SCIENTISTS IN THE FIELD

WHERE SCIENCE MEETS ADVENTURE

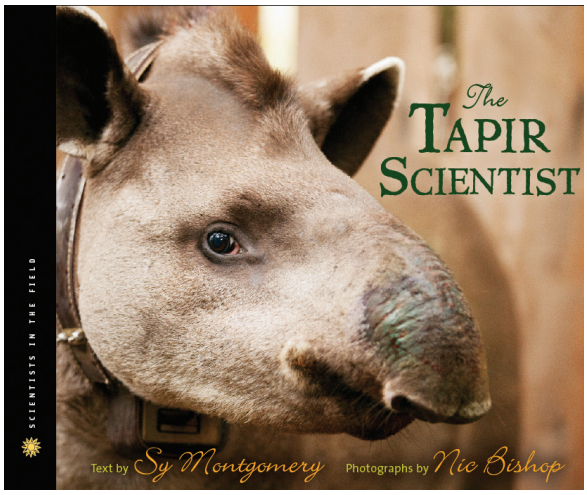
DISCUSSION AND ACTIVITY GUIDE

The Tapir Scientist

By Sy Montgomery Photographs by Nic Bishop

About the Series

The Tapir Scientist is part of the award-winning Scientists in the Field series, which began in 1999. This distinguished and innovative series examines the work of real-life scientists doing actual research. Young readers discover what it is like to be a working scientist, investigating an intriguing research project in action and gaining a wealth of knowledge about fascinating scientific topics. Outstanding writing and stellar photography are features of every book in the series. Reading levels vary, but the books will interest a wide range of readers.



The Tapir Scientist
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About the Book

What *is* a tapir and how do scientists study it? The award-winning author-and-photographer duo
Sy Montgomery and Nic Bishop join the scientist Pati Medici and her research team as they study one of the world's least understand animals and its habitat, the Pantanal ecosystem in South America. The team uses the latest scientific technology and old-fashioned determination in terrain featuring masses of ticks, venomous snakes, and pumas as they track this shy, rarely seen creature.

About the Author

The author Sy Montgomery's life would make a fascinating book. While researching some of her many books, she has been bitten by a vampire bat, hugged by an octopus, and hunted by a tiger, and she has crawled into a pit with 18,000 snakes! She has written more than fifteen books for adults and children and has won many honors, including the Orbis Pictus Award, a Robert F. Sibert Award, the Henry Bergh Award for Nonfiction, and many more.

Montgomery is an ardent conservationist. Besides writing books, she is a screenwriter for film and television and a popular speaker. She works with many organizations to preserve and protect nature. Montgomery lives on a farm in New Hampshire with her husband and many animals.

About the Photographer

Nic Bishop is the photographer for *The Tapir Scientist*. He is also the author of more than sixty books and holds a Ph.D. in biology from Canterbury University. Nic's parents were biologists too, and because

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of their jobs, Nic grew up in Bangladesh, the Sudan, and Papua New Guinea. He started taking pictures as a child with his sister's Brownie camera, and he has been taking pictures of animals and the wild and remote places they live ever since. Nic and his wife moved to the United States in 1994.

Bishop has won many awards for his books, including a Robert F. Sibert Medal (and three Honor Awards), the Orbis Pictus Award, and the Boston Globe–Horn Book Award.

Pre-Reading Activity

Bring in some potting soil, some potted seedlings with leaves, a container to plant the seedlings, and an organic fertilizer. Bring the fertilizer in its container and read the ingredients to the class—try to find a manure-based fertilizer. Many labels will have a "derived from" descriptor that indicates the source of the fertilizer. Plant the seedlings and add the fertilizer (according to the directions) to half of the plants. Keep these plants in the classroom and see whether or not the fertilizer causes any noticeable differences to the plants.

Look at ways in which animals, particularly mammals, disperse seeds. Have students consider bears and blueberries, foxes and raspberries, or deer eating apples. What happens to the seeds?

Before reading the book, show students pictures of tapirs. Without doing any research, have the students write down predictions for what kind of animal a tapir is and which animals are its closest relatives.

