SCIENTISTS IN THE FIELD

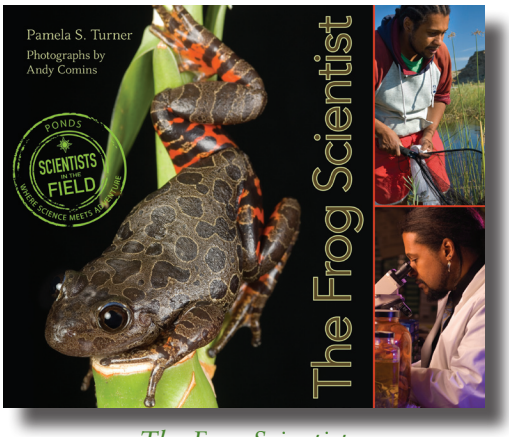
WHERE SCIENCE MEETS ADVENTURE

DISCUSSION AND ACTIVITY GUIDE

The Frog Scientist
by Pamela Turner Photographs by Andy Comins

About the Series

The Frog 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, investigate an intriguing research project in action and gain 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 Frog Scientist
by Pamela S. Turner
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About the Book

Frogs are not supposed to have a fifth leg sticking out from their chests. More than 1,800 frog species are threatened with extinction. What is happening to these amphibians, and what does this information mean to us? Dr. Tyrone Hayes worked for the company that manufactures the pesticide, atrazine. However, when he came to the inescapable conclusion that atrazine was causing problems, he was forced to resign—and redo all of his research. Dr. Turner is exploring the effects of atrazine on frogs and their eggs in Wyoming. Pesticides make it possible to produce much more food for our consumption. Turner has students exploring the long-term cost of atrazine and other pesticides weighed against our need for food crops, such as corn.

About the Author

Pamela S. Turner's license plate reads Riibiit. *The Frog Scientist* is an Orbis Pictus honor book, a Notable Book for Children, the winner of the Cybils Young Adult nonfiction award, and the 2010 winner of the American Association for the Advancement of Science award for the best science writing. Pamela has written three other books for the Scientists in the Field series.

About the Photographer

Andy Comins is a California-based photographer dedicated to bringing the wide world of scientific knowledge to children of all ages. This is his second collaboration on a Scientists in the Field title.

Houghton Mifflin Harcourt Books for Young Readers
Visit www.sciencemeetsadventure.com for authors' Adventure Notes, teacher resources, videos, and more!

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Pre-Reading Activities:

Show students an ear of corn in its husk. Slowly peel the leaves of the husk off the corn one leaf at a time. Ask students whether or not insects or other bugs might like to eat the corn. Discuss whether or not corn plants and corn offer bugs places to hide. What should we do to make sure that our corn and other crops are not filled with bugs? Show pictures of the European corn borer,
armyworm, stalk borer, corn leaf aphid, corn flea beetle, and other pests that
attack corn in this country. Show students the picture of the leopard frog on page 16 and maybe other images of deformed frogs. Ask students what corn pests and frogs have in common.

Discussion Questions:

Dr. Hayes worked for a company that produces atrazine. He was well paid. When he quit that job he chose to re-do his research. Ask students how they feel about starting all over to do school work. Follow this with a discussion about how the students feel about Dr. Hayes's decision to quit a good job and re-do his research.

Many farmers and other folks believe the problem with atrazine is far less serious than the problem of raising food. They believe that pesticides do not have to pose a serious health risk. How much environmental risk, if any, is acceptable for our country's food production process?

Discuss the obstacles Dr. Hayes has overcome in his quest to be a field biologist.

Dr. Hayes's experiment includes contaminating the water with three parts per billion of atrazine. How much is this? Can you demonstrate how much this is for other students?

Scientists often have to make controversial decisions. Turner describes Hayes' regret in having to put atrazine into the pond on page 5: "Although Tyrone doesn't like putting even a tiny pinch of pesticide into the environment, this little pond is part of an experiment that will help answer some big questions." What do you think about this? As citizens, what kinds of choices do we make about things we do or products that we buy? Are any of these choices controversial?

