



North
Carolina
Biotechnology
Center

Education &
Training
Program

VIDEO COLLECTION: North Carolina Biotechnology Center

Note: All videos are in VHS tape format, except where otherwise noted.

* Indicates video new to our collection.

Biotechnology Career-Related Videos

1. *Agricultural Biotechnology: A World of Opportunity* (1996), 14 min., Careers
2. *Bioscience: Real Jobs, Real People* (1999), 10 min., Careers
This short video follows four high school students as they visit working companies on "Bioscience Career Day." Students talk with individuals representing a broad range of career tracks such as research, product development, manufacturing and management. Employees explain their day-to-day responsibilities and offer advice about pursuing a bioscience career. In addition, some common misconceptions about employment in the bioscience industry are discussed. For example: A Ph.D. is not a requirement for employment, as many believe... in fact, entry-level positions are often available at all education levels. The video is accompanied by a lesson plan that provides a motivational activity, a class activity and suggestions for closure and extensions.
3. *Biotechnology: The Choice for Your Future* (1992), 9 min., Careers
4. *BioWork Process Overview* (2001), 16 min., Careers
This video can be used to enhance student career awareness of the growing employment opportunities within the bioprocess manufacturing industry. Opportunities presented here might be particularly attractive to vocationally-oriented students that have taken a biology or chemistry course. The piece features interviews with bioprocess technicians and managers employed by North Carolina biotechnology and pharmaceutical manufacturers Novozymes, Biogen, and Wyeth-Lederle. Viewers get a virtual tour of the manufacturing environment and hear first hand from employees about the significance of and satisfaction they receive from their jobs. It closes with a descriptive video outline of a short, 128-hour course called BioWork, created through a partnership between the North Carolina Biotechnology Center, the North Carolina Community College System, and members of the local biomanufacturing industry. The course is presently offered at selected community colleges around the state.
5. *Is This You? Health and Biosciences* (1999), 22 min., Careers
Produced in Connecticut, the video discusses career options available in the Health and Bioscience Fields. Profiles of individuals including a lab technician, an emergency room technician, a research chemist in the pharmaceutical industry, and a curator at a marine science center are featured, along with information related to the education required for these positions and their salary ranges.
6. *Not So Wild a Dream*, (1994), 21 min., Careers
Minority students are becoming scientists, exploring the unknown, and searching for cures.
7. *The Science of Discovery: Improving the Quality of Life* (2001), 9 min.
This virtual tour, produced by GlaxoWellcome, into the R&D world of drug discovery introduces students to the assortment of jobs, both scientific and non-scientific, available in the pharmaceutical industry. The video introduces some of the newest tools scientists working in the pharmaceutical industry depend on to increase the flow of the new drug pipeline. It explains where drug discovery begins, through understanding a particular disease process, and finding a point (usually a specific molecule or target) where a drug might intervene to have some desired effect. Some of the disciplines and current processes involved in drug discovery, such as medicinal chemistry, bioinformatics, high-throughput combinatorial chemical screening, and 3-D computer modeling of target and chemical structures are featured. Potential new drugs must cross pharmacological and toxicological hurdles before their production is scaled up for large-scale clinical trials. At some point during this process, the company submits a new drug application (NDA) to the Food and Drug Administration (FDA) in the United States. Further down the road, decisions are made regarding the manufacturing process and marketing of the drug. Students will gain an up-to-date understanding of the processes involved in discovering, gaining regulatory approval for, and marketing new drugs, and in the process learn about potential career paths within the pharmaceutical industry.

Biotechnology Content-Related Videos

1. *Antisense: The Magic Bullet* (1999), 50 min.
A medical “magic bullet” is a therapy that neutralizes a specific target, like cancer cells, without side effects. Antisense therapy, decades in the making and still evolving, uses chemically synthesized DNA molecules to turn off genes that produce proteins that may contribute to disease. By being the exact complement of a defective mRNA molecule, the antisense molecule can bind to the mRNA and prevent translation of the harmful protein. The antisense approach, though conceptually elegant, has run up against a series of unexpected and disappointing setbacks during its development. Yet there is still hope that in the end researchers will ultimately succeed in developing some useful therapies using this approach. Dr. Paul Zamecnik, the scientist who pioneered the antisense concept, is featured discussing the genesis of antisense over the last 40 or so years, its promise and its setbacks. Interviews with patients undergoing clinical trials of antisense anti-cancer drugs at London’s Royal Marsden Hospital are also featured in this video.
2. *The Biological Revolution: 100 Years of Science at Cold Spring Harbor* (1986), 60 min.
Explores the origins of the biotechnology revolution through the perspective of the renowned Cold Spring Harbor Laboratory on Long Island and gives an up-close look at how new techniques to manipulate the genetic code are being employed against cancer and world hunger.
3. *Biotechnology: Sowing the Seeds for Better Agriculture* (1991), DVD, 16 min.
Includes companion pamphlet. Defines biotechnology and genetic engineering in agriculture. Notes North Carolina law as it relates to genetically engineered organisms (this law is no longer in effect as federal regulations have since superseded it). Describes the role of *Bacillus thuringiensis* and *Agrobacterium tumefaciens* and discusses the biological control of pests and the possibility of genetically engineering crops for improved protein content or drought resistance.
4. *The Cloning Revolution* (1998), 50 min.
This program presents a comprehensive examination of cloning, from its beginnings and the creation of Dolly, to the latest technology, including the production of customized cells, organs, and animals. With advances in nuclear transfer, whole animals might be cloned by “reawakening” all the genes of an organism by transferring the nucleus from one of its cells into an enucleated egg cell from another organism. Scientists at the University of Massachusetts now use the new technology to modify the organs of animals destined for human transplants. Their eventual goal is to create “factories,” where animals would be used to produce organs fit for transplant. The ethics of these new technologies and practices are closely examined.
5. *Connections: Animals, People, and Biotechnology* (1989), 19 min.
6. *Cracking the Code of Life: The Race to Decode Human DNA*. (2001), 120 min.
This two-hour special, a NOVA program hosted with a light-hearted touch by ABC “Nightline” correspondent Robert Krulwich, chronicles the race to capture one of the grandest prizes in scientific history: the complete letter-by-letter sequence of genetic information that codes for human life -- the human genome. In June 2000 two fiercely competitive teams of scientists made a joint announcement that their labs had decoded nearly 90% of the human genome. NOVA tells the story of the genome triumph, the rivalries created along the way between an international consortium of scientists, lead by Francis Collins and Eric Lander, and Craig Venter, an entrepreneurial scientist and founder of Celera Genomics. The virtual completion of this complex and successful initiative will have profound implications, not only for the future of medical care but for our general understanding of the logic of life on this planet.
7. *Creation: The promise of stem cells* (2002), 50 min.
Pioneering methods of human cloning give a paralyzed Texas doctor hope that he will walk again. Meanwhile in England, a couple prepares for the results of cloning the natural way: triplets. In this program, cutting-edge imagery gives a futuristic, highly visual portrayal of the very latest advances in stem cell development and genetic science. The efforts of Dr. Jose Cibelli, head of research at Advanced Cell Technology, which led to the first artificially cloned embryo, are paralleled with the incredible feat of genetic replication as it occurs naturally in the womb. Commenting on how these innovations have already dramatically changed human life are Professor Lee Silver, molecular biologist at Princeton University, and Nobel Prize-winning cell biologist Sir Paul Nurse.

