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Clever Hans and the Humane Movement

I read with interest Susan Fowler's account of the Clever Hans conference (16):355-359, 1980). As I was not present I cannot comment on the manners of the participants, but as the editor of a humane magazine to which Dr. Thomas Sebeck frequently contributes, I would like to make a few observations on the matter.

It appears that Fowler overlooks an important issue raised by the ape/dolphin studies. Are we not, in our very sophisticated and effective communication systems already employed, ignoring the language (or symbols of it), ignoring the important issue raised by the ape/dolphin communications? Did we really need captive wildlife to discover that retarded people can use sign language? Why not just work directly with the retarded?

Finally, whether raised tactfully or not, the questions surrounding the Clever Hans phenomenon in ape/dolphin communications must be addressed. The incredibly subtle cues to which the animals respond (some far too subtle for human apprehension) may make it virtually impossible to completely eliminate it from the testing picture. Perhaps we should just admit this, leave dolphins in the sea and apes in the jungle, and study the intricate ways in which animals of all species actually do communicate.

It would not be surprising if Dr. Sebeck, who has devoted years to studying this real animal communication, has become frustrated by the popularization of the talking apes.

Susan Burns
Editor
Animals
350 S. Huntington Ave.
Boston, MA 02130
6 January 1981

Lab Animal Housing: Numbers or Common Sense?

Andrew N. Rowan

At the Institute for the Study of Animal Problems' symposium on scientific and ethical issues in primate husbandry and use, (see Original/Review articles), William McGrew (Stirling University, UK) suggested that there was one very simple action that could be taken to improve the life of caged primates. Instead of keeping the animals in cages with slatted or hatched bases (to allow feces and urine to pass through), he suggested that they be kept in cages with solid floors covered with loose litter. Seeds and other particles of food could be thrown into the litter, giving the primates an opportunity to forage as they would in the wild. Dr. McGrew had experience with such a system at Stirling, and he reported that the animals appeared to be in a better psychological state. There was apparently little problem with odor, even though the litter was changed only every one or two weeks.

Dr. McGrew's remarks were challenged by Dr. William Mason (California Primate Research Center, Davis), who argued that it would be dangerous to take an anecdotal observation and generalize it to cover all situations in which primates are kept. This may be true for those researchers who are studying primate psychology and whose background knowledge of behavior is derived totally from primates kept in barren cages, but the qualitative information provided by McGrew appears strong enough to encourage at least some action in general primate facilities to improve the mental well-being of the animals. Dr. Mason's objections reflect a common failing among scientists today, namely, an urge to rely exclusively on numbers and statistical analysis of variance rather than on common sense.

This is not to say, however, that what is taken for common sense cannot lead one astray from time to time. Dr. William Paré (1977) found that an apparently improved situation for rat housing leads to premature deaths. Dr. Paré placed his rats in a living-cage which contained an exercise wheel. The rats were given unlimited access to water, and food was available for one hour per day. While such conditions (food, water and exercise) are apparently good for dogs, they produced dead rats. In the experimental groups, between 30 to 60% of the rats died within 21 days, while there were no deaths in the control group, which did not have access to exercise wheels.

This demonstrates, once again, the incredible complexity of the living organism and its interaction with environmental factors. It also indicates that we need to do far more work on the optimal housing of all types of laboratory animals, paying closer attention to ethological parameters as well as to mere physical survival. Dr. McGrew's 'common sense' innovation at the Stirling primate unit was based on ethological data taken from the field, which may help to explain its success. In contrast, Dr. Paré's failed innovation was based on an untested intuition about the benefits of unlimited exercise.

Wallace and Hudson (1969) have shown how simple it is to improve the housing conditions for wild mice and other small rodents. By taking data on nesting behavior into account, they were able to modify the lab cages so that the animals would breed. With a relatively small amount of effort, these approaches could lead to similar improvements for the usual strains of laboratory rodents and lagomorphs.

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It appears that Fowler overlooks an important issue raised by the ape/dolphin studies. Are we not, in our efforts to make animals utilize our own language or symbols of it, ignoring the very sophisticated and effective communication systems already employed by all species? Fireflies send flash codes, fishes emit electronic impulses, moths advertise by scent—all kinds of animals communicate to survive, as individuals and as species. The assumption that the human mode of communication is superior (and should be learned by the "higher" species) is of course speciesism: just because it works well for us doesn't mean that it will work well for them. One might well ask, if a researcher is so intent on communicating with a dog, why does he not learn to bark?

There is something to be said for appreciating and learning about animals as they are, and not for their ability to become like us. Indeed, the philosophical justification for the humane movement is evolving in just this direction. While Victorian animal advocates defended kindness to animals because they perceived animals as being similar to humans, or because cruelty made humans more bestial, modern trends indicate an appreciation of animals' basic right to humane treatment. (I recommend James Turner's recent book, Reckoning with the Beast, on this philosophical development.)

Of course it is fine that retarded children have benefited from the ape studies. But did we really need captive wildlife to discover that retarded people can use sign language? Why not just work directly with the retarded?

Finally, whether raised tactfully or not, the questions surrounding the Clever Hans phenomenon in ape/dolphin communications must be addressed. The incredibly subtle cues to which the animals respond (some far too subtle for human apprehension) may make it virtually impossible to completely eliminate it from the testing picture. Perhaps we should just admit this, leave dolphins in the sea and apes in the jungle, and study the intricate ways in which animals of all species actually do communicate.

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**News & Review**

**Pink Suits BUAV**

After a long game of political see-saw, the more radical and militant elements of the British antivivisection movement have gained control of the British Union for the Abolition of Vivisection (BUAV). Reinstated during the December 1980 annual meeting, President Jean Pink favors militant action along the lines of her own organization, Animal Aid, which sponsors marches and demonstrations throughout Britain. In the five years of its existence, Animal Aid has grown from a small group of activists in Kent to a membership of more than three thousand all over England. From Pink's tenure of the presidency of the BUAV earlier in 1980, but was suspended by the old guard after serving only a short time. The old guard has since been fighting to retain control of the organization amid allegations by the radicals' supporters that it has been involved in various financial improprieties. Despite these efforts, Mrs. Pink was re-elected without opposition, and radicals secured 10 of the 18 executive seats. It is not yet clear in which direction the BUAV now moves, but its course is sure to be marked by more internal politicking and committee-room scheming.

**Acclimatization After Capture**

The stress induced in wild animals during capture and transport may be significantly reduced by employing an alternative method of capture and confinement. Conventional methods, such as netting and immediate pen confinement, yield high mortality rates. The alternative procedure, involving a period of acclimatization in large enclosures after capture and transport, has been shown to reduce the incidences of myoglobinemia and elevation in blood potassium levels.

**Shooting in Italy**

Attitudes toward wildlife in any country can be understood only through reflection on national cultural traditions. Probably nowhere in the world are the problems of wildlife conservation as exacerbated by these traditions as they are in Italy. Fabio Cassola, in his article "Shooting in Italy: The Present Situation and Future Perspectives" (Biol Conserv 7/85-106, 1979), analyzes the cultural and legal problems that confront Italian wildlife.

Italy boasts the highest density of hunters in Europe, an average of more than 8 per square kilometer. Its 2 million hunters, which are increasing at a rate of 100,000 per year, constitute over 30% of the male population. According to Cassola, machismo and conformity are the major social pressures swelling the ranks of hunters. Other causes are socio-political: Increased urbanization, coupled with greater amounts of recreation time, has turned many Italians toward hunting as an escape to the outdoors; hunting has become a mass-popular sport, no longer a pastime of the aristocracy. Enormous commercial interests in firearms production and in relevant publications have strengthened the financial and political foundation of hunting in Italy.

In the growing array of hunters is only one of a long list of factors taking their toll on wildlife. It is difficult to ascertain why conservation takes hold in one country and not in another. Certainly Great Britain has a strong tradition of conservation; interest in natural history, particularly ornithology, has long been rooted at the popular level. The lack of such traditions in Italy, Cassola maintains, has left the public, and even biologists, with little understanding or appreciation of wildlife. Poaching is rampant, forbidden hunting methods such as traps and snares are common, and "protected" species are considered fair game. Live decoys are used to lure other birds into hunters' range. Once the traditional means of procuring food, bird hunting has long since become both a sport and a commercial enterprise univalled, perhaps, in the rest of the world. Although songbirds are sold in Italian butcher shops, it is unclear from Cassola's account whether netting is primarily to trap birds for food or for pets, or to capture "destructive" birds, a term very loosely defined in Italy.

Legal traditions hinder the ability to curb such destructive practices. The "right to bear arms" is carried to an extreme in Italy. Declared a "basic individual right" in the "national interest," hunting may not be forbidden on private property except by physical barriers. Furthermore, the amount of land tied up in refuges and protected areas is limited by law.

Ambiguities in the law abound. A 1916 ban on the shooting of songbirds was allowed to lapse, apparently a not uncommon occurrence for such protective laws. A 1977 national law against bird netting rendered itself ineffective by allowing the regional issuance of permits. Regionalism is perhaps one of the most serious reasons for the chaotic state of conservation in Italy. Provincial governments attempt to satisfy their hunting constituency through disregard of national laws, allowing hunting of protected species or in protected areas.

The 1976 "leggequadro" which established new hunting regulations, made substantial improvements in wildlife law. Penalties for violations are more severe, the minimum hunting age has been raised, and hunting has been restricted to about 70 species. Yet, the practicalities of enforcement, combined with political and financial pressure from the hunters, continue to undermine the effectiveness of legal changes. Moreover, one of the changes is for the worse. Many species on the "shootable" list are rare or difficult to identify; hunting season now coincides more closely with the southward bird migration. It is not difficult to find notable examples of naturalists with a passion for shooting. Audubon shot thousands of birds, as did the 19th century shorebird hunter, George H. Mackay. Yet it was the uncommon keen observation in such sportsmen that generated concern for wildlife; accounts such as theirs drew attention to the destructive impact of market gunning, egg collecting, and the millinery trade on bird populations, and laid the framework for protective legislation.

Perhaps hindsight is the essential element for the transformation of national attitudes toward wildlife. And perhaps it is sufficient hindsight that Italy has not yet achieved; hunters search for game elsewhere in Europe, complaining that Italian prey have become scarce.

To some extent, preservationist outcry at indiscriminate hunting practices has been an aesthetic reaction to the wholesale slaughter of songbirds; the biological effects of such mortality on bird popula-
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tions are poorly understood. Slowly, however, the ecological consequences of certain practices are emerging—predator-prey imbalances through "pest management" and adverse effects on native species through the introduction of exotic game species, for example—are being addressed in the new hunting laws. Cassola sees hope in the increasing public awareness of and the burgeoning opposition to hunting. Yet the cultural, political and financial roots of hunting in Italy make it unlikely that it will ever be stopped as a sport. If there is cause for optimism, it is that hunters, sharing with conservationists an interest in wildlife, will learn the lesson that hindsight has to teach before it is too late, and recognize the need for greater biological and ecological understanding, and for stringent regulation of hunting practices. —Natasha Atkins

(Material also drawn from "The Bird Lovers," Edward R. Ricciuti, Audubon, September, 1977.)

Improved Replacement for Whale Oil

For conservationists, one of the more disappointing developments at the 1980 meeting of the International Whaling Commission was the failure to ban the taking of sperm whales. Despite warnings by scientists that the North Pacific stock of sperm whales will decline even with a take of zero, the IWC set the quota at 890.

Sperm whale oil is used as an ingredient in cosmetics and other products, but it can be replaced by the oil contained in the seeds of the jojoba, a shrub or small tree found in the desert of the southwestern United States. Ordinarily, the jojoba is diocious, bearing either all male or all female flowers. The commercial yield of oil is therefore dependent on the frequency and distribution of male plants, as well as the presence or absence of wind currents needed to ensure pollination. However, according to Dr. Demetrios Yermanos, a professor of genetics at the University of California, Riverside, has developed a strain of jojoba that bears both male and female flowers on the same plant. In eliminating the problems associated with cultivating the typical strain, the new type of jojoba should prove to be a much more economically attractive alternative to the continued destruction of sperm whales.

Boon to the Scotty Breed

Scotty, cramp, a defect in the central nervous system which afflicts Scottish terriers, may now be controllable, according to Dr. Kenneth Meyers, a research veterinarian at Washington State University (Pullman, WA). Triggered by either mental or physical excitement, Scotty cramp results in a tightening of the animal's skeletal muscle. Although the condition is apparently painless, Dr. Meyers notes: "Standing or walking becomes nearly impossible for some of the dogs. Severely affected dogs may collapse into a "curl-in-a-ball.."

Meyers and his colleagues have determined that a recessive gene, which became established in the Scotty gene pool in the course of generations of selective breeding, is responsible for Scotty cramp. The condition could therefore be bred out of a given line of Scottish terriers. Meyers stated: "By keeping good breeding records, testing every pup for the disease before selling and mating dogs that don't carry the gene, the condition can be eliminated."

During the course of his research, Dr. Meyers discovered that incidences of cramping are associated with depressed levels of the brain chemical serotonin. He then used this information to devise a screening test in which me-thylsergide is used to inhibit serotonin and thus induce cramping in afflicted dogs. Three regional Scotty cramp testing centers are currently in operation: Washington State University (Dr. Meyers); Michigan State University (East Lansing); and University of Florida (Gainesville, FL; Dr. Robert Cleemmons).

There is no cure for those Scotties that inherit the genetic trait. However, Meyers has found that tranquilizers such as Valium, and vitamin E ameliorate the condition substantially. "Avoiding high excitement or stressful situations or training the dog to face such situations calmly can decrease cramping episodes," Meyers says. "By following a treatment program [both behavioral and chemical], the animals can lead normal, healthy lives.

NFU Airs Views on Welfare

The National Farmers’ Union (UK) recently testified to the House of Commons, Committee on Agriculture, in charge of investigating animal welfare that their efforts to produce food at a reasonable price under conditions compatible with the optimum welfare of the stock were being undermined by the welfare lobby's lack of appreciation for the industry's many advances (Veterinary Record 70(7):135, 1981). In written and oral evidence given to support this claim, the NFU stated that it did not condone abuse, but reminded the committee that abuses can occur within any type of husbandry system, particularly when financial pressure is under financial pressure. The NFU recommended that welfare codes and regulations similar to those in Britain be implemented in Europe as well, to eliminate any threat of competition resulting from differing standards of practice. The union also invited, on behalf of the farming industry, more veterinary inspection and advice on welfare from the State Veterinary Service "...if only to ensure that the consumer can be satisfied that the highest standards of husbandry are maintained on British farms.

The question was raised as to whether adequate productivity was an indicator of satisfactory welfare. NFU spokesman Michael Weller replied: "By and large, that is indeed so. If the animals are not happy they are not happy in all senses and if they are distressed and frustrated they cannot produce as well as if all those factors are looked after as well as food and water." However, it was unclear, at least in the Veterinary Record article, whether Mr. Weller was making a distinction between extensive systems, in which the welfare of individual animals can have a significant impact on overall productivity, and intensive systems, in which the large scale of production can provide a cushion against the negative economic effect of poor husbandry.

