RECOMMENDED GENETICS BOOKS
Compiled by Barry Fox, Science Consultant
NY Performance Standards Consortium

(Reading Levels**:** **E** = easy
A = Average
C = Challenging)

GENERAL
History of Genetics, DNA Structure and Function, DNA Technology

1. Buxton, Jess and Turney, Jon. 2007. The Rough Guide to Genes and Cloning. Penguin. (Publisher's website: www.roughguides.com)

This relatively compact volume is packed with information covering basic principals of genetics (including short biographies of famous scientists), the human genome, genetic diseases and gene therapy, genes and behavior, and modern genetic technologies (cloning, genetic engineering, stem cell research). Even though the authors' presentation of the information is clear and quite readable—resembling a well-organized lecture—the writing lacks a conversational tone and could be more engaging. However, the book can be an extremely useful resource for students as long as the reader doesn't expect to be entertained. The authors also include an extensive appendix containing lists of further readings (nonfiction and fiction such as Brave New World, The Island of Dr. Moreau, and several others), "Genes on Screen," and "Genes on Line." (A)

2. Gonick, Larry and Wheelis, Mark. 2005. The Cartoon Guide to Genetics. Collins Reference.

The clever cartoons and minimal text of this introductory book might appeal to younger readers or those who tend to avoid reading. The book covers pre-Mendelian history of inheritance, Mendelian inheritance, role of chromosomes (including sex determination), DNA structure and function, protein synthesis, and biotechnology (cloning and genetic engineering). The engaging illustrations can spark student interest and inspire further reading. (E)

3. Johnson, Rebecca L. 2006. Great Ideas of Science: Genetics. Twenty-First Century Books. (Minneapolis).

This very slim volume—64 pages of text—could be a very appealing introductory book for young readers or students who tend to avoid reading. Tracing the development of genetics from Mendel to DNA sequencing, the book is extremely readable and engaging. The author demystifies the scientific process by focusing on the scientists' personalities. ("Maurice Wilkins and Rosalind Franklin…weren't working closely together. In fact, they didn't like each other very much.") Attractively illustrated with glossary, timelines, selected short biographies (including Rosalind Franklin but not Maurice Wikins!), bibliography, further readings, and useful websites. (E)

4. Schultz, Mark. 2009. The Stuff of Life: A Graphic Guide to Genetics and DNA. Hill and Wang.

Using clever cartoons (and somewhat of a story line), this book covers basically the same content areas as The Rough Guide to Genes and Cloning (annotated above). Like The Rough Guide, the book contains an enormous amount of information relative to its size (approximately 140 pages of cartoons). Some of the cartoons—a clone of Nixon reading a book on Watergate, for example—might appeal to the more sophisticated reader. Includes suggestions for further reading (periodicals, books, and websites) and a glossary. (A)

5. Watson. James D. and Berry, Andrew. 2004. DNA—The Secret of Life. Alfred A. Knopf (Random House).

Written by the Nobel Prize winner for codiscovering the structure of DNA, this is an immensely informative and useful book. The book covers the following topics: early history of genetics, discovery of the double helix, DNA structure and function, genetic engineering, the Human Genome Project, genes and evolution, human evolution, genetic fingerprinting, the genetics of human diseases, gene therapy, and nature/nurture issues. The authors succeed in conveying a wealth of unexpected pieces of information—for example, the Amoeba contains over 300 times as much DNA as humans—while consistently maintaining a conversational tone and avoiding technical language inappropriate for a popular audience. They also take the reader "behind the scenes"—for example, the reason for Avery's denial of the Nobel Prize for discovering that DNA was the genetic material—to reveal the human story behind famous genetic discoveries. Highly recommended for students who are ready to delve deeper into genetics beyond what the books listed above can offer. Contains many photographs and an extensive bibliography. (A)

BIOTECHNOLOGY

1. Huxley, Aldous. 1932 (New edition 2006). Brave New World. Buccaneer Books (HarperCollins).

The twentieth century has produced many novels in which genetic technology plays a major role. Many people consider this Utopian novel (originally published in 1932) to be the classic example of the genre. Huxley's description of a futuristic society—his "brave new world" of Bokanovskified fertilized eggs, hypnopedia, and soma —can stimulate lively class discussions. (A)

2. Meyer, Anna. 2005. The DNA Detectives: How The Double Helix is Solving Puzzles of the Past. Thunder's Mouth Press (Avalon Publishing Group). NY.

