

INQUIRY ACTIVITIES AT THE BROOKFIELD ZOO

By Helena Puche

Inquiry is a process of interaction between counselors and campers where the counselor engages campers in generating questions and pursuing answers through careful observation and reflection (Llewellyn 2004).

The inquiry cycle begins with a question that has to be comparative, time-wise, simple, based on observation, and exciting. In this cycle: question → action → reflection → question, counselors may help decide what to compare, what to measure (compare at least two, measure one), and how to measure and collect the data (action). In the reflection process (R), campers explain the results, and deliberate about what to do differently next time, which generates new questions (Q’).

These simple steps are the stepping stones to involve children in doing science, promote critical thinking, empower campers to become independent and life-long learners, to generate and test ideas for themselves, and to question everyday values and their understanding of the world.

I developed several inquiry activities in the informal setting of the Brookfield zoo and those are explained in the following pages. The steps of the inquiry cycle are represented by **Q** (question), **A** (action), **R** (reflection), and new question (**Q’**). Some inquiries have several questions as ideas for several inquiries. The goal is to use one question per group per visit. The methods (**A**) on how to proceed are suggested in each activity. The beauty of many of these activities is that most of them do not need a clipboard to write down the results. Shouting number counts and two or three hands are enough to collect the data and proceed to the discussion.

Several of these activities were implemented with ZOO Lab (11-14 year olds), but are also ideal for campers in the age ranges between 9-11 year olds (Adventure). I also tested The Indian Lake activity with the Discovery group (6-8 year olds) and it worked very well.

Indian Lake is located in an informal section at the western end of the BZ grounds and was created more than 50 years ago when the Salt Creek (CZS 1927) meander dried up becoming, in part, what is now dragonfly marsh. This artificial lake that was planned to be 9 feet deep covering an area of 11 acres was created with the idea of using it for boat rental at a nominal rate. The lake area functions as a natural exhibit with several species of captive birds and as many wild birds and animals that choose to drop in. Birds that in the wild have been reduced to near extinction (Blesy et al.1997) were brought to this lake to reproduce. However, other fauna came to take over the lake. By 1973, Indian Lake was called Waterfowl Lake because the numbers of waterfowl increased so profusely that the zoo had to capture many of them and transport them to Rockford where they were released. By 1999 the now Indian Lake was in trouble. The lake was diagnosed with problems affecting the on-site lake including shoreline erosion, low dissolved oxygen levels and a high phosphorus level. With funds from the Illinois Clean Lakes Program, the zoo installed rip-rap and aquatic plantings to deal with the erosion, added lake aeration, and applied alum to help control the phosphorus. Zoo biologists monitored the lake regularly to chart the lake's progress (ILEPA 1999). In 1997, for the Bird watch week at the Brookfield Zoo, Indian lake was set up as a visitor trap to give the visitors an eye view of the “Migration Sensation” (Blesy et al.1997). The lake is bordered by a mulched path that allows

visitors to walk around the lake and observe the fauna and flora. This is one of my favorite activities because it is able to place the campers in communion with wildlife and nature in a short time.

The semi-guided inquiry begins by asking the campers:

Q: Where do you think you will find more animals, close to or away from the water?

A: After discussing the possibilities, the campers hypothesize about which side of the path will have more animals. I divide the campers in groups of 2-3 to begin counting. Some groups are assigned to count animals close to the water and others to count animals on the side of the path that is away from the water. If the group is small (5 campers) everybody can count as a group, shout the next animal that they see and the counselors keep tallies.

This is a great opportunity to put the campers in contact with real nature and to lead them to actually observe, and listen to insects crawling on the fences, chipmunks trying to surreptitiously cross the path, birds singing and perching, birds flying, spiders hiding in crevices, turtles basking under the sun, frogs crowing, mosquitoes buzzing and biting, bats hanging inside a bat house... The repertoire is endless.

R: At the end of the trail, the small groups gather together and discuss the results. I was able to implement this activity. In one case, the campers found 49 animals close to the water and 170 animals away from the water. This was contrary to what was expected. However, after discussing the results, we all found out that the group counting “away from the water” was counting insects. Therefore, there were dozens of insects in each count. On the contrary, the group counting “close to the water” paid attention to birds, mammals, and amphibians, forgetting most of the insects (although they did not forget to count a wolf spider, a katydid, and an ant).

Q’: When they were asked what they would want to find out next time, many questions emerged:

- Compare the number of squirrels by the path with the number of birds.
- Compare the different types of birds and the ducks close and away from the water.
- Compare the numbers of dragonflies found to the number of spiders close and away from the water.
- Find out where would you find more frogs, close or away from the water?
- A second group of campers found 38 animals close to the water and 32 animals away from the water. I was not leading this group and the counselor was unable to have a discussion with them. However, when I asked them, they were curious to know the difference between dragonflies or butterflies close to the water and away from the water or the difference between types of birds found near the water or away from the water.
- Number of birds singing or perching

An extra activity would be to provide them with a map of Indian Lake to tally where did they find the most animals. The map could be divided in 4 quadrants so that the campers could tally with a pencil what they find in each quarter of the map. This map will help visual learners.

