Mental Health and Well-Being in Animals
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The pebble was tossed into the water by Charles Darwin in 1872 when he declared in his book *The Expression of the Emotions in Man and Animals* that humans are not the only members of the animal kingdom that experience a wide array of emotions and feelings. Despite the reputation of the renowned biologist, the ripples that this tiny rock generated went largely unappreciated at the time. In fact, these ripples remained quite small until the middle of the next century. In the past 40 years alone, the rapid advances of research in the cognitive sciences and related fields have caused the ripples in the water to swell to thunderous Waikiki-size waves. The message these waves carry is that no distinct line separates the human mind from the nonhuman mind. The more science learns about the animal mind, the more difficult it is to believe that the mental lives of nonhuman animals are fundamentally different from ours, that they somehow feel pain differently, feel less pain, feel physical pain but not emotional pain, or that they don’t feel pain or suffer emotional distress at all. This book is the result of the forces behind these changing beliefs.

Because of its diverse nature, caring for animals is a very complex endeavor. A multitude of issues face those who tend to animals. What are the causes of distress and suffering in animals, and how can we help protect animals from their harm? What causes animals to enjoy life, and how can we help bring that about? When an animal behaves in odd ways, what can that tell us about the way it is feeling? How hard is it on highly social animals like dogs, horses, and primates when they spend their days devoid of social companionship? Do animals experience mental illnesses? If so, what do the illnesses look like, and what can we do about them? Can animals be emotionally abused? If so, how would we recognize, prevent, and treat that? What is stress, what causes it, and how can we help animals avoid it or better cope with it? Does stress have the same impact on the health of animals as it does for human beings? To whom would an animal caregiver go to seek counsel on how to lessen his or her pet’s stress? Does any evidence exist to support the use of positive moods and emotions to enhance health? What has science unearthed about the mental health and well-being of the hundreds of millions of farm animals? How does mental health factor into a pet’s quality of life, and how can quality of life be improved? Are there any special mental health considerations for the aging animal? Is it possible to raise the general happiness level of a perfectly healthy animal? If so, how? What can be done during an animal’s upbringing to best achieve a lifetime of emotional health and stability?

At present, no unified field of study exists that can supply the answers to these questions. This seems rather puzzling, if not outright incomprehensible. They certainly all seem to be closely related issues—it certainly looks like they all should be in one field of study. And the one common factor in all of these issues just happens to be, in my view, the only part of life that matters to the animal: its mental life. The animal mind. *Everything* that that animal experiences in life, from the joy of play to the pain of a broken leg to the agony of separation from its mother to the pleasure of a tasty treat—every suffering, delight, stress, thrill, misery, comfort, anguish, and merriment—they all play out on one stage: the animal’s mind. With this magnitude of importance, the mind and mental life would be expected to command the most intense, concerted, and focused research efforts. But this is far from the case.

Preface
“Do animals have feelings?” This question was answered in the affirmative by Charles Darwin in the mid-1800s. Then how, one might ask, could this question appear in bold headline print on the cover of *US News & World Report* on October 30, 2000? It seems very hard to imagine how in this century, a major magazine does a cover story that, if written by virtually any one of the 120 million pet owners in the U.S., would be a very short article consisting of the single word “Yes.”

Let us look at the issue of animal feelings. Think about the rescues shown on the television news. A horse falls into a deep crevice and can’t get out, a whale is beached, a dog falls through the thin ice and is dog-paddling in sub-freezing waters, a kitten falls down an open pipe, an otter is covered in oil from a tanker spill. All of these true incidents required not one, but teams of rescuers, involving great expense and often substantial risk to human life. If animals did not have feelings, every one of these animals could have been simply ignored. No feelings, no sufferings. But we don’t ignore them. We go to such expense and jeopardize human lives in these situations for one reason: animal feelings. If the brain of that imperiled animal wasn’t generating some very powerful unpleasant feelings, we could all go about our days as we would if a tree were to be blown over by a strong wind.

To be sure, the “intuitiveness” and “obviousness” of animal emotions and feelings do not make them so. An interesting occurrence a few years ago demonstrated this to me first-hand. I was serving as the scientific consultant for the movie *Dr. Dolittle*, starring Eddie Murphy. In this movie we used a lot of live animals and a lot of animitronic animals. Animitronic animals, for those who may not know, are animal robots—with many moving parts and operated by puppetry or remote control. When they are operated, they look and act incredibly realistically. On the first day of filming, we were shooting the scene in which Dr. Dolittle brings his dog, Lucky, to the animal hospital because of a troubling cough. The scene had Lucky on the exam table with Dr. Dolittle looking on as the veterinarian did the examination. The director would frequently call me over and ask how to make the scene look realistic, such as where to place the stethoscope on the dog’s chest. In preparation to shoot the scene, the crew lifted Lucky onto the exam table. Right then, the director called me aside to ask me some questions. When I turned back around, we began shooting the scene. My eyes were on Lucky, and I immediately found myself amazed at Lucky’s performance—he responded on cue and did everything perfectly. And when he had to repeat it, he did it perfectly again. But he was not just impressive in his intelligence—he displayed a range of emotions in his face and body motions on cue that would rival the performance of our finest actors. I even felt some twinges of sympathy for him in light of the indignity of having to do the same thing over and over. As I’m standing there in wide-eyed awe of this dog’s incredible mental capacities, I happen to glance over to the side of the set, and sitting there is . . . Lucky! It turns out that when I was talking with the director, the crew had switched the real Lucky with the animitronic Lucky. I had been admiring the mental depth and skills of a machine, a nonconscious collection of moving mechanical parts. I had been one-hundred percent fooled. This raises a very obvious question: is it possible that we are all being fooled when we look at animals? Are animals just nature’s little animitronics?

It is very easy to ascribe feelings and other human mental attributes to animals, especially to those that closely resemble us. Once that occurs, any caring person will experience empathy for that creature. There are even people who feel sorry for the little scraggly tree that nobody wants on the Charlie Brown Christmas special. Some evidence even suggests that ascribing feelings to other beings may be a part of human nature. Primate researcher Daniel J. Povinelli has proposed that humans have evolved an instinctual propensity to attribute emotion to other animals, even to inanimate objects. The robot dog manufactured by Sony, called AIBO (pronounced “eye-bo”), has acquired such a fanatic owner base that AIBO clubs exist all over the country and on the Internet. Club members are very open to admit that they look at their “dogs” as much more than machines, and they proudly talk about them as if they had actual personalities, emotions, and feelings.

So here we are. Many are convinced beyond any doubt that at least some animals—mammals, birds, and maybe others—are fully conscious, thinking, feeling beings. Some do not. If the latter are correct, then the book you are holding right now would have all the legitimacy of a scholarly tome on the spectrophotometric analysis of the various hues in the cheese that makes up the moon. You would be holding an expensive doorstop (that a lot of us went to great effort to create for you).

