Subspecies Purity vs. Generic Animals

Scientific Dogma At Odds With Reality

Did you even hear people talking about how healthy and well adjusted their generic pound dog was compared to the high strung, temperamental, expensive pure bred? Generics can be perfectly healthy, fine looking animals. In the case of tigers and other endangered species where there are dwindling numbers, strictly monitored genetic management must be maintained to insure healthy offspring. If you have a limited gene pool, mixing subspecies is a viable alternative to loosing the species altogether. The justification for subspecies purity is largely a scientific/marketing argument. There may be a bit too much science smothering reality. Does it really matter if a particular tiger is a Sumatran or Bengal as long as tigers remain on this earth.

When we speak about saving the tiger we must look at what is practical and attainable. When a species as magnificent as the tiger is headed rapidly towards extinction why are scientists, zoos, and many private preserves trumpeting their adherence to subspecies purity when the species as a whole is disappearing before their eyes? This is all based on scientific dogma and a need to feel accepted by peers or monitoring, marketing, and licensing organizations.

It's all a matter of money. How to get the donated dollar and how to keep it coming. Successful marketing approaches exalt subspecies purity and exploit young or unusual animals to enhance revenue. White tigers are a prime example. I recently visited a conservation Web site that published the following paragraph:

"Unfortunately, there are a lot of unwanted big cats in captivity today. Most of them are tigers, lions, cougars, and bobcats. The tigers and lions are mostly hybrids, (Hybrid and generic are not interchangeable. The use of hybrid is incorrect.) or "generic" animals - the tigers are generally not pure Bengal or Siberian subspecies, even if they are described that way. Generic cats should not be bred, they are not an endangered species. Even if they are purebred, they often come from over-represented bloodlines, which is one reason they're not in a zoo. Also, zoos do not have room for all the big cats in captivity today. The (omitted) does not take in cast-off pets, because we simply have no room for these cats, there are so many of them. And many so-called "rescue" places are breeding yet more, contributing to the surplus animal problem."

This pontificating extols the virtue of subspecies purity. There is no other accepted alternative. However, no science is offered and no other viewpoint explored. There is a need for subspecies purity as you will learn later in this paper, but a species in danger of extinction needs broader alternatives if survival is to be insured. Is this concept too simple to grasp or are their other, more self serving motives involved? Let's analyze this paragraph sentence by sentence. "*Unfortunately, there are a lot of unwanted big cats in captivity today*." This first sentence is absolutely true. There are a lot of big cats in captivity housed in conditions that range from wonderful to abysmal. "*Most of them are tigers, lions, cougars, and bobcats*." This second sentence is good, but one might add servals to that list. "*The tigers and lions are mostly hybrids, or "generic" animals - the tigers are generally not pure Bengal or Siberian subspecies, even if they are described that way*." This third sentence mentions hybrids or "generic". These terms should not be used interchangeably. Even though Webster's has one definition of hybrid as, "anything of mixed origin", the more accurate definition they include is, "the offspring of two animals or plants of different species.." A hybrid would be a cross between a tiger and a lion, now called a liger. These hybrids are used as attractions, but are of little use elsewhere. A generic tiger, for example, would be the offspring of a Bengal and Sumatran union.

"*Generic cats should not be bred, they are not an endangered species*." This fourth sentence really supports a view based on scientific dogma rather than logical thinking. At one point in time, actually not too long ago, there was no subspecies distinction in tigers. These distinctions were made recently based mostly on geographical location. Take a look at the following excerpt from a paper written by Mr. Singh.

Billy Arjan Singh: Founder of Tiger Haven-India. Mr. Singh is probably the leading tiger conservationist in the world. He is the only man to successfully reintroduce a generic tiger, one named Tara, into Dudhwa National Park. This was met with furor by the scientific community. He has been on the front lines of this fight to save the tiger for many

years, but has been met with indifference and criticism for his heroic efforts. He was instrumental in India's Project Tiger which was initiated in 1972-73. His suggestion to adopt the tiger as India's national animal was accepted by the Indian Board for Wildlife. Here are a few thoughts from Mr. Singh.
"The compartmentalization of subspecies is possibly too dogmatic? It should be for consideration that *generic* tigers which are recommended for extinction should redeem their unfortunate existence by repopulating selected habitat areas of erstwhile Balinese, Javan and Caspian occupation, for these tigers are already in a process of a genetic transition.