8. *Cycles of Life: Patterns of Inheritance* (1996), 28 min.

Beginning with Gregor Mendel's own experiments with plant breeding, you'll see how curiosity, scientific dedication, and painstaking research led Mendel to discover one of the important secrets of life: how characteristics are passed down from one generation to the next. Other topics that are covered include: how scientists breed new forms of fruits and vegetables, the Punnett square, and the transmission of human diseases such as hemophilia.

DNA (Series, 5 DVDs)

9. *DNA: Curing Cancer*: (2003), 57 min.

This program tells the story of how a small group of researchers have developed radically new ways to treat the most feared of diseases by tracing cancer back to its origins: its DNA. The program focuses on two pioneering efforts: the race between Dr. Mary Claire King and Dr. Mark Skolnick, founder of Myriad Genetics, to isolate the gene linked to breast cancer, and Dr. Brian Druker's work that eventually led to the anti-cancer drug Gleevec, which cures Chronic Myeloid Leukemia. Extraordinary imaging shows the genetic mechanisms of cancer and how new drugs target aberrant sections of DNA. Narrated by Jeff Goldblum.

10. *DNA: Pandora's Box* (2003), 57 min.

When it comes to DNA science, nobody has a better track record than Jim Watson; what makes him controversial, however, is his vision of its future. This program looks inside the Pandora's box of genetic manipulation with the man who opened it. Watson serves as guide, exploring some of the current and proposed ways scientists are improving humankind. He also addresses some of his critics, including a family with a son who has Down Syndrome, and Dr. Kay Jamison, a world expert on manic depression and a manic-depressive herself. Narrated by Jeff Goldblum.

11. *DNA: Playing God* (2003), 57 min.

Twenty years after the discovery of DNA's structure, another revolution swept biology when scientists began learning how to manipulate genes. The controversy continues. This program tells the story of genetic engineering's pioneers, focusing on the race to synthesize insulin and the development of genetically-modified crops. Spectacular computer animations of molecular processes are paired with extensive commentary by key researchers, including Genentech founder Herb Boyer, Stanford University biochemists Stan Cohen and Paul Berg, former Genentech scientist Dave Goeddel, Nobel Laureate Jim Watson, Harvard University molecular biologist Walter Gilbert, and Monsanto biochemist Bob Horsch. Narrated by Jeff Goldblum.

12. *DNA: The Human Race* (2003), 57 min.

In 1990, a massive enterprise was undertaken to decipher the ultimate instruction manual. The Human Genome Project soon turned into a race and a feud. This program tracks the tumultuous progress of the endeavor, detailing the scientific innovations that led to its completion, as well as its political and economic impact. Exceptional graphics bring home the daunting task of sequencing the human genome. Among those who discuss the project are initial rivals Francis Collins and J. Craig Venter; Dr. John Sulston; Sir Alec Jeffreys, the discoverer of DNA fingerprinting; Nobel Laureates Fred Sanger and Jim Watson; and former President Bill Clinton. Narrated by Jeff Goldblum.

13. *DNA: The Secret of Life* (2003), 57 min.

A half-century ago, three teams with three different approaches raced to unravel the structure of DNA. This program blends extensive interviews and first-hand narration with extraordinary graphics to tell the compelling story of how the perhaps unlikely duo of Jim Watson and Francis Crick won that race. Many of the principal figures in the quest discuss their frustrations and insights, including Nobel Laureates Watson and Crick, Maurice Wilkins, and Linus Pauling's son, Peter. Narrated by Jeff Goldblum.

14. *DNA and Genes Odyssey: The Gene Scene* (2001), 3 min.

Two versions of the animated short, *The Gene Scene*, one narrated and one silent, are included on this tape. This permits instructors the choice of narrating the tape themselves. The narrated version of *Gene Scene* takes a light approach in explaining the processes involved in protein synthesis and the relationship of proteins to phenotype. It provides a useful teaching tool for exploring the dynamic process of protein synthesis.