This “problem” of being certain that animals are sentient is not a problem for the public. In America
as well as countries the world over, the public is not satisfied to sit and wait while scientists continue to debate this issue. Laws are being passed in rapid fashion, ranging from outlawing gestation crates for sows to banning the declawing of cats. Of course, there would be no reason for any of these laws if animals cannot experience feelings.

Studying the mental realm of animals presents many challenges not encountered in other branches of science. One of the biggest problems we face is the existence of frustratingly confusing and imprecise terminology and definitions for issues of the mind. What is stress? No universally accepted definition exists. Likewise for distress, suffering, welfare, well-being, happiness, quality of life, affect, feeling, discomfort, and even emotion. None of these terms can dependably convey the same information between two individuals as, say, blood pressure or vision can. It is not even clear whether many differently named concepts are not actually the very same thing. Is happiness different from psychological well-being? Is stress different from distress? Even the terms mental health, mental well-being, and mental wellness—are they all referring to positive states or to a continuum that varies from negative to positive? For example, authors frequently write phrases such as, “To achieve mental well-being, the animal’s needs must . . .” But if mental well-being is, as most authors contend, a spectrum, then it would not be possible to “achieve” mental well-being.

In studying mental health in animals, it is important that we examine the course that the mental health field took in humans. As will become apparent, an important mistake was made that we in the animal fields must not repeat.

The field of human psychology, a tiny profession in the early 1940s, grew rapidly after the return of U.S. troops from overseas after World War II. Our soldiers came back with deep emotional scars that needed healing, and the ranks of psychiatrists were much too meager to meet the need. In response, Congress passed the Veterans Administration Act in 1946, which helped create a large new pool of psychologists to tend to our wounded veterans. Understandably, with the need being the healing of mental disorders, that’s where the interest, money, and research went. As this attention to suffering continued over the subsequent decades, the fact that the psychological make-up of a human being involved more than disease and suffering, but also included the positive aspects of existence such as happiness, emotional pleasantness, and life satisfaction, took a back seat or was wholly ignored. In fact, at this time, it was generally assumed that happiness was what you had if you were free of psychological disorders. Seen this way, happiness was achieved through treating mental illnesses, making any research on happiness itself appear rather silly and pointless. Over the next half century, the very reason that the field of psychology flourished—to heal mental disorders—remained the focus of every aspect of the profession (Seligman 2002).

Myers and Diener (1995) noted that because of psychology’s focus on negative emotions such as depression and anxiety over time, “psychology” became synonymous with “mental illness.” Seligman (2003) noted that “in spite of its name and its charter, the National Institute of Mental Health has always been the National Institute of Mental Illness.”

To illustrate the effect this emphasis on the negative has had on our thinking, imagine that I had titled this book Mental Health in Animals. Give a few moments of thought to this title. Picture yourself coming across this book at a bookstore. As you reach to pull the book off the shelf to look it over, what would you be expecting the content to be? If you think like virtually everyone else, you would think that you are about to peruse a book on the various mental illnesses and disorders that animals suffer from. Would the thought that the book might be about promoting mental well-being, happiness, and enjoyment of life have even entered your mind?

Myers and Diener (1995) state that during the latter half of the twentieth century, the number of articles published in the psychology literature on negative (unpleasant) mental states exceeded those published on positive states by a ratio of 17:1. Not until the last 2 decades of the twentieth century did researchers begin to examine the positive side of the psychological well-being spectrum. The field of “subjective well-being” (the term Diener had to use when he started studying positive mental states because this term would sound more scientific than “happiness” [Richardson 2002]), which examines such topics as life satisfaction, emotional well-being, and happiness, has since grown rapidly.

Because the field of mental health in animals has not yet emerged as a distinct discipline of study, it is both opportune and essential that in the formation of this field, we do not commit the same error. One of the principle objectives of this book is to present a balanced view of mental health so that at the very
outset, the positive psychological states—those that have the potential for enhancing the life experience—will be placed on an equal level of importance as the negative states.

Preventing the negative-positive imbalance of the field of mental health is not the only obstacle we face as this new field emerges. We have to first repair the big chunk of damage that can be traced back more than 400 years to the noted philosopher René Descartes. In a story that most readers of this book know well, Descartes’s attempts to study the human body did not sit well with the reigning Church, which was the greatest power of the day. When the Church expressed its dissatisfaction with the study of God’s handiwork, Descartes struck a deal with the Church officials. He divided human existence into two realms—the physical body and the mental-spiritual realm—and assured the church leaders that if they would allow him to study the physical body unfettered, then he would regard the spiritual part of the human to be the exclusive domain of the Church and something he would not tread on or otherwise disturb. This artificial construct—a firm wall between the mental and physical—has guided scientific and medical thought ever since, much to the detriment of animal and human welfare.

Once the body and mind were (conceptually) separate, the animal mind suffered a fatal blow at the beginning of the twentieth century. Early in the century, researchers in psychology and animal behavior were deeply troubled that their field was not being accepted as “real” or “hard” science (Rollin 1989). In a groundbreaking paper, Watson (1913) appealed to the field of psychology to “throw off the yoke of consciousness,” for, by concerning itself with such a vague and nonscientific concept, “[psychology] has failed . . . to make its place in the world as an undisputed natural science” like physics and chemistry. Consciousness and its associated notions (mind, emotions, feelings) were not directly observable, measurable, and verifiable and did not behave like objects of a real science. Thus, Watson implored those in the field to “never use the terms consciousness, mental states, mind . . . and the like” (Watson 1913). Watson decreed that the field should instead concentrate on behavior because overt actions could be seen, measured objectively, and verified. Watson was proposing that animal behavior be treated exclusively as a simple stimulus-response reaction; the mechanisms at work in the “black box” of the mind—mental states and cognitions—were nonscientific and hence to be ignored. With this, in the eyes of the scientific community, the animal mind ceased to exist.

The mind remained “lost” for three quarters of a century until it “reappeared” in 1976, with the publication of Donald Griffin’s enormously influential book The Question of Animal Awareness (Griffin 1976). But a curious thing happened. The animal mind was embraced only by the field of cognitive sciences and flatly ignored by the field that tends to the animal body—veterinary medicine. So although both components of the animal were once again “alive” and under study, they had not actually been rejoined. Instead, in a remarkable development, the animal mind and the animal body began to run parallel, but distinctly separate, courses and have ever since. In the process, two separate literatures have developed—one attends to the animal body (veterinary medicine), and the other to the animal mind (cognitive sciences). This split in the scientific literature between the animal mind and body is so complete that it is almost as if two entirely different types of animal organisms inhabit the earth: mental animals and physical animals.

This divide has left us thus far with no cohesive picture of the animal mind. Each of the various disciplines studying animals—comparative psychology, cognitive ethology, neuroscience, animal science, veterinary medicine, and veterinary clinical behavior—communicates little if at all with the others, and despite its vast importance, the mind, and specifically mental health, of animals has to date not been compiled and structured into an organized field or body of knowledge. Clearly, the now-voluminous and rapidly growing body of research about animal emotions, sufferings, and psychological health comprises a solid scientific foundation for the establishment of the field of mental health and well-being in animals. But for now, this wealth of information remains, for the most part, widely scattered throughout a vast and diverse array of scientific journals, lay magazines, textbooks, and popular books.