It is a fact that tigers have a common ancestry, and this theoretically predicates that an outsize Siberian could evolve into a undersized Balinese. Yet though the subspecies are disappearing one after the other, scientific dogma insists that racial purity must be preserved, and that generic [i.e., of unknown lineage] tigers in zoos should be earmarked for extinction in accordance with a carefully maintained studbook.

It should be the endeavor of the various countries who have lost their tiger subspecies to re-colonize these vacant habitats. This might be done by the introduction of generic tigers and their progeny, which are earmarked for destruction. Hopefully their modified morphology would at some stage in the evolution to reestablish the Balinese, Javan, and Caspian, subspecies. Generic tigers are genetic transients who can reclaim an inheritance and not pariahs bred for extinction."

There is a problem, especially in this country, with unregulated breeders who have no regard for sound genetic management. They breed to sell. As long as the average person is allowed to purchase these animals backyard breeders will remain. Legislation needs to be enacted to strictly limit the ownership of these wild animals. This would in effect put many of these breeders out of business. Likewise, there are people who breed these animals for show in their private preserves to make money from visitors and donors. Baby animals are attractions. Again there is little or no regard for sound genetic management. As long as the USDA continues to license these establishments without placing strict controls on breeding they will continue with business as usual. Breeding for the wrong reasons does nothing to enhance the gene pool or save the species.

If you consider the entire tiger population as a whole in the US you might find the majority to be inbred and of little use in furthering the survival of the species beyond a given point in time. The remaining tigers, if managed properly, could sustain the species.

The writer goes on in the sentence to say the generics are not an endangered species. Technically, from a purely scientific viewpoint, this is true. But from a rational standpoint, given the tiger is almost extinct in the wild, the argument becomes ridiculous. The tiger as an entire species is nearing extinction. If you could line up one each of the remaining five subspecies and ask an adult or a child what they see I bet they would say tigers. So one is a little bigger, one a little darker, but they are still tigers. The concern should be can we as a species save the tiger as a species? Generics should be included, since they are, after all, tigers.

The sentence might also lead one to believe that generic tigers are unhealthy for some reason. Many are due to inbreeding, but many are healthy, viable animals. Using sound genetic management techniques with a large enough population of unrelated pairs you can have a healthy and sustainable tiger population.

"*Even if they are purebred, they often come from over-represented bloodlines, which is one reason they're not in a zoo*." This next sentence does not make a lot of sense. If there is a blood line that is over represented then why are they not being reintroduced into the wild? Answer - more politics. This is not the reason these tigers are not in zoos. Zoos keep tigers because they are a major draw to the facility, but they keep only so many because they are expensive to house. It sounds impressive to say these tigers are pure Bengals or pure Siberians. It looks good to have a Species Survival Plan plaque adorning their cages or habitats. What happens to these cats when they become old or infirm? That's a question you may want to ask you zoo curator. I've visited zoos where I viewed a snow leopard housed in a small, steel bared cage. It had barely enough room to walk around. Prominently displayed on the front of the cage was a SSP plaque. So what? The conditions this single animal had to endure were disheartening. Its all for show. It attracts visitors and it raises money. Zoos have these animals primarily for one reason - as attractions. They are not designed or structured to save a major species.

"*And many so-called "rescue" places are breeding yet more, contributing to the surplus animal problem.*" In this final sentence the writer mentions so-called "rescue" places. What I did not show you was the list of rescue facilities they included. The writer leaves it to the page visitor to determine whether a listed facility is good or bad. More than likely the reader will assume they are bad and never visit the sites. This practice is suspicious at best. The Zoe Foundation was listed in the 'Rescue' group. If you read over my site you will see I do not own nor rescue tigers. I am a product designer raising funds through sales for a new facility designed to save the tiger as a species. I worked with a world renowned tiger scientist studying tigers and methodology. This shows how well the writer reviews listed sites. I have since requested removal from their list.

Good rescue facilities are needed to house the abandoned and unwanted 'pets' purchased from breeders. A good rescue facility, and I know several, do not breed these animals. They supply care and housing for life. It is a total commitment. These organizations should be applauded and supported for their efforts.