Oral Rabies Vaccination for Foxes

The immense effort directed against rabies through the popular method of control by reduction of wildlife populations seems to be failing. In the United States during the past ten years, the largest percentage of reported cases of rabies has been in wildlife. In Europe as well, the epizootic has persisted and accelerated for more than forty years. Traditional "control" methods have included trapping, strychnine-paintin-, den-gassing and bounty hunting. These have proved to be not only expensive ($26-$200/animal trapped; $30/animal poisoned) and ineffective, but are now thought to be counterproductive.

The theory behind control by reduction is that if the number of possible vectors can be reduced to below a critical threshold, an epidemic could not be sustained within that population. The threshold is that population size within which the epizootic is self-sustaining. However, it has been found that at least for foxes, reducing numbers in a given area invites the introduction of foxes from other areas, resulting in a greater distribution of infection combined with an increase in the contact rate due to territorial struggles. In addition, curbing the popu-
tions are poorly understood. Slowly, however, the ecological consequences of certain practices are emerging—predator-prey imbalances through "pest management" and adverse effects on native species through the introduction of exotic game species, for example—are being addressed in the new hunting laws. Cassola sees hope in the increasing public awareness of and the burgeoning opposition to hunting. Yet the cultural, political, and financial roots of hunting in Italy make it unlikely that it will ever be stopped as a sport. If there is cause for optimism, it is that hunters, sharing with conservationists an interest in wildlife, will learn the lesson that hindsight has to teach before it is too late, and recognize the need for greater biological and ecological understanding, and for stringent regulation of hunting practices.—Natasha Atkins

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Boon to the Scotty Breed

Scotty, crape, a defect in the central nervous system which afflicts Scottish terriers, may now be controllable, according to Dr. Kenneth Meyers, a research veterinarian at Washington State University (Pullman, WA). Triggered by either mental or physical excitement, Scotty crape results in a tightening of the animal's skeletal muscle. Although the condition is apparently painless, Dr. Meyers notes: "Standing or walking becomes nearly impossible for some of the dogs. Severely affected dogs may collapse, stiffen, and curl into a ball."

Meyers and his colleagues have determined that a recessive gene, which became established in the Scotty gene pool in the course of generations of selection breeding, is responsible for Scotty crape. The condition could therefore be bred out of a given line of Scottish terriers. Meyers stated: "By keeping good breeding records, testing every pup for the disease before selling and mating dogs that don't carry the gene, the condition can be eliminated."

During the course of his research, Dr. Meyers discovered that incidences of cramping are associated with depressed levels of the brain chemical serotonin. He then used this information to devise a screening test in which methysergide is used to inhibit serotonin and thus induce cramping in afflicted dogs. Three regional Scotty crape testing centers are currently in operation: Washington State University (Dr. Meyers); Michigan State University (East Lansing); and University of Florida (Gainesville, FL; Dr. Robert Clemmons).

There is no cure for those Scotties that inherit the genetic trait. However, Meyers has found that tranquilizers such as Vaniilum, and vitamin E ameliorate the condition substantially. "Avoiding high excitement or stressful situations or training the dog to face such situations calmly can decrease cramping episodes," Meyers said. "By following a treatment program [both behavioral and chemical], the animals can lead normal, healthy lives.

NFU Airs Views on Welfare

The National Farmers' Union (UK) recently testified to the House of Commons on animal welfare, in charge of investigating animal welfare that their efforts to produce food at a reasonable price under conditions compatible with the optimum welfare of the stock were being undermined by the welfare lobby's lack of appreciation for the industry's many advances ( Vet Rec, 7087):135, 1981). In written and oral evidence given to support this claim, the NFU stated that it did not condone cruelty, but reminded the committee that abuses can occur within any type of husbandry system, particularly when farms are under financial pressure. The NFU recommended that welfare codes and regulations similar to those in Britain be implemented in Europe as well, to eliminate any threat of competition resulting from differing standards of practice. The union also invited, on behalf of the farming industry, more veterinary inspection and advice on welfare from the State Veterinary Service "...if not only to ensure that the consumer can be satisfied that the highest standards of husbandry are maintained on British farms."

The question was raised as to whether adequate productivity was an indicator of satisfactory welfare. NFU spokesman Michael Weller replied: "By and large, that is indeed so. If the animals are not happy they are not happy in all senses and if they are distressed and frustrated they cannot produce as well as if all those factors are looked after as well as food and water." However, it was unclear, at least in the Veterinary Record article, whether Mr. Weller was making a distinction between extensive systems, in which the welfare of individual animals can have a significant impact on overall productivity, and intensive systems, in which the large scale of production can provide a cushion against the negative economic effect of poor husband.

Oral Rabies Vaccination for Foxes

The immense effort directed against rabies through the popular method of control by reduction of wildlife populations seems to be failing. In the United States during the past ten years, the largest percentage of reported cases of rabies has been in wildlife. In Europe as well, the epizootic has persisted and accelerated for more than forty years. Traditional "control" methods have included trapping, strychnine-bait poisoning, gassing and bounty hunting. These have proved to be not only expensive ($26-$200/animal trapped; $30/animal poisoned) and ineffective, but are now thought to be counterproductive.

The theory behind control by reduction is that if the number of possible vectors can be reduced below a critical threshold, an epidemic could not be sustained within that population. The threshold is that population size in which intranspecific contact is minimized, thus minimizing as well the possibility of rabies transmission by bite. For foxes the threshold level has been calculated to be 2 animals/sq. mi. However, it has been found that at least for foxes, reducing numbers in a given area invites the introduction of foxes from other areas, resulting in a greater distribution of infection combined with an increase in the contact rate due to territorial struggles. In addition, curbing the popu-
surviving individuals to breed. In effect, natural selection works against culling vaccination accomplishes the same goal MacDonald (New Sci 87:640-645, 1980), vaccination accomplishes the same goal as culling, i.e., removal of susceptible individuals, but does so without the attendant social disruption (which can mean increased rate of contact and subsequent rise in disease) and destruction of uninfected animals.

The most elegant way to administer an oral vaccine is to provide foxes with an impregnated bait which they will eat, thus immunizing themselves. Bacon and MacDonald report that an inexpensive bait-delivery system has been almost perfected by its designer, David Johnson of the Ontario Ministry of Natural Resources. More than 70% of the foxes in Johansen's study group ate a biomarked bait, but it should be noted that the study tested only the effectiveness of the delivery system; actual vaccine was not used. Indeed, the vaccine itself may present a major practical problem in this scheme: the vaccine is the most effective oral immunizer for foxes. However, it is possible that other wild animals, such as rodents, who might eat bait impregnated with live vaccine, would contract rabies, or that the live strain might mutate and become virulent, causing a more serious epizootic.

Work is progressing on the development of a safe oral vaccine both in the United States and in Switzerland. Franz Stech and Alex Wandelzer recently ran an apparently successful field trial of the oral vaccination in the Swiss Alps, and William Winkler and George Baer of the U.S. Department of Health and Human Services Center for Disease Control are perfecting a patented liquid attenuated rabies vaccine which they claim poses no threat to other wildlife (report to the AVMA Convention, 23-26 July, 1979, Seattle, Washington).

Bacon and MacDonald stress that if any rabies control method is to be effective, more information on the behavior of the species in question is needed. In the case of the fox, very little is known of the factors that determine population densities, which vary widely in different habitats. The number of rabies cases among foxes may be much higher than estimated; as few as 2% of rabid foxes may be reported. Virtually nothing is known about the behavior of rabid foxes or how healthy foxes react to them. Once this information is gathered, perhaps the curbing of rabies in wildlife can be successful, and the oral vaccination may then prove to be a more humane and ecologically sound means of control.

Several years ago when it was thought to be in danger of extinction, the vicuna, a South American relative of the llama and camel, became the object of an extensive conservation program in Peru's Pampa Galeras reserve. The conservation effort was so successful in replenishing the vicuna population that it was finally necessary to initiate culling to meet an imminent threat of overpopulation and starvation. Or was it?

According to a report in New Scientist (89:413-415, 1981), the controversy over the vicuna cull centers on charges that the project director, Dr. Antonio Brack Egg, has been running the culling program to serve his own questionable interests.

Not entirely convinced that the Pampa Galeras was overpopulated, the International Fund for Animal Welfare (IFAW) commissioned Dr. Stewart Keith Eltringham, a Cambridge University wildlife biologist, to conduct an aerial survey of the area to assess the status of the vicuna population. After completing the survey, Dr. Eltringham maintained not only that the vicunas were not superabundant, but that the numbers were in fact dangerously low (about 15,000, as opposed to the 1979 official Peruvian estimate of 43,000). Although Dr. Eltringham's survey was hampered by poor conditions, his results, however tentative, were disturbing enough to warrant at least the temporary cessation of the culling project until further studies could be conducted. Alarmed by the findings, the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF), both of which had initially approved of the project, requested a suspension of the cull.

This request, according to New Scientist, was ignored by Dr. Brack, who continued to claim publicly that his project had the support of these organizations.

WWF and IUCN then commissioned Dr. Michael Norton-Griffiths and Mr. Hernand Torres to do a second population survey, this time from the ground. Dr. Norton-Griffiths, a Nairobi-based consultant in rural development and land-use planning, and author of Counting Animals—A Definitive Text on Animal Censusing, and Mr. Torres, director of the Laucan National Park in Chile, which has the largest stock of vicuna outside Peru, found approximately 48,000 vicunas in the Pampa Galeras (New Scientist 89:728, 1981). This figure was accepted by Dr. Eltringham, but although he admits that his survey could have missed animals, he remains opposed to a cull. However, even if a vicuna population of 48,000 could biologically withstand a cull of 2,500 animals, the question of whether the culling program is being properly run remains unresolved.

In its initial design, the project was intended to exemplify how an endangered species could be saved while benefiting the local people through its selective exploitation. The official objectives were to capture the vicunas and shear their wool, to translocate the surplus animals, and finally, to kill a small number of males for food. That these remain the objectives of the project is being disputed by Dr. Felipe Benavides, director of the Peruvian chapter of WWF, who charges Brack with working against the welfare of the vicunas through such actions as his public statement of the value of vicuna skins and his ordering the slaughter (throat-slitting) of the animals so that they could be served as the main course at the government diners. Benavides also charges Brack and his staff with needlessly increasing personnel, employing unskilled men as forest guards (who in turn are accused of inhumanely killing the vicunas, including pregnant females), and poaching.

Parallelizing these offenses is the curious rise in the importation of vicuna wool products, which are now available in Lima and Hong Kong at a staggering price ($460/ld.). Although the origins of the wool are unknown, there are suspicions linking Brack's project to this enterprise.

Benavides is also critical of WWF for not having taken action following an urgent warning from two German veterinarians involved in the project to move the surplus animals to avoid overpopulation. The two vets have since been removed from the project by Brack, but not before they had issued a final warning that the future survival of the vicuna in the Pampa Galeras reserve as well as throughout Peru is greatly threatened. Further, Benavides feels that the IUCN should have been more forceful in its early request to have the cull suspended.

As the culling continues, two major movements are advancing in their efforts to save the threatened species. A commission established by the University of San Marcos' Instituto Veterinario de Investigaciones Tropicales y de Al­ tur (IVITA) has submitted a report of its investigation to the Peruvian Ministry of Agriculture denouncing the actions of Brack. Among the charges:

1. The decision to implement a culling program was made without proper knowledge of the effects of the “apparent” overpopulation.

2. Given that the project was initiated partly to benefit the local people, the sale of meat to Lima was improper.

3. Insufficient research has been
Vicuña Cull: Can Brack Egg Yoke Benavides?

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done on the capture and shearing, translocation, reproduction, population dynamics, effects of culling on population dynamics, and diseases of the vicuna.

4. The method used to take the surplus animals (shooting) should have been replaced by the use of nets. (Note that the guards were not skilled marksmen, which often resulted in a prolonged, painful death for the animal.)

Local Anesthetics for Draize Test

V.C. Hoheisel, D.K. Lowther and R.L. Harris of the Consumer Product Safety Commission's Division of Health Sciences Laboratory (Washington, DC) have reported that certain local anesthetics are effective in eliminating pain associated with the instillation of irritants into the eyes of live rabbits. These are proparacaine HCI (0.5% w/v solution) and butacaine sulfate (2%). The other two, tetracaine HCI and lidocaine, were unsatisfactory in that anesthesia was delayed and animals still "exhibited responses indicating pain" when the irritant was instilled into the eye.

Proparacaine did increase the irritancy scores of some of the test chemicals and lengthened the recovery times. For example, nine out of twelve control animals dosed with 5% acetic acid were healed by the fourteenth day after dosing, while only two of the twelve experimental animals (pretreated with proparacaine) were healed. Butacaine, which is no longer used in humans because of excessive irritation and allergic response, appeared to affect irritancy scores less markedly than proparacaine. However, the butacaine studies were conducted several years ago, and the CPSC report notes that the use of the anesthetic for regulatory purposes would require further investigation.

The Limits of Legislation in Achieving Social Change

Theodore S. Meth

This paper is about law, not laboratory animals or philosophical ethics. It proceeds from the premise that law is an appropriate, perhaps inevitable, instrument for dealing with ethical issues related to the use of research animals.

The Characteristics of Law

Law has three principle characteristics: it defines, it manages and it reflects social norms. Anglo-American law in the eighteenth century was largely concerned with defining relationships, especially those involving the use of property. Thus animals came to be regarded as just another form of property. The nineteenth century saw the codification of this process and the beginnings of the managerial, or public law, approach which has been completed in this century. I believe that the twenty-first century will see great development in the reduction of social norms to formal law, especially those concerning personal freedom and economic equality.

This process has commenced already in the area of civil liberties.

Most laymen are at 1929 in this historical continuum. If they learn about an apparently cruel and pointless use of animals in an experimental laboratory, they tend to respond by demanding prohibitory legislation, enforced through criminal penalties. This is the syndrome which produced Prohibition. Such an abuse of law rarely involves any evaluation of the costs or available techniques for enforcement. It thrives on the dramatic satisfaction of outraged feelings. Such legislation is the preferred methodology of all absolutists, and therefore of the antivivisectionists.

In the intervening fifty years, legal thinking has evolved far beyond prohibitory legislation as the means of choice for dealing with social change. Especially important in this evolution has been the device of the administrative agency, armed with rule-making, investigative and prosecuting functions.

You may translate this into "bureaucracy," but bureaucracy is a function of social complexity and population scale. In the absence of radical decentralization of a modern society, the growth of agencies of government is obligatory and not entirely undesirable. Public administration can be flexible and dynamic in its implementation of the broad declarations of purpose and scope in an enabling legislation. As it moves through the process of receiving and balancing the conflicting inputs of affected factions within the society, it can develop rules which do work and which can be perfected through experience and group criticism. It is a device better suited to a pluralistic society than one-law-one problem legislation.