All of this has resulted in a different kind of challenge for establishing a field of mental health in animals. We are not faced with the task of simply erecting a new discipline; we have to reassemble our object of study at the same time. With the well-established knowledge of the inseparability of the body and mind, until the animal mind and body are reunited, we face severe limitations in making advancements in the understanding of mental health.
and well-being in animals. A second objective of this book, then, is to bring together the fields of cognitive sciences and veterinary medicine (which includes the field of clinical animal behavior) to create a comprehensive resource integrating all of the knowledge from the various disciplines. By eliminating the gap that separates these two major fields of animal study and care, we will, in a very real sense, reunite the animal mind and body.

This book is divided into four sections. Part I presents an overview of the most important general concepts of mental health and well-being in animals. Part II deals with the negative—the bad, the unpleasant, the hurting—conditions of the mind and what can be done for them. Part III is a focus on the positive—the good, the pleasurable, the enjoyable—conditions of the mind and how we can promote them. Part IV looks at some special populations of animals for which mental health and well-being issues play an especially prominent role.

An important note must be made before we get started. In 1897, a veterinary textbook entitled The Veterinary Science: The Anatomy, Diseases and Treatment of Domestic Animals was published (Hodgins & Haskett 1897). In it are numerous descriptions of pain in animals, including that experienced during what we now consider barbaric surgical procedures. A typical passage reads, “If the wound is torn too much, tie the dog’s mouth with a rope or muzzle so he cannot bite you, also tie his legs to hold them firmly, then stitch the wound up with a needle and twine. . . .” Another description about founder in pigs reads, “From the severe pain of the feet and not being able to get around to eat its food it soon falls off in condition and becomes very gaunt.” A final example describing the signs of colic in horses reads, “The horse is attacked very suddenly, begins to tremble, paws with one foot and then with the other, and turns the head around to the side, cringes and lies down. . . . The pain keeps on increasing, the symptoms get worse, and he does not get a minute’s peace. . . . He sweats freely, and the lining of his eyes becomes very much reddened and angry . . . and the pain keeps on increasing. At this stage his ears begin to lop over and he gets a very haggard look on his face, as if in extreme agony. After a few hours he is a pitying sight to see.” The reason this is so important is that even with such graphic evidence of intense suffering, it wasn’t until the very end of the next century—in the 1990s—that the veterinary profession began a serious effort to relieve pain in its animal patients.

We are now embarking on a new venture—to tend to the animal mind through promoting positive experiences and relieving the emotional pains from which animals can suffer. Let us this time not allow a hundred years to pass before we take action.

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November, 2004

REFERENCES
As a boy I grew up on a farm surrounded by animals; pigs, cows, rabbits, chickens, bees, dogs, and cats. On the farm it was a common occurrence to be faced with animal suffering, emotions, and cognition. To assume they didn’t suffer or feel or think would be ludicrous and foolhardy. You had to know the personalities and moods of the cows you milked or you could end up with more than a little milk on your face. We saw joy and depression in our animals just as in ourselves. When an animal was hurt they suffered and we responded immediately to relieve their pain; to do otherwise was unthinkable. Looking back on those days I now realize that my large farm family had unwittingly taken Darwin’s notion of continuity seriously without knowing it. It was simply accepted that there was a continuity of mind and emotions, and that although sometimes our fellow animals’ joy or pain was expressed differently, it was still joy or pain.

It wasn’t until college and my advanced courses in science that my unwitting Darwinian view of our fellow animals was replaced with the accepted and acclaimed Cartesian view. My “hayseed” naiveté was quickly stamped out with opprobrium’s like “anthropomorphism” and “sentimentality” and “subjective opinions.” I was encouraged to abandon these and replace them with “objectivity.” It was as if my abandonment of what I knew to be true was the prerequisite to get into a very special and exclusive club. The attraction catered to our species’ greatest weakness: our arrogance. By taking this up I could join a very exclusive priesthood and rise above the common person and especially the ignorant farm boys of the world. Gaining admittance to this revered priesthood would make me feel special and superior... better than most of my fellow humans as well as all the other organic beings on the planet if not the universe. Anthropocentricism is hard to abandon if you happen to be human. I didn’t realize at the time that objectivity, while worthwhile in some cases, can also be used as poison to blind scientists to suffering.

This intoxicating arrogance soon dissipated when I entered the graduate program at University of Nevada at Reno to study in Experimental Psychology. I was hired on as a research assistant to Drs. R. Allen Gardner and Beatrice T. Gardner. They were the originators of the now famous Project Washoe. Washoe was an infant chimpanzee who the U.S. Air Force had brought over to participate in their space program. The Gardners obtained her from the U.S. Air Force to begin a cross-fostering study where they, and their students, would raise Washoe as if she were a deaf human child. Project Washoe was a great success and Washoe became the first of our fellow animals to acquire a human language, American Sign Language (ASL) for the Deaf. Washoe is the type of person who has a “presence” about her. She is a very self-confident person as well as being one of the most compassionate and empathic persons I know. But it is her self-confidence that changed me. I came onto the project with my newly acquired sanctimonious Cartesian delusions and Washoe brought me back to Darwinian reality. Not only did she not consider humans to be special, but she also considered herself to certainly outrank the new students on her project. We noted that with new students on the project Washoe would slow down her speed of signing to the novice, which in turn had a very humbling effect on the aspiring scientist. In the normal course of caring for Washoe, she would order me around and demand that things be the way she wanted them to be, and she was strong enough to enforce her wishes. But, like a sibling, she cared for us a great deal. The Gardners caught on film
a situation where one of Washoe’s favorite human companions, Susan, was crying and Washoe ran to her aid to hug and comfort her. In her run to Susan she would leave her normal comfortable quadrupedal run and change to the awkward bipedal run so she could sign “HUG” to Susan as she ran to her. Over the years this compassion has endured as one of Washoe’s most dominant personality characteristics. She always expresses her care for those in need, regardless of whether it’s a fellow chimpanzee with a sore foot or a human friend who has miscarried.