15. *DNA and the Protein Express* (1986), 5 min.
Popular claymation representation of the central dogma: DNA → mRNA → protein.
16. *DNA Laboratory of Life* (1987), 22 min.
DNA is the carrier of genetic information in the cell. The film examines DNA and shows ways in which scientists are manipulating it to make products and organisms that never existed before.
17. *DNA in Practice: Southern Blotting* (1993), 14 min.
To enable us to look at specific genes following electrophoresis, the DNA is transferred from the gel onto a membrane made of nitrocellulose or nylon. This process is known as Southern blotting. The principle is very simple: the capillary action of liquid passing through the gel and the membrane is used to transfer the separated fragments of DNA to the membrane. Specific DNA probes, complementary to the DNA sequence of interest, are hybridized with the membrane containing the immobilized DNA fragments, and the probes subsequently bind to the target sequence within the fragments. In this program, we observe a Southern blot being carried out.
18. *DNA: The Secret of Life* (2003), 32 min. DVD, VHS
This program was produced to commemorate the 50th anniversary of the discovery of the structure of DNA by Watson and Crick. Suitable for students from grade 7 onward, the film successfully captures the excitement of this revolutionary scientific discovery. Watson and Crick's discovery provided the foundation for the modern molecular understanding of the genetic material that recently culminated in the determination of the complete human genome sequence. James Watson was involved in the production of this film that features possibly the most realistic and technically advanced DNA animations ever seen (courtesy of the same company that created special effects for the Harry Potter movies and *Gladiator*). These animations speak volumes about the relationship between the structure of DNA and its function. The film provides a glimpse of the future by examining modern genomics research.
19. *Double Helix* (1998), 107 min.
This fast-paced dramatization starring well-known actor Jeff Goldblum is about the race to solve one of the greatest mysteries of 20th-century science – the structure of DNA. It is the story of the diligent research, creative analysis, and perseverance of James Watson and Francis Crick that led to the 1953 discovery that launched a revolution in genetics. With the help of their colleagues, Maurice Wilkins and Rosalind Franklin, Watson and Crick, along with Wilkins, were awarded the 1962 Nobel Prize. Students of biology and genetics will benefit from the process of problem-solving used to identify the structure of DNA, as well as the clear, concise summary of research evidence. A subplot is a good illustration of the difficulties faced by serious-minded women in science, even in the second half of the twentieth century.
20. *Food Biotechnology: A Roundtable on Public Issues* (1994), 15 min.
Produced by the International Food Information Council (IFIC), this video examines why biotech foods have been making headlines since the mid-90s. Two of the reasons discussed include the potential of biotech crops for reducing the use of agricultural chemicals and increasing the nutritional value of foods. The potential of biotech crops to help address important issues like world hunger, the environment, nutrition and product quality is featured.
21. *Food Science: Technology with Taste* (1989), 105 min.
Biotechnology applications in the food industry.
22. *The Garden of Inheritance* (1984), 62 min.
Acknowledged as the "Father of Genetics," Gregor Mendel balanced a life of devotion to the Augustinian community with his thirst for knowledge about heredity and genetics. Dying before his scientific experiments and findings became widely appreciated, Mendel displayed unparalleled leadership in his field, and today is heralded for his achievement.
23. *Genetic Engineering: The Nature of Change* (1990), 16 min.
24. *Green Energy* (1988), 28 min.
The program examines some renewable alternatives to petroleum products and explains how biological and organic products like wood chips, corn, and garbage can become major sources of energy.

25. *Green Medicine* (2004), 52 min., DVD *

This documentary follows various scientists in various disciplines in their work, the ethnobotanist working with herbal healers to learn about the traditional use of green medicines, the pharmacologist bringing plants into the lab to find the chemical structures of active molecules and doctors trying to incorporate traditional medicines into western medical practice.

26. *Harvest of Fear* (2001), 120 min.

This joint FRONTLINE/NOVA production explores the intensifying debate over what has been referred to in the press as genetically modified (GM) food crops. Interviewing scientists, farmers, biotech and food industry representatives, U.S. regulators, and critics of biotechnology, this two-hour report presents both sides of the debate--exploring the risks and benefits, the hopes and fears, of this new technology.

The program explains how scientists use genetic engineering to isolate a specific gene from one organism and insert it into another possibly unrelated organism. It provides examples of benefits of this technique, including engineering plants that can survive being sprayed by weedkiller or can create their own pest defenses. It introduces opposition that states there is no way to predict with complete certainty what effects these genetically engineered plants may have on the environment or human health. It further examines the need for genetically engineered foods, including the claim that these foods will help reduce starvation and improve nutrition in developing countries. NOTE: The use of the term genetically modified foods in this program refers to foods that have been modified via genetic engineering.

Holiday Lecture Series (sponsored by the Howard Hughes Medical Institute (HHMI))

27. *The Double Life of RNA* (1995), 240 min.

Videos of four lectures on the catalytic nature of RNA by Thomas R. Cech, Nobel Laureate. Presented at HHMI's 1995 Holiday Lectures on Science.

Tape 1: "Catalysis, Chemical and Biochemical" and "RNA as an Enzyme: Discovery, Origins of Life and Medical Possibilities."

Tape 2: "How to Accelerate a Reaction 100 Billion Times Using Only RNA" and "Life at the End of the Chromosome: Another RNA Machine."

28. *The Immune System: Friend and Foe* (1996), 240 min.

Videos of four lectures in immunology. By Dr. John W. Kappler and Dr. Philippa Marrack. Presented at HHMI's 1996 Holiday Lectures on Science.

Tape 1: "How Immune Cells Create Trillions of Receptors From a Few Hundred Parts," and "How the Immune System Detects Invaders."

Tape 2: "How the Host Avoids Friendly Fire," and "Stalking the Elusive Pathogen."

29. *Senses and Sensitivity: Neuronal Alliances for Sight and Sound* (1997), 240 min.

Videos of lectures about recent discoveries and new questions in neuroscience and biomedical research by A. James Hudspeth and Jeremy H. Nathans. Presented at HHMI's 1997 Holiday Lectures on Science.

Tape 1: "Sensory Transduction: Getting the Message."

Tape 2: "The Science of Sight: Getting the Picture."

Tape 3: "The Science of Sound: How Hearing Happens."

Tape 4: "Neural Processing: Making Sense of Sensory Information."

30. *2000 and Beyond: Confronting the Microbe Menace* (1999), 2 VHS set, 2 DVD set, 240 min.

Videos of four lectures on infectious disease by Dr. Donald E. Ganem and Dr. B. Brett Finlay. Presented at HHMI's 1999 Holiday Lectures on Science.

Tape or Disk 1: "Microbe Hunters: Tracking Infectious Agents," and "The Microbes Strike Back."

Tape or Disk 2: "Outwitting Bacteria's Wily Ways," and "Emerging Infections."

