

## VETERINARY PHARMACOLOGY AND THERAPEUTICS - QUO VADIS?

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Veterinary pharmacology and therapeutics---whither goest thou? This is a difficult question to address as I don't pretend to be gifted with prescience. I will attempt, however, to indicate directions which I believe our discipline should take over the next decade. To do this, I would like first to consider two ideas which will set my theme. The first is "What is past is prologue" (Shakespeare - The Tempest, Act II, line 261). This quotation was indelibly imprinted in my mind during the early 1950's as I had occasion to ride the streetcar, every evening, past the National Archives in Washington, D.C. where it is inscribed. It is a truism that to be able to intelligently plan for the future we must understand the past.

Veterinary therapeutics is an ancient discipline which spans the recorded history of human endeavor. In contrast, the science of pharmacology began during the nineteenth century and developed slowly during the twentieth century. It wasn't until the 1950's that the transition from materia medica to pharmacology began in veterinary medicine with the publication of Veterinary Pharmacology and Therapeutics authored by Dr. L. Meyer Jones. Several individuals who played a major role in effecting this transition are now Distinguished Fellows of this Academy. During these early years, there was little definitive information concerning the pharmacology of many drugs in domesticated animals which was based on controlled scientific investigations. As much as two-thirds of the armamentarium of drugs which were taught during those early years are now regarded as being obsolete and have been withdrawn from use, although a few have found new uses as our knowledge has expanded. One such drug--yohimbine--has been resurrected since we have learned about alpha-2 adrenoceptors. Because of the imbalance between a very long tradition of veterinary therapeutics on one hand, and the recent development of veterinary pharmacology on the other, we still retain a high degree of empiricism in the practice of veterinary medicine. However, this is changing rapidly as the profession grows and the central role of veterinary pharmacologists, clinical pharmacologists and pharmacists in the development of rational therapeutics is becoming recognized by the profession. Part of this is probably due to the fact that the number of veterinarians in the United States has doubled since 1970. Currently, 85% of the profession is engaged in private practice, and the mean age for all veterinarians in the United States is 42.3 years (median = 38.8 and mode = 31).<sup>7</sup> Thus, we now have a large segment of the profession which has been exposed to the science of pharmacology during their veterinary training. This change in demography is a factor we must consider in anticipating the future.

A second thought is from Theodore Roosevelt--"There are two types of people: those who view with alarm and those who point with pride." Over the period of the last thirty years, veterinary pharmacology and therapeutics has had occasion to be schizoid in this respect. During the early years, we had to struggle for identity within the profession and to establish that our discipline was distinct from veterinary physiology. We were not simply "physiologists who give drugs." Thus, we viewed our status with alarm. Subsequently, we have focused attention on the shortage of veterinarians trained in pharmacology and clinical pharmacology. The voicing of these

concerns has resulted in a gradual change in our status within the veterinary medical community, but we still are not able to educate new veterinary pharmacologists at a rate which will meet the needs of society. With the expansion of the size of classes and the opening of new veterinary colleges, we have been able to do little better than to stay even. It seems incredible when we stop to think that a majority of American veterinary pharmacologists who ever lived are active members of our Academy. This being the case, I believe that there are many accomplishments to which we can point with justifiable pride.