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**The Direction of Law**

The legal framework needs to and will move toward other mechanisms of control, such as planning, goal-setting, discretionary funding, catalyzing the private sector and general standard-setting. As this happens, the legal structure will move away from the direct operational management of society's affairs. Indirect law techniques may not be less efficient than straight-line administration. As we all know, the direction of our lives is intimately affected by the direction of the flow of tax revenues, and so it should be. Also, where law mandates fact-finding and dissemination, at least where the effort is not directed to some trivial end, the impact on the formation of public values and the actions of society is very direct. Already the National Institutes of Health is effective in setting standards for the use of experimental animals in projects made possible by its funding. Law should move in this direction whether our society becomes more socialist or more oligarchical-capitalist. However, the humane movement must realize that its main concern is just one of a host of other single issues, such as consumer product complaints, to private agencies; or which move some classes of disputes into mediation and away from litigation, as in the case of divorce. It is in this historical context that arguments are raised about the limits of legislation as the way to achieve social change in regard to the protection of research animals. If there are those who see these arguments as lending comfort to others who regard animals as neutral tools, devoid of any ethical coefficient, then this is regrettable, but the truth must be told. We have run out of patience and funds for endless management of our activities by government. Proposition 13 is evidence of society's impatience, even if it is not a particularly helpful guide for the future.

**The Law in Relation to Animals**

This is not the place to criticize the logic of those who speak about "animal rights" or "animal liberation." Seen as political metaphors — which is what every ideology comes down to — they are harmless figures of speech. Seen as true statements about the law, they are absurd and dangerous. Dangerous because they subvert the dialectical process of social analysis and commitment and mask the subtle relationship between the problem of ethics in regard to animals and the whole constellation of other concerns which are at stake for the scientific community. Indeed, I am concerned lest law and legislation come to be the vehicles for anti-science and wonder if hostility to science, perhaps because science has at times raised unreasonable expectations in the minds of the average citizen, is not the fuel driving much of the anti-vivisectionist movement. Of course, this is not necessarily the driving force for other animal welfare groups. I cannot conceive of any fundamental antagonism between law and science in regard to the developing law regarding research animals.

**The Analogy of Environmental Law**

We have much to learn from the ecological movement and the development of environmental law. Analytically both ecology and the humane movement have their roots in religious impulses which are recent and creative, but which, in certain mindless forms have lent themselves to anti-intellectual attitudes which have also been anti-human. Thus the joke that some people love dogs and trees, and hate men and women.

Environmental law has developed a number of techniques specially suited for promoting accountability for and protection of research animals. The impact statement requires, as a condition precedent to a given regulated activity such as road-building, a clear delineation of what may fairly be projected as the consequences of the activity. That is hardly antiscientific! Another approach is to place public funds in trust, so that, for example, a fair portion of a grant must be used in learning how to avoid disrupting the wilderness, even while the greater portion is being used in ways which do have impact on the wilderness.

These are rational devices, readily administered and effectively responsive to societal need, moral concern and economic limitation. Against environmental law, we have learned to issue "licenses to pollute." Through taxation and other devices we increase the economic cost of incursions on nature. We wish to modulate and eventually eliminate those incursions, but we want to avoid the precipitous approach which might be calamitous for individual enterprises and society alike.

You can readily see the appropriateness of these techniques to the progressive regulation of the use of laboratory animals. Hopefully we will have learned from some of the more bizarre and wasteful applications of these techniques in the environmental field. Perhaps the National Institutes of Health would move toward mandating research into complementary and alternative laboratory methods to animal experimentation and testing in medical and pharmacological research. One thinks of the LD 50 toxicity test as a suitable place to begin. Likewise, direct grants for the development of alternatives and toward the establishment of international research clearinghouses are being suggested.

**The Stance of Science Toward Law**

Those who are primarily concerned about animal protection, in the course of generating public support for the sort of positive and proportionate law-making that we have been discussing, will often indulge in some excess invective against the scientific community. This occurred during the picketing of the American Museum of Natural History, where scientists failed to respond to charges of cruelty and were ultimately equated with Frankenstein's. This case, in fact, illustrates more than a failure of the Museum in public relations or blind scientific arrogance; it
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Law should move in this direction whether our society becomes more socialist or more oligarchical-capitalist. However, the humane movement must realize that its main concern is just one of a host of other single issues, such as abortion, public health, genetic research, regulation of dangerous substances including alcohol and tobacco, and cybernetics in all its dimensions. A proper understanding of the place of societal need, moral concern and economic limitation. Again, in environmental law, the Analogy of Environmental Law

We have much to learn from the ecological movement and the development of environmental law. Analytically both ecology and the humane movement have their roots in religious impulses which are decent and creative, but which, in certain mindless forms have lent themselves to anti-intellectual attitudes which have also been anti-human. Thus the joke that some people love dogs and trees, and hate men and women. Environmental law has developed a number of techniques especially suited for promoting accountability for and protection of research animals. The impact statement requires, as a condition precedent to a given regulated activity such as road-building, a clear delineation of what may fairly be projected as the consequences of the activity. That is hardly antiscientific! Another approach is to place public funds in trust, so that, for example, a fair portion of a grant must be used in learning how to avoid disrupting the wilderness, even while the greater portion is being used in ways which do have impact on the wilderness.

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Those who are primarily concerned about animal protection, in the course of generating public support for the sort of positive and proportionate law-making that we have been discussing, will often indulge in some excess inventive against the scientific community. This occurred during the picketing of the American Museum of Natural History, where scientists failed to respond to charges of cruelty and were ultimately equated with Frankensteinians. This case, in fact, illustrates more than a failure of the Museum in public relations or blind scientific arrogance; it
demonstrates the scientific community's failure to understand how great an involvement the general public has in scientific research. However, there is bound to be polemical exaggeration of the extent to which some uses of animals, as in undergraduate psychology courses, is least defensible. Also, the aggressive factionalism which has been endemic in the humane movement will tend to encourage groups competing for public attention and dollars to stray into lurid prose and unrepresentative photographs. These distortions of the goals and practices of medical and biological science are simply prices we pay for freedom in a democratic society. We pay them gladly, if also regretfully. Science, like law, has not always done a good job of public relations.

But science should not fight fire with fire. If we accept the thesis that highly restrictive legislation is socially undesirable, then the scientific community should be in the forefront of the effort to protect research animals, ameliorate their lot and strive toward eliminating their use. Look at the analogy to environmentalism: If the automotive, petrochemical and mining industries, and agribusiness, had taken a leadership position in efforts to protect nature, the costly, often ineffective, and highly uncoordinated layers of legal enactments which at times come near to paralyzing business today would probably not have been created. Regulation is obverse of irresponsibility.

As always, de Tocqueville understood Americans.

"If you do not succeed in connecting the notion of right with that of personal interest, which is the only immutable point in the human heart, what means will you have of governing the world except by fear?"

Those who are concerned with protecting the freedom of science must demonstrate leadership and take prompt action in regard to research animals, or else the absolutists will. Law making by prohibition is not dead, even though it is now less favored by the legal community.

The law is constitutionally adverse to ideological absolutism, but it will succumb unless knowledgeable, continuous and forceful leadership comes out of the scientific community. Law and lawyers ultimately do what they are told and can all too readily revert to the old ways of prohibition, bureaucratic proliferation and their attendant wastefulness and confusion. Picture the pile of forms to be filled out if rationing of higher mammals, including laboratory animals, were legally mandated. If that happens, you will only have yourselves to blame.

The Politics of Animal Rights: Making the Human Connection

Jim Mason

Animal Rights is in the air, so much so that the term borders on becoming a buzzword and the cause itself the latest form of radical chic. Although Lewis Compertz, Henry S. Salt and others put forth radically different views on attitudes and Mr. Mason is a founding member of Animal Rights Network, Inc., Box 5234, Westport, CT 06881, and an editor of Agenda, a journal of animal liberation.

relations toward other animals more than a century ago, the publication in 1972 of essays by Brigid Brophy, Richard Ryder and others in the book, Animals, Men and Morality, by Peter Singer, 1972; New York Review, 1975; and Animal Liberation, by Peter Singer (New York Review, 1975) have sparked another wave of these views and have inspired a spate of college courses, articles in both academic and popular periodicals and radio and television programs on the subject of animal rights. We are reaching the public now with better analyses and better ways of explaining why humans should stop abusing and using other species.

Still, there are early warning signs of cause for concern. The now trendy label "Animal Rights" is being slapped over some of the same old animal welfare campaigns—old wine in new bottles, so to speak. Also, some animal rights advocates may be trampled in the rush to get media coverage, and the survivors may be "had" by media outlets which because of time or space limitations and constraints on content imposed by advertisers, characteristically deal with only the most sensational, superficial or harmless aspects of any subject. In both cases we face a danger that the full meaning and implications of the case for animal rights/liberation will be lost in the shuffle and be assigned some stereotyped image that has no relevance to its substance. If that happens, we go back into the closet of political irrelevance with other crank causes for another umpteen dozen years. In the meantime, animals will still suffer and more species will become extinct.

To head off these developments, I suggest that our movement emphasize the human connection, but I mean a real connection through personal and political action and not merely one of argument. One way to make this connection is to identify the forces and institutions under human control that perpetuate exploitation of animals; the other is to identify how animal-hating and -exploitative habits affect people.

In the first part of the effort, we are up against a consortium of industries and institutions that thrive on consumer demand for meat, milk, eggs, leather, drugs, medicines and a host of nonproducts from animals such as companionship, entertainment and biological data. The demand comes from a society with deeply rooted, long-held habits of using animals for food, work, sports and other purposes. It is a self-sustaining cycle: Industry profits, and in the case of nonprofit institutions, contributions are plowed back into research and development programs that reinforce the habits and bolster demand. Society might be willing to make changes, but the industries and institutions which it put in business tend to resist them. We will have to determine how to break these cycles if we want to advance the cause of animal rights/liberation. To do that, we will have to extend the sweep of our movement. Our promotion of vegetarian and vegan diets and our campaigns against specific abuses do not run far and deep enough to produce the necessary social, economic and technological changes.

This brings us to the second part of the human connection. We need to locate our cause on the map of human concerns so that it can be perceived and understood as relevant to other social and ethical causes. It has already been done on paper, but the movement as such does not follow through with the action behind its rhetoric. Singer's case for animal liberation begins with the position that discrimination based on race or gender is immoral and goes on to state that "speciesism," a related form of discrimination, is likewise immoral. One would expect that every animal rights/liberation advocate would then necessarily embrace this basic position. To be sure, many animal activists oppose racism and sexism, but more, it seems, out of coincidence than from animal liberation convictions. Sadly, I keep
demonstrates the scientific community's failure to understand how great an involvement the general public has in scientific research. However, there is bound to be polemical exaggeration of the extent to which some uses of animals, as in undergraduate psychology courses, is least defensible. Also, the aggressive factionalism which has been endemic in the humane movement will tend to encourage groups competing for public attention and dollars to stray into lurid prose and unrepresentative photographs. These distortions of the goals and practices of medical and biological science are simply prices we pay for freedom in a democratic society. We pay them gladly, if also regretfully. Science, like law, has not always done a good job of public relations.

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coming across advocates of animal rights who either ignore or verbally attack the messages of (what should be) our companion movements against racism, sexism and other forms of discrimination among our own species. This strikes me as worse than a lapse in adhering to animal liberation principles. It is misanthropy and misogyny, that is, forms of specism — the very prejudice we claim to oppose. Moreover, since we are a political movement (if we are not, then what are we doing?), we ought to know better than to antagonize parallel, perhaps potentially supportive movements. If our moral principles against prejudicial attitudes and practices really mean anything to us, should we not have the personal conviction to act politically to further those principles? And if we as individuals do that, should not our movement as a whole follow through with political action? Without such commitment, we will be not only hypocrites but failures.

This is where our movement is most lacking. Our failure to speak, act and live according to our own basic principles isolates us from the rest of progressive politics; it makes us appear irrelevant ("kooky"), and it contributes to the perception that our case is academic rather than political.

The idea of extending our movement has been all too quietly discussed among animal rights/liberation advocates over the past few years. A friend wrote recently urging me to remind others that the “struggle for animal rights is a revolutionary movement aimed not merely at gaining protection for other creatures, but at a basic restructuring of institutions in our society.” Now this may sound too daring, too upsetting and too subversive for some people among the ranks of our movement. But then these people should not profess to want to bring an end to these inhumane practices. They should continue to function as most churches do, collecting money from the guilty, preaching platitudes and carrying on programs that are more palliative than curative.

Our movement must take stock of the cultural milieu in which we work. We are immersed in cultural attitudes and habits formed during several thousand years of a human economy based on the subjugation and exploitation of animals. We began this process some 10,000 years ago when we first brought under our dominion and control — ostensibly for our own benefit. In doing so, we invented oppression. We soon learned to apply the new invention to less powerful members of our own species — women, children or “outsiders” — and slavery was born. In her important book, Woman’s Creation (Carden City, New Jersey: Anchor Press, 1979) feminist writer Elizabeth Fisher traces the archaeological evidence that shows how early animal-keeping societies (our cultural ancestors) gradually began to treat women like another kind of livestock, as instruments to be controlled or sacrificed. She documents how dramatic changes in these societies’ perspectives on nature and sex roles are associated with war, slavery, prostitution and class oppression. Although the whole book is must reading, a few words from Fisher communicate just how relevant her findings are to our movement:

“...in a variety of ways the white man translated his ‘worst’ into his ‘best’... His sexual aggression became retention of purity and brutal domination became faithful maintenance of civilized restraints. These transmutations were so necessary to the white man’s peace of mind, were achieved at devastating cost to another people... In fearfully hoping to escape the animal within himself the white man debased the Negro, surely, but at the same time he debased himself.”

From this cursory foray into the literature on the historical roots of sexism and racism, I am convinced that there is much, much more weight to our cultural baggage of attitudes toward other animals than we have perhaps realized. While we must continue to employ science to search for alternatives to the exploitation of animals in the human economy, we must also employ history and science (anthropology, archaeology) to discover the ways in which our perspectives about ourselves, other animals and the natural world bear detrimentally on other social problems, especially on racism and sexism. In the process, I am certain that we will establish connections that will combine all progressive struggles against prejudice and oppression. This human connection to the cause for animal rights/liberation, if strengthened, would enhance our political effectiveness and accelerate progress toward a society unhampered by these lies and historical mistakes.

Although I have not yet made an exhaustive study, I believe that there is evidence that hatred, debasement and the other attitudes that made subjugation of animals emotionally comfortable to humans are interwoven among the historical roots of racism and misogyny. Ancient attitudes toward apes, for example, offer a revealing index to our attitudes about our own species in relation to other animals. Because the ape so resembled humans, it was the object of much neurotic hostility. To the Greeks and Romans, the ape was turpissima bestia (most vile beast), a hideous pretender to human status. In the early Christian era, the pejorative epithet “ape” was applied to all enemies of Christ and the ape became a figura diabola (representation of the devil) in art and literature. By the Middle Ages, apes symbolized humans in a state of degeneracy: laughable, contemptible and a reminder that we neglect “the spiritual aspect of our nature and unreasoningly abandon ourselves to the sin of the flesh.” In short, if we let our animal impulses get the better of us, then we sink to the level of ape...” (H.W. Janson, Ape and Ape Lore in the Middle Ages and the Renaissance, London University Press, 1952). It took little thinking to extend this perspective to human differences, and sure enough, apes in art of the period are associated with Eve, the “fall of man,” the victory of sensuality over Christian discipline, and feminine qualities in general. “Bestial,” “oversexed” apes represented the “wantonness” and perhaps the “natural inferiority” of women.

