

ly holds three tapirs, two of which were obtained within that country and a third donated by an AZA member. Although this species has not reproduced in zoos of either Mexico or Guatemala, the ages and sex ratios of captive tapirs in Tuxtla and La Aurora zoos are perfect for reproduction and should be expected to successfully breed within the near future.

In Panama and Costa Rica, four of the five tapir holders routinely breed tapirs and are eager to exchange specimens in order to reduce the already increased levels of inbreeding. Exchange has already occurred in one instance, when a young tapir born at the Summit Zoo was transferred to the collection in Villa Griselda, and the La Marina Zoo has initiated efforts to send one of its surplus males to the U.S. This type of exchange is routine between AZA zoos. The increased interest in this level of cooperation was unquestionably the biggest success that came out of the PHVA for captive managers. Through the leadership of Carlos Caballero, director of the El Nispero Zoo, a collection-planning meeting for zoos of Central America that hold captive tapirs has been proposed, to be hosted in April 2006 by the El Nispero Zoo. Although only representatives from the 13 tapir holding zoos within this region or regional zoos interested in holding them will be invited, their future collection planning will be crucial to the continued success of captive breeding programs within the region. In advance of this meeting, a bilingual questionnaire was developed at the PHVA that all range country holders will be asked to complete. Information sought in the questionnaire not only will include information about their present inventory, but also their future holding capacity and their willingness to participate in a regional collection plan. The results of this information will be invaluable at the upcoming meeting at El Nispero.

In a separate meeting, the International Studbook Keeper, the Baird's Tapir SSP Chair and the Permit Advisor for the Tapir TAG met and completed the RCP for AZA holders, this being the only occasion during the year when all three individuals were likely to be together. As a result, holders of all seven females in potentially breeding situations were asked to breed, while three new pairs were identified and will be asked to breed as soon as the females are of adequate age. Support for an importation from La Marina Zoo to an AZA zoo was also provided. When all these actions are realized, hopefully there will be enough additional young tapirs to provide new specimens for AZA zoos as well as to Central American zoos wanting to add this species to their collections, obtain females or increase the genetic diversity of their existing collections.

Although captive holders were not prominent in previous PHVAs, this meeting brought many players of the captive breeding community together and the results look promising. Upcoming meetings within

the region will hopefully increase interest. We look forward to the coming year.

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## News from the Field

### Estimating the Genetic Diversity of Mountain Tapir Populations in Colombia: A Joint Effort

*By Carlos A. Pedraza & Diego J. Lizcano*

In the previous issue of *Tapir Conservation Newsletter* (June 2005), the article of *Ask The Experts* mentions that "...several small populations of tapir are becoming isolated from their core populations" as a result of the fragmentation. If we introduce the fact that there is a reduction in numbers of individuals by over-hunting, we have a perfect scenario for loss of genetic diversity. By genetic diversity of a population we mean the evolutionary potential of populations. If a population has a low genetic diversity this means that this population has a lower chance to survive a detrimental stochastic event than a population with higher genetic diversity. For a changing environment such as the Andes region, considered a region with high rates of land transformation where the natural ecosystems can disappear in relatively short periods of time, we must understand all the dynamics occurring in the ecosystem, as well as the ecology, demography, natural history and the genetic aspects of remaining Mountain tapir populations to be able to overcome their extinction.

Mountain tapir populations in the Colombian

Andes region are under hunting pressure and habitat degradation, resulting in the dwindling in numbers of individuals and areas. In these populations, fragmentation can be the first step for the loss of genetic diversity of Mountain tapir populations, as explained by experts in the *Ask The Experts* article. Certainly, there is much to say about the effects of fragmentation on the loss of genetic diversity, and that we need better tools analyze this information. But we should not sit and wait until technology catches on, or populations go extinct – whatever happens first. We have the responsibility to develop better tools, to start hypothesizing, to start collecting information in the field and working in the laboratory in a joint effort to get a better understanding of fragmented and isolated mountain tapir populations.