The Living Coast:



Upon entering this exhibit, you will find an aquarium with glass 25 feet high (yellow arrow above), decorated with rocks, sea weed and filled with half moon fish. A bench is placed in front of it so that the campers can comfortably sit to observe the aquarium and its contents. Counselors can guide campers to observe by asking: **Q:** what do you notice first about this exhibit? (fish, water, kelp (habitat food), rocks (habitat)). Because usually you find eels at the bottom of the aquarium and all the fish on the top, counselors could ask the campers: Where do you see more fish: at the top or at the bottom of the tank? Upon answering you may ask: **A:** What factors might be leading the fish to be at the top of the aquarium and not at the bottom? They may mention: the bottom is darker, the temperature is warmer on the top and cooler on the bottom, and the eels are at the bottom of the exhibit.

R&Q: If you were a scientist, what would you be interested on knowing about the animals in this exhibit? Would you design the exhibit differently? Why and what would you change? This is a simple inquiry in which campers observe where most of the fish are and reflect about the reasons of that finding. It also can be a way to initiate critical thinking and the inquiry process for future activities.



Butterflies:



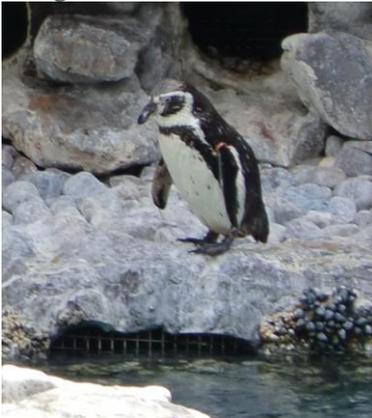
Q: Before entering the butterfly exhibit, ask the campers to observe and decide where they think they will find more butterflies: flying, on the plants or on the floor. They will vote for each location. Nobody is right or wrong.

A: Then, divide the campers in small groups of 2-3 and ask them to count the butterflies at the location where they thought they were going to find the most butterflies. If you are with younger children, divide them in two groups only. After entering the exhibit, gather them and let them know when do they have to begin to count (in your marks, set go!). Give them 1-2 min. Call them when the time is over and discuss with them the results. **R:** What factors might have prone the butterflies to be more abundant in one place than another? **WAIT. LET THEM THINK AND EXPRESS THEMSELVES.** Possible answers are: time of day, weather, and temperature (early in the morning, when it is colder, butterflies tend to be on the floor, while on warmer days they will tend to flutter in the air). **Q’:** Then ask them: Which other comparisons could you make? What are you interested on knowing about these butterflies? **WAIT AND LISTEN.** All answers are correct.

USE ONLY ONE INQUIRY QUESTION PER GROUP. The activity lasts ~10 minutes at most but will make them think about what they are observing. Other possible inquiry questions: Where will you find more butterflies: near the water or near the food? Do zebra butterflies are more on red or yellow flowers? Do zebra butterflies are found more in the sun or in the shade?, What about swallowtails; are they more in the sun or in the shade ?)



Penguins:



Q: Where do penguins prefer to be, out of the water or inside the water? **A:** Count penguins in both locations for 1 s, every 30 s for 5 minutes. Use ethogram (p 9).

Inca terns (orange beak)



Q: Who produces sounds more often, the Inca terns or the seagulls? **A:** Evaluate for 1 s, every 30 seconds for 5 minutes. Use ethogram & Discuss results. **R:** What question would you like to know? How would you do it?

Seagulls:



Q: Flying seagulls: which of them stays longer flying, the terns or the seagulls? Are seagulls flying most of the time or standing? **A:** Use scan sampling observing position of terns and seagulls. Compare results. What would you study next?

Naked Mole rats:



Q: Are female rats more active (moving) than male rats? Are adult rats more active than young rats? Are female rats moving farther from the farthest box on the right than male rats? In which of the boxes will you find more rats: box1, box2, box3, box4. What factors may be affecting this distribution? **A:** Measure distance traveled, compare distance between sexes. **R:** Discuss results. What factors might be influencing one sex to move more than the other? (possible answers: search for food, roles in the colony (scouts look for food). What would you like to know about mole rats in this exhibit?

Giraffes:



Q: When are giraffes more active, in the morning or the afternoon? Which activity do they do the most during those times, foraging, feeding, moving, resting? Use ethogram (p. 9).