Possessing this cultural outlook, Europeans of the 16th century were introduced to the anthropoid apes and to West African peoples at the same time and in the same place. As Winthrop D. Jordan states in his classic study on the historical origins of racism in the United States, The White Man’s Burden (Oxford University Press, 1974):

“Given this tradition and the coincidence of contact, it was virtually inevitable that Englishmen should discern similarity between the man-like beasts and the ‘bestial’ men of Africa. A few commentators went so far as to suggest that Negroes had sprung from the generation of ape-kind or that apes were themselves the offspring of Negroes and some unknown African beast... By forging a sexual link between Negroes and apes, Englishmen were able to give vent to their feelings that Negroes were a less, lascivious, and wanton people.”

Jordan points out how undertones of sexuality run throughout English accounts of West Africa and how the likening of Africans to beasts indicated the fear and loathing of the animal within humans. In the conclusion to his work, Jordan argues
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that racism based on hatred of animals served not only to legitimize in the Christian mind the enslavement of another people, but that the racist subjugation of African people offered peace of mind that the beast in humans was under control:

"...The continuum between animals and people is felt by many. Small wonder then that the keeping and raising of animals had wide-ranging effects on the customs, art, and psyche of human society.

"...Now humans violated animals by making them their slaves. In taking them in and feeding them, humans made friends with animals and then killed them. To do so, they had to kill some sensitivity in themselves. When they began manipulating the reproduction of animals, they were even more personally involved in practices which led to cruelty, guilt and subsequent numbness. The keeping of animals would seem to have set a model for the enslavement of humans, in particular the large-scale exploitation of women captives for breeding and labor, which is a salient feature of the developing civilizations."

Other feminist writers see the connection between animal exploitation and human oppression, and more than a few advocate ethical vegetarianism along with feminism. In her book, The Violent Sex (Guerneville, California: Bluestocking Books, 1978) Laurel Holliday writes:

"Peter Singer has presented the case (for vegetarianism) with the utmost philosophical clarity... My purpose here is not to recruit vegetarians so "primitive" in their customs! (emphasis in original)

In the introduction to their excellent vegetarian cookbook, The Political Palate (Bridgeport, Connecticut: Sanguinaria Publishing, 1980) the women of The Bloodroot Collective explain the reasons for their diet:

"Our food is vegetarian because we are feminists. We are opposed to the exploitation, domination, and destruction which come from factory farming and the hunter with the gun. We oppose the keeping and killing of animals for the pleasure of the palate just as we oppose men controlling abortion or sterilization. We won't be part of the torture and killing of animals."

In their search to understand the roots of their own oppression, these feminists see the significant relationship between animal subjugation and human social relations—a relationship that our movement would do well to better illuminate. They note how well once animal subjugation, exploitation and the hatreds that go with them come to be legitimized in a culture they can be directed elsewhere. Indeed, the severest degrees of hatred and oppression of Blacks, Jews, Orientals and other "races" are still rationalized on the grounds that these humans are "just animals" and not entitled to moral consideration.

Behavior and Weight Loss of Feeder Calves in a Railcar Modified for Feeding and Watering in Transit


The behavior of 164kg Angus and Hereford calves was studied in a double deck 26m x 2.6m "jumbo" railcar equipped with feed and water. A 4,180 liter water tank positioned in the center of each deck divided the car into four compartments. Fifty head were loaded into the lower and upper forward compartment (252kg/㎡ floor space), each containing 675kg of hay in racks. The two rear compartments served as quarters for equipment and researchers. Two video cameras were mounted in the upper forward compartment containing calves. Behavior of the calves was monitored, with portions video taped during rail transport from Memphis, Tennessee to Amarillo, Texas (57 hr) in June, 1979. The calves commenced eating and drinking immediately after being loaded in the railcar. Up to 75% of the cattle could lie down while the car was not in motion (14.4 hr of trip). Calves stood at high speeds (80km/hr) on unimproved track but continued to eat, drink and move about. Self and mutual grooming commonly occurred while traveling up to 40km/hr. Railcar temperature and relative humidity ranged from 17.8 to 41.1°C and 54 to 99%, respectively, and was identical to outside. Weight loss for 50 similar calves shipped by truck was 10.6% while rail calves lost 4.5% during truck transport to the railcar (71.3 hr) and 2.1% during rail transport for a total of 6.6%. Average daily gain (ADG) from initial weight to 7 days postshipment was 41kg for rail and 0.02kg for truck, but ADG became similar at 30 days indicating full recovery. One truck calf was dead on arrival and 8% of the truck and 5% of the rail calves were treated for shipping fever. Excluding feedcosts, rail transport at 252kg/㎡ floor space costs 30% less per calf than transport in fully loaded trucks.

Introduction

The United States' first federal animal welfare law was enacted in 1883 and was known as the "28-hour" law. It regulated, relatively ineffectively, the interstate transportation of livestock by railroad and ship. The present version of the "28-hour" law, (Public Law No. 340), was enacted in 1906 and has been very effective (the Animal and Plant Health Inspection Service, USDA, 1978), Public Law No. 340 states in part:

"That no railroad,... or the owners or masters of steam, sailing, or other vessels carrying or transporting (animals)... shall confine the same in cars, boats, or vessels of any description for a period longer than twenty-eight..."
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"Peter Singer has presented the case (for vegetarianism) with the utmost philosophical clarity... My purpose here is not to recruit vegetarians so much as to make the point once again that the root of the problem is in our blithely taking power over the lives and deaths of other creatures whose suffering is in no way necessary for our survival. If we so easily take the lives of animals who are only a few evolutionary steps removed from us, what is to prevent us from doing the same to humans who are physically very different from us.—of a different color, or speaking an unintelligible language, or "primitive" in their customs?" (emphasis in original)

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consecutive hours without unloading the same in a humane manner, into properly equipped pens for rest, water, and feeding for a period of at least five consecutive hours..."

Section three states in part:

"That when animals are carried in cars, boats, or other vessels in which they can and do have proper food, water, space, and opportunity to rest the provisions in regard to their being unloaded shall not apply."

Motor transport was excluded because it had not come into general use in 1906. The "28-hour" law has never been amended to include animals moved interstate in trucks. Due to the increased mobility and speed of trucks and the added economic burden on the railroads of conforming to the "28-hour" law, essentially all livestock in the USA are now transported by truck.

Recent increases in the cost of energy are making transport of animals by rail, which has at least a four-to-one fuel efficiency advantage over trucks (Clark, 1979), more attractive. Most railroads in the United States refuse to transport livestock, citing the high costs of labor necessary to conform to the "28-hour" law, the switching required to unload cattle cars, and a lack of cattle handling facilities. There is also some evidence that rest stops can be more detrimental to the animals than shipping direct (Kilgour, 1978).

The purpose of this study was to monitor the behavior of calves shipped in a railcar equipped with food and water. Density was planned to allow the cattle to lie down. These data would then be used to determine if this method of transport conformed to the intent of the "28-hour" law.

Procedure

Railcar

The double-deck 26m by 2.6m "jumbo" railcar had a 4,180 liter water tank placed against a side wall in the center of each deck. A door extended from the tank to the opposite wall, dividing each deck into two compartments. There was one drinking well on each side of the tank. Water level in the well was controlled by a self-filling vacuum system. A float board was used in each well to prevent splashing.

Inside height of the bottom deck was 1.7m and upper deck, 1.8m. The floor of the top deck consisted of alternating 14cm wide strips of flat steel and wood running across the car with the wood being beveled and extending 2cm above the steel. Excrement from the top deck could not drain onto the lower deck. The all wood bottom deck was similar in configuration.

Twelve temperature probes were placed in and around the cattle compartments. Fig. 1 shows location of the water tank, a television camera, and hay racks. The door connecting the two compartments is open. Hay racks, made of strips from automobile tires, were installed the length of the car. Each compartment held 675kg of hay in rectangular bales. The car was cleaned and bedded with fresh straw, and was agitated next to last on a 114-car train. Cattle were loaded in the forward half of both decks directly out of trucks. No loading or unloading facilities were required. The aft half of the cattle car served as living quarters for the researchers and housed the monitoring equipment.

Video cameras were installed in the top forward compartment. Camera #1 was mounted on top of the water tank (Fig. 1). A convex mirror mounted on the ceiling and positioned to appear in the top of the video picture provided a view of the waterer directly beneath the camera. Camera #2 was mounted in the forward part of the car to monitor the activity of animals as they moved from one end of the car to the other. However, it was difficult to identify calves when they were midway between the cameras due to the low camera angle. Activity was continuously monitored during transport with portions recorded for later analysis at 18 hr video tape using NEC VC-7505* ¼ inch cassette time lapse recorder. Minor frequency fluctuations in the electrical generator prevented use of slower time lapse speeds, i.e., 36 or 72 hr tape.

Direct observations were also made through the door separating the compartments while traveling and through the sides of the car while stationary.

Experimental animals

One hundred and fifty Angus and Hereford steer and heifer calves averaging 164kg were obtained in Newport, Tennessee. They were fed a corn silage-based 16% crude protein conditioning ration in a feedlot for sixty days prior to transport. Fifty randomly selected calves were loaded into a conventional cattle truck and transported directly to the Texas Agricultural Experiment Station feedlot at Bushland, Texas. The calves were placed in compartments at the same density as if the truck had a "typical" full load. The remaining calves were transported by truck to Memphis, Tennessee where they were again weighed and immediately transferred to the railcar. Fifty head were loaded in the forward half of each 4,180 liter compart-ments (5250kg/m² of floor space). This was 0.2kg/m² less than the load density recommended by Ashby and Landridge (1970) for export shipments of less than seventy-two hours duration. Large...
Section three states in part:

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Inside height of the bottom deck was 1.7m and upper deck, 1.8m. The floor of the top deck consisted of alternating 14cm wide strips of flat steel and wood running across the car with the wood being beveled and extending 2cm above the steel. Excrement from the top deck could not drain onto the lower deck. The all wood bottom deck was similar in configuration.

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NEC America, Inc., El Grove Village, Illinois.
numbered tags were glued on the backs of ten randomly selected calves loaded on the top deck to serve as representative samples. The calves remained in the railcar until they reached Amarillo, Texas where they were trucked (.75 hr) to the feedlot at Bushland. The calves were weighed after 0, 7, 14, 28 and 48 days in the feedlot. Data were subjected to analysis of variance.

**Results**

The calves were in the railcar a total of fifty-seven hours. Time spent in transit, distance traveled and speed of the different phases of the shipment are summarized in Table I.

Calves were loaded in the railcar on June 26 at 1800 hours and immediately commenced eating hay and drinking water. Thirteen different calves drank during the first thirty minutes, reflecting the water deprivation during transport to the railcar. The calves remained highly active (exploratory behavior) for the first two hours after loading, with many animals moving from one end of the compartment to the other in less than fifteen minutes. The first animal was observed lying down at 2000 hrs. At 2233 hrs two-thirds of the calves on the bottom deck were lying down. None were lying down on the upper deck, but these were disturbed several times by personnel checking equipment.

Many of the cattle were lying down while the train was standing (=25% of the time in transit) or moving at slow speeds (30km/hr or less). Lying while the car was moving was a common occurrence from midnight of the first day on. If the ride was rough, almost all would stand. Those that remained lying were usually along a wall or in the blind area by the door separating the compartments (e.g., Fig. 6), perhaps to reduce the chance of being stepped on by calves attempting to maintain their balance.

The ride became extremely rough (pitch and sway) when the train was moving at high speeds (80km/hr) over unimproved sections of track. These periods rarely lasted more than one to two hours because the train was required to slow down when going through metropolitan areas. Since the car was pulled at the end of the train, occasional strong jolts were received during changes in speed due to the accordion action of the other cars. The train twice broke an air line and the automatic brake system caused an abrupt halt which threw the calves to the front of the car. Only once, however, was a calf observed to lose its footing during such a stop. Some calves appeared to be aided in maintaining balance by physical contact with others. Examination of video tapes showed that the calves positioned themselves in a random manner throughout the car regardless of speed and smoothness of ride. No tendency for them to maintain a head-to-head or head-to-tail orientation was observed. In concurrence with the observations of Kilgour and Mullord (1973), they avoided contact with the sides of the car when it was moving.

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Distance (km)</th>
<th>Average Speed (km/hr)</th>
<th>Time (hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck (Newport to Memphis)</td>
<td>750</td>
<td>66.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Railcar (Memphis to Amarillo)</td>
<td>1226</td>
<td>21.4</td>
<td>57.2</td>
</tr>
<tr>
<td>Truck (Amarillo to Bushland)</td>
<td>24</td>
<td>32.0</td>
<td>0.75</td>
</tr>
<tr>
<td>Overall</td>
<td>2000</td>
<td>28.6</td>
<td>69.2</td>
</tr>
</tbody>
</table>

The calves continued to eat hay and drink regardless of the smoothness of the ride. Thirty-six different calves drank during an hour of the roughest ride experienced. When the car was standing still, hay and water consumption was greatly reduced as calves lay down to rest. Only one calf drank during the last 30 minutes of a 4 hr period, when the car was stopped. This occurred after 46 hrs in the railcar, and the highest temperatures were recorded during this stop. When the car started moving, the calves stood up and commenced eating and drinking. Apparent hay (5.1 kg) and water (21 liters) consumption per head per day was normal (National Research Council, 1976). There was little wastage of hay, and the float board in the waterer was very effective in preventing splashing.

Five mounting attempts and frequent self and mutual grooming were observed. Social grooming occurred even while the train was moving at moderate speeds. Figs. 3, 4, 5 and 6 show the activity patterns of four calves under varying conditions. Calves traveled the full length of the compartment in as little as 12 minutes (Fig. 5). Animal density (65m²/head) permitted 75% of the animals to lie down at one time.
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**TABLE I. Distance Traveled, Average Speed, and Time Calves Spent on Trucks and Railcar**

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<td>32.9</td>
<td>28</td>
</tr>
<tr>
<td>Overall</td>
<td>2000</td>
<td>28.6</td>
<td>69.2</td>
</tr>
<tr>
<td>Truck (Newport to Bushland)</td>
<td>1976</td>
<td>54.9</td>
<td>36.0</td>
</tr>
</tbody>
</table>

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when the car was still, which accounted for 14.3 hours of the trip. Many calves continued to lie when the train was moving at slow to moderate speeds (15-50 km/hr).

Ambient temperature and relative humidity ranged from 17.8 to 41.1°C and 54 to 99%, respectively. Temperature inside the car was identical with outside temperature, due to the open sides of the car. The maximum temperature (41.1°C) occurred when the car was stopped in a railyard. The calves showed no heat stress despite the presence of only a slight breeze.

Weight loss of calves shipped by truck was 10.6%, and was similar to that reported in other studies (Table II). The rail shipment had a weight loss rate which was 6.6% lower (P<.01) than the truck shipment (4.5% during truck transport to the train, and 2.1% during rail transport and the truck ride to Bushland). Since the calves could not be weighed until after being trucked to Bushland, some of the 2.1% loss attributed to the railcar may have been caused by truck transport from Amarillo to Bushland. Four of fifty calves in the truck shipment and five of the 100 rail calves were treated for shipping fever after arrival at Bushland.