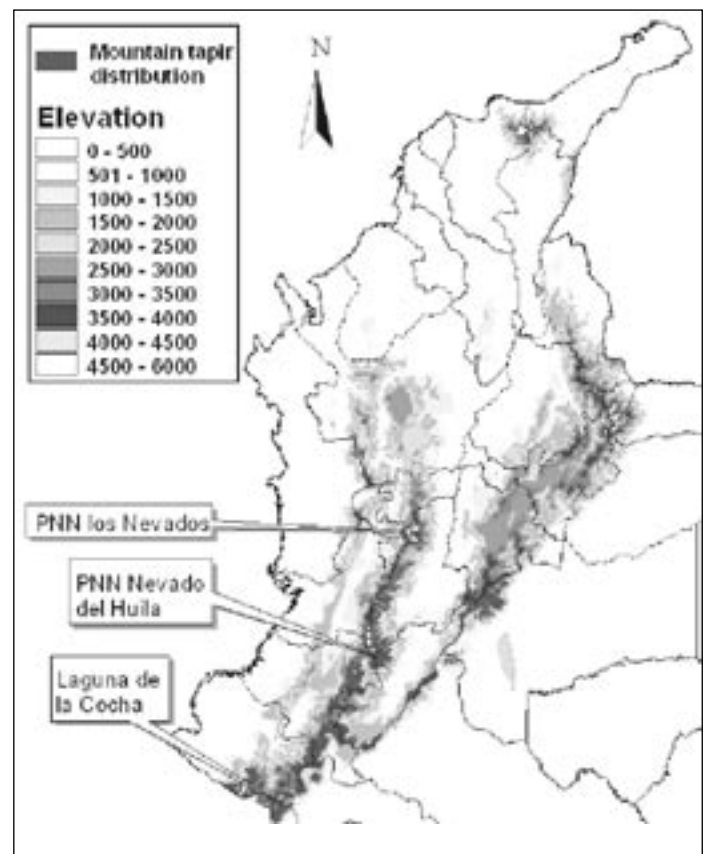
At the beginning of 2004, Diego Lizcano and I held several talks about the difficulty of gathering information from Mountain tapir populations, and also about the need to develop a project to produce genetic information. We realized the need to develop methodologies that meet two conditions. First of all, methodologies should permit us to census and monitor populations with reliable results; second they must overcome the difficulty of finding the animals in the field. So, we decided to develop a project to estimate the genetic diversity of three mountain tapir populations in Colombia (Figure 1) living in forest fragments of different size and with different fragmentation degree (Figure 3).

In the field it is very difficult to find a Mountain tapir without the help of trained dogs, but we can identify trails, sleeping and scratching places where tracks, feces and hair samples from the individuals can be collected. In these days we can use different tools to produce information from different evidence of the presence of Mountain tapirs.

Molecular Biology provides the capacity to extract DNA from feces, hair, carcasses, skin, and blood. Each individual is characterized by its unique genetic structure so that, if we have access to DNA of individuals and sample a significant number of individuals of a population (minimum 30 samples per population for statistical significance); we can thereby obtain representative information about a specific population.

In this project we are obtaining information from Mountain tapirs using noninvasive techniques, by collecting hair samples where there is no adverse effects product of the handling of animals (Figure 2). The main objective of this project is to develop protocols and techniques for the analysis of hair samples using molecular biology tools, as well as to estimate the genetic diversity of three apparently isolated populations in Colombia (Figure 1).

There is no doubt that we must put attention to the genetics of the Mountain tapir populations if we want to ensure their survival for a long period of time. To fully understand all ecological processes occurring within



**Figure 1. Sampling places: Los Nevados National Park, Nevado del Huila National Park and La Cocha Lake. Blue areas represent Mountain tapir distribution (adapted from Lizcano et al. 2002).**

populations and between populations in Colombia, we decide to develop a genetics based project as the first step to answer basic questions about the genetics of Mountain tapir populations: Is there a grade of differentiation in genetic diversity between populations? Is there any gene flow between these populations? Do we have useful tools for the analysis of this kind of information? Does a real effect exist in the genetic diversity as consequence of fragmentation?

