



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
1990 Volume VI: Genetics

Introduction

The seminar addressed several areas: defining the human genome, genetics and environment, and basic human genetics. The Fellows chose areas on which to concentrate in their units. These included genetics and evolution, genetics and alcoholism, basic concepts, and genetic counseling.

The size and complexity of the human genome is beginning to be clarified, largely by the study of genes in which mutations are responsible for human disease. The curriculum units in this area are timely as well as exciting. A review of basic genetic concepts begins the study, including Mendelian principles and multifactorial inheritance, followed by an introduction to the “new genetics,” how genes are put together, how they work, and how they are analyzed. Much information is already available, and the curriculum units include materials commercially available and made by the teachers, which aid in teaching the concepts of basic human genetics. There are several exciting suggested “laboratory experiments,” many of which require only simple tools such as colored paper clips:

The human genome contains more than 10,000 genes. Excepting twins, no two individuals in the world have ever had exactly the same genes. Small wonder then that people are so different from each other. Yet in many ways people are very much alike. The causes for human diversity and similarity are both biologic and environmental. The ability to define and identify human genes and their mutations, along with the ability to manipulate DNA, opens a new era in medicine in the diagnosis and treatment of genetic disorders. The ability to screen populations to identify an individual’s deleterious mutations raises questions about public and private information and how such information will be used. Public discussion about policy and possible legislation will require an informed public. Any informed discussion of these questions requires an understanding and appreciation of the basic scientific issues and facts. Therefore schools will need to educate students about these issues. In this seminar, basic human genetics, genetic counseling, the defining of the human genome, genes and environment, and the role of genes in human evolution were all areas addressed by the curriculum units developed by the teachers.

Eight of the units take the concepts and facts of basic genetics and develop them into a framework accessible to young students who are novices at science. Although each is concerned with the same body of knowledge, each takes its own unique approach to the information, and develops teaching modules which are different. Two units have looked at biological and environmental factors: genetics and alcoholism and genetics and environment. These are suitable for high school students. One unit developed a teaching module for children with special needs; this unit is designed to present the concepts of basic genetics to children with special educational problems, both to educate them as to this important area of science and to help them to put their own situations into perspective. One unit addresses genetic counseling as a career option, combining basic

scientific facts with information useful to high school students who are beginning to select a life's career. One unit has highlighted the new methods of molecular genetics in a way that looks at how genetic mechanisms can explain how evolution occurred. All the units are developed in a way that makes them usable for teachers who did not participate in the seminar. They use teaching aids which are part of the resource list from the seminar which should help the visualization of molecular mechanisms and structures which form the basis for our understanding of how genes work.

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