Optimal density in regard to behavioral factors should be determined. Density must be expressed on a weight basis rather than by number of animals to account for differences in animal size. There is also a strong possibility that the relationship between weight and space requirements may not be linear, especially for extremely light and heavy cattle. Excessive density would inhibit movement to the waterer and feeder and reduce or prevent lying. Cattle will resist lying as long as possible under crowded conditions. Animals are trampled when fatigue forces them to lie down and an excessive density does not leave them enough maneuvering room to get up. Our subjective observations indicate onset of fatigue after 14 hours. This would vary with the age and condition of the calves and the mode of transport. Kilgour and Mullord (1973) judged 13 hours of continuous travel to be the critical time for weaner calves in trucks, while Sutton et al. (1967) concluded that 24 hours was the maximum for 360 kg oxen in railcars.

The calves were remarkably adept at maintaining their balance and conducting "normal" activity even when the ride was very rough. During severe jolts that occurred when the train's brakes locked, the cattle were thrown forward but received support from the other cattle due to the relatively high density. The animal that fell from other calves.

The railroad charged $1.02/km, while truck transport cost $.86/km. Assuming 200 calves were transported in the railcar at the density used in this study (50 calves in each compartment) and the trucks were carrying a "typical" full load of 164 kg calves (100 head each), transport by rail would save 30% per km transported. When the cost of truck transport (39% of the distance moved was by truck) and all feed costs are included, there was an overall savings of 21% or $717 compared to shipment solely by truck.

Discussion

The calves appeared relatively uninhibited while in the railcar. They ate readily, each of the tagged animals drank several times a day, and self and mutual grooming occurred frequently. This indicates that the environment in the railcar was not overly stressful.

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Table II. Typical Weight Loss (Shrink) of Cattle Transported by Truck

<table>
<thead>
<tr>
<th>Source</th>
<th>Number of Animals</th>
<th>Distance Shipped (km)</th>
<th>Shrink %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addis and Crenshaw (1969)</td>
<td>1,294</td>
<td>1,900</td>
<td>9.5</td>
</tr>
<tr>
<td>Self and Gay (1972)</td>
<td>297</td>
<td>1,005</td>
<td>8.9</td>
</tr>
<tr>
<td>Emery et al. (1968)</td>
<td>80</td>
<td>1,450</td>
<td>7.6</td>
</tr>
<tr>
<td>Hale et al. (1967)</td>
<td>72</td>
<td>1,500</td>
<td>10.8</td>
</tr>
<tr>
<td>This study</td>
<td>30</td>
<td>2,000</td>
<td>10.6</td>
</tr>
</tbody>
</table>

*Calves originating from sale yards, shipped during the summer.

Table III. Average Daily Gain from Preshipment Weight (Actual Pay Weight) for Calves Transported by Rail and Truck

<table>
<thead>
<tr>
<th>Period</th>
<th>Average Daily Gain (kg)</th>
<th>Rail</th>
<th>Truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preshipment—7 days on feed</td>
<td>0.45 ± 0.17</td>
<td>0.02 ± 0.04</td>
<td></td>
</tr>
<tr>
<td>Preshipment—14 days on feed</td>
<td>0.79 ± 0.78</td>
<td>0.38 ± 0.68</td>
<td></td>
</tr>
<tr>
<td>Preshipment—28 days on feed</td>
<td>0.97 ± 0.33</td>
<td>0.94 ± 0.43</td>
<td></td>
</tr>
<tr>
<td>Preshipment—48 days on feed</td>
<td>0.96 ± 0.33</td>
<td>0.99 ± 0.43</td>
<td></td>
</tr>
</tbody>
</table>

*Rail differed from truck, P<0.05.

*Rail differed from truck, P<0.04.

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size seemed more important than density. Bailey (1979) recommends group sizes of up to forty for cattle under 315 kg and twenty for animals exceeding that weight, based on research with ocean shipments. The group size of fifty used in this study for 164 kg animals was probably marginal; however, more research is needed in this area.

The lack of any special orientation of our calves is in contrast to two rail shipments of oxen observed by Sutton et al. (1967). A pronounced parallel orientation perpendicular to the direction of travel was observed while the train was moving. They did not, however, include data on density (though it was probably much greater than in this study), or where the car was placed on the train. An important consideration may be the amount of sway (caused by condition of the track) and the amount of slap occurring during changes in speed.

Conclusions

Transport by rail in cars with feed and water with adequate space appears to have some advantage over transport by truck. The calves were transported at a savings in cost and reduced weight loss. The difference in weight loss, however, was only temporary. The truck calves fully compensated in approximately 30 days. A major problem with rail transport is the increased time in transit and the possibility of extended delays. The use of unit trains (composed entirely of cattle) would greatly reduce transit time. Cattle at the density and weight used in this study could have stayed on the car much longer without ill effect based on their appearance; however, hay and water would have had to be replenished.

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9th California Feeders Day, Univ. of California, Davis, CA.
Social and Cognitive Capabilities of Nonhuman Primates: Lessons from the Wild to Captivity

William C. McGrew

All anthropoid primates in nature lead highly sociable lives. In infancy and childhood this is characterized by stability and familiarity for both sexes; in adulthood either one or the other sex changes groups. The natal group provides a social network of matrilineal kinship; after sexual maturity incest avoidance and exogamy are the rule. Important differences exist across species and between the sexes in mating strategies. In most species, males emigrate, but in others females do so. Male sexual behavior is based on competition between peers; females exercise choice in selecting sexual partners. Normal development of sexual behavior and maternal caretaking requires contact with adults. According to one school of thought, the selection pressures of dynamic life in groups led to the evolution of "social intelligence." Such cognitive abilities are manifested in coalitions and reciprocity based on assessment of the predictability of others' behavior over time, i.e., on long-term relationships as well as short-term interactions. Another school of thought sees the evolutionary origins of cognitive capacities in the demands of subsistence. "Extractive" foraging requires varied techniques for the acquisition and skillful processing of foods. Optimal budgeting of daily activities such as ranging is facilitated by long-term memory and cognitive mapping. The absence of such social and environmental challenges may lead to pathological behavior.

Introduction

Like all other organisms, nonhuman primates are products of evolution by natural selection. That is, selective pressures in the physical and social environment have shaped the form and function of the organism through variation in reproductive success. Such selection has acted both on the primate's structure and on its behavior, and the two are inextricably linked (Clutton-Brock and Harvey, 1976). Even those behaviors which are cultural in nature, i.e., those transmitted by social learning from one individual to another, are ultimately limited by the capacities of the brain, which is a construction of the genome (Bonner, 1980).

This state of affairs has obvious implications for anyone seeking to learn from nonhuman primates in captivity. This will apply both to those studying primates for their own sake and to those using primates as a means to seek solutions to human problems. In either case, the validity and reliability of research into normal processes will be enhanced in direct proportion to the resemblance of conditions in captivity to those in nature. Moreover, it follows that measures to safeguard mental health in captive primates should take equal precedence to those concerning physical health. Finally, the plasticity of primate behavior is not without limits, and research procedures that push subjects beyond those limits run the risk of distorting or even nullifying the results obtained. In short, lab and zoo workers should listen to field workers, for they sometimes can supply crucial knowledge. (Of course, the reverse may also be true, but that is the subject for another paper).

Relationship Between Field and Laboratory

What has been said so far is not new, and the gap between field and laboratory is not nearly so wide as sometimes has been supposed. One of the few advantages of the shrinkage in job opportunities in the 1970's was that a sizeable number of field primatologists found themselves in laboratories, and a number of laboratory workers ventured to the field. Cross-fertilization ensued. Furthermore, over the same period, a number of institutions and individuals founded facilities which represent a compromise between the extremes of cage and canopy. Such free-ranging...
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populations, usually housed outdoors in relatively spacious, semi-natural surroundings, range from fenced or moated enclosures in safari parks (Pfeiffer and Koeboer, 1978) to off-shore islands (Estrada and Estrada, 1976). Many lessons learned from early field studies have been applied beneficially to both parties, i.e., to the profits or findings of the human primates and to the increased health and reduced suffering of the nonhuman primates. Is this the case, what then is the justification for this paper? Has it all been said before, and have the appropriate lessons been learned? In my opinion, the answer to these questions is no. There are at least two major reasons for continuing to pursue the application of knowledge from the wild to captivity. First, in spite of trends to the contrary, the majority of the thousands of nonhuman primates in captivity still live in pathogenic conditions. Most monkeys and apes in laboratories and zoos are housed and treated such that their mental and physical health suffers as a result. This is especially regrettable, for many of these pathogenic conditions persist through ignorance and could be remedied. The status quo is thus unacceptable. Second, a more mundane reason for this article is that new findings accrue constantly, requiring repeated revision of our knowledge of primates. Much of this alteration is minor, but occasionally major surprises require us to reconsider generalizations about a given species or an established procedure. Often these new findings take too long to percolate through to users of primates in the 'real' world; they are published in academic journals or books by scientists unable or unwilling to recognize their practical implications. None of what follows is totally new, and some of the findings are re-interpretations, but they result largely from studies done in the last five years.

Before proceeding, let me try to answer any skepticism aroused by these provocative generalizations with a specific example. It is simple but illuminating. Last winter a British company that breeds monkeys reported findings which stimulated national interest and eventually caused questions to be asked in Parliament. This study (Welburn, 1979) compared the responses of two species of macaques, Macaca mulatta (rhesus monkey), and M. fascicularis (longtailed or cynomolgous monkey), to over-wintering in unheated quarters in southern England. The results were dramatic: All of the rhesus monkeys survived, but 85% (22 out of 26) of the longtailed monkeys died. No details of post-mortem examination were presented, but it is likely that the monkeys died from exposure after much suffering. An important lesson about species differences was learned, at the greatest possible cost to the participants, and at no little financial expense to the firm. What is regrettable is that attention paid to field studies of the two species would have yielded the same knowledge. Recent field work in Borneo, Sumatra and Malaysia shows that the longtailed monkey is a lowland species reaching its highest densities in warm, mangrove swamps (see review in Lindburg, 1980). It is doubtful that the species in nature ever encounters subfreezing temperatures, and its long tail is singularly unsuited to conditions of possible frostbite. On the other hand, rhesus monkeys live in the foothills of the Himalayas, reaching elevations of over 3000m. Their chunky builds, thick coats, and shorter tails all indicate adaptation to colder temperatures. Had these differences been appreciated, much waste could have been avoided.

The aims of this paper are, first, to skim over a variety of topics in the general area of social development and organization over the animals' life-span. Second, I shall seek to relate these to cognitive capacities by referring to two types of explanation for the evolution of intelligence. Such abilities are based not only on individual recognition of one's fellows but on predicting their behavior under a variety of conditions over time (see, e.g., Humphrey, 1976). The other school of thought sees the evolutionary origins of complex cognitive capacities in the demands of subsistence, especially feeding. So-called "extractive" foraging requires varied techniques for the acquisition and processing of foods that are irregularly distributed in time and space (Parker and Gibson, 1977 & 1979). Third, throughout I shall make practical suggestions for the husbandry of primates which arise from the new knowledge from field studies.

Social Development and Organization

Primates are social (Fig. 1). This may sound like a truism, but at least three points need to be made: Even species that do not live constantly in groups lead active social lives. Such supposedly solitary species are not so, especially as subadults; they differ from other, truly solitary mammals in this regard. This has emerged from studies of orangutans (Pongo pygmaeus) in Sumatra, bush babies (Galago senegalensis) in South Africa, and tree shrews (Tupaia glis) in India. Second, in some such species, previous studies may have exaggerated the solitariness by studying populations under abnormal conditions, e.g., when risks from predators are absent. Wild chimpanzees (Pan troglodytes) at Mt. Assirik in Senegal rarely are alone, while solitary chimpanzees are commonly reported at Como in Tanzania. The Senegalese chimpanzees are under pressure from 4 species of large carnivores (Tutin et al., 1981) while the Tanzanian chimpanzees are in no such danger. Similarly, Old World monkeys (which make up the majority of primates in laboratories) are more sociable than is sometimes acknowledged. Unlike the human species, their lives are constantly focused on a single group at any point in life, from birth to death. Human primates are simultaneously members of a variety of groups throughout life. My conclusion is that any primate housed alone is socially deprived. The stress from such deprivation is likely to distort both physiological (e.g., corticosteroid secretion) and behavioral (e.g., stereotypes) processes, even in adults previously reared in groups. Even more serious may be the effects of isolation on immature individuals.

Primate infancy and childhood are characterized by social stability (Figs. 2, 3, 4). The primate infant is constantly in the company of its mother, and often of older sibs as well. In monogamous species, the father is also present. This period of social dependency is longer in many species than previously suspected, e.g., in chimpanzees, weaning does not occur until the fifth year (Clark, 1977) and the average birth interval is almost six years (Tutin, 1980). Juvenile chimpanzees as old as eight years of age may grieve to death as a result of being orphaned. Such effects are not confined to apes. Long-term studies of orphaned female Japanese monkeys (Macaca fuscata) show them to have reduced reproductive success later in life (Hasegawa and Hiraawa, 1980). In captivity, separation of infants from their mothers and rearing in varying degrees of isolation are more extreme than orphaning in the wild, where the immature primate may be fostered by kin who assume the role of substitute caretakers. Such allomaternal behavior is widespread (Quiatt, 1980). Single-caged housing in captivity precludes this, and although human caretaking may be sufficient to ensure survival, it may be more disturbing than rearing in isolation in terms of negative effects in later life (Riesen, 1971). Contrary to earlier optimistic reports, behavioral abnormalities such as sexual dysfunction often cannot be reversed by social therapy (Goy and Coldfoot, 1974). Similarly, cumulative data from breeding

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records show that females who did not experience maternal rearing in their infancies make poor mothers, if they can be impregnated at all. In orangutans the two effects combine to produce a virtual absence of births from second-generation, captive-born parents, whereas wild-born individuals are successful in captivity (Jones, 1977).

Primates emigrate. Contrary to early reports, all primates do not grow up, live, and die in the same group; at least half the members of any primate grouping leave the natal group and join another, or sometimes several others in succession. In monogamous species such as marmosets, offspring of both sexes leave at adolescence. In most species living in groups composed of several males and several females, emigration occurs at sexual maturity. Such emigration was noted as occasional in early field studies of populations living at artificially high densities (Boelkins and Wilson, 1972). Later studies under more natural conditions suggest that most (Japanese monkeys, Sugiyama, 1976) or all (olive baboons, 

Papio anubis, Packer, 1975) males of such species will emigrate. However, in other species it is the females which transfer between groups either temporarily or permanently, e.g., in chimpanzees (Pusey, 1980). The proximate cause for such movement is the urge to breed outside the natal group; the ultimate cause is presumably avoidance of inbreeding depression, the effects of which are now established (Ralls et al., 1979). Such findings have important implications for primates in captivity. Groups left intact are likely to deteriorate as stresses accumulate over years. Social problems are likely to increase and fertility to decline; the time-scale of the process should be predictable from the life history of the species involved. In Callithricidae (marmosets and tamarins) antagonism between parents and young will emerge after the latter are succeeded by one or two sets of younger siblings. Such older offspring will not breed if left in the natal group. Similarly, removal and introduction of individuals in other species should involve the appropriate sex at the appropriate time. To exchange females rather than males between captive breeding groups of rhesus monkeys, as was done for years in one well-known research facility in England, resulted in prolonged social stress and possibly in reduced fertility.

