



## ***Teacher's Guide***

### **Scientific Methods & The Venom Cure** **NATURE Science Education Series**

#### **Grade Levels:**

5-12

#### **Subject Areas:**

Sciences

Life Sciences

Biology

#### **Synopsis:**

Visits several parts of the world to observe and capture venomous predators, milk their venom, and illustrate in the lab and with computer animation, how their venom is being used to create medicines to cure or manage human diseases. A fascinating sequence follows the adventures of an Australian woman who hunts the deadly brown snake whose venom is used to create antivenin to cure snakebites. The sequence includes a history of the discovery of antivenin and its blood staunching powers and the creation of an Exenatide, an antivenin that may eventually cure diabetes. Other scientific adventures include the capture of snails, newts, octopus, puffers, frogs, toads and scorpions to create medicines to alleviate chronic pain. In each case, the scientific method is exemplified from field study to the creation of pharmaceuticals, some which may even cure deadly brain and breast cancers.

#### **Learning Objectives:** Students will:

- Provide examples of the effects of venom in the predator/prey relationship.
- Provide examples of toxins that are being used to produce medicines.
- Appreciate the complexities of scientific investigation moving from field study to the production of successful pharmaceuticals.

#### **Vocabulary:**

boomslang, venomous, chameleons, venom, saliva, toxic, copperhead, serpentarium, miraculous, elixir, contortrostatin, death adder, tiger snake, fierce snake, cobra, blood staunching, gila monster, Exenatide, insulin, clinical trials, cone shells, debilitating, conotoxins, siphon tube, proboscis, sciatica, harlequin frogs, virulent, California newt, tetrodotoxin, TTX, cyanide, blue-ringed octopus, docile, fugu puffer, Tectin, natural toxins, poison dart frogs, chlorotoxin, glioma, radioactive isotope, coagulants

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**Pre-Viewing Discussion:**

Why are most people afraid of rattlesnakes? What are the effects of a rattlesnake bite?

What other predators produce deadly toxins?

What is an anti-toxin? How are anti-toxins produced?

Why would pharmaceutical companies be interested in researching the effects of toxins and anti-toxins?

**Post-Viewing Discussion:**

Why is the South African boomslang such a successful predator? How does snake venom cause damage in a victim?

What other successful predators produce venom that can be used to create products that alleviate pain and disease in humans?

What is Exenatide? What are some of its possible uses? What are the effects of the drug in human sufferers?

What are the possible uses of conotoxins? What animal produces these? How do scientists harvest conotoxins?

What are some of the possible uses of TTX? What animals produce TTX?

**Further Activities:**

Find further examples of companies that employ biologists to harvest natural products for medicinal purposes. In each case explain how company teamwork provides a model of the scientific method in action.

Find stories of chronic pain sufferers. Focus on their attempts to control their pain and live productive lives. Speculate on the type of pharmaceuticals that might help them without producing debilitating side effects.

Interview a scientist who is participating in field studies that may result in new pharmaceuticals. Provide examples of how the scientist applies the scientific method in his research.

Visit a pharmaceutical company to analyze a specific topic such as how they guarantee quality control of the products they produce.

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