The author's goal in this introductory book is to explain how DNA technology—specifically ancient DNA research using cloning and DNA fingerprinting—is finding answers to unsolved mysteries of the past. Using very basic terminology and writing in a highly descriptive, story-telling manner, Meyer focuses primarily on questions involving human ancestry (Were Neanderthals our ancestors?), capabilities and ethics of cloning (Could extinct animals be brought back to life?), origins and causes of disease (Did Columbus introduce tuberculosis to the Americas?) and problems of identity (Did Anastasia, the youngest daughter of the last Romanov tzar, survive the Russian revolution?). Students with no prior knowledge of genetics will find the author's presentation of background information and descriptions of the cloning and DNA fingerprinting techniques extremely accessible. Her over-all approach might prove very appealing to the less sophisticated student. Includes an extensive bibliography. (E-A)

3. Nusslein-Volhard, Christine. 2008. Coming to Life: How Genes Drive Development. Kales Press.

Written by a Nobel Prize Winner, this advanced book is mainly devoted to a discussion of how genes influence embryonic development while providing additional information on human evolution, cloning, and stem cell research. This is a beautifully written book (and only approximately 145 pages of text). Highly recommended for the student who is ready for a challenging but very rewarding read. Includes many illustrations, a time line, and glossary. (C)

4. Smith, Gina. 2005. The Genomics Age: How DNA Technology is Transforming the Way We Live and Who We Are. AMACOM Books. NY.

The purpose of this highly readable, engaging and accessible book is to explain the developments of the rapidly growing "DNA revolution" so that the reader will not only be able to understand and appreciate DNA technologies, but will also be capable of making informed decisions about the issues they raise. The author devotes approximately one third of the book to explaining DNA structure and function and to trace how scientists discovered that DNA was the material of inheritance. In the remainder of the book, the author describes various technological procedures and the results of the latest DNA research. The book concludes with a discussion of the ethical issues involved. The author is concerned more with informing the general reader of the wide range of discoveries that the DNA revolution has produced, rather than concentrating on only a few outcomes. (Compare with The DNA Detectives above.) The book is nicely organized; each chapter is scattered with illustrious quotes and ends with a list of intriguing facts. Highly recommended. Includes a very accessible glossary and extensive endnotes containing primary and secondary sources. (A)

5. Wade, Nicholas. (ed.) 1998. The Science Times Book of Genetics. Lyons Press (NY).

This is a collection of over forty articles reporting the latest genetic research that appeared in the New York Times between 1992 and 1998. Although all of these articles are available online, this anthology makes research more convenient. It also gives the student an appreciation for the quantity and scope of research produced in a relatively short period within their lifetime. Topics include: genes and human evolution, human genetics, genomics, DNA technology, embryonic development, genes and disease, and genes and aging. There is also an appendix, "A Guide to the Language of Biology." (A)

HISTORY OF GENETICS

1. Endersby, Jim. 2007. A Guinea Pig's History of Biology. Harvard University Press. (Cambridge, MA).

This immensely readable and engaging book describes how various organisms—from the zebra-like quagga which became extinct in 1883 to the transgenic OncoMouse produced in 1985—have helped scientists make genetic discoveries. The book traces the history of genetics, with each of the twelve chapters devoted to a particular organism. Like DNA—The Secret of Life (annotated above), the author reveals the human story behind the headlines while providing the reader with an enormous amount of information. For example, in the chapter on Drosophila melanogaster (the fruit fly), we learn that Sutton was a farm boy from Kansas who was attracted to grasshoppers, how the X chromosome got to be named, the political repercussions of fruit fly research in the USSR, and—most important of all—the source of the quote, "Time flies like an arrow. Fruit flies like bananas." Highly recommended and accessible. Includes extensive endnotes, bibliography, and suggestions for further reading. (A)

2. Judson, Horace Freeland. 1996. The Eighth Day of Creation: Makers of the Revolution in Biology (Twenty-fifth Anniversary Edition). Cold Spring Harbor Laboratory Press. (Woodbury, NY).

In this most impressive book, the author traces the events that led to the three most significant genetic milestones of the biochemical revolution—the discovery of the structure of DNA, the breaking of the genetic code and subsequent discovery of RNA, and the solution of how protein molecules work. Written for the general reader, the book is organized around the numerous interviews the author conducted with dozens of scientists ranging from the obscure to the world famous. Thus the fortunate reader is indulged with snippets of conversation and extended quotes from Francis Crick, Max Delbruck, Francois Jacob, Matthew Meselson, Jacques Monod, Max Perutz, James Watson, and many others. Consequently, Judson is able to humanize the story behind their discoveries in much greater detail than Watson and Berry (in DNA, annotated above) or Endersby (in A Guinea Pig's History of Biology, annotated above). For example we learn why Watson's first draft of the Double Helix (which Watson originally titled, Honest Jim) so outraged scientists that they forced Watson to make extensive cuts before it was published. Judson also reveals how scientists' personalities can affect the course of events—for example in the intriguing afterword, "In Defense of Rosalind

Franklin: The Myth of the Wronged Heroine." Here Judson, along with Sayre and Watson (see below), presents a third perspective of the Rosalind Franklin controversy, providing an ideal learning experience for inquiry-based classes.

