HEALTH AND DISEASE IN SOCIETY

MEDICINE AND HEALERS THROUGH HISTORY

Edited by Kara Rogers, Senior Editor, Biomedical Sciences

Britannica Educational Publishing

IN ASSOCIATION WITH

ROSEN EDUCATIONAL SERVICES
CONTENTS

Introduction xii

CHAPTER 1: ANCIENT MEDICINE AND ITS PRACTITIONERS 1

- Primitive Medicine and Folklore 2
  - Medicine Man 3
- The Ancient Middle East and Egypt 4
  - Imhotep 5
- Traditional Medicine and Surgery in Asia 7
  - India 7
  - China 9
  - Japan 12
- The Roots of Western Medicine 13
  - Early Greece 13
  - Hippocrates 14
  - Hippocratic Oath 18
- Hellenistic and Roman Medicine 19
  - Public Baths 21

CHAPTER 2: MEDICINE IN THE MEDIEVAL AND RENAISSANCE ERAS 26

- Christian and Muslim Reservoirs of Learning 27
  - Translators and Saints 27
    - Hunayn ibn Ishāq 27
    - Arabian Medicine 28
- Medieval and Renaissance Europe 31
  - Salerno and the Medical Schools 32
  - The Spread of New Learning 34
- The Enlightenment 37
  - Harvey and the Experimental Method 37
  - The Futile Search for an Easy System 38
- Medicine in the 18th Century 42
  - Midwifery 44
- Major Figures in 18th-Century Medicine 45
  - William Cullen 45
  - Edward Jenner 46
  - René-Théophile-Hyacinthe Laënnec 49
  - Benjamin Rush 51
  - Lazzaro Spallanzani 52
**Chapter 3: The Rise of Scientific Medicine in the 19th Century**

- Emergence of Physiology
- Verification of Germ Theory
- Discoveries in Clinical Medicine and Anesthesia
- *Chloroform*
- Advances at the End of the 19th Century
- *Filarial Worm*
- Notable 19th-Century Physicians
  - William Beaumont
  - Claude Bernard
  - Jules Bordet
  - Gardner Quincy Colton
  - Carlos J. Finlay
  - Friedrich Gustav Jacob Henle
  - Sir Patrick Manson
  - William Thomas Morton
  - Johannes Peter Müller
  - Francesco Redi
  - Sir Ronald Ross
  - Sir James Young Simpson
  - John Snow

**Chapter 4: Immunology and the 20th-Century Fight Against Infectious Disease**

- Infectious Diseases and Chemotherapy
- The Introduction of Antibiotics
  - Sulfonamide Drugs
  - *Sulfonamide*
  - Penicillin
  - Antituberculous Drugs
  - Other Antibiotics
- Immunology and Immunization
  - Antibacterial Vaccination
  - *Typhoid Mary*
  - Immunization Against Viral Diseases
  - The Immune Response
- Major 20th-Century Figures in Immunology and Infectious Disease
  - Emil von Behring
Chapter 5: Progress in the Understanding of Disease in the 20th Century

Notable Figures in the Advancement of 20th-Century Medicine

Sir Ernst Boris Chain
Leonard Colebrook
Paul Ehrlich
Sir Alexander Fleming
Howard Walter Florey
Camille Guérin
Kitasato Shibasaburo
Albert Bruce Sabin
Jonas Edward Salk
Selman Waksman

Endocrinology
Epinephrine and Norepinephrine
Insulin
Cortisone
Sex Hormones

Nutrition and Vitamins

Tropical Medicine

Sir Frederick Banting
Sir William Maddock Bayliss
Charles H. Best
Adolf Butenandt
Christiaan Eijkman
Beri beri
Philip Showalter Hench
Sir Frederick Gowland Hopkins
Edward Calvin Kendall
J.J.R. Macleod
George Richards Minot
William P. Murphy
George Redmayne Murray
Tadeus Reichstein
Leopold Ružička
Ernest Henry Starling
Jokichi Takamine
George H. Whipple
CHAPTER 6: DEVELOPMENTS IN THE UNDERSTANDING OF CANCER  

Achieving a Basic Understanding of Cancer  
Radium  
The Role of Retroviruses  
Smoking and Health  
Major Figures in the History of Cancer Research  
David Baltimore  
J. Michael Bishop  
Johannes Fibiger  
Charles B. Huggins  
Salvador Luria  
Sir Percivall Pott  
Peyton Rous  
Elizabeth Stern  
E. Donnall Thomas  
Harold Varmus  
Rudolf Virchow  
Bert Vogelstein