Discussion Questions

Tapirs have been around our planet for around five million years. Why do we know so little about them?

Tapirs are killed by jaguars and pumas. They are also hunted and eaten by people. The biggest threat to their existence, however, comes from the timber industry, from cattle ranches, and from other industries that are removing tapir habitat. How do we insure that people have the timber resources they need, the food and homes they need, without completely destroying the habitat necessary for tapir survival?

What benefits to an ecosystem does the tapir provide? How high of a priority should tapirs be to the people of Brazil and the other countries in which they live? Is the priority high enough to concern students in the United States? So many animals are threatened with extinction that no single person can care about all of them. Does the tapir make your personal list of animals to protect? Which ones do or do not? Why?

Researching tapirs requires long, hot hours in remote areas. Researchers must endure ticks, keep an eye out for poisonous snakes, and spend hour after hour collecting and analyzing poop. Writing or photographing a book about tapirs requires spending a much shorter amount of time in these conditions. Are you more of a scientist or more of an author? Why?

As the technology for researching tapirs improves (cameras are getting smaller, more durable; our ability to track animals with GPS devices is much better; etc.), will our need to spend time in the habitat with the animals decrease?

Applying and Extending Our Knowledge

In chapter one we learn that tapirs have "*remained unchanged since the Miocene, more than twelve million years ago—a time when mastodons, saber-toothed cats, and bear dogs roamed North America and the first humans had not yet evolved in Africa.*" (p. 9)

- Have students research and determine how many years humans have been alive and figure out how much older the tapir is. Have students develop a graphic or an analogy to explain to younger students just how much older the tapir is.
- Since most people believe that tapirs are related to hippos or elephants or anteaters, even after seeing pictures of them, have students prepare an online slideshow (or a poster display) comparing the tapir, the elephant, the hippo, and the anteater. After sharing the biological details of these animals, have students do the same thing with tapirs, horses, and rhinos.
- Tapirs remain unchanged. Yet horses have evolved from animals that had three toes on each foot but now has just one. Tapirs are related to horses. Have

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students speculate on why the tapir foot still has three toes whereas its relative, the horse moved from three to just one. Were there habitat changes or other environmental changes that forced a change in horses? Why has the tapir remained so similar?

- Are there other animals alive today that have remained unchanged for a similarly long period of time? Compare and contrast the tapir with at least one other animal (there are several) that has remained virtually unchanged.

Common Core Connections

CCSS.ELA-Literacy.RH.6-8.7 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
CCSS.ELA-Literacy.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
CCSS.ELA-Literacy.W.7.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.

Pati Medici and her tapir team spend much of their time trying to find, trap, dart, and collar tapirs. Yet they meet false alarms, have other setbacks, and go many days without putting a collar on a single tapir. Why is this so difficult?

- To introduce students to the difficulties of finding and tracking something in nature, find a spot on your school property or in the neighborhood that students can observe over time. If your school has, say, an area with lots of bushes or dandelions or other very common plants growing profusely, take the class out there and cut an unnatural small shape or design on one leaf of one plant. Do NOT record the location or ask the students to pay attention to exactly where the plant is located. After a weekend or after a few days send small groups of students out to find the marked leaf in a specified time period. Note: This works best in an area that is wild and not landscaped in patterns. If your school does not have any wilderness areas, try marking a rock or a small piece of pavement. The point of this activity and the ones below is to encourage the conversation of how to make the location of the item easier to find the next time.
- Try tossing a penny into the middle of a big grassy field (with fairly long grass). Leave and then come back the next day and try to find the penny. Then try again using tracking equipment. If you have access to a tracking device and a radio collar, put the collar on an item and then have a student hide the item. Use the tracking device to find it. You may check with your local police department or other government agency that uses GPS tracking to demonstrate how such devices work. If your school does not have access to such resources, try using your lined football field to show how tracking uses coordinates to work.
- Carefully and gently dig up a section of soil to find beetles or worms or other animals. When you find an animal, take note of its size, color, features, etc. Then carefully replace the creature. Come back a week later and see if you can find the exact same animal. Why is finding the tapir so much more difficult?