Although the book is relatively large (more than 600 pages of text), it is divided into three distinct sections ("DNA," "RNA," and "Protein") so that students can choose to focus on any one of the sections and exclude the other two. It is a surprisingly readable book and would be an excellent resource for any classroom. (It even contains reprints of Watson and Crick's original two historic 1953 letters published in Nature describing the structure of DNA.) Highly recommended for students who wish to extensively explore the history of genetics. Contains many photographs and comprehensive endnotes. (A-C)

3. Sayre, Anne. 2003. Rosalind Franklin & DNA. W.W. Norton

Anne Sayre wrote this book in response to James Watson's disparaging portrayal of Rosalind Franklin (see The Double Helix, below), whose X-ray work made it possible for Watson and Francis Crick to discover the structure of DNA. Using a variety of sources—published papers, interviews, letters, as well as Franklin's own research notes—Sayre cites evidence refuting the "facts" that Watson related (mostly from memory) of Franklin's career and character. She is so earnestly dedicated to record the accurate story of Franklin, whom she knew personally, that occasionally she interrupts the flow of her narrative by responding to a passage quoted from The Double Helix exclaiming, "Now all of this is thoroughly absurd." or "Now these statements [about Rosalind] are literal nonsense." (Sayre always refers to Franklin as "Rosalind," whereas Watson uses the diminutive, "Rosie.") Ideally, Sayre's book should be compared with Watson's and appropriate passages from The Eighth Day of Creation (annotated above). Students can then decide if Sayre's premise is accurate—that Watson's portrayal of Franklin was based on his belief that a brilliant female scientist must be abnormal as a woman. Includes endnotes. (A)

4. Watson, James D. 2001. The Double Helix: A Personal Account of the Discovery of the Structure of DNA. Touchstone (Simon and Schuster).

As Watson clearly states in his preface, this is his version of the events that culminated in his winning the Nobel Prize in 1962. In the preface he also informs the reader that a more important goal is to explain how science is "done." On this level one can argue that Watson succeeds, while at the same time perhaps inadvertently revealing controversial aspects of his personality as he races against Linus Pauling to be the first to discover the structure of DNA. The book has become infamous for his negative portrayal of Rosalind Franklin, whose X-ray work was essential for the elucidation of the structure of DNA. (Watson qualifies his remarks about her in the book's epilogue.) If possible, student should compare Watson's book with Sayre's and appropriate passages from Judson's (annotated above). (A)

NATURE-NURTURE

Each of the following three books discusses how the complex interplay of nature (genetic factors) and nurture (internal and external environmental factors) shapes our behaviors. Citing results drawn from many animal and human studies, all three books reveal surprising information about the origins of a wide range of human traits.

1. Hamer, Dean and Copeland, Peter. 1999. Living With Our Genes: Why They Matter More Than You Think. Anchor Books.

2. Moore, David S. 2003. The Dependent Gene: The Fallacy of "Nature vs. Nurture." W.H. Freeman/Owl Book.

3. Ridley, Matt. 2003. The Agile Gene: Genes, Experience and What Makes Us Human. (Originally published as Nature via Nurture). HarperCollins.

Living With Our Genes is an excellent introduction to nature/nurture issues. The book is very well organized with each chapter devoted to a specific behavior: novelty-seeking, shyness, anger (aggression, crime, and violence), addiction (drinking, smoking, and drug abuse), sex (gender roles and sexual orientation), intelligence, hunger, and aging. Extremely readable and accessible. Includes an extensive bibliography and suggestions for further reading. (A)

The other two books are well-written and fairly accessible, but organized differently from Living With Our Genes so information about a specific behavior might be scattered throughout the book. However, The Dependent Gene and The Agile Gene can serve as excellent resources for students. They also cite more research studies than Living With Our Genes which might appeal to students who wish to delve further into specific behaviors.

Like Living With Our Genes, The Dependent Gene discusses origins of intelligence (and learning), sexuality, and obesity. Some examples of other topics the reader can find in The Dependent Gene are the development of brain nerve cell pathways and the effect of the prenatal environment on the sensory system. Includes extensive endnotes and bibliography. (A)

The Agile Gene also contains information on intelligence, learning, sexuality, and the development of brain nerve cell pathways. In addition, the book devotes entire chapters to the nature of instinct and the complicated origins of schizophrenia. Includes extensive bibliography. (A)

All three books cover a vast array of fascinating and controversial topics that can stimulate lively classroom discussions.