Applying and Extending Our Knowledge:

Brainstorm with your students what kinds of organisms the class could observe in an outdoor area, such as a playground. Then move outside and generate a list of all the organisms found in a set amount of time (at least five minutes). Don't forget to include insects and other bugs, as well as plant life. Share with the class a field journal. The American Museum of Natural History has good information about field journals here: www.amnh.org/explore/curriculum-collections/biodiversity-counts/what-is-biodiversity/doing-science-researchers-and-exhibition-staff-talk-about-their-work.-keeping-a-field-journal-1. Make sure students add questions to the end of each entry about something they observe. Generate with the students various predictions and hypotheses about what they expect to observe each day and over time.

- Using string or hula hoops or natural markers, assign students a specific section of the outdoor area to monitor with a field journal. Make sure to map the site so the students are always observing the exact same location. For the next month (or longer), have students record their observations as regularly as time permits (ideally, on a daily basis).
- Print checklists of the organisms from your earlier observation to distribute to students. Have students list any organisms from this list that they observed in their specific location (adding any new ones, as required). Discuss reasons for not seeing some animals and regularly seeing others. Which are always found, usually found, regularly found, sometimes found, rarely found, and never found in a student's specific habitat? Take a daily picture from the exact same location with a digital camera. Make sure to date each picture.
- Divide the class into groups and have certain groups specialize in a specific organism (in addition to their field journal work).
- Create a class booklet of the questions students have written. When appropriate, have these questions guide the next day's observations. Have other students use their own observations to formulate answers or theories concerning the questions.

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- These activities, above, may also be used by students in outdoor areas of their own choosing (and assigned as homework or extra credit). Discuss with students whether a field journal could even be done in, say, the lunch room.
- Compare the class predictions before starting with what the class observes monthly (and at the end of the time period). What new predictions and hypotheses do the students have?

Common Core Connection

RI.6.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Frogs and other amphibians are found throughout the world. Turner has pictures of at least twenty different frogs.

- Map the location of all the frogs listed in this book. Be sure to indicate whether a frog is endangered.
- Add frogs from your location to the map. Be sure to include the scientific name of any frogs you add, in addition to the common name.
- Use a library to discover at least five more frogs to add to the frog map.

Common Core Connection

W.6.7. Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
RI.6.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Displaying our findings is an essential part of science. Dr. Hayes has to present information regularly.

- Perhaps using information from student field journals or information about local frogs, have students create a science poster. A good rubric may be found here: sciencenetlinks.com/student-teacher-sheets/scientific-poster-checklist.

Common Core Connection

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Pamela Turner's book was published in 2009. Research on this fascinating subject has continued. Visit this site from the Yale School of Forestry and Environmental Studies: e360.yale.edu/feature/unraveling_the_mystery_of_the_bizarre_deformed_frogs/2368/. Or search a magazine database for other recent articles.

Compare and contrast the conclusions of the two studies. What conclusions can you draw? Discuss the evidence that supports your conclusions. Can you locate other studies?

Common Core Connection

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.
RI.7.8. Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
RI.7.9. Analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts.
RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

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Web Resources to Explore

Malformed Frogs in Minnesota
pubs.usgs.gov/fs/fs-043-01

A USGS Update on a coordinated field study on malformed frog found in Minnesota. This site summarizes the scientific results of the study.

Unraveling the Mystery of the Bizarre Deformed Frogs
e360.yale.edu/feature/unraveling_the_mystery_of_the_bizarre_deformed_frogs/2368.

An interview with Yale, ecologist David K. Skelley, who conducted a study on deformed frogs in four different landscapes in the northeastern United States.

Causes for Concern: Chemicals and Wildlife
www.epha.org/spip.php?article1112

A PDF downloadable report from the WWF, **"Causes for Concern: Chemicals and Wildlife."** The paper examines scientific findings concerning exposure and effects of various chemicals on wildlife, as well as research on related human health impacts.

Pamela S. Turner – *The Frog Scientist*
www.pamelasturner.com/the_frog_scientist_79242.htm

Pamela S. Turner's website offers a wealth of additional information, links, and videos.

Additional Print Sources

Allen, Kathy. *Deformed Frogs: A Cause and Effect Investigation*. Capstone, 2011.

Bishop, Nic. *Frogs*. Scholastic, 2008.

Desonie, Dana. *Hydrosphere: Freshwater Systems and Pollution*. Chelsea, 2008.

Stewart, Melissa. *A Place for Frogs*. Peachtree, 2009.

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