Rehabilitation, Behavior, and Growth Patterns of Orphaned Northern Anteaters (*Tamandua mexicana*)

06/06/2015 – 08/19/2015

By Duncan Coleman
Objectives for The Project

* **Ultimate Objective:**
  * To release Peligroso into the wild with the skills necessary for his survival

* **Secondary Objectives:**
  * To observe and document the foraging, climbing, swimming, predator avoidance, human interest, and water and shelter finding skills of Peligroso
  * To observe and document the activity, position, orientation, height, and substrate size behavior patterns of Peligroso for over 100 hours
  * To document the weight and growth patterns of Peligroso over a Ten Week Period
  * To present a scientific research project over the behavior, growth patterns, and rehabilitation process of an orphaned Northern Anteater to the staff of KSTR
  * To publish a detailed scientific guide on how to raise an orphaned Tamandua mexicana in captivity so that it can be successfully released into the wild
Classification of Northern mexicana

- Super Order Xenarthra, Order Pilosa, Suborder Vermilingua, Family Myrmecophagidae, Genus Tamandua, Species T. mexicana.

- The Super Order Xenarthra contains 31 extant species. This includes 21 species of armadillos, six species of sloths, and four species of anteaters. Xenarthra species are only found in the New World or Americas.

- All species of Xenarthra are found in Central and South America apart from the Nine Banded Armadillo.
Distinguishing Features of Xenartha

* All species in the Xenartha Superorder have “xenarthrans” in the lumbar vertebrae of the lower backbone.

* Xenarthrans are extra contacts or joints on the vertebrae that strengthen the lower back and hips.

* This unique feature aids the Tamandua mexicana in digging to find food and standing on two legs to ward off predators.
Distinguishing Features of Xenarthra

* Xenarthra have a double posterior vena cava. This vein returns blood to the heart from the hindquarters.

* Xenarthra have no teeth or very primitive peg-like teeth.
Order Pilosa, Suborder Vermilingua

* Order Pilosa is comprised of sloths and anteaters.

* The Order Pilosa is further divided into the suborders Vermilingua or “worm-tongue” (Anteaters) and Phyllophaga or “leaf-eater” (Sloths).
* Characteristics of Family Myrmecophagidae (Anteaters)
* Long, sticky tongues
* Very small mouths
* No teeth
* Insectivorous
* 5 digit front claws with an especially large third digit
* Muscular pyloric region of the stomach
* Highly Developed Sense of Smell
* Solitary
The word Tamandua is from the Brazilian Portuguese term tamandu´a that is derived from the yupitaa language and means ants; mundeu means trap (Cervantes and Villa 2003).

The genus Tamandua includes 2 living species, T. mexicana and T. tetradactyla.

T. tetradactyla is found mostly in South America, usually uniform in color, and slightly larger than T. mexicana.
**Tamandua mexicana**

* **Range**
  - Southern Mexico to Northern South America. Can be found in Mexico, Venezuela, Colombia, Peru, Ecuador, and throughout Central America.
  - Habitats T. mexicana can be found in include evergreen, deciduous tropical forest, mangroves, second-growth forest, savannah, gallery forest, mist forest, and transformed areas.

* **Physical Characteristics**
  - Tamandua mexicana is a medium-sized anteater.
  - T. mexicana has a elongated and tubular head, is toothless, and has a long, slender and sticky tongue, small eyes, and short, rounded ears.
  - T. mexicana has a prehensile tail and a black vest-like patch across their back.
  - T. mexicana has 5 digits on the hind foot and 4 digits on the forefoot; the middle digit of the forefoot has an extremely large claw.
Range of *Tamandua mexicana*
Tamandua mexicana Behavior

* Tamandua mexicana are solitary and territorial. They have been know to mark territory through drag-marking with the anal scent glands.
* Adult T. mexicana are usually silent, while juveniles often make calls and emit sound.
* Although observed mating's are rare, it is theorized that males locate females through scent.
* T. mexicana usually produce a single young, which rides on the back of the mother. Once about half the size of the mother, the juvenile is independent.
* T. mexicana can be diurnal or nocturnal or both and arboreal and terrestrial.
* T. mexicana has been documented swimming in the wild.
* T. mexicana can visit 50–80 different colonies of termites or ants each day, making little damage to the nest to replenish the population.
* Although the principal diet is ants, the pulp of some fruits have been known to be consumed.
Notes of the activity, position, substrate size, orientation, and height of Peligroso in a semi-wild environment were taken every 2 minutes on an ethogram for observation periods of 30 minutes or more. This was done over a ten week period 6 days a week.