CHAPTER 7: SURGERY IN THE 20TH CENTURY AND BEYOND  

Obstacles in the Development of Surgery  
Changes Before World War I  
Abdominal Surgery  
Neurosurgery  
Radiology  
Surgery and World War I  
Dakin’s Solution  
Between the World Wars  
The Problem of Shock  
Anesthesia and Thoracic Surgery  
World War II and After  
Support From Other Technologies  
Heart Surgery  
Organ Transplantation  
Contemporary Surgery  
Notable Figures in Surgery From the 19th Century to Today  
Christiaan Barnard  
Theodor Billroth
<table>
<thead>
<tr>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denton A. Cooley</td>
<td>153</td>
</tr>
<tr>
<td>Harvey Williams Cushing</td>
<td>153</td>
</tr>
<tr>
<td>Michael DeBakey</td>
<td>153</td>
</tr>
<tr>
<td>Clarence Dennis</td>
<td>154</td>
</tr>
<tr>
<td>Charles Richard Drew</td>
<td>155</td>
</tr>
<tr>
<td>William Stewart Halsted</td>
<td>155</td>
</tr>
<tr>
<td>Sir Victor Horsley</td>
<td>156</td>
</tr>
<tr>
<td>Karl Landsteiner</td>
<td>156</td>
</tr>
<tr>
<td>Norman E. Shumway</td>
<td>157</td>
</tr>
<tr>
<td>Daniel Hale Williams</td>
<td>158</td>
</tr>
</tbody>
</table>

**Chapter 8: Nursing and Influential Nurses in History**

- Historical Overview of Nursing 160
- Florence Nightingale 164
  - Family Ties and Spiritual Awakening 165
  - Nursing in Peace and War 165
  - Homecoming and Legacy 167
- Mary Ann Bickerdyke 169
- Florence A. Blanchfield 170
- Mary Breckinridge 171
- Edith Cavell 172
- Sue Sophia Dauser 173
- Jane A. Delano 173
- Sister Mary Joseph Dempsey 174
- Clara Maass 175
- Mary Mahoney 176
- Lucy Minnigerode 176
- Mary Adelaide Nutting 177
- Mary Seacole 179
- Mabel Keaton Staupers 179
- Florence Wald 180
- Lillian D. Wald 181
  - *Henry Street Settlement* 182

**Chapter 9: Pioneers of Modern Medicine**

- Sir Thomas Clifford Allbutt 185
- Elizabeth Garrett Anderson 186
- Virginia Apgar 187
  - Apgar Score System 188
- Oswald Avery 189
Sara Josephine Baker 190
William Bateson 191
Alexander Gordon Bearn 192
Elizabeth Blackwell 194
Baruch S. Blumberg 195
Emeline Horton Cleveland 196
Mary Putnam Jacobi 197
Mayo Family 198
Menninger Family 200
Antonia Novello 202
Sir William Osler 203
Mary Jane Safford 205
David Satcher 206
Marie Stopes 208
Helen Brooke Taussig 209
Conclusion 211

Glossary 212
Bibliography 214
Index 215
INTRODUCTION
The history of medicine could be seen as a millennia-long progression from superstition to enlightenment. Although such a characterization might even be true in the broadest strokes, it would be a significant oversimplification of the fascinating story of the development of medical knowledge. In fact, remarkably sophisticated medicine was being practiced in some societies many centuries BCE, and some recent scientific discoveries have served to validate the efficacy of treatments once dismissed as old wives’ tales.

What is unquestionably true is that the history of medicine has seen a steady progression in scientific knowledge of how the human body works, which has led to amazing advances in understanding the causes of disease as well as how to treat and prevent disease. In some cases, these advances have even led to the complete eradication of historically devastating diseases. The history of medicine is also very much the history of specific individuals who have made discoveries and advances relating to human anatomy and physiology, as well as those who have changed the practice of medicine through introducing new treatments and new policies. This book will introduce many of those individuals and will explore the ideas and practice of medicine from prehistory to the present day.

Medicine’s story begins before the time of recorded history, with fossil remains of early humans showing evidence of healed bones and wounds and of scars from primitive surgery, perhaps performed to allow evil spirits to escape from the body. The earliest written record of the practice of medicine is in Hammurabi’s code, an extensive code of laws written in Mesopotamia between 1792 and 1750 BCE. One section of the code is devoted to explaining laws on payments due for successful treatments and penalties for doctors who cause harm in the course of making incisions, removing tumours, and healing broken bones and other injuries. Papyri from ancient Egypt include entire treatises on the proper treatment of diseases using ointments, medications, and surgeries, with instructions for appropriate incantations to accompany each form of treatment.