We have, as teachers, educated a new generation of veterinarians who are trained to think about drugs in a scientific manner and to question the validity of empirical approaches to therapy. These results are not perfect, nor will they ever be, but we have provided a foundation. Our research has defined the importance of species differences existing among domesticated animals, has provided conceptual foundations for dosage regimens, has facilitated the application of results of basic research in pharmacology to problems of veterinary significance, and has introduced new modalities of drug therapy. In the area of public service, veterinary pharmacologists are making significant contributions to the continuing education of veterinarians, to the dissemination of information concerning veterinary use of drugs, and to the provision of expert advice to numerous groups. Annually, for the past ten years, we have organized or have participated in conferences, colloquia, symposia and other meetings designed for the exchange of pharmacologic and therapeutic information. As a result of the dedicated efforts of veterinary pharmacologists, we have gained recognition for our discipline, not only within our own profession but also within governmental agencies, A.S.P.E.T., the U.S.P. and clinical specialty groups. Veterinary pharmacology has accomplished much over the past thirty years, but there still remains much to be done. Prognosis has always been fraught with a greater degree of uncertainty than diagnosis or therapy, but the difficulties associated with planning seem to be particularly great at this time. We seem to be at a great transition point in history, which Toffler terms "The Third Wave."<sup>8</sup> Many of our traditional bearings are being lost, we seem to be oscillating at the brink of social and economic chaos in the world, and we are having to cope with an increasingly coercive federal bureaucracy and special interest groups.<sup>3</sup> The judicial system seems to be out of control, which adds greatly to the problems we are facing. These factors must be considered as we plan our agenda for the future.

One of the significant social movements of the 1980's has been the increased concern for animal welfare. The animal rights groups have become increasingly vocal, militant and effective. Various explanations have been given for the development of this phenomenon, but it is part of the reality with which we must deal in the 1980's. The veterinary medical profession should play a leadership role in this movement rather than merely reacting to the increasing militancy of some of the groups of laypersons and to the animal welfare bills which have been introduced in the Congress of the United States, e.g., Walgren, Dole, Brown, Torricelli, Broyhill-Madigan, Hatch-Kennedy. As a discipline of veterinary medicine, these events provide an unprecedented opportunity for veterinary pharmacologists to participate in the development of more rational approaches to drug therapy in animal patients and more humane and less wasteful methods for the evaluation of safety and efficacy of new drugs.<sup>1</sup>

The greatest strength of veterinary medicine lies within its generality. In an age<sup>5</sup> characterized by narrow specialization, high technology, decentralization, an exponential increase in quantity of information, and fragmentation of the "big picture," there is a vital need for generalists who have been trained to synthesize information derived from a wide variety of sources, for the improvement of health and health-care of animals.<sup>4</sup> The veterinary pharmacologist and clinical pharmacologist should endeavor to meet this societal need.

For the past fifteen years, administrators of veterinary colleges have yielded to political pressure for expansion of the size of veterinary classes and for the establishment of new colleges. This has produced a glut of veterinarians with a concomitant decline in opportunities for new graduates in the private-practice sector. Accordingly, we need to expand the post-graduate training opportunities for veterinarians. This may take the form of traditional graduate programs in comparative pharmacology leading to the M.S. and Ph.D. degrees to prepare the student for a research career. However, the number of years already spent in formal education and the burden of financial debt incurred would seem to militate against the general attractiveness of this option to many veterinarians. Innovative approaches should be sought for intensively educating veterinarians in pharmacology and toxicology so as to preserve and expand their clinical expertise while, at the same time, providing them with with a depth of scientific understanding. Such individuals would be of value in academic, industrial and regulatory positions. A corollary would be the development of intensive, short-term, post-graduate training programs at veterinary colleges for veterinarians who plan on making mid-career shifts or who already are employed by the pharmaceutical industry or federal government. Perhaps these programs could originate from a network or a consortium of several veterinary colleges to most efficiently utilize the limited manpower which is available for such training.

An important future-oriented activity of veterinary pharmacologists is research. The fruits of our laboratory or clinical investigations provide the basis for further advancement of our discipline. We have made good progress, as pointed out earlier, but have become too narrow in our perspective. Virtually our entire collective effort has been focused on problems concerning the disposition of drugs in the various domesticated animals. We now should seek to provide a broader base for understanding the pharmacologic effects of drugs in these same species. We must investigate the pharmacodynamics of drugs employed in veterinary therapeutics and elucidate the effects of various disease processes on both drug-disposition and drug-action. There is a need to investigate the drug concentration-pharmacologic response relationship for a number of drugs to make our pharmacokinetic knowledge more applicable to the solution of problems inherent in drug therapy. Finally, newer research techniques and knowledge of basic science developed in basic pharmacology departments of medical and pharmacy schools should be applied, by veterinary pharmacologists, to the diverse problems encountered in veterinary therapeutics. In doing so, we can maintain the generality of our understanding, fully utilize our veterinary medical training, improve the quality of veterinary care, and develop more sophisticated methods for evaluation of safety and efficacy of drugs.