That simple paragraph is a small example of how things are generally presented to the public. I could relate horror stories about some of the people I have met working in this arena. I have written many mainstream scientists, preserve directors, and fund raisers about this project, but I have received little or no response. Could it be that a facility designed to successfully save the species would pose a threat to their programs and fund raising campaigns? Or are these people simply rude and self serving? Or do they just not tolerate outspoken people with incompatible views? There is one word that covers the entire spectrum - politics.

To put this into a little better perspective I would like you to read a comment by a research scientist at a major university in the USA who specializes in genetics.

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"A subspecies is simply a geographic division of a species. For example, taxonomists (scientists who study the systematic division of organisms into groups based on differences between the groups) have examined many individual tigers and found enough physical differences between tigers from different geographical locations to divide the tiger species into five living subspecies: Bengal, Siberian, Chinese or Manchurian, Indo-Chinese, and Sumatran.
The problem arises when subspecies distinctions are used to set captive breeding policy. The Captive Breeds Specialty Group (CBSG) of the International Union for the Conservation of Nature has decided that all subspecies must be preserved in captive breeding. No "generic" animals are included in the Species Survival Plans and no cross-subspecies captive breedings are sanctioned. I have heard two reasons for this short-sighted policy:

1) Some conservationists believe that a subspecies might have evolved a set of genetic adaptations that make it particularly suited to its geographic home range and that cross-breeding might dilute these adaptations to produce a generic stock poorly adapted to the home range of either parental lineage. This is a very unsatisfactory argument because it is unscientific and completely unfounded in real-world experience: when subjected to very exacting genetic analyses, most subspecies differences are miniscule compared to ordinary individual differences.

2) The other argument is political and states that if it ever becomes possible to reintroduce an endangered species into reclaimed habitat in country A, the local politicians will only want genetically-pure, captive bred A subspecies animals, unspoiled by racial mixing with inferior, foreign animals. This is another argument that anticipates a not-yet-existent problem; attributing to officials in the third world a measure of narrow-minded provincialism that they have not yet shown.

Neither of these arguments carries any weight whatsoever in the face of the real problem with subspecies: more than 99% of all subspecies are so rare in captivity that if strict subspecies purity is preserved, the species as a whole will be inbred to extinction within a very few generations. For example, the cougar is divided into 29 subspecies: 13 North

American and 16 Central and South American. The 1995 ISIS Mammal Abstract lists only 15 of these subspecies in captive breeding programs. For six of these subspecies, only males or females are held. Under the current CBSG policy, these six subspecies are doomed to extinction in captivity and, probably, in the wild. They could, potentially, contribute their outbred genetic diversity to the production of a healthy, genetically-sound population of generic cougars that would ensure that the cougar, as a species, survives in captivity. These captive generic cougars could provide a robust breeding stock capable of filling the large carnivore role in a wide variety of New World ecosystems."

To further clarify this situation I would like you to read a paper given to me by renowned zoologist and tiger scientist Dr. Michael A. Bleyman. Many scientists do not agree, but one must consider their reasoning. Saving one's job or specific program plays an important if not predominant role in the decision making process. Keep that in mind when considering people's motives. This paper is somewhat technical, but it is ***very*** important when it comes to better understanding subspecies categories.

"Difficulties in Dividing Species into Sub-Species Categories

The problem that now baffles taxonomists and vexes conservation biologists is how (or whether) to divide species into infraspecific categories, what to call these categories and what is the biological significance of these distinctions.
It is obvious that species can be divided into clearly recognizable subdivisions that still meet the criteria for inclusion within a species. The human species, for example, can be divided into races on the basis of skin color, hair texture, and the ability hit the open jump shot. The several races fill the same role in the ecosystems they inhabit and can successfully interbreed.

Linnaeus only recognized one subdivision of the species, called the variety. The variety was defined as any deviation from the type of that species. Because the essentialist notion of a species is now largely discredited, this term is no longer used with a specific definition. Other subspecific divisions are occasionally used: The terms cline, isophene, deme, phenon, and variant have all been used with definitions of varying precision and utility.

The infraspecific category with the widest current acceptance is the subspecies. Mayr defines a subspecies as "an aggregate of phenotypically similar populations inhabiting a geographical subdivision of the range of that species and differing taxonomically from other populations of that species." This definition is full of complex notions and deserves a careful dissection. First, notice the term "phenotypically similar populations." ‘Phenotype’ is a genetic term that means "how an organism looks" or what laboratory tests can tell you about how an organism functions. It is always compared and contrasted with the ‘genotype’ of an organism: the sum total of genetic material with which that organism has to operate. This phrase alerts us to the fact that the division of a species into subspecies will be made largely by visual (subjective) criteria and not by adaptive (behavioral) or genetic (objective) criteria.

