

17th century**ADVANCES IN MEDICINE**

The seventeenth century was a watershed in the evolution of medical knowledge and the practice of medicine. The development and perfection of the microscope opened new fields for the study of human anatomy and physiology, leading to greater understandings of reproduction, growth, disease, and decay.

LOCALE: England and continental Europe

CATEGORIES: Health and medicine; science and technology; biology; inventions; cultural and intellectual history

KEY FIGURES

Jan Swammerdam (1637-1680), Dutch anatomist and physiologist

William Harvey (1578-1657), English physician who discovered the circulation of blood

Antoni van Leeuwenhoek (1632-1723), Dutch lensmaker who perfected the microscope

Francesco Stelluti (1577-1646/1652), student of Galileo who coined the term “microscope”

Francesco Redi (1626-1697), Italian physician and poet who helped disprove spontaneous generation

Marcello Malpighi (1628-1694), Italian physician who developed the concept of glands

Nicolaus Steno (1638-1686), Danish physician and anatomist

Thomas Sydenham (1624-1689), English physician credited with reviving the Hippocratic view of medicine

SUMMARY OF EVENT

The development of the lens arguably represents the key element in scientific discovery during the seventeenth century. While Antoni van Leeuwenhoek is generally accredited with the microscope’s perfection, it was Galileo who first developed a mechanism to observe the “small.” Galileo is correctly associated with the telescope and its use in observations of the solar system, but he also used the same technology to observe microscopic objects. Early discoveries were made by students of Galileo, including Francesco Stelluti, who was the first to publish drawings of insects based upon his microscopic observations (1630), and the one who coined the term “microscope.”

While the microscope did not originate with Leeuwenhoek, he developed it to the point that it became

widely applicable in the field. Leeuwenhoek was born in Delft, Holland, in 1632, the son of a basket maker. Initially in the drapery business, by the 1650’s he became increasingly interested in the production of lenses and their application in microscopy. In 1680, he would be elected as a fellow to the Royal Society of London; many of his letters and illustrations to the society were published in 1684. Even in Leeuwenhoek’s old age, contemporaries noted the steadiness of his hands for his work.

Leeuwenhoek’s work was primarily observational. The early sources for his specimens included water, plaque scraped from his teeth, and even fecal matter. His drawings appear to depict primarily protozoa and bacteria, though Leeuwenhoek never associated his “animalcules” with disease. Indeed, the germ theory of disease would not develop for another two centuries.

Contemporary with Leeuwenhoek was Jan Swammerdam, born in 1637 and among the first to apply Leeuwenhoek’s microscope to the study of anatomy and physiology. Swammerdam is credited with the discovery of red blood corpuscles, though his ideas on their functions were primarily speculative. He studied insect anatomy mostly but also was one of the early anatomists to study the human reproductive system.

While the existence of a circulatory system was known as early as Galen in the second century, knowledge of its function remained nebulous for another fifteen hundred years. Galen understood the concept of blood vessels as well as a difference between arterial and venous blood based upon their color. In his view, however, circulation was an inherent function of arterial pumping; blood was created in the liver and was consumed by the organs.

It remained for William Harvey to provide a more modern explanation for blood circulation. First trained at Caius College in Cambridge, England, Harvey continued his medical training as a student of Italian anatomist Hieronymus Fabricius ab Aquapendente at Padua in Venice. Fabricius ab Aquapendente was a student of Italian anatomist Gabriele Falloppio, who discovered the function of what came to be called the Fallopian tubes in a woman’s body. Fabricius ab Aquapendente’s discovery of valves within the venous system would later play an important role in Harvey’s work on the process of circulation. Harvey received his diploma from Padua in 1602. Returning to England, in 1607, Harvey was elected fellow of the College of Physicians, maintaining a practice

that had King James I and King Charles I as clients. He also did research in both anatomy and physiology.

Harvey utilized a variety of animals in his early studies on circulation, settling on snakes because the slow beating of their hearts allowed for a more precise observation. Harvey established that the contraction of the heart drives blood through the circulatory system. He also observed that the heart rested between beats, allowing it to be “refilled.” Among other observations, Harvey noted that venous circulation occurs in a single direction: Using the heart as a pump, blood flows from arteries to veins, returning to the heart. Furthermore, by measuring the quantity of blood in an animal, Harvey demonstrated that blood is not produced continuously in the liver.

The primitive state of microscopy early in the century limited Harvey’s ability to study the connections between arteries and veins. It remained for Marcello

Malpighi to discover the role of capillaries in the process. Born in Rome in 1628, ironically the same year Harvey published his work describing circulation, Malpighi earned his medical degree in 1653 from the University of Bologna. He spent much of his professional career there as a member of the medical faculty.

Malpighi is considered the father of comparative physiology, as he was among the first to utilize the microscope in the study of various systems in animals. Prior to Malpighi, physicians considered organ tissues to originate as coagulated fluids (coagulum), and hence referred to such tissue as parenchymal. Malpighi determined that such tissue is actually glandular, pockets of globular forms of cells. His observations encompassed numerous types of tissue. He discovered capillaries after observing that the lungs, for example, were composed of thin membranes with a variety of tiny vessels.