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Position</th>
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The specific skills needed to survive include advanced foraging, climbing, swimming, water and shelter finding, and predator and human avoidance skills.

All of these skills were tested for either through planned testing or through general behavior observation in the semi-wild environment.
The weight of Peligroso was recorded twice a week.

Measurements of Peligroso’s tail length, circumference of tail, leg, arm, circumference of arm, longest nail, and tip of nose to base of tail were taken once a week in the last month of the project.
Skills Required to be Released

- **Foraging Skills** – The ability to find enough food to sustain a healthy body weight
- **Climbing Skills** – The ability to easily and efficiently traverse trees
- **Predator Avoidance Skills** – The ability to climb, run, and hide from predators
- **Human Avoidance Skills** – The ability to be disinterested in humans
- **Water Finding Skills** – The ability to locate and drink from water resources such as streams or bromeliads
- **Shelter Finding Skills** – The ability to find shelter to sleep in and take refuge from adverse weather
- **Swimming Skills** – The ability to swim easily and efficiently across streams and rivers
Foraging Ability

Scale

* **1** – Able to find ants and termites in enclosure when placed in front of it by handler
* **2** – Able to find and eat ants and termites in enclosure on a platform when placed in front of it by handler
* **3** – Able to find and eat ants and termites in enclosure when placed in obvious place on the ground or in branches by handler. Able to use visual and olfactory sensory information to find exposed food.
* **4** – Able to locate and manipulate a wild food source placed in enclosure such as a termite mound or ant nest to gain access to the ants and termites within. Able to use visual and olfactory sensory information to find hidden food.
* **5** – Able to find and eat exposed and hidden ants and termites on the ground or in small trees outside of the enclosure environment when placed near a known food source.
6 – Able to find and eat ants and termites on the ground or in small or medium trees outside of the enclosure environment when not directly placed in front of the food source. Able to forage and search out food in non-enclosure environment.

7 – Able to find and eat wild food in variant weather conditions such as abnormal rain, wind, and heat. Able to continue foraging after falling from a tree of >5 meter height. Has at least a mild tolerance of aggressive, highly defensive ants – Does not immediately run away from nest after 5 seconds. Conditioned for life in the wild.

8 – Able to find and eat ants and termites in large trees >10 meter height for more than 1 hour at a time when taken into a semi-wild environment. Able to find and eat different food sources besides ants and termites such as wild fruits or palm nuts without being placed directly in front of the food.

9 – Able to find and eat ants and termites in large trees >15 meter height for more than 3 hours at a time when taken into a semi-wild environment. Able to climb from one tree to another via branches in search of food. Able to forage for food despite obstacles blocking food sources from easy access such as small streams. Has a medium tolerance of aggressive, highly defensive ants – can last over 30 seconds feeding from nest before running away.

10 – Spends a majority of time feeding in semi-wild environment when on long walks. Takes very little time to locate food resources. Has a high tolerance of aggressive, highly defensive ants – can last over one minute feeding from nest and after running away may come back to nest to continue feeding from it. Able to find and eat ants and termites in very large trees greater than 20 meters in height.
Climbing Ability Scale

- 1 – Able to climb vertically up the base of a small tree
- 2 – Able to climb vertically, horizontally and obliquely on small branches once in a small tree. Able to be in the cling position in a small tree
- 3 – Able to be in different positions than cling, such as tripod hang or bipedal stand for example, in a small tree. Able to climb above 3 meters in height.
- 4 – Able to climb vertically up the base of a medium tree. Able to climb above 5 meters in height.
- 5 – Able to climb vertically, horizontally, and obliquely on medium and small branches in a medium tree. Able to tripod and bipedal hang on medium and small branches. Able to aquaplane down a medium tree
6 – Able to climb in terminal sized branches. Able to monopedal hang. Able to recognize if the branch is unable to support his weight. Able to climb above 7 meters