Medicine was comparatively advanced in the early civilizations of Asia. Treatises on medical practice in India described some 1,120 different diseases and explained the use of hundreds of medicinal plants, minerals, and animal products. Surgical techniques were extremely advanced, including the removal of tumours and bladder stones, as well as cataracts. Chinese physicians also knew and used more than 1,000 different herbal, mineral, and animal products for the treatment of disease. The practice of acupuncture, designed to balance the distribution of yin and yang in the body, was widely used in ancient Chinese medicine.
Most of these early civilizations had strict religious prohibition against the mutilation of the dead, limiting the ability of early practitioners to study the parts of the human anatomy or to understand the workings of the body. Most treatments were no doubt discovered largely by trial and error, and by the time of their codification into medical texts, such as the ancient Egyptian papyri, the majority of the world's treatments for disease had been discovered. The theories of how and why these treatments worked, however, bear little resemblance to what is known today.

The Greek physician Hippocrates (c. 460 BCE-c. 375 BCE) has been referred to as the father of medicine because he is believed to have been the first to assert that diseases were the result of natural, rather than supernatural, causes. His legacy is also carried on today in the form of the Hippocratic oath, a code of high ethical conduct for physicians. Hippocrates—or others writing in his name—left extensive treatises detailing observations on disease and methods of healing. He was also famed as a teacher imparting his ideas to an entire generation of Greek physicians. For the next several centuries, Greek medicine was acknowledged to be the most advanced, and it was carried on through the medical school established in Alexandria, as well as by Greek-trained physicians during the Roman Empire.

After the fall of the Roman Empire, medical knowledge in Europe was largely maintained in the monasteries, both through the translation and transcription of classical medical texts and through the hospitals associated with many monasteries and convents. In the Islamic empire, extending from Persia across Northern Africa to Spain, physicians experimented in the field of chemistry, developing new techniques for purifying substances as well as discovering new medicines. In fact, many drugs that are in use today were originally developed by medieval Arabic scientists. Medical schools flourished in Cairo, Baghdad, and Córdoba, and textbooks written at these universities continued to be used well into the Middle Ages.

By the 14th and 15th centuries, the Renaissance brought a new enthusiasm for the advancement of knowledge through direct observation and experimentation, as opposed to following traditional teachings. Dissection of cadavers allowed for a much more precise knowledge of human anatomy and physiology. Italian physician Giralomo Fracastoro even advanced a theory in 1546 that the transmission of disease occurred through imperceptible particles in the air or through direct contact. Fracastoro’s observations predated Louis Pasteur’s actual discovery of such particles by more than 300 years. In the 1600s, British physician William Harvey published two landmark books describing his experiments and conclusions on the circulation of blood and the generation of life. Thus, medicine was beginning to adopt a scientific basis, a departure from the historical reliance on simple observation and theory. The invention of the
microscope in the 17th century and of the stethoscope at the end of the 18th century contributed substantially to the advance of knowledge about the inner workings of the body.

Improvements in the understanding of the human body also began to influence the actual practice of healing the sick. Equally important in advancing medical practice was the openness to experimentation and observation. The discovery of an effective method of preventing smallpox by vaccination was one of the most significant medical advances of the 18th century, even though an understanding of the mechanism of immune response and the discovery of viruses were still a century or more away. Similarly, a British naval surgeon was able to eradicate scurvy among British sailors by recommending the addition of citrus fruits to their diet. The discovery of vitamin C, however, did not occur until the early 20th century.

In the 19th century, scientists began to look even deeper into human physiology, with one of the most important advances being the identification in the middle of the century of the cell as the centre of pathological changes causing the symptoms and effects of a variety of diseases. Equally influential was the confirmation by Louis Pasteur of germ theory—the idea that specific diseases are caused by specific microorganisms. Pasteur also made several other significant discoveries in the fields of epidemiology and immunology, including the creation of the first vaccine against rabies. Pasteur was one of the most important figures in any century in the history of medical advances, despite the fact that he was a chemist and not a physician. His work influenced many other medical researchers, encouraging them to search for the specific bacteria responsible for a wide variety of diseases, including tuberculosis and cholera.

A practical impact of Pasteur’s work was the work of Joseph Lister, who used the germ theory to develop and promote the importance of antiseptic barriers during surgeries and childbirth, leading to a dramatic decrease in death due to infections. Another innovation of the 19th century was the use of anesthesia during surgery. Pioneered by physicians in the United States, the practice was quickly adopted by surgeons in Europe, allowing for not only greater comfort on the part of the patient but also the possibility of longer and more complex surgeries.