Malpighi observed similar “pockets” of cells in other tissues, including the spleen, liver, and kidneys (renal glomerulus), and was also the first to observe the layering of tissue that makes up the epidermis. Though he was a contemporary of Leeuwenhoek, Malpighi’s attention to application—to practice—distinguished him from other scientific “observers.”

Though Malpighi had discovered glands, it was the Danish anatomist Nicolaus Steno who determined how they function. Born in Copenhagen in 1638, Steno carried out his early anatomical studies at the university in that city. In 1661, while dissecting the head of a sheep, he observed the presence of excretory ducts originating from the salivary glands. The duct from the parotid (salivary) gland would be named the *ductus stenonianus* in his honor. Steno would continue his work in the field of anatomy, eventually discovering numerous glands and ducts in the mouth and nose.

Therapy for disease as it existed in the early seventeenth century was often a “hit or miss” phenomenon. The Aristotelian concept of “humors” as the basis for disease continued to dominate medical thought, and it often formed the basis for treatment that was as likely to kill as to cure; bleeding was a common practice. Thomas Sydenham, an English physician, is often credited with reviving the Hippocratic school of medicine, in which careful observation and “bedside manner” played an important role in diagnosis and recovery.

Sydenham received an excellent medical education at Oxford, though he came to believe clinical observation was more important than pharmacological treatments. His study of epidemics in the 1650’s formed the basis of his theories on the role played by the environment in the



An illustration of the use of medical instruments, from a 1656 medical treatise on surgery. (Hulton/Archive by Getty Images)

ADVANCES IN MEDICINE	
Date	Event
1628	William Harvey publishes <i>Exercitatio anatomica de mortu cordis et sanguinis in animalibus</i> , the description of blood circulation in animals
1630	Francesco Stelluti publishes the first microscopic drawings of insects
1632	Marco Severino authors the first illustrated text on surgical pathology
1652	Thomas Bartholin describes the presence of the thoracic duct in humans, demonstrating the presence of a lymphatic system
c. 1658	Jan Swammerdam observes red blood cells through a microscope
1661	Nicolaus Steno discovers excretory ducts in salivary glands
1661	Marcello Malpighi publishes his work on the physiology of the lung, including the existence of capillaries
1665-1666	Malpighi publishes his work on glandular structures
1666	Malpighi publishes the first description of Hodgkin's disease
1668	Francesco Redi demonstrates fallacies in the belief of spontaneous generation

outbreak of disease. For example, he was the first to associate fleas with typhus. He later concluded that certain illnesses resulted from iron deficiencies. Like the Hippocratic school, Sydenham believed fever itself was dangerous for the body, and he practiced methods of cooling the body to counteract its effects. Though skeptical about the drugs of the time, Sydenham did believe quinine would be useful in treating malaria. Because he insisted on careful observations in the diagnosis of medical problems, Sydenham became known as the English Hippocrates.

The idea that living matter could arise spontaneously from nonliving material, a concept called spontaneous generation, had been accepted since the time of Aristotle. Even the Church accepted some aspects of spontaneous generation. Recipes existed for the spontaneous production of mice (wheat plus dirty underwear), and frogs and eels could be generated from mud. Worms were thought to arise spontaneously in decomposing meat, a common sight during these times before refrigeration. In 1668, Francesco Redi demonstrated that such “worms,” or maggots, arose not spontaneously but rather as a result of eggs laid by flies or other insects on the exposed food.

Redi carried out one of the earliest experiments using what are now referred to as “controls.” He set up a series of flasks, into which were placed pieces of meat. The sur-

faces of several of the flasks were sealed completely or overlaid with gauze, which kept insects from the meat. Flasks were also left uncovered. Redi observed that the meat placed in the uncovered flasks became contaminated with maggots, and the covered flasks were free of maggots. Later, when he placed insect eggs obtained from the fine gauze on the previously covered meat, maggots formed.

Ironically, the development of microscopy would also lend support to the belief that the generation of microscopic animalcules could still occur spontaneously. The primitive state of microscopic observation meant that while relatively large objects could be observed in liquids, smaller objects could easily be overlooked. Consequently, even Redi could be “fooled” into mistaking contaminated liquids for those that were sterile. French scientist Louis

Pasteur (1822-1895) ended the controversy of spontaneous generation through his own work in microbiology.

SIGNIFICANCE

Until the seventeenth century, medical knowledge and practice were guided by theories that originated with Hippocrates and Aristotle, and the study of anatomy was directed by the ideas of Galen. The single most important event for the century was arguably Leeuwenhoek's perfection of the modern microscope, which made clear some of the basic structures of plants as well as animals and opened the way for the sciences of anatomy and physiology. Researchers were able to see that microscopic elements—the “small”—were the necessary links to understanding organic processes such as reproduction, growth, disease, decay, and decomposition. Human anatomy and physiology, no longer speculative, were carried into the realm of modern science.