7 – Able to climb vertically up large trees. Able to use smaller trees to climb into larger trees. Able to climb above 10 meters

8 – Able to climb from tree to tree using the upper branches or canopy. Able to bridge from one tree or branch to another. Able to come down from trees from multiple points by tail sliding or using the tail to slide from a branch to the ground.

9 – Able to perform all climbing positons in the trees. Comfortable moving from tree to tree using the canopy. Able to be climb calmly and without signs of stress in light to medium rain. Able to climb above 15 meters.

10 – Comfortable performing advanced climbing positions, such as monopedal hang and bipedal hang, often. Considers any and all tree pathways to get to another tree before going to the ground. Able to climb above 20 meters.
Water Finding Scale

* 1 – Not able to find water unless bowl filled with water is placed directly in front of the anteater
* 2 – Able to find water in a bowl placed inside enclosure
* 3 – Able to find water in a hidden bowl placed in a tree in a semi-wild environment
* 4 – Able to find water from streams or rivers when placed in front of the stream or river
* 5 – Able to find water from streams or rivers without being placed in front of or near the water source. Able to drink water from bromeliads in the trees.
* 1 – Not afraid of predators. The anteater will actively walk or climb towards predators out of curiosity
* 2 – Indifferent towards predators. The anteater will neither be afraid nor curious. The anteater could accidentally stumble upon the predator.
* 3 – Mildly afraid of predators. The anteater will walk away from the predator if startled by the predator's sound or movements from a short distance (5m) away.
* 4 – Afraid of predators. The anteater will run away or immediately climb up a tree or climb higher up a tree if startled by a predator that is seen, heard or smelt from a medium distance (10m) away. After running or climbing away, the anteater will stay very still until it is safe to move again.
* 5 – Very afraid of predators. The anteater will be aware of the predator's presence from a large distance (15m) away. The anteater will run away, climb up the nearest tree or climb higher up the tree it is already in and/or it will stay very still until it is safe to move again.
Shelter Finding Scale

1 – Unable to find shelter unless placed directly inside the shelter
2 – Able to find shelter in enclosure without assistance
3 – Able to locate shelter within the enclosure if moved to different locations in the enclosure
4 – Able to locate shelter in a semi-wild environment to sleep or rest in during good weather conditions or light rain
5 – Able to locate shelter in a semi-wild environment in very heavy rain and little visibility
**Human Avoidance Scale**

* 1 – Very interested in humans. The anteater will actively seek out humans when taken outside on observation walks. Instead of feeding or foraging, the anteater will continue to follow the handler or other humans.

* 2 – Interested in humans. The anteater will move towards the handler and stop feeding or foraging if startled by the noise or close proximity of the handler or other humans observing the anteater.

* 3 – Mildly interested in humans. The anteater will move towards the handler if the handler attempts to lure or call the anteater to come to him/her. The anteater will not seek out the handler if not in close proximity or making excessive noise. The anteater may chase off the handler and then return to feeding and foraging. This is inactive human interest.

* 4 – Indifferent to humans. The anteater will ignore the handler if in close proximity to it. The anteater may pass directly in front of the handler when traveling and will not seek out human contact. The anteater will prefer to continue feeding and foraging rather than be picked up by the handler.

