

# Teaching about fatherless snakes in a prison classroom

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## Abstract

Developing a course for the first time as a graduate student is challenging. When I first taught introductory biology with the Cornell Prison Education Program, I struggled to design and adapt lessons that felt relevant to my students. *CourseSource* was a wonderful resource for finding biology activities. I especially enjoyed using the “Why Meiosis Matters: The Case of the Fatherless Snake” case study to teach meiosis to my students. My students loved solving the biological mystery of a boy snake born to a female snake kept alone in captivity, developing hypotheses and experiments to test them. *CourseSource* relieved the stress of bringing the material to life in a content-heavy class and activities like the fatherless snake activity inspired me to create my own active learning exercises throughout the semester.

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## INTRODUCTION

I am a Ph.D. student in the Department of Ecology and Evolutionary biology at Cornell University where I teach introductory biology in the Cornell Prison Education Program. This program partners with four medium and maximum-security state prisons in upstate New York to offer associate degrees in the liberal arts to students. For many of my students, this course is their first biology course since high school. It is important to me that I make the course interesting and relevant, especially because many of my students did not have good experiences in their high school biology classes.

When my co-instructor and I started teaching this course, we found it challenging to create a course from scratch and to find learning activities to keep our students interested for three hour-long class periods. Furthermore, because my co-instructor and I are both trained in ecology and evolutionary biology, developing innovative classroom activities for the genetics and molecular biology portion of our introductory biology course frequently stumped us. To top it all off, we were limited in the materials we could bring into our prison classroom: no lab equipment, 3D models, or access to the internet, just a chalkboard and paper handouts. Fortunately, *CourseSource* saved us with its easy-to-use resources that engaged our students and could be adapted to the prison classroom.

## TEACHING ABOUT CELL DIVISION USING THE FATHERLESS SNAKE ACTIVITY

Meiosis and mitosis are difficult concepts for students to grasp and for instructors to make compelling and relevant, even though errors during either process have huge implications. Using case studies, like the one presented in “Why Meiosis Matters: The Case of the Fatherless Snake,” (1) helped us bring

these biological concepts to life for our students.

Prior to class, students read about meiosis and mitosis in our introductory biology textbook and completed a pre-class assignment with questions about the reading. In class, I read them the scripted prompt from *CourseSource*, which describes how a scientist came into his lab one day to find that one of his captive snakes had given birth. The twist? She was a female snake who had lived alone in a cage for the last 14 years and had just given birth to a male snake.

Students then had a few minutes to develop hypotheses on their own about how a female snake raised alone in captivity could give birth to a boy snake. We then had a whole-class discussion about how students would test their hypotheses and what evidence would show that their hypotheses were wrong. Our students enjoyed developing and testing their hypotheses. Students said comments such as “Maybe an unrelated baby snake snuck into the cage, but if the mother and boy snake shared many of the same genes, she would have to be his mother.” Throughout the course, we focused on helping our students develop scientific process skills, and this *CourseSource* lesson fit perfectly with these broader learning outcomes.

Next, I gave a mini-lecture on parthenogenesis and what could cause a female snake to give birth to a boy snake without a male. We talked about different sex chromosome systems and their importance. Students then read a recent National Geographic article (2), not included in the *CourseSource* materials, which summarizes the findings of a recent scientific study (3) on evidence for parthenogenesis, where an unfertilized egg cell develops into an embryo, in wild snakes. Reading a popular science article about scientific findings was an important first step in teaching our students how to interpret data and their implications. By the end of the semester, our students were reading and presenting on a primary scientific research articles.

Finally, we wrapped up class with a discussion about why parthenogenesis occurs, why all organisms do not reproduce parthenogenically, and why this form of reproduction might have negative conservation consequences.

### **STUDENT REACTION TO THE FATHERLESS SNAKE ACTIVITY**

Our students enjoyed the fatherless snake activity for a variety of reasons. Many of our students are religious, and the idea of scientific evidence for virgin birth intrigued them. Presenting a real-world problem about snakes that contradicts what you would predict also inspired the students to creatively think through possible solutions, which engaged them during the lengthy class periods.

### **THE IMPORTANCE OF COURSESOURCE FOR NEW TEACHERS**

In summary, I view *CourseSource* materials as being analogous to a cookbook for a new home chef. When I first began teaching, I was hesitant to tweak any materials I was given, and over time, I realized that I could take activities others had developed and adapt them to fit my pedagogical needs. Ready-made materials helped ease the stress of developing my own course for the first time and sparked inspiration for similar active-learning exercises throughout the semester. Developing a course from scratch is never simple and is especially daunting for new teachers like me, but *CourseSource* materials helped me provide my students with thoughtful, engaging learning activities that I could tailor to meet our learning outcomes and unique teaching situation.

### **REFERENCES**

1. Wright R. 2014. Why Meiosis Matters: The case of the fatherless snake. *CourseSource* 1.
2. Than K. 2012. "Virgin Birth" Seen in Wild Snakes, Even When Males Are Available. *National Geographic News*.
3. Booth W, Smith CF, Eskridge PH, Hoss SK, Mendelson JR, Schuett GW. 2012. Facultative parthenogenesis discovered in wild vertebrates. *Biology Letters* 8:983–985.