31. *Clockwork Genes: Discoveries in Biological Time* (2000) 2 VHS set; 240 min.
Videos of four lectures on biological clocks by Dr. Michael Rosbash and Dr. Joseph S. Takahashi. Presented at HHMI's 2000 Holiday Lectures on Science.
Tape 1: "Biology in Four Dimensions and "Unwinding Clock Genetics."
Tape 2: "Perfect Timing," and "The Mammalian Timekeeper."
32. *The Meaning of Sex: Genes and Gender* (2001), 240 min.
Videos of four lectures on the determination of gender by Dr. David C. Page and Dr. Barbara J. Meyer. Presented at HHMI's 2001 Holiday Lectures on Science.
Tape 1: "Deciphering the Language of Sex," and "Hermaphrodites: The Safer Sex."
Tape 2: "Sex and Death: Too Much of a Good Thing," and "Sexual Evolution: From X to Y."
33. *Scanning Life's Matrix: Genes, Proteins, and Small Molecules* (2002), 2 VHS set, 2 DVD set, 240 min.
Tape 1: "Reading Genes and Genomes" and "Probing Genes and Genomes."
Tape 2: "Human Genomics: A New Guide for Medicine," and "Chemical Genomics: New Tools for Medicine."
34. *Learning from patients: the science of medicine* (2003), VHS or DVD, 240 min.
Medical researchers discuss how working with patients has influenced their efforts to understand and treat cancers and neurological disorders, including cerebellar ataxia and Rett syndrome.
Tape or Disk 1: "Research mechanics: putting the brakes on cancer" and "Chaos to cure: basic research to patients"
Tape or Disk 2: "A healthy nervous system: a delicate balance" and "The strength of families: solving Rett syndrome"
35. *Evolution: Constant change and common threads* (2005), DVD, 240 min.
Two leading biologists explore how key developmental genes, natural selection, and time fuel the evolutionary process. In the 2005 lectures, HHMI investigators Sean B. Carroll and David M. Kingsley discuss how Charles Darwin's ideas about evolution ignited a revolution in biology that continues to this day. Darwin's concept of a living world changing over time through natural selection has become biology's major unifying framework.
36. *Potent Biology: Stem Cells, Cloning, and Regeneration*, (2007), Set of 2 DVDs *
- Stem cells are fundamental to biology. In the course of embryonic development, stem cells generate all the specialized cells that populate body tissues like muscle, the nervous system, and blood. In adults, reserves of stem cells repair and regenerate tissues damaged by disease and wounding. Because of the potential of stem cells to generate fresh, healthy cells, there is a huge interest in cultivating them to treat various diseases. This series will explore exciting progress toward the goal of harnessing stem cells to treat diabetes, nerve damage, and heart disease.
- Disk 1:** Lecture 1. Understanding embryonic stem cells. Lecture 2. Adult stem cells and regeneration. Lecture 3. Coaxing embryonic stem cells. Lecture 4. Stem cells and the end of aging.
Disk 2: Interviews and discussion session.
37. *Legislative Week in Review, April 6, 2007*: Norris Tolson and Steven Burke on Biofuels commission report – UNC-TV. 30 min., Research Triangle Park, NC, 2007.
38. *Minds of Our Own*, (1995), DVD, 180 min. *
- This video is geared towards teachers, not students. An entertaining yet sobering look at some of the best and brightest this country's education system can produce, and the difficulties even these students have in applying their knowledge. The program discusses what teachers can do to address this problem. A work of "The Private Universe Project" – DVD release of a series of television programs first broadcast in 1995. Narrator: Lindsay Crouse.
39. *The NewsHour on Science*, National Science Foundation, 2003-2005; 5-DVD set *
- A set of science reports from "the NewsHour with Jim Lehrer" specially compiled to encourage greater understanding of science. From the News Hours with Jim Lehrer, PBS. 5 DVD set. Each DVD is devoted to a specific area of science. Animals and Insects; Space Exploration, Environmental Science; Biology, and Technology. For more information, see www.pbs.org/newshour/science.

40. *Of Hearts and Hypertension: Blazing Genetic Trails* (1999), DVD, 240 min:
In four lectures on one disk, Dr. Christian E. Seidman and Dr. Richard P. Lifton discuss their groundbreaking research. Dr. Seidman explains how heart circulation works and discusses her research in identifying the mutant genes that cause hypertrophic cardiomyopathy, the most common cause of sudden cardiac death in young athletes. Dr. Lifton discusses his work on the genetics of hypertension and other diseases affected by the kidney's ability to regulate salt.
41. *President George W. Bush visits Novozymes in Franklinton, February 22, 2007*. Novozymes, 2007, VHS, 30 min., Slideshow, 27 min. *
Photos and video highlights of the Presidential visit. President Bush visited North Carolina in February, 2007 to highlight the importance of "decreasing this country's addiction" to foreign oil. By visiting Novozymes, the largest enzyme manufacturing site in North America, he emphasized that the tools of biotechnology are part of the solution to utilizing waste materials like corn stalks, wood chips and dedicated energy crops (switchgrass, miscanthus, etc.) to make alternative liquid fuels such as ethanol.
42. *Scientific Method* (2004), 1 DVD, 23 min. *
Originally produced in 1999, this program examines the basic elements of the scientific method: defining and researching the problem, forming a hypothesis, gathering information through experimentation and observation, analyzing the data, forming a conclusion, and communicating the results.
43. *The Human Genome Project* (1995), 21 min.
Produced by The National Center for Human Genome Research, this video explores the genetic makeup of a cell and the steps involved in finding a gene. Aimed at teenage and young adult audiences, it uses laboratory footage and interviews to explain how the Human Genome Project helps scientists to locate genes and what can happen after they do.
44. *The Human Genome Project. (1) Exploring Our Molecular Selves and (2) The Secret of Our Lives* (2001) 20 min.
Program consists of "Exploring Our Molecular Selves," a short (3:30) animation of the processes of replication, transcription, and translation, followed by "The Secret of Our Lives" (16:00), a description of the Human Genome Project. Appearing in the program are Drs. J.D. Watson, Francis Collins, Eric Lander and other notable scientists identified with the Genome Project. The newly derived genome data are used to point out, (1) the close relationship between humans and other organisms, (2) the close genetic relationship shared by all humans (3) the highly cooperative (and international) nature of the Human Genome Project and (4) how this information can be used to cure disease and to better protect those that are vulnerable. Despite its significance even the scientists most involved in the Genome Project readily admit that in most cases, the base sequence of our individual genomes cannot fully explain who we are today or predict our fate with certainty. The program is available for online viewing at the National Human Genome Research Institute (NHGRI) website at http://www.nhgri.nih.gov/educationkit/index_cont.html2.
45. *Improving Foods Through Biotechnology* (1995), 5 min.
Discusses how biotechnology can be used to continue the crop improvements initiated by our ancestors thousands of years ago. Examines the potential benefits that this technology can bring to the foods we eat today.
46. *The Infinite Voyage: The Geometry of Life* (1988), 55 min.
Demonstrates how new technologies allow scientists to examine the genetic evidence of human and animal evolution, trace hereditary diseases, and produce new vaccines using genetic engineering.
47. *Influenza 1918: The worst epidemic in American history* (1999), 60 min.
Early in the morning of March 11, 1918, a young private reported to the Army hospital at Fort Riley, Kansas, complaining of fever, sore throat, and headache. Then, another sick soldier appeared, then another and another. By noon, the hospital had more than one hundred cases; in a week, there were five hundred. Forty-eight soldiers died at Fort Riley that spring. No one knew why.