* 5 – Afraid of humans. The anteater will react to humans as they would a predator, running away or climbing up when startled and staying very still when excessive noise is made. The anteater will actively avoid humans.
Swimming Ability Scale

* 1 – Not able to swim. Either the anteater sinks or is too frightened to swim
* 2 – Mildly able to swim. The anteater struggles and thrashes about in water for a short distance.
* 3 – Almost able to swim. The anteater can paddle through the water a short distance, but it is inefficient and may require assistance from a handler.
* 4 – Able to swim. The anteater can swim efficiently to the shore once placed in a stream. The anteater can also cross small brooks or streams. No Assistance is required.
* 5 – Able to swim great. The anteater can swim across wide streams and even small rivers without assistance.
Anteater Training Ethogram

Date: 7/24/15  Time: 9:14  Climate: cloudy/hot

Name of animal: Peligroso  Age: 7 months 3 weeks 2 days  Weight: 1.80kg

Name of rehaber: Duncan

Place taken: Secret Garden

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The Results: Activity Behavior

Activity Behavior Percentage Over A Ten Week Period

- Feed
- Forage
- Travel
- Rest

Time (Weeks):
- First
- Second
- Third
- Fourth
- Fifth
- Sixth
- Seventh
- Eighth
- Ninth
- Tenth

Percentage of Time at Activity (%):
- 0.0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8

The graph shows the percentage of time spent on different activities over a ten-week period.
Activity Behavior Percentage Over a Ten Week Period

Time (Weeks)

Percentage of Time at Activity (%)

Feed
Forage
Travel
Rest

First
Second
Third
Fourth
Fifth
Sixth
Seventh
Eighth
Ninth
Tenth
The Results: Position Behavior

Percentage of Time Spent in Hanging Positions Over a Ten Week Period

- Tripedal Hang
- Bipedal Hang
- Monopedal Hang
- Cling
Percentage of Time Spent Climbing Versus Walking Over a Ten Week Period

- **Walk**
- **Total Climbing**
- **Climb Up**
- **Climb Down**
- **Climb Horizontal**

Weeks: First, Second, Third, Fourth, Fifth, Sixth, Seventh, Eighth, Ninth, Tenth

Percentage of Time in Position (%)

- Time (Weeks)
The Results: Substrate Size Behavior

Percentage of Time Spent on Ground Level Versus Above Ground Level
Substrate Size Behavior Percentage Over a Ten Week Period

Percentage of Time on Substrate (%) vs. Time (Weeks)

- **Terminal**
- **Small**
- **Medium**
- **Large**
- **Ground**
The Results: Orientation Behavior

Change in Percentage of Time Spent in Various Orientations Over a Ten Week Period

- **Horizontal**
- **Vertical**
- **Oblique**
The Results: Climbing Height Behavior

Average Climbing Height of Peligroso Over a Ten Week Period
**Activity:** Peligroso feeds more and travels less, taking less time to find food.

**Position:** Peligroso spends more time in advanced climbing positions such as monopedal and bipedal hang rather than the cling position. Peligroso spends more time climbing in trees rather than walking on the ground.

**Size:** Peligroso has progressed from spending most of his time on the ground to being in medium sized branches. Peligroso climbed more and more in terminal sized branches over time.

**Orientation:** Peligroso used to spend most of his time at a horizontal orientation, but now Peligroso is most likely to be found in either a vertical or oblique orientation.

**Height:** Peligroso likes to be at a higher average height than he did at the beginning of this study.
Change in Weight of Peligroso from 06/06/2015 to 08/20/2015
Growth Patterns of Peligroso in the Last Month

- Nose-Tail
- Tail
- Tail Circ.
- Leg
- Long Nail
- Arm
- Arm Circ.
Peligroso has steadily been growing in size as he has gotten older. The rate of weight increase in the first two months stayed relatively constant at around 250-300 grams a month, but in the last three weeks in the month of August (from 8 months to 9 months old) the rate of weight increase has increased significantly to a projected 500 grams a month.

In the last month, when this significant growth was occurring, the tail length, the arm circumference, and the length from the tip of the nose to the base of the tail significantly increased in size, while the other measurements remained relatively constant.
Rehabilitation Goals and Activities

- **Goal:** To make Peligroso have a greater tolerance of aggressive, highly defensive ants.
- **Activity:** I took Peligroso to specific trees within the Sloth Bootcamp and Secret Garden that contained the grey ant nests. I also collected these particular ants and put them within in his enclosure to acclimate him to the stings of the ants.
Rehabilitation Goals and Activities

* **Goal:** To make Peligroso act more calmly and be less stressed in heavy rain conditions.
* **Goal:** To make Peligroso have the ability to find shelter in heavy rain conditions.