We have selected three wild populations to carry out Mountain tapir sample collections (Figure 1): Los Nevados National Park, Nevado del Huila National Park and La Cocha Lake in the Central Andes of Colombia. Between these populations there is a geographic isolation produced by the road, between Bogotá and Armenia, and landscape transformations. The project also includes Mountain tapir samples from three individuals living in the Cheyenne Mountain Zoo; these individuals will contribute to the development of genetic markers (micro satellites) that will help researchers to make better estimations of population numbers and genetic change.

As expected results of this project, we want to con-



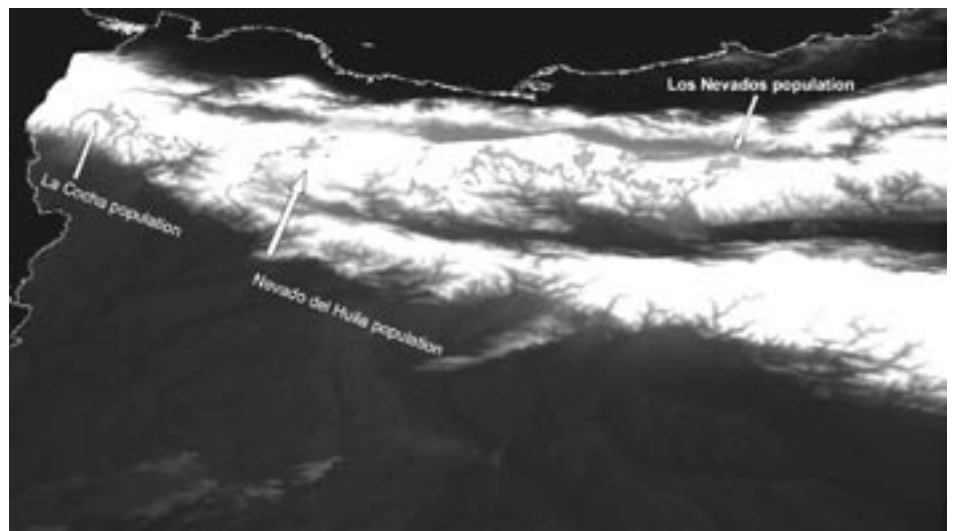
**Figure 2. Noninvasive hair sampling collection in Los Nevados National Park.**

tribute to different researchers interested in the use of molecular biology, providing them with protocols and lab methodologies that will help answer different aspects of the natural history, ecology and genetics of Mountain tapir populations. The indirect and noninvasive techniques for the collection of hair samples used in the project, coupled with molecular biology, can be an alternative method to census and monitor Mountain tapir populations, thus providing key information for the implementation of conservation and management plans.

To date, we have completed four field trips to Los Nevados and Nevado del Huila National Natural Parks, where 38 and 21 hair samples were obtained, respectively. All procedures used are those described by Anders Gonçalves da Silva in the TSG document: **Sampling Techniques for Genetic Analysis**, where the hair samples are preserved dry, in sealed unwaxed envelopes with silica gel. Additionally, GPS points have been recorded for every hair sample. All the samples are kept at room temperature in the laboratory. Those among the readers interested in collecting hair samples must be very carefully to collect just those hairs with follicle (DNA's main source), avoiding those that present white coloration or that easily break (this suggests that may be the DNA present, if any, is already degraded).

Based on our experience and the recommendations of other researchers, we found that Mountain tapir proteins present in hairs are very difficult to break down. "Mountain tapir hair samples, compared to those of other mammals, present difficulties in DNA extraction. Is not an easy job", commented Dr. Manuel Ruiz Garcia, Director of the Population Genetics Laboratory of the Javeriana University in Bogotá. We found that the proteins surrounding the follicle are very resistant to the enzymatic digestion for DNA extraction; we have to break these proteins so we can have access to DNA. For this reason, we had to modify the original protocol. The first step in the laboratory was to standardize the protocols; right now we are performing the first essays of DNA extraction using a variation of the organic method with proteinase K digestion. Despite concerns and difficulties expressed by Dr. Ruiz, organic digestion showed 100% success for the first 25 extraction essays and looks that work is progressing very well.

