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Curriculum Units by Fellows of the National Initiative
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Introduction

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Evolutionary biology involves studying genetic changes within populations over time, and resolving relatedness among species. Although evolution is central to the understanding of biology and the history of life on Earth, one problem with teaching evolutionary biology is that students often fail to grasp its applied significance. Evolutionary medicine is the application of evolutionary thinking to gain valuable insights and new perspectives into human health and disease, demonstrating that knowledge of evolution vitally impacts our everyday lives. The overall aim of this seminar was to explore ways to teach students about aspects of evolutionary medicine, emphasizing that this interdisciplinary science helps explain the origins of many medical conditions, including obesity, diabetes, asthma, heart disease, allergies and aging. Also, the seminar stressed that evolutionary medicine informs why humans often suffer from infectious diseases ranging from benign to deadly, and how illnesses such as smallpox, malaria, AIDS and the flu have profoundly influenced human evolution, societal interactions, and major historical events. The seminar incorporated instruction and discussions of readings on evolutionary medicine, some hands–on laboratory experiments, and a tour of the collections at the Peabody Museum of Natural History to learn how these holdings are used to study evolutionary biology. The seminar was intended for teachers of science and mathematics at all grade levels.

The resulting units were diverse, reflecting the varied interests and backgrounds of the Fellows. Vivienne Bartman–McClellan develops a unit for elementary school students that examines why popular sanitizers do not protect against all infections, and the idea that growing up in overly clean environments may actually increase disease susceptibility later in life. Intisar Hamidullah's unit looks at the historical impact of diseases during the Civil War, and how these illnesses led to high mortality in soldiers. Deborah James focuses on the mysterious and alarming increases in asthma and food allergies in children, and the possible roles of genes and the environment. Madeline Keleher's unit emphasizes the teaching of hypothesis–testing, where students are challenged to think about proximate and ultimate explanations for natural phenomena, especially evolution of systems in the human body. Laura Kessinger's unit is on nutritional choices and human health, emphasizing how humans evolved through time and that our current diets differ dramatically from those of our ancestors. Valerie Schwarz describes how human history has been affected by disease, particularly the arrival of Europeans and Africans in the New World and the devastating effects of diseases such as smallpox on Native Americans. Deborah Smithey's unit is on HIV and the AIDS epidemic, and could be used to help instruct teenage students about risky behavior and its dangerous consequences. Connie Wood's unit connects together teaching of evolutionary biology and the human body, to show students that diseases such as sickle–cell anemia have persisted in humans because the responsible genes protect against dangerous pathogens such as malaria parasites.

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