



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
1982 Volume VII: Human Fetal Development

Introduction

Human development occurs as genetic orders take substance in an environment that is, for the most part, protective and supportive. Problems are seen when there are imperfections in the genetic blueprint and when the environment is hostile and damaging. The nine units explore the genetic and environmental events that precede the birth of a new baby, a baby who usually is healthy and normal but occasionally is born with a birth defect or serious disease.

Two units, entitled “The Cell” and “Cell Structure and DNA,” are basic units for students without extensive science backgrounds. Both encompass cell structure, how various parts of the cell function, and how cells divide. “The Cell” has special emphasis on exercises that illuminate physical features of a cell and its organelles, while “Cell Structure and DNA” places its emphasis on DNA and RNA, the large chemicals that transmit and translate genetic information.

Two other units, “Genetics” and “Genes—the Nature of Human Development,” are advanced, sophisticated units about the substance of heredity. In these units there is detailed treatment of DNA and RNA, chromosomes, gametogenesis, inheritance patterns, and birth defects. “Genetics” emphasizes the common modes of mendelian inheritance, genetic diseases, and birth defects. “Genes—the Nature of Human Development” emphasizes the chemistry and function of DNA and RNA, the passing of genes from generation to generation, and the new era of genetic engineering.

Mathematics relates very importantly to science and two of the units are written to provide students with experience of this relationship in the setting of genetics and biology. “Mathematics and Heredity” introduces mendelian inheritance and pedigree analysis as a basis for exercises with probability, data analysis, ratios, and graphing. “Hereditary Defects—Down Syndrome and Sickle Cell Anemia” reviews the DNA molecule and mendelian inheritance as background to quantitative exercises with two common genetic disorders, Down Syndrome and sickle cell anemia.

The unit, “Environmental Causes of Birth Defects,” explores what is known about the environmental side of fetal disease. The role of the placenta and of common teratogens—alcohol and other chemicals, infections, and radiation—are detailed in the unit and exercises are designed to illustrate the reality of birth defects.

Another ambitious unit for more advanced students looks at the later stages of fetal development and the transition to an airbreathing existence in a relatively cold and possible hostile environment. The fetus obviously is ready for that transition and “Fetus to Newborn: the Perinatal Period” explores why via the study of placental function and several body systems of the fetus (circulation, brain and nervous system, etc.).

Finally, the unit “Nine Months in Six Weeks” gives a more global view of the experience of being pregnant. The unit begins with conception and early signs of pregnancy, explores abortion, fetal development, and nutrition, and ends with delivery and lactation. Various tests of fetal well-being and certain dangers associated with being pregnant are included.

Many fields of study—genetics, biology, mathematics, sociology, ethics—can use the developing human being as their focus for learning. These units illustrate several of the possibilities.

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