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Curriculum Units by Fellows of the National Initiative
2010 Volume V: Nanotechnology and Human Health

The Relative Nature of Size in Biological Sciences: Let's Start Small and Work Our Way Up

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Nanotechnology is a big word that is used to describe a science which deals with things that are really, really small. The applications for nanotechnology, also referred to as nanoscience, are numerous and far-reaching. Research is currently being conducted in areas as diverse as cancer treatments, self-cleaning windows and toilets, water purification, and cosmetics. In this unit, I want to first introduce to my students a concrete concept of size scaling and how size relates to the structure and function of living organisms. Next, I will like to explore the science of nanotechnology and the various applications that are available today as well as the potential for future applications.

In this unit, students will first be introduced to metric measurement and the concept of size relativity in order to understand the nanoscale. Next, students will explore how living organisms are dependant on scaling for structure and function. The students will then apply what they have learned by constructing their own creature and explain how size and scaling dictated the form of their creation. Lastly, students will view nanotechnology as a part of biotechnology and discuss the practical applications that have already been developed and the growing potential of nanoscience for the future.

Upon the completion of this unit, I want my students to be able to recognize these concepts and be able to apply this knowledge effectively as we discuss the structure, function, adaptation, evolution, and interconnectedness of all living organisms in our biosphere throughout the entire course. As a result of teaching this unit, I want to be able to introduce some of the models and concepts which will not only enhance what we will be covering in this course this semester, but will form background knowledge for the courses my students will take after Biology such as Chemistry, Physics, Physical Science, and Anatomy.

(Developed for Honors Biology, General Biology, and SIOP English as a Second Language, grades 9-12; recommended for Biology, grades 9-12, and Life Sciences, Middle School grades)

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