The most important phrase in this definition is "inhabiting a geographical subdivision of the range of that species ...". As Mayr says, "No non-arbitrary criterion is available to define the subspecies, nor is the subspecies a unit of evolution except where it happens to coincide with a geographic or other genetic isolate." To drive home this point, Mayr states that "when an author reports several subspecies of one species from the same locality, it strongly indicates an incorrect use of the term." It is apparent from this discussion that the only legitimate criterion for dividing species into subspecies is geographical separation. Taxonomists have therefore applied very little division into subspecies to those species that have significant proclivities to wander and migrate, such as migratory birds, whales, and humans.

The definition also includes the curious phrase ".. and differing taxonomically from other populations of that species." What does this mean? Other than geography, what criteria do taxonomists consider sufficient for the division of species into subspecies?

Consider the following example. Tigers exist in continuous populations and they also exist as separated populations. If we were to present you with tigers in two adjacent compounds and were to tell you that one was a Sumatran tiger

(Panthera tigris sumatrae) while the other was a Siberian tiger (Panthera tigris altaica) how are you to know whether the two (slightly dissimilar) tigers are exemplars of two distinct subspecies or examples of the fundamental variability that makes members of the same species look slightly different from one another? This is easy since Siberia is far away from Sumatra and the two land masses have probably been isolated for tens of thousands of years. Therefore, they can be said to form two distinct subspecies. If I present the same two tigers and claim that they are from India and Thailand then your choice is somewhat more difficult, but you will eventually decide that they are from different subspecies because Mayr's definition specifically mentions "geographic subdivision" and your World Atlas clearly marks Thailand as being geographically distinct from the Indian subcontinent. If, however, I state that these two tigers come from two adjacent valleys in India and present the additional data that several native hunters from that region have said that they have never seen a tiger travel from Valley A to Valley B, then you have a real problem. To solve this problem it will require a careful taxonomic investigation, because Mayr has clearly stated that geographically separated populations can only be separated into subspecies if they differ "taxonomically" from other populations of that species. The taxonomist will examine the two specimens and determine whether they differ 'phenotypically' enough to be classified into different subspecies.

Problems with the Subspecies Concept

Mayr cautions taxonomists against the naming of local populations which differ insignificantly as separate subspecies because the establishment of a subspecies should be based on some biological or evolutionary distinction. For example, the Chatham County population of white tailed deer and the Wake County population of deer are not distinct subspecies. They are perfectly adequate "geographical" descriptions but do not indicate subspecies of deer. These two populations of deer can interbreed in the wild near the border between the two counties and the offspring are fully capable of surviving in either county. Similarly, any captive breeding program which interbreeds wild-caught animals from the two counties does no damage to the deer gene pool by mixing the two populations.

Most modern taxonomists have chosen to ignore Mayr's advice and use the subspecies as casual descriptive nomenclature for any geographical population. This unnecessary proliferation of subspecies has brought into focus four aspects of the subspecies as a working classification that makes it much less useful and instructive than does the concept of species:

1) **Different characters, such as tooth size, coat color, tail stripes, or the frequency of specific isozyme alleles, (see biochemical genetics) show independent trends of geographical variation.**

There is a taxonomic concept called the cline which is defined as a graded series of morphologic or physiologic differences exhibited by a group of related organisms usually along a line of environmental or geographic transition. For example, since the early days of classic descriptive taxonomy, two important north-south gradients of physical characteristics within a species have been observed. Members of a species living near the equator tend to be 1) smaller and 2) more darkly pigmented than members of the same species living in more northern latitudes. Comparison of specimens from extremes of a species range may seem to indicate two geographically distinct subpopulations. However, if one looks at a continuum of a population of a species running from north to south, sampling from the entire range, it is probable to have larger and paler tigers in the north, smaller, redder tigers in the south, and tigers of intermediate size and color in the middle of the range. This does not make them different subspecies.
Why not? A subspecies is supposed to represent a subpopulation with clear differences from the rest of the species. Built in to the definition of a subspecies is a need to show a discontinuity.