The development of this project could not be possible without the participation of researchers and members of the IUCN/SSC Tapir Specialist Group (TSG), specially Diego Lizcano, who taught me how to follow Mountain tapirs and since then is an active contributor of the project; Juan Armando Sanchez, Director of the BioMMar Laboratory affiliated to Los Andes University where all the lab procedures are carried out; Patricia Medici, Della Garelle and Alan Shoemaker who always help me, specially with the importation of samples of individuals from Cheyenne Mountain Zoo. Anders Gonçalves da Silva, Carlos Mora, Martha Cardenas and Manuel Ruiz are collaborating with all their knowledge in Molecular Biology and all the methods in the lab.



**Figure 3. 3-D view of the habitat suitability areas for Mountain tapir populations in Colombia, showing the isolation between the three study populations. The areas were calculated using the Ecological Niche Factor Analysis (ENFA) (Hirzel, 2001). Adapted from Pedraza 2005.**

Thanks to the staff at Los Nevados and Nevado del Huila National Parks for all the facilities during the time in the field, also to Andres Guarnizo and Diego Lizcano for their experience and company in the field. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Conservación Internacional Colombia, Idea Wild and BioMMar provided funding.

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## First Ever Notes on Tapir Reproduction in the Wild

By **Leonardo Salas**

In late October 2004, Juan de Dios Valdez Leal, working under the supervision of Charles Foerster – in Corcovado National Park, Costa Rica – went to locate the young offspring of one of Charlie’s collared females. Juan De Dios found the female with her offspring, but also something else as important as his observations of mother-infant relationship and infant survival: the first documented copulation of tapirs in the wild. He documented this most unusual observation with photographs and a detailed description of the duration of behaviors and vocalizations.

In all mammals, most investment in the production of offspring is the responsibility of the female. Because of this, and unlike males, females can only produce a limited number of offspring. It follows that they stand to profit most by ensuring that their genes have the best chances of survival and to be passed to another generation (in contrast, males need not be so choosy, because they can ensure their genes are passed on by copulating with as many females as possible). It is pre-

cisely because of this, as noted by Robert Trivers and other behaviorists nearly 30 years ago, that females are expected to be choosy and pick their male consorts with care to ensure that the male’s genetic contribution would result in offspring well equipped for the task of carrying and passing on those genes. This is one of the principles of sexual selection and is well supported by scientific evidence.

Tapirs are no exception to this principle, or at least we do not have a priori reasons to expect otherwise. Thus, Juan De Dios’ observations are all the more intriguing. He noted, for instance, that the female did not seem receptive to the male. The male attempted to mount seven times before eventually succeeding; yet, the female did not run away or confront the male with aggression. Moreover, there was no apparent selection behavior by the female, other than to resist the male for a while. Juan De Dios’ observations seem to indicate that there is no mate choice behavior in females. Perhaps the female knew where the most suitable male could probably be found and opted to spend time within his home range? Perhaps the selection of males happened before Juan De Dios got the “VIP seat”?

That matter aside, the observations are in agreement with either monogamy or a loose social system with a form of facultative polygyny similar to an extended harem, in which male tapirs would overlap (but not fully encompass) home ranges with those of several females. In an extended harem, a male patrols his home-range seeking signs of a female in heat. Upon finding the female, he forces copulation and secures parenthood. Other males may also overlap home ranges with the same female, so it is a matter of chance – being in the right place at the right time to pick up the cues leading to the receptive female – that is, if there is no female choice involved. Monogamy would imply a full overlap of male and female home ranges. I believe Charlie will solve this matter of the social system soon.

These observations are also important because we finally have a detailed report of the length of inter-birth interval in the wild for Baird’s tapirs. It is certainly shorter than I expected. How long? Go to: <http://www.icomvis.una.ac.cr/revista/articulos.htm>, download the article and do the numbers yourself.

*N.B. Although the article was published this year, for some reason it is listed as being in the 2001 volume of *Vida Silvestre Neotropical*. Don't be confused by the journal's volume date!*

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