Primate social life is based on kinship (Figs. 5, 6). A major finding from field studies is that social ties go beyond the parent(s) and offspring. Not only are sibs (or half-sibs, as is more usual) important, but also grandparents, uncles and aunts, and cousins, nieces and nephews. In many species of monkeys, matrilineal groups form the enduring core of a troop's social structure. Throughout their lives, such related individuals focus their social behavior, e.g., grooming, on each other, and form coalitions in competition. The evolutionary basis for such relationships appears to lie in kin selection (Hamilton, 1964), and the nature of social interactions can be predicted from the degree of relatedness, that is, the extent to which genes are shared between individuals (Kurland, 1977). Conversely, such individuals avoid engaging in incestuous reproduction, i.e., in son-mother, father-daughter, or sibling mating. This has been especially well-documented in the chimpanzee (Pusey, 1980; Tutin, 1980), where females actively avoid being mated by their sons and brothers. It is likely to hold true for all forms: There are no recorded cases in which incest is typical of naturally-living groups of primates. The reasons for this are likely to be those which underlie the incest taboo in humans, i.e., deleterious effects of homozygous recessive genes (Seemanova, 1971). The ramifications of such findings for confined primates are obvious. All individuals, even adults, housed alone are subject to 'kin deprivation;' moreover, infants growing up with only the company of their mothers are socially impoverished. Such individuals cannot be expected to engage in interaction in later life which requires reciprocity, as in the case of adult male olive baboons that help each other in competition over estrous females (Packer, 1977). By the same token, primates forced by lack of alternatives to breed to close kin will be stressed, their reproductive success is likely to decline, and any resultant offspring are likely to be at risk.
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Primates breed selectively. Recent field studies show that no species of primate whose reproductive behavior has been studied breeds randomly. Early accounts of promiscuity lacked long-term data on identifiable individuals, or confused some aspects of sexual behavior with reproduction, i.e., with fertilization. Such selectivity in breeding is based ultimately on sexual selection as expressed in competition among males over females (intrasexual selection) and in female choice of mates exercised on the basis of this competition (intersexual selection). The evolutionary aspects of this are now well understood, being based on sex differences in parental investment and the breeding strategies which follow from this (Trivers, 1972). For example, recent findings show that in wild chimpanzees, a supposedly promiscuous species, although the vast majority of copulations are opportunistic, most of the conceptions occur during consortships (Tutin, 1979). These are temporary, monogamous bondings which require mutual consent. In some polygynous species, competition between males may take the extreme form of one male killing the infants fathered by another (Hrdy, 1979). Even in species with great sexual dimorphism in body size, such as baboons, in which males may seem to dominate social affairs, it is the females who determine their impregnators (Collins, in prep.).

These observations have numerous implications for primates in captivity. For a male living in a pair with a female, or in a harem-group with two or more females, the spur of male competition is missing. This is especially important for species whose mating strategies evolved in multi-female, multi-male troops, e.g., all macaques, most baboons, and chimpanzees. The result may be progressively lower motivation to breed. Such forms should be housed in facilities of adequate size to hold two or more males. Similarly, females living in such captive conditions are prevented from exercising their choice of the fittest males, and their mental and emotional health may decline, along with their motivation to breed. Lack of choice may lead to forced matings. Chimpanzees paired in captivity mate throughout the menstrual cycle, whereas wild chimpanzees confine their matings to periods of female estrus (Tutin, 1980). Such matings result from male intimidation, and primiparous chimpanzees in captivity conceive earlier than their wild counterparts and show high rates of infant mortality (Tutin, 1980). Institutions seeking successful breeding of primates are advised to mimic as closely as possible the natural conditions under which the two sexes play out their mating strategies.

In summary, each species of nonhuman primate has social tendencies which are a result of its evolutionary past, i.e., of a particular set of selection pressures imposed by the environment which shaped its genome. [That such genetic inclinations exist is revealed in those fortuitous conditions in nature where two neighboring, closely related species hybridize, e.g., the zone of overlap between olive baboons and hamadryas baboons in Ethiopia (Nagel, 1973).] These social inclinations manifest themselves at all levels — in interactions, relationships, and social structure, to use Hinde’s (1976) terminology. These form the basis of the social capabilities cited in the title of this paper.

Origins of Cognitive Capabilities

It will be obvious that as our knowledge of the social worlds of primates increases, our estimations of their socially cognitive abilities must increase proportionally. Discrimination in interactions requires the ability to make judgments and distinctions; reciprocity in coalitions requires a memory with ‘files’ for individuals; competition over mates requires assessment of probabilities of relative success and
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 Origins of Cognitive Capabilities

It will be obvious that as our knowledge of the social worlds of primates increases, our estimations of their socially cognitive abilities must increase proportionally. Discrimination in interactions requires the ability to make judgments and distinctions; reciprocity in coalitions requires a memory with 'files' for individuals; competition over mates requires assessment of probabilities of relative success and
even costlier failures. Recent studies of primates do not shrink from using such terms as 'tactics' or 'strategies' to describe these abilities. De Waal (1978) has described the complex, conditional decision-making used by adult male chimpanzees in their alliance in dominance interactions. Walker Leonard (1979) has identified several alternative long-term strategies for stump-tailed macaques (Macaca arctoides), again related to eventual ranking in a dominance hierarchy. Wu et al. (1980) have shown that infant macaques have the ability to recognize half-sibs, even when they have been reared apart. (In all such cases, it must be emphasized that this need not entail conscious intent, but only that primates behave as if they were aware of the contingencies of behavioral alternatives.)

The plausibility of this social explanation for the evolution of intelligence should not blind us to other possibilities, however. More basic to evolution than reproductive success is individual survival. That is, in terms of inclusive fitness, an individual may advance its genes in the absence of reproduction by aiding its relatives, an individual unable to stay alive becomes an evolutionary dead end. Primates as an order are the most varied and catholic of all mammals in diet. Much of their success in this regard derives from their skill at extractive foraging (Parker and Gibson, 1977). This entails exploiting resources which are not directly harvestable but which present 'detour' problems to be solved before eating. These challenges may take the form of an underground root or social insect colony, a tough-shelled fruit or skull, water in a tree-hole, or fungi under a stone (Hamilton et al., 1978; Rhine and Westlund, 1978). All of these tasks involve the indirect expenditure of energy, i.e., manipulation of objects other than the foodstuff before it can be eaten. Other species practice extractive foraging, e.g., squirrels with nuts, sea-lillters with abalones, but only in a limited and stereotyped way compared to the opportunistic, omnivorous monkeys and apes.

These recent findings on the cognitive aspects of feeding (which could easily be extended to the cognitive aspects of foraging, e.g., cognitive maps in wide-ranging species) reinforce a well-known point: Captive primates kept in bare cages without access to a continually changing array of manipulable objects are sensorially, motorically, and intellectually deprived. If their diet consists largely or entirely of artificial biscuits, the problem is compounded. Such nonhuman primates, no less than human ones, suffer pathogenic boredom, which shows in hair-pulling, coprophagy, and self-mutilation. This is especially regrettable when solutions exist: Chaimove and Anderson (1980) have shown the beneficial effects of a deep litter substrate salted with small cereal grains, a technique which is both efficient and economical in providing opportunities for foraging.

Results from recent field studies of nonhuman primates continue to increase our estimation of their intelligence. This is the case whether we interpret its function in terms of the social demands of group-living or in terms of the environmental demands of individual subsistence. In either case (or more likely, with both acting together) the implications are clear. Primates in captivity that are socially or intellectually deprived are not realizing their evolutionary potential. Their behavior is abnormal in proportion to the degree to which such deprivation exists. Conclusions based on this abnormal behavior are suspect at best, and invalid at worst. Surely it is not beyond the ingenuity of users of primates in captivity to overcome these problems, as they have successfully done with so many others, to the mutual benefit of the human and nonhuman primates involved.

References


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W.C. McGrew—Capabilities of Nonhuman Primates Review Article

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Legislation & Regulation

The Law in Sweden

On 14 December 1978, the new Swedish Animal Protection Act came into being to protect domestic and other animals kept in captivity. The general provisions include broad requirements for adequate housing and nutrition, good working and transport conditions, and proper slaughter practices. Docking of ears and tails is either totally prohibited, as in the case of ear-docking in dogs, or permitted where the suffering or pain could be considerable (certain toxicity tests, radiation studies, tumor transplants, all stress tests, and behavioral studies using major interventions); (2) methods involving anesthesia where the animals are allowed to recover and where post-operative pain or suffering is likely (biopsies, insertion of catheters, experimental surgery, burns); (3) methods involving conscious animals where the suffering or pain could be considerable (certain toxicity tests, radiation studies, tumor transplants, all stress tests, and behavioral studies using major intervention); (4) methods involving conscious, curarized animals (certain physiological and pharmacological studies).

Experiments that fall into categories 3, 4, and 5 must be submitted for review to the ethical committees. Experiments conducted for educational purposes, as opposed to research, must be reviewed regardless of category.

The Law in India

In 1890, the Prevention of Cruelty to Animals Act was passed in India, and Societies for the Prevention of Cruelty to Animals opened in Calcutta, Madras, and Bombay. Ten, five years passed before Delhi followed suit, but several smaller towns had already founded animal welfare leagues. The organizations functioned mainly to implement the provisions of the anti-cruelty legislation through inspectors, to whom the state governments delegated the requisite police powers. Most of the SPCAs and other animal welfare organizations suffered from a critical lack of funds.

In 1961, a new Act superseded the earlier legislation, and under its provisions, the Animal Welfare Board was established. The Board, consisting of 25 members, receives a grant from the Indian government which enables it to provide limited financial assistance to selected organizations and to issue information to the public. It also publishes a quarterly journal, Animal Citizen, which provides news of Indian and worldwide events affecting animal welfare.

Bills and Resolutions Before the 97th U.S. Congress

HR556 (Roe)—Mandates the establishment of a National Center for Alternatives Research and a reallocation of 30-50% of animal research funds to alternatives

HR220 (Ferraro) and HR2110 (Donnelly)—Both authorize the expenditure of $12 million in federal funds for alternatives research.

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HR1002 (Anderson)—Regulation of trapping of mammals and birds. Would discourage waste of wildlife species and unnecessary mutilation and pain caused by inefficient and indiscriminate trapping and capture devices.

HR1950 (de la Garza)—Animal damage control. Would permit, inter alia, the use of the poison Compound 1080 for predator control, which constitutes a reversal of former Secretary of the Interior Cecil Andrus’ predator control policy.

HR2331 (Vento)—Corrupt Horse Racing Practices Act. Would control drug abuse in racehorses. Intended to provide a national framework for state drug control, testing procedures, and enforcement. Allows an exemption for all states that enact comparable programs.

Current Events

Meeting Reports

Bioassay Methodology—Meeting #1

In mid-1979, Congressmen Fred Richard (NY) introduced HR4805, the Research Modernization Act, which proposed the establishment of a National Center for Alternatives and the reallocation of a large proportion of the funds for animal research to the development of alternatives. United Action for Animals, the architects of the bill, mounted a energetic letter campaign aimed at members of Congress, especially Congressmen George Brown (D-CA), who was then the Chairman of the Subcommittee on Science and Technology. Despite the biomedical establishment’s consensus that the bill was undesirable, because they felt its provisions were ambiguous and unworkable, Brown had to respond to an obviously concerned public. After discussions with officials of the National Institutes of Health (NIH), it was decided that NIH should hold a “state-of-the-art” conference on the subject of alternatives to the use of laboratory animals, and that any hearings on HR4805 would be scheduled after the conference was over.

Senate Resolution 65 (Durenberger) and House Concurrent resolution 27 (Jacobs)—Urge federal agencies to support research into an alternative to the Draize test.

House Concurrent Resolution 38 (Whitehurst)—Urges promotion of alternative methods to laboratory animal research.

House Joint Resolution 131 (Whitten)—Would declare the first week of May each year “Be Kind to Animals Week.”
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On 17 May 1979, the Swedish government issued a decree regarding the establishment of the Central Experimental Animal Committee which set forth the following goals:

1) Promotion of cooperation among animal breeders, researchers, animal care staff, animal protection groups and the authorities;
2) Planning the future direction of laboratory animal use as well as alternatives and complementary methods;
3) Following the judgment of the ethical boards (see below) on the use of laboratory animals;
4) Support for the development of alternatives and disposal of the funds placed at the Committee's disposal for this purpose.

The government also distributed guidelines to the ethical committees which include five categories of experimentation: (1) Methods involving little or no pain (injections, blood tests, intubation, simple feeding studies, behavioral studies without major intervention); (2) methods involving anesthesia where the animal does not recover, or euthanasia to obtain tissue samples (removal of organs for histological or other study); (3) methods involving anesthesia where the animals are allowed to recover and where post-operative pain or suffering is likely (biopsies, insertion of catheters, experimental surgery, burns); (4) methods involving conscious animals where the suffering or pain could be considerable (certain toxicity tests, radiation studies, tumor transplants, all stress tests, and behavioral studies using major intervention); (5) methods involving conscious, curarized animals (certain physiological and pharmacological studies).

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NIH had at this stage already started its own internal investigation of the concept of alternatives and the extent to which it was supporting research into such techniques. The General Accounting Office (GAO) was conducting a similar enquiry at the request of Congressman Charles Pashayan (D-CA). The NIH report ended with a recommendation that a conference be held on the topic, while the GAO report stated that any immediate action on alternatives should be "delayed pending further study" and noted that "the planned NIH conference could provide beneficial information on the use of alternatives." Despite all of these indications that NIH should organize or would be organizing an alternatives conference, nothing happened. As 1980 progressed, it seemed more and more likely that nothing would ever happen. Finally, according to informed sources, Congressman Brown went to Dr. Donald Fredericksen, Director of NIH, and said that he would schedule immediate hearings on HR4805 unless NIH started to organize the conference right away. This action apparently produced the desired effect. Shortly thereafter, Dr. William Raub, Associate Director for Extramural Research and Training (NIH), was charged with the task of planning the conference and acting as its moderator.

The events leading up to the conference and NIH's reluctance to organize the meeting provide some explanation for the eccentric and haphazard planning that was thwarted by the resignation of many of those who attended, both scientists and nonscientists. NIH decided to avoid the use of the term "alternative" despite the fact that public interest in the concept was the main, if not the only reason for holding the conference. The final title of the conference was "Trends in Bioassay Methodology: In Vivo, In Vitro and Mathematical Approaches." As Dr. Raub stated at the opening on February 18, 1981, the three-day conference was held in Washington, DC. The conference was to focus on the bioassay and testing area because of the significant economic advantages of in vitro tests, because one could talk unambiguously about where and how animals may be replaced, because animal tests are impacted (although the use of animal bioassays results from a perceived or real lack of adequate in vitro systems), and because the simpler the test, the more scientifically rigorous it is likely to be. The speakers, according to Dr. Raub, had been specifically asked to talk about the strengths, limitations and future possibilities in their various areas of expertise. The conference would thus serve to highlight areas of agreement and distinguish areas of difference.