Prairie Dogs:



Q: What do they do more in 5 minutes: running, sleeping, playing, fighting, or echoing? When do the dogs are doing more activities in the morning or in the afternoon? **A:** Compare day and afternoon → go twice during the week. Use ethogram (p.9)

Dolphin Show and human behavior:



Q:What side of the entrance to the stage do people take the most: left or right? **A:**Arrive early, count people, what factors might be making them go to one side more than the other? Where would you expect them to go more? **R:** DISCUSS AND GENERATE NEW QUESTIONS TO INVESTIGATE.

Otters:

Where do they stay the most: inside or outside the water? Do the two otters stay together most of the time or prefer to be alone most of the time? Does this behavior change during the day (go twice during the week: in the morning and in the afternoon).



SCALES AND FEATHERS:

Honey eater:



Q:Where do they prefer to drink water; from the bucket or from the river? No clipboard is needed.

Peach throated monitor:



Q: When is it more active: in the morning or in the afternoon: **A:** Make scan sampling observations of 1 second every 30 seconds for 5 minutes. Use your hands to count.

Road runner:



Q: Where do they prefer to spend more time: on the spiny trees or on the floor? They are provided with mice to eat. But they hammer the mice to try to break it up before eating it. The question is: is there a specific place where they break up the dead mice: on a rock or on the floor of the exhibit? Compare possible locations **A:** Pass by every day at about the same time to exclusively check on the feeding habits.

Gambles Quail:



Gamble Quails are territorial and males go to the highest points of perching, logs and rocks for the birds to call back and forth. A question would be, **Q:** Do these birds prefer to be on the floor, on rocks or trees in the exhibit?

TROPIC WORLD:
Cotton top tamarin:



Q: Where do they prefer to be: close to the food tray (right) or far (left). Does preference change with time of day and feeding time? **A:** Count location for 1 minute.

Calamico monkeys:



Q: Which of the two monkeys grooms the other more, calamico 1 to calamico 2 or reverse? Do they groom each other longer in the morning or in the afternoon **A:** Pass by twice during the week alternating morning and afternoon. Observe for 3 minutes each time. Divide children in two groups to observe each calamico monkey.

Gibbons:



Q: In which trees do they stay more time (compare trees)? In which island do they go the most time (compare islands)? Does this behavior change at different times of the day (compare morning and afternoon)? Where do they prefer to sleep: on the floor or on the trees?



Q: Who moves more, adults or baby? Are females (yellow) more active than males? Who sings longer, the male or the female? (They begin to sing at about 10:30 am. Compare number of times that each adult calls). **A:** Use ethogram for movement (p. 9).

Tapir: **Q:** Does the tapir spend more time in the water or outside the water? **A:** For one minute, observe were the tapir spends the time; in the ater or outside of the water.



Orangutans:



Q: Where do they prefer to eat: on the floor or above the playing structure? Where do they prefer to sleep: on the floor or on the top? **A:** Count for one minute each camper and add all results.

Mandrills:



Q: When are they more active: morning or afternoon? Do they sit, guard, or sleep most of the time? **A:** Prepare a list of behaviors on a sheet and ask the campers to observe for 1 second, every 30 seconds for 5 min. Make all of them write down what they see and discuss the results. **R:** What would they want to know about the mandrills that can be evaluated in a short time?

Gorillas:



Q: Where do the male stays the most: at the bottom of the pit or above? Where do the females stays the most: on the pit, on the top floor or on the trees? Where do the juveniles stay the most: trees, top floor or pit? Which animals are more active; male , females, or the young? Define active. **A:** Use an ethogram to record the behaviors every 30 seconds for 1 second for a total of 3-5 min. Note time of the day. **R:** Compare results with campers of other weeks or from your own observations.

References cited

CZS. (1927). Year Book p 28.

Blesy A., N. Schulze C. White, and V. Wegner.(1997). Migration Sensation: International Migratory Bird Weekend at Brookfield Zoo.

ILEPA. (1999). Brookfield Zoo's Indian Lake will be Focus of Environmental Education Effort. News Release.

Naked mole rat pictures retrieved from:

http://scienceblogs.com/afarensis/2006/08/18/rudolf_raft_slandering_naked_m/.

ETHOGRAM: Field WORK - Behavioral Observations

Animal: _____ **Date:** _____
Description: _____ **Time of Day:** _____

Time	Behaviors					
	Foraging	Feeding	Interacting/ Playing	Moving/ Walking	Resting	Out of view
0.30						
1.00						
1.30						
2.00						
2.30						
3.00						
3.30						
4.00						
4.30						
5.00						
Totals						

Animal: _____ **Date:** _____
Description: _____ **Time of Day:** _____

Time	Behaviors					
	Foraging	Feeding	Interacting/ Playing	Moving/ Walking	Resting	Out of view
0.30						
1.00						
1.30						
2.00						
2.30						
3.00						
3.30						
4.00						
4.30						
5.00						
Totals						