This compassion is not limited to Washoe. Today she lives with Tatu and Dar, two other cross-fostered chimpanzees and Loulis, whom she adopted when he was 10 months of age. Loulis has acquired all of his ASL signs from Washoe and the other chimpanzees. The day before yesterday was my 61st birthday and in celebration my wife Debbi and I went out for a movie and dinner. In the movie theatre while making a last minute trip to the restroom I walked into a guardrail pipe that caught my upper thigh with such force that I had to limp to the restroom while trying to work out the muscle bruise to my thigh. Needless to say, it hurt a great deal. The next morning at 7AM Debbi and I greeted the chimpanzees, some still covered in their beds or snuggled in their nests. Tatu was awake and she had her blankets gathered in front of her while doing her typical comforting walk-rock. I went over to the wire separating us and squatted down to wish her a GOOD MORNING in ASL. My thigh was still quite sore and stiff and I must have given a slight grimace when I squatted down, though I didn’t realize it. Tatu immediately stopped rocking and asked me “HURT?” holding the ASL sign with the questioning expression on her face. I signed, “YES, HURT THERE,” indicating my thigh. Tatu moved her blankets aside, came to the wire, and extended her lips through the wire and I gave her my pronated wrist to kiss. Her kiss did make it better. It is always nice to know that someone is concerned and cares about you. This morning when I came in, the minute Tatu saw me she stopped her usual blanket rock-walk and asked me “HURT?” I answered “YES BUT I BETTER.” This seemed to satisfy her because she went back to her blankets until I squatted down and greeted her. Behavior such as Tatu’s is common among all of the chimpanzees at our facility, and I have reported several such instances in my book Next of Kin. It is particularly ironic to me that we humans, who consider ourselves demiurges or at minimum the paragon of animals, would so often come in second to a chimpanzee with regard to empathy, compassion, and caring for another species. They are not blinded to the suffering of others.

Given our personal experiences in academics and with Darwin’s theory, which embraces the continuity of the mind as well as the body, the question arises as to how we came to this profoundly flawed Cartesian state. The answer is simple; perhaps our species' greatest weakness is our arrogance and indiscrimining acceptance of those who pander to this arrogance and our demiurge pretensions, Plato being one of the earliest examples of this mindset. Plato gave Man a rational soul and a brute soul. The rational soul gave Man rational thought and when he died, this part was permitted entry into heaven. The brute soul was ruled by irrational emotions and died with the body. But only some human beings had a rational soul, and everyone else had brute souls, including all of our fellow animals as well as women and slaves. This model justified the exploitation of the "have-nots" as a noble act to improve life for the special few at the top. Plato’s student Aristotle picked this up and translated it into a Scala Naturae, which put the sole processor of the rational soul, Man, on top, and then after a difference in kind, ranked those relegated to having only brute souls. Women were with the brutes, and Aristotle felt they were only good for two things: cooking and having children. When the Catholic Church arose they badly needed a hierarchy that displaced women and animals, so the church adopted this pagan worldview as their philosophy of record. Descartes, being a good Catholic subject, adopted and adapted it as well for his philosophy. The big change he made in Plato’s model was that Man was still on top with the rational soul, but now women and animals were no longer emotional slaves, but instead machines. The origin of the two schools of Subjective Psychology and Objective Psychology can be traced to this philosophy. By being machines, it simply meant that the yelp of a dog that is struck by its master is no different than the ringing of a bell that is struck by its owner. If the reader is offended by the objectification of subjects such as women, or even when forests are destroyed for monetary profit, you now know whom to blame: Rene Descartes and all those who have embraced this erroneous philosophy. In a pragmatic sense it has done a great deal of harm, not only to those who have been treated like machines, but to those who treated them in this way. The animal, child, or woman suffers, but the abusers suffer as well by committing the act. It slowly chokes any
compassion or empathy they might have and makes them less of an organic being than they were before the act.

Times are changing and there are signs that our civilization is beginning to leave the delusional arrogance of Cartesian discontinuity behind and instead embrace the biological reality of Darwinian continuity of mind and body. This book is one such sign, where the minds of our fellow animals are recognized and as a result their mental health is considered a legitimate endeavor to study and treat. This is a remarkable feat when I consider that in my lifetime it was considered perfectly ethical to drive a piston into an unanesthetized chimpanzee’s head, or to sew a monkey’s eyes shut all in the name of objective science. This first step is very encouraging. Of course it will bring some discomfort to the misguided Cartesians in our midst because it implicitly raises some ethical concerns. Given the reality of the continuity of mind and emotions, doesn’t it make sense to abandon Aristotle’s Scala Naturae vertical scale and replace it with Darwin’s horizontal gathering of organic beings? And if we do this, is the next step to provide the protection and care to fellow animal beings as we would our fellow human beings? It is my hope that we will embrace the biological reality and its ethical implications.

I look forward to reading the contributions of this noted assemblage of experts in the mental health of our fellow animals. The sheer presence of such a book and the impressive array of noted scientists speaks loudly to the change we are experiencing. If I could I would only change one thing about this book, and that is its title. The title speaks to pervasiveness of our civilizations’ assumption that we are outside of nature with the implicit implication that we humans are not “animals.” I would change the title to “Mental Health and Well-Being in our Fellow Animals.”

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Part I
Foundations of Animal Mental Health and Well-Being
On Understanding Animal Mentation

Bernard E. Rollin

The very idea of a book on mental health and emotional well-being in animals would predictably have brought forth guffaws and ridicule across the scientific community as recently as the late 1980s. In agricultural science, one of the few areas to even talk about animal welfare, the definition of welfare did not include any reference to subjective states of the animal, but instead focused exclusively on productivity. As the CAST report put it,

The principle [sic] criteria used thus far as indexes of the welfare of animals in production systems have been rate of growth or production, efficiency of feed use, efficiency of reproduction, mortality and morbidity. (CAST 1981)

In other words, the welfare of an animal was to be determined by how well it fulfilled the human purposes to which it was put, not by how it felt.

One might expect such a response from industrialized, post-World War II agriculture, where the supreme values were “efficiency and productivity,” industrial values that, in the second half of the twentieth century, tended to supplant the traditional agricultural values of way of life, husbandry, and stewardship. After all, agriculturalists were primarily committed to producing massive amounts of food as cheaply as possible, keeping the cost of food low for consumers, feeding a rapidly burgeoning population, and applying scientific and industrial methods to yet another area that had been largely unchanged for thousands of years. United States Department of Agriculture (USDA) funding drove land grant universities in that direction so that, ironically, the schools that were chartered in part to help sustain small agriculture were instrumental in hastening its demise. But what of other areas of science that did not directly serve an economic function—biomedicine, psychology, biology? Unfortunately, these areas too exhibited virtually no concern for animal welfare and related concepts.

As we will discuss in detail later in this volume, to generate an account of animal welfare that is of any use, one needs at least two conceptual components: First, one needs some approach to animal subjective experience. To say that an animal is in a state of poor welfare, we mean that it is suffering to some extent—physical pain, fear, anxiety, loneliness, boredom, or other noxious subjective experiences. In the end, animal thought and feeling are constitutive of what we need to worry about when we use an animal for testing, research, or agriculture.

To take a simple example, rodeo bulls show all evidence of enjoying bucking off cowboys; they are typically not experiencing any pain in the process, and certainly no fear. Assuming they are adequately fed and housed, it is reasonable to say that, as far as the bull is concerned, its job does not harm its welfare. (Though people may of course object to such spectacles on other grounds.) In contrast, consider a young calf used for calf roping. Even ranchers are uncomfortable with such an event because the immature animal surely experiences fear and physical pain when jerked at the end of a rope.