In fact, the conference turned out to be more a series of anecdotal talks on specific research areas, with an evident bias for animal research. The present and future potential of in vitro testing systems was either not delineated, or was lost as one speaker after another felt the need to emphasize the obvious, namely that some animal research was applicable, and that the battery of four animal tests would cost about $400,000 per chemical and a complete toxicological characterization would cost several million dollars. However, he stated that toxicity testing in animals is predictive of human risk and that there are no satisfactory replacements for such systems.

The other talks in the in vitro section of the conference were very mixed. Dr. Frank Schabel (Southern Research Institute, Birmingham, AL) gave a talk on the history of national research in this area and noted that some complementarity between the various systems.

A modest battery of four animals should be used, because one battery of four animals is predictive of human risk and that there are no satisfactory replacements for such systems. The following conclusions:

1. Short-term tests detect chemicals that damage DNA. Second, no single test will detect all types of carcinogens. Third, there is some complementarity between the various systems. Finally, even a battery of short-term tests will not detect all carcinogens, the number of mistakes made by such a battery is lower than the number made by the standard animal test.

Dr. Roland Nardone (Catholic University of America, Washington, DC) described the general strategy for in vitro testing of ocular toxicity, but was generally pessimistic about the potential of developing such an alternative. However, during questioning, he stated that the area was one of the few areas to which current animal tests could satisfy the conditions he described for evaluating in vivo systems, but on the statement that animal testing is a direct function of our ignorance rather than our knowledge.

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The events leading up to the conference and NIH’s reluctance to organize the meeting provide some explanation for the eccentric and haphazard planning and preparations that were experienced by many of those who attended, both scientists and nonscientists. NIH decided to avoid the use of the term “alternative” despite the fact that public interest in the concept was the main, if not the only reason for holding the conference. The final title of the conference was “‘Trends in Bioassay Methodology: In Vivo, In Vitro and Mathematical Approaches.” As Dr. Raub stated at the opening on February 18, 1981 (the three-day conference was held in Washington, DC), the conference was to focus on the bioassay and testing area because of the significant economic advantages of in vitro tests, because one could talk unambiguously about where and how animals may be replaced, because animal testing would be required for each test (although the use of animal bioassays results from a perceived or real lack of adequate in vitro systems), and because the simpler the test, the more scientifically rigorous it is likely to be. The speakers, according to Dr. Raub, had been specifically told to talk about the strengths, limitations and future possibilities in their various areas of expertise. The conference would thus serve to highlight areas of agreement and distinguish areas of difference.

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The other talks in the in vivo section of the conference were very mixed. Dr. Frank Schabel (Southern Research Institute, Birmingham, AL) gave a talk that was virtually a paean of praise for animal research in the search for chemotherapeutic agents against cancer. However, it is common knowledge that the success of the National Cancer Institute’s animal bioassay program has been less than impressive despite the sacrifice of millions of animals. (NIC programs consume approximately 6.5 million rodents every year.)

Dr. Alfred Prince (New York Blood Center, New York City) described the use of chimpanzees in hepatitis and slow virus research and then suggested that chimpanzees be given the same protection and consideration as mentally subnormal human beings. The animals should be acquired in a humane manner, the Working Group on acute toxicity tests had come up with a recommendation for one alternative to the Draize eye irritation test which would reduce animal suffering. Instead of demanding that eye irritancy be tested on six rabbits, the group was recommending that only three animals be used unless the results were equivocal. Furthermore, substances which are irritant in the dermal test, as well as substances which are not irritant, should not be tested in the eye but should simply be labelled as eye irritants.

The standardization of tests being effected by the IRLG and also international organizations is certainly long overdue and is prompted, in part, by the increase in demand for data on chemical toxicity. As Dr. Richard Griesemer (Oakridge National Laboratories, Tennessee) noted, there are about 40,000 chemicals produced in commercially significant amounts for which toxicological data is either totally lacking or inadequate. Dr. Robert Albers (Birmingham, AL) gave a talk on the effect of the use of panzees on toxicological research. Dr. Alfred Prince's chimpanzees are maintained in institutions in the USA, and if Prince's recommendations were put into effect here, it would probably mean the end of all chimpanzee research in this country.

The in vitro section of the conference was opened by Dr. Joyce McCann of Professor Bruce Ames’ laboratory in Berkeley, California. After describing the general structure of short-term tests to detect potential mutagens and carcinogens, and entering several caveats about their applicability, she presented the following conclusions. First, short-term tests detect chemicals that damage DNA. Second, no single test will detect all types of carcinogens. Third, there is some complementarity between the various systems. Finally, while a battery of short-term tests will not detect all carcinogens, the number of mistakes made by such a battery is lower than the number made by the standard animal test.

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specific cell culture system for screening water soluble surfactants for ocular irritancy. While it is a valuable adjunct, it is not a search tool for the animal eye irritancy test in its current form.

Dr. Matthew Scharff (Albert Einstein College of Medicine, Bronx, NY) described the new hybridoma techniques for producing monoclonal antibodies and their tremendous potential as research, diagnostic and therapeutic tools. Usually, antibodies are either obtained as heterogenous mixtures after an animal has been treated with an antigen, or as monoclonal products from a very limited range of myeloma cultures. However, in 1975, two scientists at Cambridge University reported that they could immortalize normal antibody-producing cells by fusing myeloma and normal spleen cells. The application of this technique is only in its infancy, but it is already being used in routine serology, diagnosis and identification of infectious agents (e.g., the rabies virus has been shown to differ from one part of the world to another), and identification of tumor antigens. Possible future applications include the production of large amounts of human monoclonal antibodies for passive immunization, for manipulating the immune response and for the delivery of therapeutic agents to limited sites in vivo. There is no doubt that the development and application of hybridoma technology will reduce the use of animals as antibody producers, at least.

Many of the speakers in the section on mathematical approaches noted that these techniques are not substitutes for animals. Dr. Arthur Guyton (University of Mississippi Medical Center, Jackson, MS) stated that his increasing use of mathematical models had not resulted in any reduction of animal use although he was getting more information per animal. Thus, mathematical modelling had improved the efficiency of animal research.

Dr. Richard Cramer (Smith, Kline and French, Philadelphia, PA) noted that his use of Quantitative Structure Activity Relationships (QSAR) had reduced the number of animal experiments, but that there is no chance that QSAR techniques will be able to predict biological properties with sufficient accuracy. His animal experiments superfluous. He also stated that funding is adequate in this area, that the field of computer modeling is not on the verge of a breakthrough, and that it would be pointless to try to encourage its speedier advance.

A number of different points were made during the panel discussions. While the standard line about the futility of throwing money at the problem came up on a number of occasions together with other platitudes of the conference to all agencies that were not represented at the meeting. With the exception of the specific recommendation on chimpanzee research, these amount to little more than proposals for continued dialogue. Certainly, it is clear that the conference came nowhere near to being the "little rain on the "state-of-the-art." Also, the proposed NIH action is decidedly equivocal when compared with the decisive and constructive approach taken in Sweden, as described by Dr. Monica Thelestam (Karolinska Institute, Stockholm). It resulted from establishing ethical committees for all animal research that is likely to involve pain and suffering. Sweden has also set up a fund, albeit relatively small, to support specific research into alternatives. While this probably does not amount to "throwing money at the problem" it indicates that alternatives research can be supported without inviting a national disaster.

Dr. Andrew Rowan (Institute for the Study of Animal Problems, Washington, DC) emphasized this point when he explained the fundamental difference between providing funds to find a cure for cancer and to develop new techniques. In biomedical research, the pace of advance is affected by the number of intuitive or creative insights, by critical evaluation and testing of those insights, by the development of new techniques and by luck. More money will not increase the amount of intuition or luck (unless more people are encouraged to take up science) and it will probably adversely affect the quality of critical evaluation (as in the "war on cancer"). However, it could and would hasten technical innovation, as in the development of cell culture technology. This is already accepted in a number of animal research areas where specific funds are available for core support of animal facilities and the development of animal models.

The topic of the ethics of animal research was raised a number of times. Dr. Thomas Regan (University of Pennsylvania, Philadelphia, PA) stated that his increasing use of animals was the result of his frustration at the lack of communication among the various factions in the audience. However, he did serve to highlight the fact that the issues underlying the convening of the conference were not acknowledged at all or covered so superficially as to be of little use.
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Dr. Richard Cramer (Smith, Kline and French, Philadelphia, PA) noted that his use of Quantitative Structure Activity Relationships (QSAR) had reduced the number of animal experiments, but that there is no chance that QSAR techniques will be able to predict biological properties of animal experiments superfluously. He also stated that funding is adequate in this area, that the field of computer modelling is not on the verge of a breakthrough, and that it would be pointless to try to encourage its development. First, he would attempt to establish a "national forum" on the topic. Second, he would suggest the establishment of an ad hoc committee to determine the extent to which such opportunities are being missed.

In the concluding discussion, Dr. Raub expressed the intention of pursuing similar lines of action. First, he would attempt to establish a "national forum" on the topic. Second, he would suggest the establishment of an ad hoc committee for chimpanzee research at NIH. Third, he would distribute the proceedings of the conference to all agencies that were not represented at the meeting. With the exception of the specific recommendation on chimpanzee research, these amount to little more than proposals for continued dialogue. Certainly, it is clear that the conference came nowhere near to being the "end of the line" of the "state-of-the-art." Also, the proposed NIH action is decidedly equivocal when compared with the decisive and constructive approach taken in Sweden, as described by Dr. Monica Thelestam (Karolinska Institute, Stockholm). A result from establishing ethical committees for all animal research that is likely to involve pain and suffering, Sweden has also set up a fund, albeit relatively small, to support specific research into alternatives. While this probably does not amount to "throwing money at the problem" it indicates that alternatives research can be supported without inviting a national disaster.

Dr. Andrew Rowan (Institute for the Study of Animal Problems, Washington, DC) emphasized this point when he explained the fundamental difference between providing funds to find a cure for cancer and to develop new techniques. In biomedical research, the pace of advance is affected by the number of intuitive or creative insights, by critical evaluation and testing of those insights, by the development of new techniques and by luck. More money will not increase the amount of intuition or luck (unless more people are encouraged to take up science) and it will probably adversely affect the quality of critical evaluation (as in the "war on cancer"). However, it could and would hasten technical innovation, as in the development of cell culture technology. This is already accepted in a number of animal research areas where specific funds are available for core support of animal facilities and the development of animal models.

The topic of the ethics of animal research was raised a number of times. Dr. Thomas Regan (North Carolina State University, Raleigh, NC), a professor of moral philosophy who has written much on animal rights, commented that he was surprised to hear that many of the scientists in the audience regarded him as an extreme radical. He stressed that he and his colleagues were not anti-sciences. In fact, they are great admirers of science and believe that the trend to "ethics courses, general and specific" is evident, although relatively small, to support specific research into alternatives. While this probably does not amount to "throwing money at the problem" it indicates that alternatives research can be supported without inviting a national disaster.

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It was very surprising that the legislative initiative which had led to the conference—namely, the introduction of HR4805 (now HR536)—had not been specifically mentioned. There were one or two oblique references to legislation not being an appropriate tactic for reform, but not even Elinor Peretsman, lobbyist for United Action for Animals, addressed the issue directly. If this was a deliberate omission by the conference planners, then it was a tactic that backfired with an expression of frustration from many nonscientists at the meeting. The most serious shortcoming, however, was the lack of direct comparison between the different techniques. If the meeting had been organized around units in which the relative merits of in vivo, in vitro and mathematical approaches to a specific problem (e.g., the detection of carcinogens, or the study of radiation effects) were compared directly, it would have provided a much clearer picture of the "state-of-the-art." In the final analysis, this conference achieved relatively little of note. There were some interesting items raised in the papers and discussions, and no doubt many of the participants made some fruitful contacts. The meeting could have been a real milestone in the evaluation of biomedical research technology, but its major product appeared instead to be frustration. —A.N. Rowan

Bioassay Methodology — Meeting #2
On the evening of the first day of the NIH Conference (18 February 1981), the George Washington University Society for Ethics and Animals organized a meeting to examine the concept of alternatives in certain research and testing areas and some of the associated ethical issues. There were four speakers—two from the animal welfare side (Dr. Andrew Rowan of the Institute for the Study of Animal Problems and Dr. Tom Regan of North Carolina University) and two from the biomedical establishment (Dr. Phillip Noguchi of the Food and Drug Administration and Dr. David Brusick of Litton Bionetics, Kensington, MD).

Dr. Rowan opened the meeting with a brief discussion of the concept of alternatives (i.e., two examples of the application of the concept and an outline of the funds available for biomedical research and testing programs in 1981 (approximately $10 billion in the USA). Estimates of the amount spent on nonanimal research and testing programs vary from about 20% (internal NIH figure) to as much as 65% of the total biomedical research budget (from the Institute of Laboratory Animal Resources survey of animal research resources in 1978). However, as the ILAR survey is widely regarded as having produced a very low estimate of the level of animal use in the USA, the figures on alternatives must also be considered suspect.

Dr. Noguchi described an organ culture system designed to assess the tumorigenicity of cell cultures that appears to correlate very well with tumorigenicity in vivo. The bioassay is based on the invasive growth of the test cells into an organ culture of chick embryonic skin. The system gives excellent qualitative results and has the potential to be developed further as a quantitative measure of the metastatic potential of tumor cells.

Dr. Brusick discussed cell culture and animal systems as detectors of carcinogens. He noted that the animal bioassays are very time-consuming and expensive ($180,000 for the mouse bioassay; $280,000 for the standard rat bioassay), while the cell systems were rapid and cheap (a few thousand dollars at most). Also, the animal systems are far from perfect, with interspecific and even intraspecific differences, as in the case where a particular color additive was found to be carcinogenic in one strain of rat but not in another. The flame retardant, TRIS, passed all of the toxicity tests required at the time before it was identified as a potential problem in the nonanimal Ames test. It was then retested and found to be a carcinogen. Dr. Brusick stated that it would now be possible to replace the animal systems for the detection of carcinogens with a suitable battery of short-term tests. However, it was not possible to replace animal tests in the process of human risk evaluation. Dr. Regan discussed the ethics of animal research and centered his arguments on the moral concept of harm. It is possible to harm a wide range of objects, sentient beings by causing them to suffer, or inanimate objects by damaging or destroying them. He then argued that it was morally untenable to support either an "unlimited animal research" position or a "no animal research" position. The morally consistent position is described by the Modified Innocence Principle which he and Dr. Dale Jamieson (University of Colorado, Denver) have developed. According to this principle, research on innocent animals that harms those animals is permissible only if all alternatives have been thoroughly explored and if there is rational justification for believing that harming the animal is the only way to prevent comparable or greater harm to many other innocents.

Several members of the audience commented on the fact that the speakers at this meeting were much more positive about the future prospects of the "alternatives" concept than those at the NIH Conference. In the case of Rowan and Regan, this was not surprising, as they have been promoting the idea of alternatives for some time. However, Noguchi and Brusick were much more encouraging than their counterparts at the NIH Conference, which serves to illustrate how intimately the selection of speakers influenced the outcome of that conference.