In the arena of professional service, veterinary pharmacologists can serve in a pivotal role which has become more important as a result of rapid changes in our society. Regulatory bodies have become increasingly coercive and the American populace has become more inclined toward litigation in recent years. In order to minimize the damage done to the profession as a result of these trends, we must maintain the dialogue which has been established among academia, industry and regulatory agencies.<sup>2</sup> Active communication is essential if we are to mitigate the negative effects of sometimes overzealous regulation of the pharmaceutical industry and veterinary practitioners. At the same time, we academicians should extend greater efforts toward the continuing education of veterinarians. Many cases of malpractice actions against veterinarians have been the result of inappropriate use of drugs. Increased knowledge of pharmacology will serve as a basis for better therapeutic decisions in the course of veterinary practice. Indeed, the Center for Veterinary Medicine of the FDA recently has established the doctor-patient-client relationship as the necessary basis for the extra-label use of drugs in veterinary medical practice. This is as it should be, as the person in the best position to assure safe and effective use of a drug is the attending veterinarian, who is in a position to make a responsible therapeutic decision relative to a particular case. This person must have the necessary information to be able to make appropriate risk-benefit assessments regarding his or her choice of therapy. Efforts by veterinary pharmacologists to provide current concepts and knowledge through available vehicles for continuing education will assist the practitioner in his task.

There is an urgent need, which must be met in the very near future. This is to provide a safe alternative drug to fill the void left by chloramphenicol in food-animal practice. I agree that the decision made by FDA to prohibit the use of chloramphenicol in food-producing animals was appropriate vis à vis human safety. Nevertheless, it has left the veterinary profession without any viable alternative for the treatment of animals infected with a variety of pathogens for which chloramphenicol was the only drug likely to be effective.

In our efforts to determine the best paths to pursue during the next decade or two, we can profitably learn from the lessons provided by Peters and Waterman.<sup>6</sup> Factors which they identified as being common to excellent institutions were:

1. Willingness to take risks.
2. Remaining close to the public (practitioners, livestock producers, animal welfare groups, animal owners).
3. People are our chief resource (not buildings, technology or money).
4. Possession of a well-developed sense of purpose and shared values.
5. Doing what the institution does best (veterinary medicine!).
6. Keeping hands on and being value-driven.
7. Emphasis on synthesis of ideas as opposed to continual analysis of problems.

These lessons can be translated into an agenda for action by veterinary pharmacologists. We can maximize the impact of our limited numbers by developing relationships among institutions and laboratories through networking,<sup>5</sup> which emphasizes broad-based goals and purposes. Cooperative and collaborative ventures among institutions will facilitate the sharing of facilities and technology and provide the horizontal linkage of people needed

to provide a generality of perspective which leads to effective action. This effort should extend to the broadening of experience of people engaged in post-graduate training programs. An example is the residency program in clinical pharmacology at the University of Illinois. Residents receive part of their training at the FDA and a pharmaceutical industry as these are the only environments in which they can accomplish certain objectives of their training program. This approach could easily be extended to include periods of intensive work in other laboratories for purposes of learning techniques or working with particular species of animals. Training within such a network would provide the breadth necessary for synthesis of information needed to improve drug therapy in animals and would provide the perspective necessary for contemporary times--to be able to think globally but act locally.

In summary, I quote a portion from Festus, a poem written by Philip Bailey in 1839: "It is much less what we do than what we think, which fits us for the future." Since I began this discussion with Latin, I will conclude by stating qui non proficit deficit: translated--He who does not advance loses ground (or fails)!

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