2) **Polytopic Subspecies**

There are many instances of the occurrence of phenotypically indistinguishable populations in different geographic areas (which taxonomists call polytopic subspecies). These populations are often divided into subspecies when taxonomists feel that further study might discover some trait or characteristic by the two populations differ in some biologically significant way.

3) **Microgeographic Races**

The subspecies themselves can be subdivided into an array of microgeographic races that shade off into individual variability.

4) **Arbitrary Distinctions**

The degree of distinction which different taxonomists consider as justifying subspecies separation is extremely arbitrary, quite unlike the criteria for species separation. Distinctions are often made as a consequence of local phenotypic variation. A good example of this within the Carnivora is the "Rex" or "King" cheetah. The coat pattern of the King cheetah was first thought to be a separate species. This conspicuous tabby variant was later considered a subspecies. It is now known to be the result of the expression of a single recessive gene which has slightly different frequencies in different African cheetah populations. Similarly, black and spotted leopards are not different subspecies, merely coat color variants.

Seizing upon a single arbitrary difference in order to define a subspecies difference without looking at a broad range of physical and behavioral characters is one of the most common taxonomic errors. One must be aware, for example, of the wide variety of phenotypic variability that occurs naturally in local populations, within a species. In a healthy population of outbred animals there will be enough innate genetic variability to ensure that random mating does not produce inbreeding and yield the resultant problems associated with the expression of deleterious recessive mutations. This variability, and the constant re-assortment of genetic material that is the great advantage of sexual reproduction, assures that all members of a single species will differ genetically, and therefore differ phenotypically. The phenotype is the physical form of the organism. It is the expression of the genes and their interaction with environmental conditions.

It is also very important to realize that all phenotypic variation is not necessarily the result of genetic variation. Mouse geneticists have known for years that individuals of inbred strains (which have been maintained by brother-sister mating for as many as 150 generations and are therefore identical at 99.999% of their genes) never look exactly the same. Even within this genetically controlled context, because of random developmental variations and the happenstance of unknown small environmental factors, skin pigment cells don’t always migrate to exactly the same places during embryonic development and so coat color patterns are subtly different. Embryonic tooth buds start out in slightly different positions so that adult teeth grow in slightly different places, making head shapes individual and unique. The environment is another non-genetic influence on phenotype. Diet, and other factors such as, exposure to various microorganisms, chemical insults and physical activity have enormous effects on the behavior, physical appearance and health of inbred mice.

Implications of the subspecies controversy for the captive breeding of endangered species.

The division of species into subspecies could be an amusing and diverting intellectual exercise except when official conservation policy is established on the basis of these divisions. De facto policy for captive breeding of endangered species is set by the various "specialty groups" within the Conservation Breeding Specialty Groups (CBSG) of the International Union for the Conservation of Nature (IUCN). These groups include wildlife biologists and Zoo professionals who study the distribution and status of particular species or groups of species in the wild, issue a Population and Habitat Viability Assessment based on this study and make recommendations for the preservation of that species in captive breeding programs, if necessary. Many of these specialty groups have decided to preserve all subspecies distinctions by not sanctioning (and therefore effectively prohibiting) all inter-subspecies matings in captivity.

Many species of carnivores are divided into an absurd number of subspecies. In an ideal world with large and healthy captive populations of all extant subspecies, and an infinite number of zoos and wild animal parks in which to breed these subspecies, it might be prudent practice to maintain these populations as genetic breeding isolates. There are two reasons for this:

1) Two geographical subpopulations of a species may have evolved genetic isolating mechanisms in spite of morphological similarities. These mechanisms may prevent inter-subspecies fertilization or may cause inter-

subspecies hybrids to be subfertile or infertile. Genetic isolating mechanisms may be behavioral — courtship behavior, such as body postures and actions that indicate arousal or receptiveness, may not be correctly interpreted between isolated subpopulations; or they may be biochemical — for example, the enzymes that allow the sperm to pierce the outer layers of the egg may lack the ability to penetrate the eggs of females from isolated populations. These genetic isolating mechanisms can evolve between populations of animals from the extremes of the range of that species or between island and mainland populations.

If two subspecies are truly reproductively isolated from one another, then they are not subspecies at all, but sibling species or cryptic species. A captive breeding program that involved two or more such cryptic species would produce no offspring at all if the genetic isolation is absolute, or if the isolation is incomplete, create sterile "mules" or subfertile offspring.