The George Washington University Ethics and Animals Society plans to publish the proceedings of the meeting. Contact Jo Shoesmith, PO Box 56272, Washington, DC 20011 for further details. —A.N. Rowan

FORTHCOMING MEETINGS

VII International Congress of the World Veterinary Poultry Association: July 1-3, 1981, Oslo, Norway. Contact the WVPV Organizing Committee, National Veterinary Institute, POB 8156 Dep, Oslo 1, Norway.


Hungarian Society of Agricultural Sciences: International Conference of Ethology, August 26-30, 1981, Agricultural University of Godollo, Godollo, Hungary. Topics include "The Role of
It was very surprising that the legislative initiative which had led to the conference—namely, the introduction of HR4805 (now HR536)—had not been specifically mentioned. There were one or two oblique references to legislation not being an appropriate tactic for reform, but not even Elinor Peretsman, lobbyist for United Action for Animals, addressed the issue directly. If this was a deliberate omission by the conference planners, then it was a tactic that backfired with an expression of frustration from many nonscientists at the meeting. The most serious shortcoming, however, was the lack of direct comparison between the different techniques. If the meeting had been organized around units in which the relative merits of in vivo, in vitro and mathematical approaches to a specific problem (e.g., the detection of carcinogens, or the study of radiation effects) were compared directly, it would have provided a much clearer picture of the "state-of-the-art." In the final analysis, this conference achieved relatively little of note. There were some interesting items raised in the papers and discussions, and no doubt many of the participants made fruitful contacts. The meeting could have been a real milestone in the evaluation of biomedical research technology, but its major product appeared instead to be frustration. —A.N. Rowan

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Ethology in Large Scale Animal Breeding,” and “Developing the Technical-Biological Unit of Industrial Animal Breeding with Help of Ethological Research.” Contact Prof. Dr. J. Czako, Organizing Committee for Congress of Applied Animal Ethology, Agricultural University, Codolli, H2103, Hungary.

Wildlife Disease Association (Australian Section): Fourth International Wildlife Diseases Conference, August 24-28, 1981, Sydney, Australia. Contact Dr. E. P. Finnie, Program Chairman, Toronga Park Zoo, Mosman, NSW 2086, Australia, or Dr. M. E. Fowler, Dept. of Medicine, School of Veterinary Medicine, University of California at Davis, CA 95616, USA.


International Conference on the Human/Companion Animal Bond: October 5-7, 1981, Philadelphia, PA. Sponsored by the University of Pennsylvania Center for the Interaction of Animals and Society and the Delta Group of the Latham Foundation. Contact the Center (above), School of Veterinary Medicine, University of Pennsylvania, 3800 Spruce St., Philadelphia, PA 19104.


International Primatological Society: IXth Congress, August 8-13, 1982, Atlanta, GA. The annual meeting of the American Society of Primatologists will be held jointly with the Congress. Contact Dr. Frederick A. King, Director, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322.

ANNOUNCEMENTS

SCAW Organizes Conference

The Scientists Center for Animal Welfare (SCAW) is pleased to announce the organization’s First Conference on Scientific Perspectives in Animal Welfare. This two-day conference will take place in Washington, DC and will address some practical, philosophical and public policy considerations involved in animal experimentation. It is tentatively scheduled for November 1981, and the proposed theme is the “three R’s” of Russell and Birch. Suggestions for program content and possible speakers from both the scientific community and others should be addressed to Dr. Jean Dodds, Director, Laboratory for Veterinary Science, Division of Laboratories and Research, New York State Dept. of Health, Albany, NY 12201.

American Association of Wildlife Veterinarians

The American Association of Wildlife Veterinarians has been formed with the objective of encouraging involvement of veterinarians in wildlife management on a professional rather than emotional basis. The AAWV membership represents diverse opinions on the acceptability of hunting and trapping as management practices, but agrees that the most beneficial role for the veterinarians is to play is that of scientific advisor to those responsible for policy decisions affecting wildlife. For more information contact Dr. Albert W. Franzmann, President, AAWV, Soldotna, AK 99669.

Conference on Environmental Ethics

A conference on “Environmental Ethics and Contemporary Ethical Theory” is tentatively scheduled to be held at the Georgia Center for Continuing Education at the University of Georgia, Athens, 19-21 October 1981. The conference will be sponsored by the Georgia University Center for the University of Georgia’s role of captive breeding as an aid to conservation. Material will include morning lectures, practical instruction with zoo staff, and the research, preparation and presentation of individual projects using Trust facilities for behavioral observation, record research and reference sources. The course will be directed by Dr. Robert Martin and Dr. Alison Jolly. Residential course fee: £350 inclusive. For further details, contact the Trust Secretary, Jersey Wildlife Preservation Trust, Trinity, Jersey, Channel Islands, UK.

Yale University Program

The School of Forestry and Environmental Studies at Yale University is establishing a graduate program in Human Animal Ecology. The program will focus on the interaction between human beings and other animals, primarily wildlife, and will feature the following elements:

a) Masters and PhD training and short-term fellowships for professionals in mid-career;
b) a research program;
c) policy analysis and conflict resolution, possibly in a workshop/symposium/colloquium format;
d) information dissemination.

The program officially starts in July 1981. All queries should be sent to Professor Stephen R. Dodds, Director, AAWV, Soldotna, AK 99669.

Course on Captive Breeding of Primates

The Jersey Wildlife Preservation Trust is offering an intensive course entitled “Biological and Conservation of the Primates” from 27 July to 16 August 1981. The course is intended for zoo staff or students who wish to further their research in the University of Georgia’s role of captive breeding as an aid to conservation. Material will include morning lectures, discussions, practical instruction with zoo staff, and the research, preparation and presentation of individual projects using Trust facilities for behavioral observation, record research and reference sources. The course will be directed by Dr. Robert Martin and Dr. Alison Jolly. Residential course fee: £350 inclusive. For further details, contact the Trust Secretary, Jersey Wildlife Preservation Trust, Trinity, Jersey, Channel Islands, UK.

ALTERNATIVES TO PAIN IN EXPERIMENTS ON ANIMALS by Dallas Pratt (Argus Archives, New York, 1980, $4.95) is a sequel to his 1976 book Painful Experiments on Animals which described numerous biomedical experiments involving animals, discussed the legal protection and laboratory care then available and briefly touched on some of the alternative methods. In the present book, the author has attempted, insofar as possible, to match a selected animal experiment with an alternative. The author encourages comment and states that the “important thing is to open up a debate, hopefully friendly, between the research community and its critics.” However many of those whose experiments are described and subjected to criticism are likely to react rather strongly to the authors’ blunt and straightforward comments.

The book begins with a section on pain. Common practices in animal research are compared with analogous human experiences to refute the notion that animals do not suffer, sometimes very severely. There is also a section on anesthetics and analgesics and a brief discussion of post-operative analgesia. The remaining chapters focus on particular research or testing topics, covering behavior, cancer, immunology, inhalation, toxicology, nonhuman primates, ra-
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It is also incorrect to state (p. 174) that Chemie-Gruenenthal was acquitted because medical authorities testified that animal tests could not be conclusive for human beings. Chemie-Gruenenthal did attempt to discredit its opponents and was seemingly successful in nullifying the testimony of some of its major critics. However, the case against the company was never brought to final conclusion because the company finally decided to settle out of court. The actual result of the thalidomide tragedy was a vast increase in animal testing despite the admitted deficiencies of attempting to extrapolate from animal results to the human situation.

As already stated, the above criticisms represent only minor defects in the book and the author's overall argument. He demonstrates with explicit examples that there are potential alternatives to some types of research and testing. In some instances, a potential alternative requires a totally different approach from the scientist. In others, the alternative system may be a little simplistic. For example, it is not correct to compare homo- geneous cell cultures, developed for various biochemical and pharmacological studies on norepinephrine and dopaminergic models that are used to study neurophysiological studies on the function of the locus coeruleus (p. 132). It should also be noted that while the anticancer drug, azetomicin, was developed using a computer program (p. 246), the basic structure of the molecule was determined by results from animal research. The computer then generated refinements to produce a molecule which seemed to provide the best fit, and this was substantiated by further animal research.

Dr. Pratt's book has a great deal of valuable information and interesting insights into the debate on animal research and alternatives. Anyone who believes that animal research is conducted in ways which avoid suffering should read this book. While some alternatives may not yet be ready to be applied in some situations, we always have the choice of not doing the research in the first place. If the suffering is likely to be great and the benefits small, the choice appears obvious and yet this book demonstrates that to some people, the choice is not obvious. We need to effect the discussion and debate in this area, and Dr. Pratt's book is a welcome addition to the sparse literature of critical and scholarly analyses of animal research. —A.N. Rowan

BOOKS RECEIVED


UFAW Publication List

The Universities Federation for Animal Welfare was established to examine animal welfare issues from a scientific and scholarly point of view. They have a number of excellent publications, the major and most recent ones being listed below. (All prices include postage and packaging—US $ price is approximate since airmail postage varies considerably.)

The UFAW Handbook on the Care and Management of Laboratory Animals, 5th Edition (648 pp.). Published by Churchill Livingston (£18.30, $50).

The Care and Management of Farm Animals, 2nd Edition (249 pp.). Published by Bailiere Tindall (£9.50, $30).

The Human Killing of Animals, 3rd Edition (34 pp.). (£0.80, $3). Symposia Proceedings (The first nine held during 1968-1975 are not listed.) 1980 The Ecology and Control of Feral Cats (£2.50, $6).

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INSTITUTE PUBLICATIONS AND SERVICES

Library: The Joyce Mertz Gilmore Library has been established by the Humane Society of the U.S. under the aegis of the Institute for the Study of Animal Problems. It currently houses approximately 1,500 volumes and 100 newsletters and periodicals. A reprint file of relevant journal articles is being compiled as support, a specialist bibliographic data retrieval system will also be established.

Hours: Open to qualified persons, 9 a.m. to 5 p.m. Monday-Friday, subject to change. Please contact Gud Hodge, (202) 452-1100, to set up an appointment.

INSTITUTE PUBLICATIONS AND SERVICES

Student Internships: A limited number of student internships are available at the Institute and the Humane Society of the U.S. during the summer months and the academic year.

- Open to students of veterinary medicine and college seniors.
- Small stipend to cover living costs provided.

Student Veterinary Essay Competition:

- Open to all enrolled veterinary students in the U.S.
- Essays must be between 4,000-5,000 words in length and must be thoroughly documented using appropriate citations and references in the AVMA format.
- Essays can be based on literature analyses, data gathering projects or personal viewpoints. Any doubts about the suitability of proposed topics, please contact Dr. Michael Fox at the Institute.
- Winners will be awarded a cash prize and a certificate of appreciation. Copyright of winning entries will be transferred to ISAP with author’s rights reserved.
- Deadline for entries is December 31, 1981.

Publications: In addition to the bimonthly International Journal for the Study of Animal Problems, a number of booklets exploring current animal welfare science issues are available from the Institute at a minimal cost.

Order Form
Please check the number of copies desired beside each publication:

- Animals in Education: The Use of Animals in High School Biology Classes and Science Fairs ($9.95, 1980)
- Evaluation of Awarded Grant Applications Involving Animal Experimentation ($2.00, 1979)
- Euthanasia of Dogs and Cats: An Analysis of Current Knowledge with Recommendations for Research ($3.00, 1978)

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Information Sought

The Institute for the Study of Animal Problems is seeking papers, anecdotal material, preliminary observations, unpublished research data and arguments on the following topics:

Breeding of Wild Animals in Captivity — We would like to examine ethical and practical issues, such as the type and degree of constraint which are or should be placed on breeding nonhu­man primates for research, or the role of zoos as “genetic reservoirs” for endangered species.

Cross-Cultural Comparisons of Human Attitudes Toward Animals — We would like to collect ethological and anthropological data on how people in subsis­tence economies interact with their domestic animals and with wildlife. For ex­ample, sub-Saharan Fulani tribesmen control their cattle through the use of touch, in contrast to, say, the Western roundup. How do such differences affect the character of the human/animal bond?

Productivity as a Measure of Farm Animal Welfare — We are interested in the question of how the economies of scale which govern modern intensive systems of animal farming affect evaluation of the individual animal’s welfare. In addition, does individual productivity reflect individual welfare?

Use of Animals in Psychological Research — We encourage comments on and data illuminating the basic psychologist’s paradox: If the human psyche is an important parameter in moral consid­erations, then the better the animal is at modelling the human psyche, the greater consideration it must be paid as an object of moral concern.

Please send all material to the Institute for the Study of Animal Problems, 2100 L St., NW, Washington, DC 20037, Attention: TTD.
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Animal Welfare Science Essay Competition

Deadline: December 31, 1981
Two $500 Prizes

Competition Rules:

- All enrolled veterinary students in the U.S. (including those who have graduated within six months of the deadline) are eligible to compete.
- The two best essays, selected by a panel of judges comprised of veterinarians, philosophers, ethologists and other relevant scientists, will be awarded a cash prize of $500 and a Certificate of Appreciation. Judging criteria will include quality of writing, the accuracy of the supporting data and the extent to which opposing viewpoints have been taken into consideration and/or refuted.
- Essays should be between 4,000-5,000 words in length and may be based on literature and analyses, data gathering projects or personal viewpoints. All essays should be thoroughly documented with appropriate citations and references using the JAVMA format.
- The winners will be welcome to submit their essays to the International Journal for the Study of Animal Problems for consideration of publication.
- Copyright of the winning entries will be transferred to the Institute for the Study of Animal Problems as a condition of receiving the award. The author’s rights will be reserved.
- Candidates who are in doubt about the suitability of proposed topics are invited to contact Dr. Michael W. Fox for advice. Examples of subjects from which essay topics (either broader or more specific) may be selected include:
  - Trapping
  - Predator Control
  - Farm Animal Husbandry and Welfare
  - Use of Animals in Teaching
  - Humaneness and Veterinary Ethics
  - Ethical and Legal Aspects of Animal “Rights”

Sponsored by: The Institute for the Study of Animal Problems
2100 L Street, N.W., Washington, D.C. 20037

Send Essays or Enquiries to the Attention of: Dr. Michael W. Fox

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Organize manuscripts: Title page (pg. 1) containing title of the article (48 characters), author(s), affiliation, present address, address where proofs should be sent; Abstract (pg. 2); Text (begin pg. 3) which includes introduction, methods/procedures, results, discussion, conclusion, acknowledgements, references, tables, and figure legends. Special instructions for the copy editor or printer should be affixed on the original copy.

Abbreviations and units: Standard dictionary abbreviations are generally accepted. Other abbreviations should be explained when first mentioned. SI units are preferred.

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Tables: These should be concise and typed double-spaced throughout.

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Types of articles: The following requirements are given as a guide only; one double-spaced typed page contains approximately 250 words.

Review Articles: 5000-6000 words with a comprehensive list of references to be used as source material.
Original Articles: Up to 5000 words or long enough to provide an adequate introduction (stating the objective of the study and why it is considered necessary), description of methods (including an outline on the treatment of the research animals and the number of animals used), and combined results/discussion section.

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Reprints: Authors of Review or Original articles will receive twenty-five free reprints. All other contributors will only receive reprints if specifically requested and a charge will be levied to cover the additional cost.

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