Yet another component is essential to making welfare determinations: the ethical judgment as to how much pain or discomfort one ought to allow an animal used by humans to experience. This is essentially a moral question. Consider animals—beef cattle—raised by cow-calf producers on western rangelands. It is generally acknowledged that such animals are far better off than animals raised in full confinement, if only because their telos, or nature, is largely respected, say as opposed to a sow or veal calf in a crate. Ranchers generally care about their animals a good deal, yet brand them and castrate
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males without anesthesia. Yet they will claim that the animals enjoy positive welfare, because these economically necessary procedures are of short duration and cause only very short-term pain, whereas the remainder of the animal’s ranch life is pleasant. Much of the public, however, considers even short-term pain induced by a third-degree burn in branding to be morally unacceptable and would thus confute the rancher claim about cattle welfare being “acceptable.”

Thus, talking of welfare in animals used by humans (i.e., animals whose welfare is in human hands) depends on assuming that we can judge animal subjective experiences and then rate these experiences morally. (This is of course less of a moral problem with “wild animals,” whose welfare is far less a function of human treatment and more a function of nature. Nonetheless, judging welfare will still depend on assessing animal experience and on having some notion of what an animal in such circumstances ought to expect to experience, hence, our debatable but morally laudable tendency to want to feed wild animals during drought and famine.)

The problem that excluded welfare talk from all areas of biomedicine, biology, and psychology is basically one of unexamined assumptions that are highly debatable but were rarely questioned during most of the twentieth century—what I have elsewhere called scientific ideology or the Common Sense of Science. As Aristotle long ago pointed out, every field of human activity, be it art, medicine, law, mathematics, politics, or science rests on making certain assumptions. As in the paradigmatic case of geometry, the assumptions are taken for granted, not proven, because all proof depends on using the assumptions. If the assumptions are capable of being proven, it would have to be on the basis of other assumptions, which would themselves need to be either assumed or proven, etc., ad infinitum. Because an infinite regress is impossible, we begin with certain unproven assumptions. Examples of such assumptions are myriad: It was long assumed in Western art that works of art needed to be representational; the legal system assumed that we could coherently distinguish between actions for which people could be held responsible and those for which they could not; medicine assumed the concepts of health and disease; morality assured that our moral concepts applied only to our treatment of (some) humans, etc.

None of this, however, means that assumptions cannot be challenged. Modern art challenged the representational assumption; biological knowledge can lead us to question the degree to which human action is really “free”; medical community pronouncements about obesity, child abuse, alcoholism, and violence challenge our concepts of disease. Indeed, one useful definition of philosophy is that it exists to challenge assumptions on the basis of reason. Such challenges can in turn yield major conceptual and even scientific revolutions, as when Einstein challenged the accepted concepts of Absolute Space and Time.

When, however, certain assumptions in various fields become insulated from and impervious to rational criticisms, they become ossified into ideologies. The Nazi assumptions about inherently inferior races, the fundamentalist belief in the literal truth of sacred texts, and the Catholic view of the Trinity as being three-in-one despite the inability to reconcile that view with logic all represent clear examples of ideological belief that will be held onto regardless of empirical or logical refutation. Ideologies are pervasive world views, views of a field, or assumptions that resist or even forbid criticism.

Beginning in the late nineteenth century but actually rooted in much earlier scientific thought (e.g., Newton’s famous dictum “I do not feign hypotheses”), the scientific community developed a view of science that rapidly hardened into scientific ideology, or, as I have called it, the Common Sense of Science (Rollin 1998), for it was to science and scientists what common sense was to ordinary people in ordinary life. This view was based on the desire to draw a clear line of demarcation between science and nonscience and to exclude from science notions such as life force (élan vital), entelechies, absolute space and time, and aether that had become adopted illegitimately in biology and physics.

The key to this ideology was that nothing could be admitted into science that was not subject to empirical verification and falsification. Testability (verifiability and falsifiability) became the sine qua non for what could legitimately be considered part of science. This was meant to exclude speculative, mystical notions from the domain of science, but soon was far more widely applied and used to exclude value judgments in general, and ethical judgments in particular, from science because they could not be tested. (Wittgenstein once remarked that if you take an inventory of all the facts in the universe, you won’t find it a fact that killing is wrong.) The slogan for much of the twentieth century was that “science is value-free.”

The second mischievous implication of restricting the scientific to the observable was the declaration
that science could not deal with mental states, which are inherently subjective in both humans and animals, and what is inherently subjective is not testable. One wit, commenting on the history of psychology, quipped that, after losing its soul, psychology proceeded to lose its mind. What is particularly perplexing about this second component of scientific ideology is that it was radically incompatible with Darwinism, the regnant paradigm in biological science.

It was axiomatic to Darwin that if physiologica1, morphological, and metabolic traits were phylogenetically continuous, so too were mental and psychological ones. Darwin believed this to be true not only of cognition but also of emotion. One of his all-but-forgotten books details his experiments on the problem-solving ability (intelligence) of earthworms, and the title of his classic work, The Expression of the Emotions in Man and Animals, underscores his view of continuity of mentation. Darwin’s secretary, George Romanes, was entrusted by Darwin with much of the writing on animal mentation, and he produced two brilliant but barely noticed books on this subject, entitled Animal Intelligence and Mental Evolution in Animals.

Romanes reasoned that though controlled experimentation could provide some knowledge of animal behavior and thought, the vast majority of such knowledge would properly come from anecdotes recounting observations of animal behavior under natural conditions. Acutely conscious of the fact that anecdotal information can be extremely unreliable, Romanes (1898) devised a method for critically sifting or, in his words, “filtering” anecdotes:

First, never to accept an alleged fact without the authority of some name. Second, in the case of the name being unknown, and the alleged fact of sufficient importance to be entertained, carefully to consider whether, from the circumstances of the case as recorded, there was any considerable opportunity for malobservation; this principle generally demanded that the alleged fact, or action on the part of the animal should be of a particularly marked and unmistakable kind, looking to the end which the action is said to have accomplished. Third, to tabulate all important observations recorded by unknown observers, with the view of ascertaining whether they have ever been corroborated by similar or analogous observations made by other and independent observers. This principle I have found to be of great use in guiding my selection of instances, for where statements of fact which present nothing intrinsically improbable are found to be unconsciously confirmed by different observers, they have as good a right to be deemed trustworthy as statements which stand on the single authority of a known observer, and I have found the former to be at least as abundant as the latter. Moreover, by getting into the habit of always seeking for corroborative cases, I have frequently been able to substantiate the assertions of known observers by those of other observers as well or better known.

Though part of scientific ideology is having healthy contempt for anecdote, I do not share this view and see Romanes’ method as perfectly compatible with the common sense we use in daily life. After all, consider our knowledge of human behavior. How much of this knowledge is derived from laboratory experimentation—virtually none! Virtually all of this knowledge—with the exception of a few social-psychological insights such as those provided by Milgram’s work on obedience or Zimbardo’s work on simulating guards and prisoners—comes from interaction with other people in daily life. The same is true of our knowledge of animal behavior. For example, though the cat is one of the most studied animals in twentieth-century physiological psychology, all that has been learned has to do with cats under unusual circumstances (brain lesioning, deprivation, and so on). None of this work produced a single book on normal cat behavior!