"Influenza 1918" is the story of the worst epidemic the United States has ever known. Before it was over, the flu would kill more than 600,000 Americans – more than all the combat deaths of this century combined.

48. *Killer Flu* (2004), 60 min.

In 1918, a flu pandemic ripped through the global population with such speed and virulence that by the end of the following year an estimated 40 million people would be dead – four times the number of victims eventually claimed by the First World War. The flu's impact was simultaneously felt in nearly every corner of the earth, from the battlefields of Europe and Northern Africa to remote Inuit villages in Alaska and the grasslands of New Zealand. The international medical community, lacking the expertise to deal with the virus (which it mistakenly believed to be a bacterium), found itself powerless to stop the contagion from spreading. Hospitals ran out of beds for their sick. Morgues spilled out onto the streets, the corpses stacked on the sidewalks like cordwood. And the war ensured that the cycle would continue. Troops from both sides of the conflict, dispatched back and forth across the globe, were serving as the unwitting carriers of a lethal disease. The carousel of death kept turning.

Where did this particular flu strain come from, and what made it so deadly? Eighty-five years later, virologists and epidemiologists the world over are still hunting down the answers to those two critical questions. Their quest has been imbued with a sense of urgency; modern health experts are bracing themselves for the emergence of a flu strain similar to 1918's, with many suggesting a similar pandemic will occur within the next decade.

The Life Revolution* (Series, 3 VHS)*49. *Cutting and Splicing DNA* (1999), 26 min.**

A brief history of genetic science, from Darwin's theory of evolution through the discovery of DNA and the invention of gene splicing.

50. *The Human Genome* (1990), 26 min.

The search for one specific disease-causing gene among a hundred thousand genes clustered on 23 pairs of chromosomes – a maze called the human genome. This program shows how individual genes are being identified, and the moral and psychological dilemmas confronting doctors and patients when a disease can be genetically identified.

51. *Recombinant Technology* (1990), 26 min.

Describes the search for a magic bullet against AIDS and cancer. Vaccine developers are using genetically-engineered vaccines to create more effective vaccines that are cheaper and easier to deliver. A longer-range goal is to understand the role of cancer-causing genes called oncogenes in controlling growth, in an effort to solve the underlying problem of cancer itself.

52. *Lifeseek: the Fighting Edge* (1987), 60 min.

Medicine and immunology.

53. *Marked For Life* (1994), 50 min. (episode of CBS program *48 Hours*)

Discusses scientific advances in genetic research. The program focuses on the use of *in vitro* fertilization and genetic testing. Features the following topics: The Human Genome Project, genetic testing for Huntington's Disease, the search for the breast cancer gene, genetic discrimination by insurance companies, and the use of gene therapy in the treatment of genetic diseases.

54. *Medicine and Molecules* (2006), DVD, 30 min. *

This program guides students through advances to biotechnology and genetic engineering that may lead to long-sought medical treatments and cures. Presenting the 19-century development of aspirin as the first synthetic imitation of a naturally derived medicinal substance, the video demonstrates large-scale present-day experiments on fungi and plant materials that make gene-based medical breakthroughs almost inevitable. The creation of smart plastics for surgical applications will further expand students' understanding of where medicine and nanotechnology meet.

55. *Microbes in Action* (2003), 32 min.

This program is divided into a sequence of laboratory demonstrations that investigate fermentation using sugars, determine fermentation rates through carbon dioxide output, quantify the action of yeast in bread, measure microbial growth, use an enzyme to peel an orange, employ saccharification to sweeten starch, and use yeast cells to generate electricity. Core laboratory competencies such as how to set up an experiment, titrate, and estimate numbers of cells are introduced, as well as background information on enzymes, aerobic and anaerobic environments, and the interdisciplinary nature of science.

56. *North Carolina People* (2000), 50 min. (An interview show hosted by Dr. William Friday)
Dr. Charles Hamner, former President and CEO of the North Carolina Biotechnology Center, discusses the promise of biotechnology, its potential to improve our health, the food we eat, and its importance to North Carolina's economy.
57. *North Carolina's Research Triangle Park: An Investment in the Future* (1999), 57 min.
This video describes what it took to make RTP the "economic engine of the Southeast." North Carolina was ranked 2nd to last in per capita income in the late 1950's. College students were leaving the state to find good-paying jobs elsewhere. It took a group of visionary leaders from business, state government, and the universities to form a bold idea for the future of North Carolina: Research Triangle Park. Video features rare historical footage from the State's film archives. Produced by John Wilson and narrated by National Public Radio's Carl Castle.

Pathways to Technology (7 VHS and 1 DVD)

Series provides discipline- and career-related information to help students explore Advanced Technological Education programs at community colleges.

