy, and I mention it only to emphasise the importance of problem identification for creativity. Creative persons see problems where others don't. When we teach our undergraduate students how to solve problems, we teach them techniques, methods, tricks; we face them with a ready-made problem and ask them to solve it. In academia we should rather educate them to recognise a problem, to make them view the world around them as an ever-present challenge for discovery. Also the farm animal veterinarian needs this attitude.*

*I do not claim that these ideas are original - many scientists in our veterinary environment share them. A paradigm such as PBL may just prevail for too long, draining energy from the 'shakers and movers', siphoning away the time and opportunity to genuinely educate those few students who want to spread their wings. Talking about birds: wasn't there a (flightless) Struthionid renowned for putting his head in the sand when noticing peril.*

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