GENES AND EVOLUTION

1. Barash, David P. 2004. Revolutionary Biology: The New Gene-Centered View of Life. Translation Publishers (New Brunswick, NJ).

A fascinating and engrossing account of how genes influence human behavior. As Richard Dawkins argues in The Selfish Gene (see below), the author's main point is that

natural selection acts on the gene and not on the individual or the species. This evolutionary process can explain the existence of different aspects of human nature—why we sometimes can be altruistic or selfish, and why we behave differently toward kin than to strangers. The author's conversational tone and use of numerous examples taken from everyday life—his interpretation of the Ten Commandments is especially intriguing--make this an extremely readable book and less challenging than The Selfish Gene. Contains controversial ideas about male and female behaviors that can lead to lively class discussions. (A)

2. Carroll, Sean B. 2006. Making of the Fittest: DNA and the Ultimate Forensic Record of Evolution. W.W. Norton.

The author's goal is to illustrate how DNA technology has influenced our understanding of evolution. Because he wants to write for a general audience, his writing is extremely clear and concepts are very carefully organized and explained. After a discussion of the nature of "immortal genes"—the ancient genes that all living things share—Carroll devotes much of the book to show how scientists can use the technology of analyzing the genes responsible for a single trait—in this case color vision—to trace evolutionary relationships of different species. Of the remaining topics, one of particular interest is his account of how modern advances in DNA technology (post 1994) have helped to explain the evolution of the vertebrate eye. It is a beautiful example of the conservative nature of DNA—the immortal genes—at work. Extremely informative, readable, and accessible. Includes an extensive bibliography and suggestions for further reading. (A)

3. Dawkins, Richard. 2006. The Selfish Gene: 30th Anniversary Edition. Oxford University Press.

Probably referenced in every book on evolution published in the last 25-30 years, this is the classic book of modern evolutionary theory in which Dawkins argues that the gene is the basic unit of natural selection and that there is an evolutionary explanation for the existence of social behaviors. (See above annotation for Revolutionary Biology.) Dawkins provides many examples of animal behaviors (nonhuman) to illustrate how "selfish" genes can account for altruism, aggression, and kin selection. Even though his arguments might seem somewhat rambling and overextended, reading the words of such an influential scientist who coined the words that have already become part of today's scientific vocabulary—"selfish gene," "extended phenotype" and "meme"-- can be extremely rewarding. (C)

THE HUMAN GENOME

[NOTE: The entire human genome database is now available online by entering "NCBI human genome" in the Google search window. Although many of the resources provide highly technical information, one very useful link for students is "OMIM" (Online Mendelian Inheritance in Man). Students can search the OMIM database for information on any human trait (of which there are thousands) that is inherited according

to Mendelian principles. Using OMIM, students can find the latest research on any human trait of interest—for example a genetic disease or even a human behavior—by linking to thousands of journal citations and abstracts.]

Ridley, Matt. 2006. Genome: The Autobiography of a Species in 23 Chapters. Harper Perennial.

Ridley has devised an intriguing idea for this introductory book—to give an overview of the human genome by describing the roles of twenty-three carefully chosen genes, each located on one of the twenty-three pairs of human chromosomes, with each chapter devoted to telling the story of a particular gene. By focusing one chapter on a single gene—chromosome by chromosome—he proposes to explain "our origins, our evolution, our nature and our minds."

Ridley meets this goal with varying degrees of success. Chapters that will probably most engage students are those in which he fairly early clearly identifies the gene and devotes most of the chapter explaining its significance. Examples of these genes' stories are: the SRY or male sex-determination gene (Chapter "X and Y—Conflict"), gene D4DR (Chapter "Chromosome 11—Personality') which affects the neurotransmission of dopamine in the brain, and gene TP53 (Chapter "Chromosome 17—Death") which suppresses tumors. (Ridley cites the professional research of Dean Hamer, coauthor of Living With Our Genes, annotated above, in his discussion of the SRY and D4DR genes.) The reader might find chapters less focused in which the author mainly discusses what might be considered a secondary issue—the history of evolution, the history of genetics, or ethical issues of eugenics—instead of concentrating on the gene's function per se. Occasionally the author's narrative rambles and his writing tends to be glib and somewhat affected. He also has the habit of assuming the level of the reader's experiences and knowledge (for example that Homer historically preceded Virgil) or failing to define certain terms ("ontological discontinuity"). However, the book can be a useful resource for students, especially for those seeking information on a particular gene. Includes extensive endnotes and bibliography. (A-C)

.