58. *Overview* (2003), 15 min.
Community colleges are in the forefront of technology education. This overview introduces a range of innovative Advanced Technological Education programs at community colleges across the nation, including Marine, Information, Agricultural, Process Technologies, and Biotechnology. See scenes drawn from the 7-part multimedia series of students as they learn about and experience exciting and regarding careers in a variety of technology fields.
59. *Biotechnology* (2003), 15 min.
Follow two community college students as they learn to use cells, genes, and bacteria to engineer new food and drugs, map the human genome, and find ways to prevent disease and detect biological threats.
60. *Information Technology* (2003), 15 min.
Meet two community college students who are gaining the engineering, technical, mechanical and analytical skills they need for rewarding careers in Information Technology. Follow them as they learn to use computer hardware and software for business data, voice communication, and even motion picture applications
61. *Marine science* (2003), 15 min.
Follow two community college students who are gaining the science, engineering, and technology skills they need for rewarding careers in Marine Technology. Follow them as they learn to use a wide range of technology, including submersible robots, sonar, and underwater satellites.
62. *Precision agriculture* (2003), 15 min.
Follow two community college students as they learn to use sophisticated mapping instruments to provide the detailed land and water information vital to precision farming and Agricultural Technology.
63. *Process Technology* (2003), 15 min.
Follow two community college students as they learn about Process Technology – how to break down raw materials and combine and refine them to make everything from fuel to plastics.
64. *Success Stories* (2003), 15 min.
Meet six successful community college graduates now working in a variety of technological fields.
65. *Recruitment toolkit* (2003), DVD, 15 min.
Includes a seven-part video series, sample agendas, hands-on activities, planning and publicity tips, and customizable print resources
66. *Perfect Baby* (1990), 50 min.
Focuses on the astonishing medical revolution in genetics, interviewing parents and doctors who must decide how "perfect" children should be. Barbara Walters hosts this program.

67. *Polymerase Chain Reaction* (1995), 41 min.

This instructional video presents an explanation of the polymerase chain reaction (PCR), with an associated laboratory exercise conducted by Dr. Helen Kreuzer of Carolina Biological Supply Company. The first part of the video explains what PCR is and how it works, using simple laminated paper models of DNA. Students actually see what is required for PCR to take place and what happens at the molecular level through four thermal cycles. The second part gives a step-by-step explanation of an exercise from Carolina's DNA Amplification by Polymerase Chain Reaction Kit. In this exercise, a fragment of lambda DNA is manually amplified by PCR using two water baths, then electrophoresed on an agarose gel and stained with Carolina BLU or ethidium bromide. This is a simple experiment that introduces the techniques of PCR and can be done by anyone who has electrophoresis equipment.

68. *The Race for the Double Helix* (1993), 60 min. (not to be confused with the movie starring Jeff Goldblum – see *Double Helix*, #19)

In this program, Isaac Asimov narrates the story of the 1953 discovery of the structure of DNA by Watson and Crick.

69. *Secret of Photo 51* (2003), 60 min.

The dramatic story of James Watson and Francis Crick's discovery of the structure of DNA in 1953 is by now legendary. Watson, Crick and their collaborator, Maurice Wilkins, shared a Nobel Prize for the discovery. What is not so well known is the essential contribution of an intense young female scientist, Rosalind Franklin, who worked in Wilkins' laboratory. Fifty years later, "Secret of Photo 51" investigates the seminal role played by Rosalind Franklin and her remarkable X-ray photograph in one of the greatest discoveries in the history of science.

The program draws on extensive interviews with surviving major participants in the DNA drama, including Wilkins, who casually showed her crucial Photo 51 to Watson; Raymond Gosling, Franklin's PhD student with whom she made Photo 51; and Nobel Prize recipient Sir Aaron Klug, Franklin's last and closest collaborator, who inherited her notebooks. Klug analyzes Franklin's notebooks to demonstrate just how close Franklin came to making the double helix discovery.

The Secret of Life: Redesigning the Living World by David Suzuki and Joseph Levine (Series, 8 videocassettes)

70. *Accidents of Creation* (1993), 60 min.

How did the millions of organisms on Earth become so different in appearance, behavior and habitat? Life exists because DNA is so good at replicating itself, yet it is an error in replication -- mutation -- that is responsible for life as we know it. We humans share 99% of our gene pool with chimpanzees; random mutation and natural selection is responsible for the all-important 1% difference.

71. *Birth, Sex, and Death* (1993), 60 min.

For years, the Olympic Committee has barred some women athletes because, according to chromosome tests, they didn't appear to qualify as women. However, the Committee was wrong. Scientists now know that a single gene on the Y-chromosome is required for a fetus to develop into a male. This program introduces some of the master genes that determine our sex, our development, and possibly even the length of our lives.

72. *Cell Wars* (1993), 60 min.

Some age-old enemies persist in their attacks on our species. This program looks at some of the parasites and microbes that pose a constant and formidable challenge to the human immune system. Increasingly, scientists are studying these aliens in our midst on the molecular level, in the hope of preventing diseases like shistosomiasis, multiple sclerosis, even AIDS.

73. *Children by Design* (1993), 60 min.

A couple has one child with cystic fibrosis (CF) and another free of CF. Determined that their next child will be free of a defective CF gene, they participate in an experiment in which the fertilized egg is tested and possibly rejected. The parents decide that their child will be among the first to undergo gene therapy.