In 1985, Morton and Griffiths produced a classic paper on recognizing pain in animals, in response to researchers complaining about new laws mandating the control of pain. These researchers expressed ideology-based agnosticism at knowing how to identify pain in animals. Morton and Griffiths gave two responses: first, they provided a calculus for evaluating pain—2 points for the animals not eating, 4 points for vocalizing, and so on. In this case, Morton and Griffiths said, essentially, that if a scientist is in doubt about animal pain, he or she should ask an animal caretaker, ranch manager, or technician—in short, those who live with the animals. Morton and Griffith’s second approach was the one they considered most accurate. In this approach, those who live with animals must know the animals’ mental states to survive. In the 1940s, psychologist David Hebb (1946) reported that zookeepers said they could not do their jobs if they were not permitted to use mentalistic locutions about the animals’ changes.

My own animal science students some years ago were taking an animal behavior course from a
person agnostic about animal consciousness. Most of the students were ranch kids, having grown up with animals, and, having addressed nearly 30,000 ranchers in my career, I know that no ranchers doubt that animals are conscious. I asked the students how they dealt with the professor’s agnosticism about animal awareness. “Oh, we give him back what he preaches on tests,” they said, “but we forget all that crap when we go back to the ranch. If I can’t say ‘the bull is in a mean mood today,’ I won’t live long!”

In a paper I delivered as a keynote speech to the International Society for Applied Animal Behavior (Rollin 2000), I argued that the rejection of anecdote (and anthropomorphism) as a source of information about animal consciousness was misguided. After all, every report of scientific experiment is itself an anecdote, and the scientists reporting it have a strong vested interest in its being accepted. With all we know of data falsification and “publish or perish” pressure, why consider the scientist a more credible source of knowledge than the disinterested lay observer, corroborated across time and space by others?

In any event, returning to the main thread of our discussion, the denial of consciousness was directly incompatible with classical Darwinism, but that did not bother either Behaviorist psychologists (who dominated psychology in Britain and the U.S.) or Ethologists (who dominated Europe). Positivism eclipsed Darwinism. When Ethologists met with Behaviorists for the first time in 1948, as chronicled in the volume *Instinctive Behavior*, they agreed on virtually nothing except the unknowability of animal consciousness (Schiller 1957).

Because Behaviorism dominated U.S. animal psychology for much of the twentieth century, it is worth briefly mentioning how it came to trump Darwinism. J. B. Watson almost single-handedly accomplished this feat, though he was originally a believer that psychology should study consciousness, even complaining in an early book review that the book did not talk enough about consciousness. Later in his life, however, Watson argued that if psychology was to achieve the status of other sciences, it in essence needed to stop dealing with the subjective and consider only observed learned behavior, which to him assured objectivity. Furthermore, from an objective psychology could and would come practical applications—a behavioral technology, as it were, that would allow society to create ideal educational institutions, rehabilitate criminals, and cure psychological and anti-social aberrations. (This project was carried on by B. F. Skinner [Kitchener 1972].) Furthermore, Watson had been a founder of modern advertising psychology, had succeeded in the industry, and had sold Behaviorism through the mass media while most other scientists shunned (and still shun) the press.

In any event, Behaviorism denied the studiability of mentation in humans or animals, with Watson at one point coming close to affirming that “we don’t have thoughts, we only think we do.” So dominant was Behaviorism that it occasioned a marvelous speech by Gordon Allport when he was president of the American Psychological Association:

So it comes about that after the initial take-off we, as psychological investigators, are permanently barred from the benefit and counsel of our ordinary perceptions, feelings, judgments, and intuitions. We are allowed to appeal to them neither for our method nor for our validations. So far as method is concerned, we are told that, because the subject is able to make his discriminations only after the alleged experience has departed, any inference of a subjectively unified experience on his part is both anachronistic and unnecessary. If the subject protests that it is evident to him that he had a rich and vivid experience that was not fully represented in his overt discriminations, he is firmly assured that what is vividly self-evident to him is no longer of interest to the scientific psychologist. It has been decided, to quote Boring, that “in any useful meaning of the term existence, private experience does not exist”. (1939)

And, commenting on the idea that all human psychology could be modeled in rat learning (i.e., conditioning), Allport produced this gem:

A colleague, a good friend of mine, recently challenged me to name a single psychological problem not referable to rats for its solution. Considerably startled, I murmured something, I think, about the psychology of reading disability. But to my mind came flooding the historic problems of the aesthetic, humorous, religious, and cultural behavior of men. I thought how men build clavichords and cathedrals, how they write books, and how they laugh uproariously at Mickey Mouse; how they plan their lives five, ten or twenty years ahead; how, by an elaborate metaphysic of their own contrivance, they deny the utility of their own experience, including the utility of the metaphysic that led them to this denial. I thought of poetry and puns, of propaganda and revolution, of stock markets and sui-
cide, and of man’s despairing hope for peace. I thought, too, of the elementary fact that human problem-solving, unlike that of the rat, is saturated through and through with verbal function, so that we have no way of knowing whether the delay, the volition, the symbolizing and categorizing typical of human learning are even faintly adumbrated by findings in animal learning. (1939)

In short, Behaviorism combined with Positivism to produce the two components of Scientific Ideology we have discussed. In today’s world, where concern for animal treatment is a major social issue across the Western world, the general public would never have permitted the denial of mentation. However, during the period roughly from 1920 to 1970, society did not manifest such concern, so ethics did not choke ideology, and the scientific denial of animal consciousness (indeed, human consciousness) endured.

It should be noted that although one cannot produce a “bible” of scientific ideology, the value-free aspect was literally written in the introductions to biology textbooks at least into the 1990s. Indeed, this view was omnipresent in science. All students were taught that science did not make ethical judgments. Science courses did not engage ethical issues occasioned by the sciences; nor did scientific conferences or science journals. Even when society was highly critical of animal use in research, the scientific/medical community responded by trotting out sick people, threatening to not cure children, and generally responding every bit as emotionally as their anti-vivisectionist critics because, to Positivism, ethical judgments are nothing but emotional predictions mistakenly put in propositional form. I have argued that the major reason for societal rejection of biotechnology is the failure of the scientific community to articulate the ethical issues emerging from genetic engineering and cloning. The resulting lacuna in social thought is then filled by doomsayers (such as Jeremy Rifkin) or theologians. George Gaskell (1997) of the London School of Economics demonstrated through survey data that Europeans reject biotechnology not, as common scientific wisdom suggests, out of fear, but on moral grounds.

This is well-illustrated in the story of Dolly, the cloned sheep. When scientists failed to articulate any ethical issues associated with cloning, the public raised its own issues. Within a week of the announcement of Dolly’s cloning, a Time magazine survey showed that fully 75 percent of the general public saw cloning as “violating God’s will” (Anonymous 1997).

