

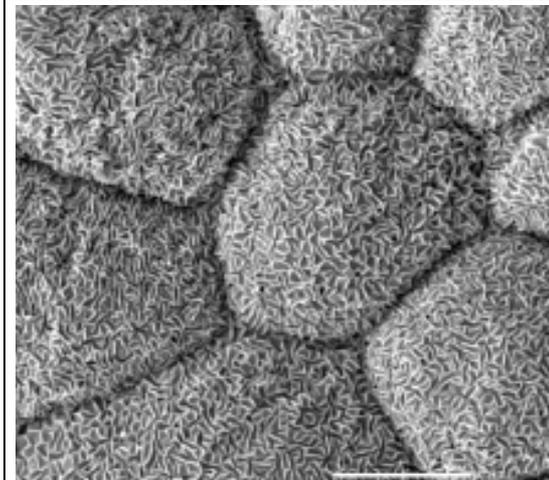
Investigations of Cell Structure and Function in Egg-laying and Live-bearing Snakes

Ann Lehman (Trinity College), DMR-Award #1039588

Intellectual Merit: The Scanning Electron Microscope (SEM) is a valuable tool in biological research on placentas, organs that sustain developing embryos in female animals that give birth to their young. Live-bearing reproduction has evolved independently in mammals and other animal groups, including many snakes. Using this NSF-funded SEM, Biology students study reptiles to reconstruct placental structure, function and evolution. The SEM enables the observation of subtle surface features in the cells responsible for material transfer between maternal and fetal tissues. These include exquisite arrays of cells that line the yolk sac, intercellular channels that function in sodium-coupled water transport, and elaborate networks of tiny blood vessels responsible for respiratory gas exchange. Students learn to use a highly advanced technology while applying scientifically sound analytical principles.



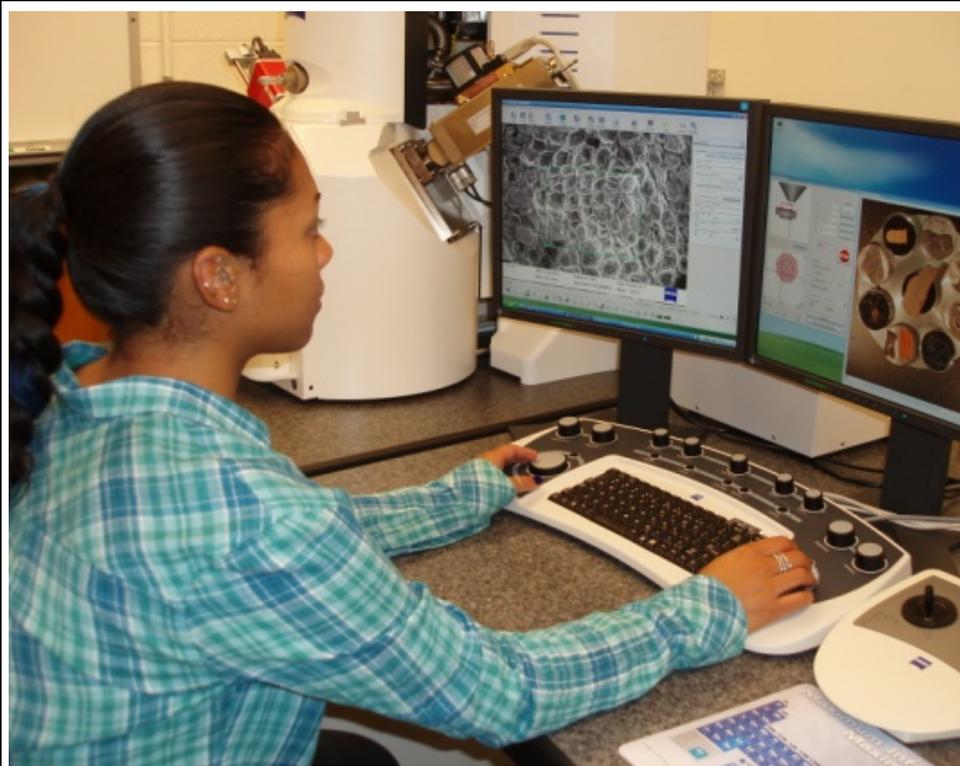
Embryo of the live-bearing snake *Storeria dekayi*.
Bar=1mm.



Absorptive cells of the yolk sac of the egg-laying snake *Pantherophis guttatus*.
Bar=2.5 μ .

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A Biology major uses the SEM to study the relationship between embryonic and maternal tissue development in snakes that bear live young.

Broader Impact: This NSF-funded Scanning Electron Microscope (SEM) is an advanced scientific research tool that is used for the study of biological tissues. Student research projects involving reptiles that lay eggs as well as reptiles that bear live young are used in college courses in the life sciences to study likenesses and differences in organs that have evolved extraordinary means for successful reproduction. They learn about the advanced technology that makes these images possible and to apply sound analytical principles. This SEM is also used in the classroom to instruct students in applications across multiple interdisciplinary fields.