74. *Conquering Cancer* (1993), 60 min.
What happens when the cells of our bodies don't get or follow the right instructions? As scientists are learning that cancer is a disease of the genes, they are beginning to formulate genetic cures. There has been an explosion in our understanding of cancer and the oncogenes that cause it. As new molecular approaches are developed, there is real optimism that cancer may be controlled in the future.
75. *The Immortal Thread* (1993), 60 min.
No wonder scientists are so enthusiastic as they follow the trail of DNA! In the process of identifying and mapping the human genome, science has discovered something quite extraordinary: from 60-million-year-old dinosaur DNA to yeast to humans, there is ever-growing evidence for the unity of life on Earth.
76. *The Mouse that Laid the Golden Egg* (1993), 60 min.
What happens when science meets the marketplace, when life itself becomes a commodity? Does consumer demand drive the biotechnology industry, or are new products created because they can be -- and the market only later created for them? This program examines the promises and the dangers of industrial genetic manipulation.
77. *Who Are You?* (1993), 60 min.
Do our genes determine our behavior? This program looks at the results of thousands of interviews with twins -- and at a handful of individuals: a 15-year-old afraid of repeating his father's alcoholism may nevertheless be showing some of the symptoms; a doctor who claims that alcoholism and thrill-seeking are not only related but are genetically based.
78. *Sequencing Life* (2001), 16 min.
In this program, Drs. Francis Collins, head of the Human Genome Project, and J. Craig Venter, former CEO of Celera Genomics, discuss the completion of the mapping of the human genome and what that achievement means for the future of medicine. Initial discoveries indicate that the structure of human DNA is simpler but its functions far more complex than previously imagined.
79. *Spare Parts: Growing Human Organs* (2000), 26 min.
In this fascinating program, experts on the cutting edge of tissue engineering and regenerative medicine present the astounding results of their research. Academic experts from MIT, Johns Hopkins Medical Institute, Massachusetts General Hospital, Duke University, and the University of Toronto—plus representatives of Osiris Therapeutics and Geron, leading industry pioneers—explain how new organs, arteries, ligaments, tendons, and skin are being grown from scratch using embryonic stem cells and bone marrow cells, bioreactors, and biodegradable scaffolding. Ethics issues and the race for patents are discussed as well.
80. *Transgenesis: Agricultural Biotechnology* (1997), 52 min.
As the Green Revolution begins to sputter amidst a rising world population, more emphasis is being placed on biotechnology, which uses living organisms to produce new or altered products. In transgenesis, scientists are able to remove specific genes from one living organism and transplant them into others, such as vegetables, to create bigger, better, more disease- and insect-resistant produce. This program follows the process of transgenesis from the laboratory to the farmer's field and finally to the consumer's table.

Unseen Life on Earth: An Introduction to Microbiology (Series, 13 videocassettes)

A series of programs focusing on the life of microbes, from the molecular to the community level. (From the Annenberg/CPB collection)

81. *Intimate Strangers* (1999).

A 4-hour condensation of the material presented in the 12-program series, *Unseen Life on Earth*.

Tape 1 (120 min.) contents: "The Tree of Life" (60 min.), Scientists explore how all living things are related and how microbial life on the planet has evolved over its 3.8 billion year history. *and* "Keepers of the Biosphere" (60 min.), Scientists trace the role of microbes in maintaining the conditions on Earth, including how they affect the global climate and perform the recycling that keeps the world habitable.

Tape 2 (120 min.) contents: "Dangerous Friends and Friendly Enemies" (60 min.), Scientists focus on microbial communities that live in and on humans as well as some key factors that contribute to the emergence of new infectious diseases. *and* "Creators of the Future" (60 min.), Scientists turn to microbes for solutions in repairing our damaged environment and for feeding our planet's growing population.

82. *Unseen Life on Earth Program 1: The Microbial Universe* (1999), 30 min.
The world of microorganisms is a dynamic one, and all other life forms depend on microbial metabolic activity. An overview of recent work in microbiology leads to a description of the different types of microbes and a new vision of the relationships among bacteria, plants, and animals.
83. *Unseen Life on Earth Program 2: The Unity of Living Systems* (1999), 30 min.
All cellular organisms – prokaryotic and eukaryotic – share basic chemical similarities. Out of these similarities, however, emerge diverse patterns of cell assembly. Students encounter the tools they need to understand various cell types and their relationship to non-cell entities such as viruses.
84. *Unseen Life on Earth Program 3: Metabolism* (1999), 30 min.
The metabolic pathways that produce energy create important environmental transformations. Although living organisms have diverse ways of meeting their energy needs, there is an amazing similarity among all life forms as they carry out metabolic processes directed to the construction and use of necessary biological molecules.
85. *Unseen Life on Earth Program 4: Reading the Code of Life* (1999), 30 min.
DNA is central to cell activity, carrying the information for all proteins and replicating with great fidelity – except in the important case of mutations. Organisms also regulate the products made from genes in an effort to conserve energy and adapt to new environments.
86. *Unseen Life on Earth Program 5: Genetic Transfer* (1999), 30 min.
Microbial populations achieve genetic diversity through horizontal gene transfer. Bacteria may transfer genes from one to another by conjugation, transformation, or transduction. Scientists often exploit these processes through recombinant DNA technology.
87. *Unseen Life on Earth Program 6: Microbial Evolution* (1999), 30 min.
Recent genetic techniques have led to new theories of evolution and the relationships among organisms. Students examine this “evolution revolution” using molecular sequences to trace the phylogenetic relationships of microbial life. Both the big picture of microbial evolution and the methods necessary for determining molecular phylogenies are examined.
88. *Unseen Life on Earth Program 7: Microbial Diversity* (1999), 30 min.
What is the relationship among the bacteria, archaea, and eukaryote branches of the tree of life, with their startling variety of organisms? Students see comparisons of organisms in their natural habitats and examine ways of studying these organisms in those habitats and in the laboratory.
89. *Unseen Life on Earth Program 8: Microbial Ecology* (1999), 30 min.
Humans and all other life forms depend on microorganisms as the essential processors of oxygen, mineral nutrients for plant growth, and waste materials. Here we investigate some of the important environments dominated by microbes and how their presence is essential for human life.
90. *Unseen Life on Earth Program 9: Microbial Control* (1999), 30 min.
In certain situations, microbial control is a necessity. For instance, our food system requires sanitary conditions, and hospitals require sterilization techniques. Here we see the options available for various levels of microbial control.
91. *Unseen Life on Earth Program 10: Microbial Interactions* (1999), 30 min.
There are many symbiotic relationships among microbes and between microbes and higher organisms. Students will examine fundamental examples of these relationships.
92. *Unseen Life on Earth Program 11: Human Defenses* (1999), 30 min.
Both nonspecific and specific defense strategies can defeat the invasion of microbial pathogens. Here students learn about the coordinated defense system of humans through visual analogy, animation, and examples of specific diseases.
93. *Unseen Life on Earth Program 12: Microbes and Human Diseases* (1999), 30 min.
How microbes come into contact with humans and the many factors leading to disease outbreaks around the globe are examined here. Students learn about current efforts to track infectious diseases and the considerations necessary to control disease worldwide.

94. *Web of Life* (1989), 58 min.

95. *Who Gets to Know? Genetics and privacy.* (2003), 57 min.