Common Core Connection

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Chapter two shows a picture of Leticia and her first calf, Cali. Baby tapirs are striped, and the students describe the baby as looking like a watermelon.

- Purchase a striped watermelon from the store and cut it in half (students may carve the fruit out of the watermelon and enjoy a snack). Take the watermelon husk, striped side visible, and make a habitat that would explain why calves are born with stripes.
- Look at other animal babies that are born looking much different from the adults. Have students design a chart that explains the advantages for that particular species of offspring that are so different visually than the parents.

Common Core Connection

CCSS.ELA-Literacy.RH.6-8.7 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

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Much of the work described in *The Tapir Scientist* involves setting traps, checking traps, or releasing animals found in traps.

- Divide students into teams. Have each team select an animal that isn't usually trapped (especially animals that are abundant locally, if possible). Have students design a realistic trap that would successfully trap their chosen animal. If students are able to build a model, that's wonderful (but not essential). Students *must*, however, explain why their trap will capture their animal, why it will not harm the animal, where the trap must be placed, and why their trap will be able to hold the animal until the trap is checked. If necessary, students will need to explain why their trap is feasible and show an example of an actual component of the trap or an actual existing trap as proof.
- Have groups of students design and build traps that will capture ants or other abundant small insects (make sure to release the insects, if the trap works). Have students explain why their traps were successful or not successful.

Common Core Connection

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Tapir TV is just one example of technology and media that are utilized by scientists in the field studying tapirs (and environment). In this chapter, a motion-activated camera clicks five photographs of the tapirs very quickly.

- Have teams of students take pictures at the same time and in the same place of the first five nonhuman animals that pass by. Try to find five different species of animal. Do this for thirty days (or at least ten days). Have students sort the pictures and graph the animals by various criteria, including abundance. Make sure that someone in the group keeps an accurate log of the time each picture is taken (if the camera does not do this for the group). Make sure that the location is exactly identified and the orientation of the picture (e.g., facing west) is recorded.
- Do the same activity as above, but try doing it at a different time of the day or in a different location. Have students find a place near their own homes and do the same activity. Note: If students do not have digital cameras, they may always write down their observations in a field book.

Common Core Connection

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-Literacy.RH.6-8.7 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

On page 38, Benjamin Brind presented his reasons to support Pati's tapir project at a school assembly in which students vote for a charity to support. His presentation was successful and his school voted to support tapir conservation.

- If your school allows students to select a charity to fund, consider allowing students to make presentations such as Benjamin's.
- Have your class select five animals in need of conservation efforts (especially local animals) for this activity. You may need fewer animals or more animals depending on class size. In groups of four or five, have students make a presentation about why their animal should be supported. Tie the presentation in with math standards by assigning an arbitrary monetary prize for the winning presentation. Have students address current distribution, future predictions based on current trends, special consideration, how the money will be utilized, etc. After all the presentations are given, have students vote by secret ballot for the animal they think they should support.

Common Core Connection

CCSS.ELA-Literacy.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

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CCSS.ELA-Literacy.SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

On page 59 we read, "To a field biologist, a tapir turd is a treasure."

- If the maturity level of the class allows and if sufficient safety precautions and materials are available, inspect various "treasures" from local critters (that do not pose any health risks). What is inside? Can you see evidence of diet? Just exactly why do animal biologists spend so much time inspecting feces? If the class maturity level does not allow for an actual inspection, or if the "resources" are not available, have the class make a list of all the reasons a scientist would want to study animal droppings.
- A very similar (and safer) exploration may be conducted using owl pellets. If the class uses owl pellets, be sure to discuss the differences between regurgitated owl pellets and feces.

Common Core Connection

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Other Websites to Explore

Cool Jobs: Delving into Dung
www.sciencenewsforkids.org/2013/01/cool-jobs-delving-into-dung (An article on the importance of dung research from *Science News for Kids).*

Tapirs
animals.nationalgeographic.com/animals/mammals/tapir
(Informational article on tapirs from *National Geographic*.)

Tapirs
animaldiversity.ummz.umich.edu/accounts/Tapiridae
(Information on tapirs from Animal Diversity Web from the University of Michigan Museum of Zoology.)

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