YALE NATIONAL INITIATIVE
to strengthen teaching in public schools®

Curriculum Units by Fellows of the National Initiative
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Introduction

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Why does a submarine look like a whale? Why do airplanes look like birds? Because humans have long turned to Nature for solutions, such as how to design a boat that travels underwater or a machine that soars through the air. Similarly, we have looked to biomimicry (solutions based on traits drawn from species biodiversity) as inspirations for solving other problems, including diseases. Since prehistoric times, humans have experimented with curing illnesses by harnessing species – especially plants – found in natural environments. In the current day, we continue to be inspired by the Earth's biodiversity to address health concerns, including using viruses to cure bacterial diseases that are resistant to antibiotics, as well as discovering anticancer drugs derived from natural products. As we grapple with concerns over pests that threaten the agricultural food supply, and the ongoing threats of emerging pathogens that can spur epidemics, we continuously seek to understand why many natural plant and animal communities remain healthy despite such threats. This seminar explored the many ways that we have looked to Nature for solutions to human problems, emphasizing the importance of a 'One Health' approach which recognizes that optimal health for people is best obtained by understanding and maintaining the health of wild and domesticated animals, as well as our natural ecosystems.

The overarching goal of the seminar was to empower teachers in their knowledge of how the natural world and its species diversity inspires humans to discover solutions to difficult problems, with the expectation that this understanding would enrich the classroom experiences of their students. The resulting units are diverse, reflecting the varied interests and backgrounds of the Fellows. Carol Boynton develops a unit for kindergarten students on the essential role of honeybee pollinators in maintaining healthy plant communities, and the importance of protecting bee colonies against declines caused by parasites such as mites. The focus of Kirsten Craig's unit for kindergartners also centers on pollination, to emphasize how insects not only positively impact crop health and food production, but also generally help to maintain biodiverse natural communities and provide ecosystem services that benefit humans, plants, and animals alike. Michael Doody's unit on sustainable agriculture is designed for Advanced Placement (AP) Environmental Science or similar students, and examines agroecosystems and Indigenous practices as alternatives to those developed during the Green Revolution, to strive for plant agriculture with fewer negative impacts on natural communities. Chloe Glynn's unit concerns the growing threat of antimicrobial resistant bacteria, and how their natural virus enemies – bacteriophages – can be developed as alternatives for treating bacterial infections when antibiotics fail. Anna Herman's unit for high school students examines how nature can inspire alternatives to our poorly sustainable industrial food and agriculture systems, to adopt practices which are better for the overall health of interconnected human, animal and natural environment systems using the One-Health paradigm. Aliyah Hoye's unit serves as an introduction to biodiversity and biomimicry for kindergartners, emphasizing how our daily lives are positively impacted by the many machines, tools, and medicines that have been inspired by the

natural world, in order to solve human problems. The kindergarten unit by Joe Parrett examines behaviors in animals that strengthen their social connections, as inspirations for developing better communication skills in students and improved social emotional learning in the classroom.