Such isolating mechanisms (which are a normal feature of speciation, the evolutionary process which creates new species) may account for previously reported difficulties in several captive breeding programs which involved specimens from the extremes of a species' range and which have been described as "outbreeding depression." For example, the Dourocouli, also known as the Owl or Night monkey, Aotus trivergatus, was thought to consist of five subspecies. When captive breeding was attempted, it was accomplished only with unusual rarity. It was very rare to find fertile breeding pairs. However, if there was a strict intra-subspecies pairing of mated douroucoulis, then fertile breeding was much more common. Leonid Van Der Boer and his colleagues (2) found that the window of taxonomic discrimination had not been set narrowly enough to pick up the real species differences. There were five different species of Douricouls. Practical captive breeding policy enabled taxonomists to define species differences that conventional taxonomic techniques were not discriminating or sophisticated enough to detect.

In any captive breeding program there will be certain male-female pairs which will never produce offspring. Careful observation and record-keeping will reveal which pairs of animals need to be reshuffled into more fertile pairings. If there is a systematic and general inability of two reputed subspecies to produce fertile offspring then those two populations will be established as separate (cryptic) species and the subspecies designation will be abandoned. The two "subspecies" will then be given distinct species names and managed as separate species.

2) Another argument against the interbreeding of subspecies in captivity states that (even if two subspecies have not yet evolved into cryptic species) hybridizing subspecies A [which has evolved certain adaptations which make it exquisitely suited to inhabit environment A] to subspecies B [which is likewise uniquely adapted to environment B] might breed a group of individuals which is not well adapted to either of these environments.

The answer is one of practicality: most threatened or endangered species have been assigned that status because of habitat destruction: environment A and environment B simply do not exist anymore. The force which drives habitat destruction is human population growth, a malignant and implacable force which can only be reversed by environmental cataclysms so widespread and severe that only starlings, rats and cockroaches could survive. The time has come to recognize that within 50 years there will be no more "wild" and the only living species on this planet will be weeds and vermin and those species in carefully managed captive breeding programs.

The present financial reality is a situation in which zoos all over the world (from the prestigious London Zoo to several municipal zoos in the United States) are going broke and closing down. The resources, including money, cage space, and personnel available for managing captive breeding programs are rapidly decreasing. The IUCN needs to face reality: We no longer have the luxury of maintaining separate captive-bred populations of 30 subspecies of cougar or 15 subspecies of ocelot. If we wish our grandchildren to be able to see any living cougars or ocelots then we must genetically manage all of the existing specimens in captivity so as to preserve as much species-specific genetic variability as is possible. Yet if we look, for example, at the registry of all ocelots in captive breeding we see a rather pathetic scattering of subspecies spread out through the world's breeding institutions. Many subspecies are represented by only one or two individuals in captivity in the whole world (1). The entire weight of practical experience suggests that these fragments of breeding populations cannot be maintained with any success at all.

The example of small gazelle species demonstrates how difficult it is to rescue a species from a truly tiny population. In 1973 the St. Louis Zoo rounded up the last three known members of Spekes Gazelle (Gazella speki) in order to try to

perpetuate it. The difficulties in the struggle to save this animal species were enormous and frustrating. Tempelton (3) recounted this as a seesawing battle to remove the piled up deleterious genes. Under continued effort to build the population up it grew from three to twelve. Then it crashed to five. The number of Spekes gazelle climbed back to twelve and then down to seven. Only recently has success been in sight (4).

References

1 E. Mayr and P. D. Ashlock, Principles of Systematic Zoology, 2nd Edition, McGraw-Hill, New York, 1991.
2 van Der Boer et al. on the Owl Monkey
3 Templeton on Speke's gazelle
4 The current world captive population of Speke's gazelle is 20 after 18 years of breeding. Infant mortality is 45% see ISIS Mammalian abstracts 1992."

I hope this paper has given you pause for thought. If the tiger is going to be saved a managed facility dedicated to that species must be pursued. This will be a very expensive undertaking if these animals are to be managed in habitats worthy of their size and needs. That, however, is my goal in honor of Dr. Bleyman who passed on in 1996. The tiger can be saved if enough people put aside politics and concentrate on meaningful action.