When it comes to genetic testing, how much should a patient be told? If the news is bad, who else should the patient inform? And could—or should—such privileged information be made available to employers, insurance companies, and others? This panel discussion, moderated by Harvard Law School's Arthur Miller, offers a compelling discourse on the far-reaching ethical, social, legal, and economic implications of genetic testing. Panelists include U.S. Supreme Court Justice Stephen Breyer; Nancy Wexler, president of the Hereditary Disease Foundation; Cynthia McFadden, ABC News senior legal correspondent; Nadine Strossen, president of the ACLU; and Representative Louise McIntosh Slaughter (D-NY), sponsor of the Genetic Non-Discrimination in Health Insurance and Employment Act.

96. *Why not clone a human?* (1999), 44 min.

One day very soon, ordinary people could have the ability to choose their children's genes and perhaps even grow themselves completely new body parts. In this program, ABC News anchor Ted Koppel and correspondent Robert Krulwich examine the breakthrough science behind cloning and delve into the ethical dilemmas surrounding advances in genetic science. Interviews on topics including the sanctity of personal identity, the widespread implications of prenatal testing, and the impact of genetic engineering on parent/child bonding.

Robert Krulwich talks with Princeton University's Lee Silver about cloning. Features Stephen Jay Gould of Harvard University discussing Siamese twins; Jane Curtin and Buck Henry in the role of evil parents; video artists Josh and Adam explaining how to clone sheep DNA; plus, the Jody Oberfelder Dance Project performing a dancing baby ballet, "Rock Me Mama"; and, the photographs of American artist Roni Horn. Originally broadcast August 19, 1999.

Winding Your Way Through DNA: A symposium for the public on the scientific possibilities and social puzzles of DNA technology. (Series, 9 videocassettes)

97. *Discovering the Wonder of DNA* (1992), 72 and 98 min./tape

Tapes 1 & 2 answer the following questions: How did it all begin? What were the benchmark discoveries that started the revolution in DNA technology? How did those discoveries change the way scientists viewed the role of DNA? What do "chromosome," "gene," "genetic engineering," and "DNA" really mean?

Tape 1 (72 min.) contents: • "Introduction" - Harold E. Varmus • "The Riddle of the Helix," a personal story of the early days of DNA research and of the historic discovery that set the world of science on its heels - James D. Watson • "Learning the Language of Life," how scientists learned to read the language of DNA and manipulate its words - Paul Berg.

Tape 2 (98 min.) contents: • "From Corned Beef to Cloning," how a late-night talk about the possibility of cloning DNA became a moment of personal discovery and sparked the revolution in DNA technology - Stanley Cohen and Herbert Boyer • "Those Marvelous Molecular Manufacturing Plants," how DNA can now be engineered in the lab to produce large amounts of useful proteins - David Botstein • "The Double Talking Helix Blues," a bit of musical whimsy written by Joel Herskowitz and performed by his brother Ira, the singing scientist of the University of California, San Francisco.

98. *New Ways to Use DNA* (1992), 76 and 82 min./tape

Tapes 3 & 4 examine new ways to use DNA and address the following questions: How can DNA technology predict future illnesses and produce new medical therapies? What effects will this technology have on health care here and around the globe? How is DNA technology being used to increase our food supply?

Tape 3 (76 min.) contents: • "Introduction" - Elizabeth H. Blackburn • "New Weapons in the War Against Disease," how DNA technology is changing medical practice and care - David W. Golde, MD • "DNA Technology for the Third World," what DNA technology can do to fight disease in developing countries - Barry R. Bloom.

Tape 4 (82 min.) contents: • "Green Genes," looking for ways to produce stronger, heartier, more marketable plants with DNA technology - Gerald R. Fink • "Tales Our Genes Can Tell Us," how scientists are now able to "read" our genes and use what they learn to diagnose inherited disorders - Maxine F. Singer.

99. *Asking the Tough Questions About DNA Technology* (1992), 72 min./tape

Tapes 5 & 6 examine the ethics of using DNA technology to disclose our medical destiny. Should the government regulate this new technology? Could DNA technology get out of control? Will DNA evidence now be used to decide court cases? How is technology affecting society in general and each of us as individuals? How can we exploit the benefits and limit the risks?

Tape 5 (72 min.) contents: • "Introduction" - Richard M. Myers • "Walking the Ethical Tightrope," the ethical problems created by biotechnology's ability to predict inherited diseases - Neil A. Holtzman • "Superplant to the Rescue or Monsters in our Backyards?" the potential benefits and hazards of releasing genetically altered organisms into the environment - Roger N. Beachy.

Tape 6 (72 min.) contents: • "Should DNA Be Kept at Bay?," a look at the pros and cons of government regulation of DNA technology - Donald Kennedy • "DNA on the Witness Stand," the issues concerning the use of genetic evidence in civil and criminal court cases - Eric S. Lander • "Symposium in Perspective: Learning to Live with Technology," how society can adjust to the impact of new technology - Leon M. Lederman.

Tape 7 (19 min.) contents: "On Becoming a Scientist" (1996) This video provides viewers with an understanding of the lives and work of scientists. Divided into seven segments, the program begins with video and sound bytes from members of the general population telling about their perception of scientists. Most are stereotypes. Next, a number of scientists are interviewed, many of whom are young. They explain that they have chosen their careers because finding answers to challenging questions, working in laboratory settings, helping people, and cooperating with others motivate them. Includes a teacher's guide.

Tape 8 (25 min.) contents: "Promise & Perils of Biotechnology: Genetic Testing" (1996) Genetic tests are becoming more prevalent but it is far from clear how test results impact upon the individuals affected, their families and the social structure they depend on. This documentary profiles three such people: a young woman with a family history of Huntington's disease who decides to be tested, and a woman and her young daughter who have changed their lifestyles to counteract family hypercholesterolemia. The video captures their struggle with the reality of their conditions, and the ethical, legal and social dilemmas that confront them. Includes teacher's guide.

Tape 9 (28 min.) "Stories From the Scientists" (1994) Francis Crick and James Watson describe how they discovered the structure of DNA, and Herbert Boyer and Stanley Cohen recall how they developed the first methods for combining DNA molecules and cloning genes. The narrative weaves together interviews, animation, re-enactment, and historical footage to illustrate the participants' scientific achievements, their personalities, and their individual approaches to the challenge of discovery. Includes a teacher's guide.