In one of the most extraordinary incidents bespeaking the pervasiveness of this ideology, James Wyngaarden, then head of National Institutes of Health (NIH) and arguably in that role, the chief spokesman for the biomedical research establishment, affirmed at his alma mater, Michigan State University, that “although scientific advances like genetic engineering are always controversial, science should never be hindered by ethical considerations” (Anonymous. 1989). Tellingly, when I read this statement to my students and ask them to guess its source, they say Hitler.

I would argue that few things have hurt science as badly as removing itself from ethical issues. In addition to hurting biotechnology, science’s failure to truly engage the ethical issues in animal research almost led to severe legislative curtailment of biomedical funding. Failure of the scientific community to consider the moral issues of research on humans has led to Draconian federal regulations in that area, and the lack of moral thinking and training has led to the proliferation of fraud and deception in science. (After all, if science has nothing to do with ethics, why not falsify data?)

Animal research is done largely with public money (though the percentage funded privately by drug companies, biotech companies, etc., is increasing). In this case, it is necessary to have public support for research. Much of that public support depends on public perception that animal research is very conscious of its ethical dimensions. Indeed, researchers’ actions and statements evidencing lack of ethical awareness led to the crises of confidence in animal research in the late 1970s and early- to mid-1980s. This lack of confidence in turn led to the federal passage in 1985 of laws written over a decade by my colleagues and myself to instill moral concern into science, erode scientific ideology, and assure proper animal treatment. We shall shortly discuss these laws and the fine job they have done to restore public confidence in animal research by eroding scientific ideology.

Just as we have discussed the way in which the belief that science is value-free that is inherent in scientific ideology alienated animal research from public morality and public moral concern for animals, the denial of the knowability of (if not existence of) animal subjective experiences further alienated the scientific community from society, who intuitively always believed in animal consciousness and who, beginning in the 1970s,
generated ever-increasing moral concern for animal treatment.

For younger people trained after the late 1980s, it is difficult to fathom the degree to which the denial of consciousness, particularly animal consciousness, was ubiquitous in science. In 1973, the first U.S. textbook of veterinary anesthesia was published, authored by Lumb and Jones. Although the book gave numerous reasons for anesthesia (to keep the animal from hurting you, keep it from injuring itself, allow you to position the limbs for surgery), the control of felt pain was never even mentioned. When I went before Congress in 1982 to defend our laboratory animal legislation, I was advised to demonstrate that such laws were needed. To accomplish this goal, I did a literature search on laboratory animal analgesia and, mirabile dictu, found only one or two references, one of which argued that there should be such knowledge.

In 1982, the crescendo of concern among the public about animal pain was so great that the scientific community felt compelled to reassure the public that animal pain was indeed an object of study and concern, so they orchestrated a conference on pain and later published a volume entitled Animal Pain: Perception and Alleviation (Kitchell & Erickson 1983). Despite the putative purpose of the volume, virtually none of the book was devoted to perception or alleviation of felt pain. As a result of scientific ideology, pain was confused with nociception so that the volume focused on the neurophysiology and electrochemistry of pain, what I at the time called the “plumbing of pain,” rather than the morally relevant component of pain, namely that it hurts.

Most surprising to members of the general public is the fact that veterinarians were as ignorant and skeptical about animal consciousness, even animal pain, as any scientist. To this day, and certainly in the 1980s, veterinarians called anesthesia “chemical restraint” or “sedation” and performed many procedures (e.g., horse castration) using physical restraint—jocularly called “bruticaine”—or paralytic drugs such as succinyl choline chloride, which is a curariform drug inducing flaccid paralysis, not anesthesia. Indeed, one surgeon told me that until he taught with me, it never dawned on him that the horse being castrated under succinyl choline hurt.

This sort of absurdity also occurred in physiological psychology. I have already mentioned the psychological community’s rejection of animal consciousness. Yet the same community regularly performed stereotaxic brain surgery and brain stimulation using succinyl choline without anesthesia, because the psychologists wanted the animals “conscious.”

That ideology could triumph logic and even reason was manifest in this area. In the late 1970s, I debated a prominent pain physiologist. His talk expounded the thesis that because the electrochemical activity in the cerebral cortex of the dog (his research model for studying pain) was different from such activity in the human and because the cortex was the seat of processing information, the dog did not feel pain the way humans did. His talk took an hour, and I was expected to rebut his argument. My rebuttal was the shortest public statement I ever made. I said, “As a prominent pain physiologist, you do your work on dogs. You extrapolate the results to people, correct?” He said yes. “Excellent,” I said, “then either your speech is false, or your life’s work is!”

In a similar vein, I experienced the following incident. In the mid-1980s, I was having dinner with a group of senior veterinary scientists, and the conversation turned to the subject of this chapter: namely, scientific ideology’s disavowal of our ability to talk meaningfully about animal consciousness, thought, and awareness. One man, a famous dairy scientist, became quite heated. “It’s absurd to deny animal consciousness,” he exclaimed loudly. “My dog thinks, makes decisions and plans, etc., etc.” all of which he proceeded to exemplify with the kind of anecdotes we all invoke in such common-sense discussions. When he finally stopped, I turned to him and asked, “How about your dairy cows?” “Beg pardon?” he said. “Your dairy cows,” I repeated, “do they have conscious awareness and thought?” “Of course not,” he snapped before proceeding to redden as he realized the clash between ideology and common sense and what a strange universe this would be if the only conscious beings were humans and dogs, perhaps humans and his dog.

A colleague of mine who was doing her PhD in the mid-1980s in anesthesiology was studying anesthesia in horses. The project involved subjecting the animal to painful stimuli and seeing which drugs best controlled the pain response. When she wrote up her results, her committee did not allow her to say that she “hurt” the animals, nor could she say that the drugs controlled the pain—that was ideologically forbidden. She was compelled to say that she subjected the horses to a stimulus and to describe how the drugs changed the response.

One of the best stories covering the ideological denial of consciousness was told by Dr. Robert
Rissler, the USDA/Animal Plant and Health Inspection Service (APHIS) veterinarian in charge of writing the regulations interpreting the 1985 laboratory animal laws. Rissler related that he was particularly worried about one provision of the law, namely the requirement that nonhuman primates be housed in environments that “enhanced their psychological well-being.” As a veterinarian, Rissler said, he knew nothing about either primates or psychological well-being. It occurred to him to approach the primatology division of the American Psychological Association. He made an appointment and tendered his queries to some eminent scientists in the field. “Psychological well-being of primates,” they said. “Don’t worry Dr. Rissler, there is no such thing.” Acutely aware of when the new law would take effect, Rissler replied, “Well there will be after January 1, 1987, whether you people help me or not!”

These anecdotes help to buttress my claim early in this chapter that a scientific book on animal mental and emotional health would have been impossible even 15 years ago. It is therefore important to explain why it is now a much more legitimate project, though one that older, die-hard ideologies would doubtless continue to reject.