The 19th century was also the age of imperialism in Europe. As Europeans took control of huge swaths of Africa, South America, and Asia, they were exposed to new tropical diseases. Wars of conquest and competition between the European powers also spread disease. English physicians demonstrated that mosquitoes were the means of transmission for tropical diseases such as malaria and yellow fever, and they developed measures to prevent infection. The Crimean War between Britain and Russia in 1853–56 also led to a new phase in the practice of medicine—the use of skilled, trained nurses in hospital care. This
development was introduced by the work of Florence Nightingale and her recruits.

At the end of the century, another woman was also making a major contribution to medical history. In 1898, Marie Curie and her husband, Pierre, discovered and isolated radium. After her husband’s early death, Marie Curie continued her research into the medical applications of radioactive substances, a field that revolutionized medicine in the 20th century. In fact, it was only during the 20th century that many of the advances taken for granted in medicine today were discovered. Major developments during this period included the introduction of antibiotics and the near eradication of common diseases through widespread vaccination.

In 1910 scientists for the first time isolated a chemical substance that was effective against a specific disease-causing bacterium. The organism was the bacterium that causes syphilis, and the discovery of the substance led to the development of a cure for the disease. Other antibacterial agents quickly followed, with the most dramatic being the discovery of penicillin in 1928 and its development as an antibiotic over the next decade. Penicillin was effective against a wide variety of infections, which led to the risk of infectious agents becoming resistant to it as physicians prescribed it freely. In the last half of the 20th century, a variety of other antibiotic agents allowed for more discriminate use, but the battle between antibiotic-resistant forms of disease and the development of new antibiotics to treat them continues as an important issue in medical practice today.

During the same period when penicillin was developed, rapid advances were also being made in the creation of vaccines to prevent disease. Armies were vaccinated against typhoid and tetanus, diseases that had previously been as dangerous to the troops as battle deaths. An effective vaccine against diphtheria was developed in the 1920s, and by the 1960s had virtually wiped out the disease in countries where childhood vaccination was the norm. A vaccine for pertussis, or whooping cough, followed in the 1940s, and today most children in developed countries receive a combined DPT (diphtheria, pertussis, tetanus) injection in infancy.

Although the battle against bacterial diseases has been largely successful on two fronts—both treatment and prevention—viruses pose a different problem. Antibiotics are not effective against viral diseases, and scientists had little understanding of viruses until well into the 1930s. But as scientists were able to isolate and study viruses, vaccines began to be introduced. Perhaps the most important was the development of a vaccine against polio, introduced in the 1950s. Polio, or poliomyelitis, is a disease that most often affects children and can lead to lifelong paralysis. Although the most severe outcomes affected only a small portion of those infected, it was a constant worry for parents. Today polio is
virtually unknown other than in isolated pockets of India and some countries in Africa. Public health officials believe it would be possible to eliminate the poliovirus entirely, as was done with smallpox, with concerted vaccination efforts in those areas where the disease still persists.

Other vaccines that also became available in the 20th century included several for common childhood diseases, including measles, mumps, chickenpox, and German measles (rubella). Today, most children never contract these diseases, which affected virtually every child only half a century earlier.

Another development of the 20th century was the understanding of the role of hormones in disease, allowing for effective management and treatment of diabetes by use of insulin, cortisone for rheumatoid arthritis, and hypothyroidism by injections of the thyroid hormone. An understanding of the role of hormones also allowed for the development of the birth control pill, by adjusting the levels of estrogen and progesterone to prevent ovulation and fertilization. Other diseases were found to be tied not to a deficiency in specific hormones, but to deficiencies in another 20th-century discovery—vitamins.

Today, the most common causes of death in previous centuries have nearly all been conquered or brought under control. Significant progress also has been made against human immunodeficiency virus (HIV), which causes AIDS. In addition, progress is being made in the treatment of cancer using radiation, chemotherapy, and surgery. A vaccine has even been introduced for cervical cancer. Cancer is now the second leading cause of death in most Western countries, following heart disease, partly because the population is now living longer rather than dying from other diseases at an early age.

Many medical practitioners today, particularly in primary practice and public health, focus not on illness, but on wellness. Obesity is now seen as one of the most important health threats, and lifestyle changes are the first line of defense for preventing diseases from adult-onset diabetes to heart disease. An understanding of environmental factors has also led to significant decreases in some cancers, notably lung cancer. The impact of stress hormones on health and on the immune system is also becoming better understood. The recommendations for healthy diet, rest, and fresh air promoted by Hippocrates and other early physicians remain sound medical advice today.

In laboratories of the 21st century, scientists at the frontiers of medical research are probing the human genome, exploring whether nerves can be regenerated to reverse paralysis, experimenting with genetically engineered drugs, and exploring the science of aging. Much of this work would have once been considered science fiction. Thus, the history of medicine, which began millennia ago, continues to be written by today’s scientists and practitioners.