**Activity:** I took Peligroso to the Secret Garden on “rain walks” where I would observe Peligroso in heavy rain conditions. If he would start running or show signs of stress, I would continue to put him in trees until he found shelter or began feeding and foraging again. When he did find shelter from the rain, I would wait in the rain for him rather than take him back so that there was no negative association with finding shelter.
Rehabilitation Goals and Activities

- **Goal:** To get Peligroso to be less interested in humans.

- **Activity:** After much trial and error I was able to perfect a bowl that Peligroso would not spill his milk in. This stopped the human contact of holding his milk until he was finished.

- **Activity:** Constant enrichment of Peligroso’s enclosure with Palm sides, Palm nuts, Termite and ant infested logs or branches, hammocks, digging tires, and Bromiliads served to encourage wild behavior rather than human interest.

- **Activity:** Generally rougher handling while on observation walks.
Rehabilitation Goals and Activities

* Goal: To have Peligroso climb in large trees over 20 meters in height.
* Goal: To have Peligroso feel confident enough to climb terminal branches.

* Activity: Repeated walks in the Secret Garden continued to strengthen Peligroso’s climbing abilities. I set Peligroso on the ground near Large trees and trees with terminal branches once I felt that he was advanced enough in his climbing abilities.
**Rehabilitation Goals and Activities**

- **Goal:** To get Peligroso to prefer using the canopy to cross into different trees rather than the ground.
- **Activity:** I periodically set Peligroso’s carrying cage near the river in the Secret Garden. He would eventually run out and climb up the trees on the river bank due to his close proximity to the water. These trees formed a canopy with each other. The river underneath discouraged Peligroso from coming to the ground, forcing him to climb into other trees using the canopy rather than the ground.
Goal: To make Peligroso be able to identify unstable branches in the trees that could fall.

Activity: Peligroso fell six times from trees of a height greater than five meters. Through this process of trial and error, Peligroso became more adept at identifying unstable branches that would not support his weight. I did not assist Peligroso or make my presence known after each fall.
Rehabilitation Goals and Activities

- Goal: To get Peligroso to avoid predators.
- Activity: I exposed Peligroso to a variety of potential predators to encourage his natural instinct to be fearful of predators like dogs, weasels, and humans with lawnmowers. Two large dogs, Darla and Henry, came into the Secret Garden on one occasion and I called them over to the base of the tree Peligroso was in to observe his reaction and encourage his natural instinct to avoid dogs.
Rehabilitation Goals and Activities

- Goal: To have Peligroso be able to drink water from bromeliads and small streams.
- Activity: Instead of using water bowls, I would fill small bromeliads with water and put them in his enclosure. I did not observe Peli drink from these bromeliads, but I did observe Peli drinking from bromeliads found in trees in the Secret Garden after I began this activity. Walking Peli near a small stream for many hours encouraged Peli to drink from the stream.
Rehabilitation Goals and Activities

* Goal: To have Peli be able to swim, so that he can cross small streams if no canopy crossing is available across streams in the wild.

* Activity: I, along with a few other helpers for safety, went to a stream of about 1 meter deep and 4 meters wide. I then proceeded to place Peligroso into the water. I held his tail while he swam and then once I saw that he was adept at swimming I let him go. He swam downstream for a bit and was able to swim to shore.
Peligroso the anteater is ready to be released back into the wild!
Recommendations

- Anteaters require an extremely large amount of dedication, attention, time, and effort to be able to be released successfully.
- I recommend that the skills worked on in this research project should be learned by all anteaters before release back into the wild.
- Although it is dangerous and stressful, the Secret Garden is an invaluable asset to training anteaters to be wild again.
- The Anteater ethogram can be enhanced with a column that allows for an observer to record the number of trees the anteater goes in and if the anteater got into the tree using the ground or the canopy.