First and foremost, it is now abundantly clear that the public is displaying significant moral concern for animal treatment in all areas of animal use, from abattoirs to zoos. One major social ethical concern that has developed over the past three decades is a significant emphasis on the treatment of animals used by society for various purposes. It is easy to demonstrate the degree to which these concerns have seized the public imagination. According to two major organizations having no incentive to exaggerate the influence of animal ethics—the U.S. National Cattlemen’s Beef Association and the NIH (the latter being the source of funding for the majority of biomedical research in the U.S.)—by the early 1990s, Congress had been consistently receiving more letters, phone calls, faxes, e-mails, and personal contacts on animal-related issues than on any other topic (McCarthy 1988, 1992).

Whereas 25 years ago, one would have found no bills pending in the U.S. Congress relating to animal welfare, the past five to six years have witnessed 50–60 such bills annually, with even more proliferating at the state level. The federal bills range from attempts to prevent duplication in animal research, to saving marine mammals from becoming victims of tuna fishermen, to preventing importation of ivory, to curtailing the parrot trade. State laws passed in large numbers have increasingly prevented the use of live or dead shelter animals for biomedical research and training and have focused on myriad other areas of animal welfare. Numerous states have abolished the steel-jawed leghold trap. When Colorado’s politically appointed Wildlife Commission failed to act on a recommendation from the Division of Wildlife to abolish the spring bear hunt (because hunters were liable to shoot lactating mothers, leaving their orphaned cubs to die of starvation), the general public ended the hunt through a popular referendum. Seventy percent of Colorado’s population voted for its passage. In Ontario, the environmental minister stopped a similar hunt by executive fiat in response to social ethical concern. California abolished the hunting of mountain lions, and state fishery management agencies have taken a hard look at catch-and-release programs on humane grounds.

In fact, wildlife managers have worried in academic journals about “management by referendum.” According to the director of the American Quarter Horse Association, the number of state bills related to horse welfare filled a telephone-book-sized volume in 1998 alone. Public sentiment for equine welfare in California carried a bill through the state legislature, making the slaughter of horses or shipping of horses for slaughter a felony in that state. Municipalities have passed ordinances ranging from the abolition of rodeos, circuses, and zoos to the protection of prairie dogs and, in the case of Cambridge, Massachusetts (a biomedical Mecca), the strictest laws in the world regulating research.

Even more dramatic, perhaps, is the worldwide proliferation of laws to protect laboratory animals. In the United States, for example, as we mentioned, two major pieces of legislation regulating and constraining the use and treatment of animals in research were passed by the U.S. Congress in 1985, despite vigorous opposition from the powerful biomedical research and medical lobbies. This opposition included well-financed, highly visible advertisements and media promotions indicating that human health and medical progress would be harmed by implementation of such legislation.

In 1986, Britain superseded its pioneering act of 1876 with new laws aimed at strengthening public confidence in the welfare of experimental animals. Many other European countries and Australia and New Zealand have moved in a similar direction, despite the fact that some 90 percent of laboratory animals are rats and mice, not generally thought of as the most cuddly and lovable of animals.
Many animal uses seen as frivolous by the public have been abolished without legislation. Toxicological testing of cosmetics on animals has been truncated; companies such as the Body Shop have been wildly successful internationally by totally disavowing such testing, and free-range egg production is a growth industry across the world. Greyhound racing in the U.S. has declined, in part for animal welfare reasons, with the Indiana veterinary community spearheading the effort to prevent greyhound racing from coming into the state. Zoos that are little more than prisons for animals (the state of the art during my youth) have all but disappeared, and the very existence of zoos is being increasingly challenged, despite the public's unabashed love of seeing animals. And, as Gaskell and his associates' work has revealed, genetic engineering has been rejected in Europe not, as commonly believed, for reasons of risk but for reasons of ethics—in part for reasons of animal ethics. Similar reasons (e.g., fear of harming cattle) have, in part, driven European rejection of the use of bovine somatotropin (BST). Rodeos such as the Houston Livestock Show have, in essence, banned jerking of calves in roping, despite opposition from the Professional Rodeo Cowboys Association, who themselves never show the actual roping of a calf on national television.

Inevitably, agriculture has felt the force of social concern with animal treatment; indeed, it is arguable that contemporary concern in society with the treatment of farm animals in modern production systems blazed the trail leading to a new ethic for animals. As early as 1965, British society took notice of what the public saw as an alarming tendency to industrialize animal agriculture by chartering the Brambell Commission, a group of scientists under the leadership of Sir Rogers Brambell, who affirmed that any agricultural system failing to meet the needs and natures of animals was morally unacceptable. Though the Brambell Commission recommendations enjoyed no regulatory status, they served as a moral lighthouse for European social thought. In 1988 the Swedish Parliament passed, virtually unopposed, what the New York Times called a "Bill of Rights for farm animals," abolishing in Sweden, in a series of timed steps, the confinement systems still currently dominating North American agriculture. Much of northern Europe has followed suit, and the European Union is moving in a similar direction. Recently, activists in the U.S. have begun to turn their attention to animal agriculture and to pressure chain restaurants and grocery chains, and it is reasonable to expect U.S. society to eventually demand changes similar to those that have occurred in Europe. Unfortunately, the agricultural community did not heed the signs and, as people at the 2002 Reciprocal Meat Conference, the annual meeting of the American Meat Science Association, told me, lost the moral high ground to the activists.

Obviously, in the face of all of this manifest and politically powerful social-ethical concern about animal treatment, Scientific Ideology could not be sustained. Consider a recent editorial (April 2002) in Nature contemplating the dramatic rise of ethical concern for animals. Whether or not animals have "rights," we should learn more about their capacity for suffering. In Germany, the right of freedom to research is enshrined in the nation's constitution. But that may soon have to be balanced against a new constitutional right of animals to be treated as fellow creatures, and sheltered from avoidable pain. Not surprisingly, biomedical researchers fear that their work will be mired in legal challenges.

The latest moves in Germany are the product of political circumstances, but attempts to give animal rights a legal foundation are quietly gathering momentum worldwide. Three years ago, New Zealand's parliament considered and ultimately rejected a plan to extend basic human rights to the great apes. At a growing number of law schools in the United States, courses in animal law are popular.

Some commentators have already countered that "rights" are only created by beings capable of asserting themselves, therefore very young children, and animals, are properly accorded protection, not rights (see Nature 406, 675–676; 2000).

Nevertheless, most experts would agree that we have barely started to understand animal cognition. Even our knowledge of animal welfare is still rudimentary. We can measure levels of hormones that correlate with stress in people. But is a rat with high levels of corticosteroids suffering? We just don't know.

Given the passions raised by animal experimentation, and the importance of biomedical research to human health, the science of animal suffering and cognition should be given a higher priority. We owe it to ourselves, as much as to our fellow creatures, not simply to leave the lawyers to battle it out. (Anonymous 2002)