—Richard Adler

FURTHER READING

Conrad, Lawrence, et al., eds. *The Western Medical Tradition, 800 B.C. to A.D. 1800*. New York: Cambridge University Press, 1995. Andrew Wear's chapter, “Medicine in Early Modern Europe, 1500-1700,” is an excellent introduction to early modern medicine.

- Davies, Gill. *The Timetables of Medicine: An Illustrated Chronology of the History of Medicine from Prehistory to Present Times*. New York: Workman/Black Dog & Leventhal, 2000. Davies provides an illustrated time line for advances in medicine, covering a period of thousands of years. The detailed content makes for fascinating reading.
- Fournier, Marian. *The Fabric of Life: Microscopy in the Seventeenth Century*. Baltimore: Johns Hopkins University Press, 1996. Examines work in microscopy and the reasons for the microscope's appearance in the seventeenth century.
- Gest, Howard. *Microbes: An Invisible Universe*. Washington, D.C.: ASM Press, 2003. A history of microbiology from the time of its invention to the beginning of the twenty-first century.
- McNeill, William. *Plagues and Peoples*. Wilmington, N.C.: Anchor, 1998. This work is primarily a sociological and geographic approach to the movement of disease through human history. McNeill follows the progression of disease as a function of human migration.
- Nuland, Sherwin. *Doctors: The Biography of Medicine*. New York: Vintage Books, 1989. A history of medicine covering its beginnings with Hippocrates to modern times. Includes an excellent chapter on William Harvey and the context of his work.
- Piccolino, Marco. "Marcello Malpighi and the Difficult Birth of Modern Life Sciences." *Endeavour* 23, no. 4 (1999). Examines Malpighi's contributions to sci-

ence, including his pioneering work in microscopic medical anatomy, the composition of the human body, and the pathology of diseases.

- Porter, Roy, ed. *Cambridge Illustrated History of Medicine*. New York: Cambridge University Press, 2001. As the title implies, this work is primarily an illustrated history, but it is a useful general history source.
- Ruestow, Edward. *The Microscope in the Dutch Republic*. New York: Cambridge University Press, 1996. Ruestow explores the role of the microscope in the scientific discoveries of the seventeenth century. Emphasis is placed on the role of Leeuwenhoek.

SEE ALSO: 17th cent.: Birth Control in Western Europe; 1601-1672: Rise of Scientific Societies; 1612: Santorius Invents the Clinical Thermometer; 1617-1628: Harvey Discovers the Circulation of the Blood; 1660's-1700: First Microscopic Observations; 1664: Willis Identifies the Basal Ganglia; c. 1670: First Widespread Smallpox Inoculations; 1672-1684: Leeuwenhoek Discovers Microscopic Life; 1676: Sydenham Advocates Clinical Observation.

RELATED ARTICLES in *Great Lives from History: The Seventeenth Century, 1601-1700*: Galileo; William Harvey; Jan Baptista van Helmont; Robert Hooke; Christiaan Huygens; Antoni van Leeuwenhoek; Hans Lippershey; Marcello Malpighi; Santorio Santorio; Nicolaus Steno; Jan Swammerdam; Thomas Sydenham.

17th century

AGE OF MERCANTILISM IN SOUTHEAST ASIA

The theory and practice of mercantilism led to European—especially Dutch—expansion into Southeast Asia, where European powers and local states competed for control of the strong and profitable spice market. The age of mercantilism was a key period in the development of the European economy and in the establishment of European colonialism.

LOCALE: Southeast Asia, especially modern Indonesia

CATEGORIES: Economics; expansion and land acquisition; government and politics; colonization

KEY FIGURES

Abul Mafakhir (d. 1651), fourth sultan of Banten, r. 1596-1651

'Ala al-Din (d. 1639), sultan of Gowa, r. 1593-1639

Jan Pieterszoon Coen (1587-1629), officer of the Dutch East India Company and governor-general of the Dutch East Indies, 1619-1623 and 1627-1629

Arung Palakka (1634-1696), a prince of the Bugis and subject of Gowa who rebelled against Gowa and allied himself with the Dutch

SUMMARY OF EVENT

By the seventeenth century, Western Europe had developed into a region of competing nation-states, each with a central government, and each practicing mercantilism. According to the principles of mercantilism, the goal of trade is to increase the wealth of a nation. To increase and store wealth, according to mercantilist theory, states were encouraged to export more goods than they import.

Within a given country, mercantilism calls for individuals to be thrifty so that the amount of national wealth spent on consumer goods is minimized and the amount flowing to the country's treasury maximized. Internationally, export was key to a nation's wealth, as it led to the creation of a monopoly on vital goods and a monopoly on income. The strong armies made possible by increasing national wealth enabled states to establish colonies, to protect their markets, and to compete with one another directly in wars. In addition, rising states in other parts of the world followed economic practices similar to those of the competing European nations. Several of those non-European states were in the islands of Southeast Asia.

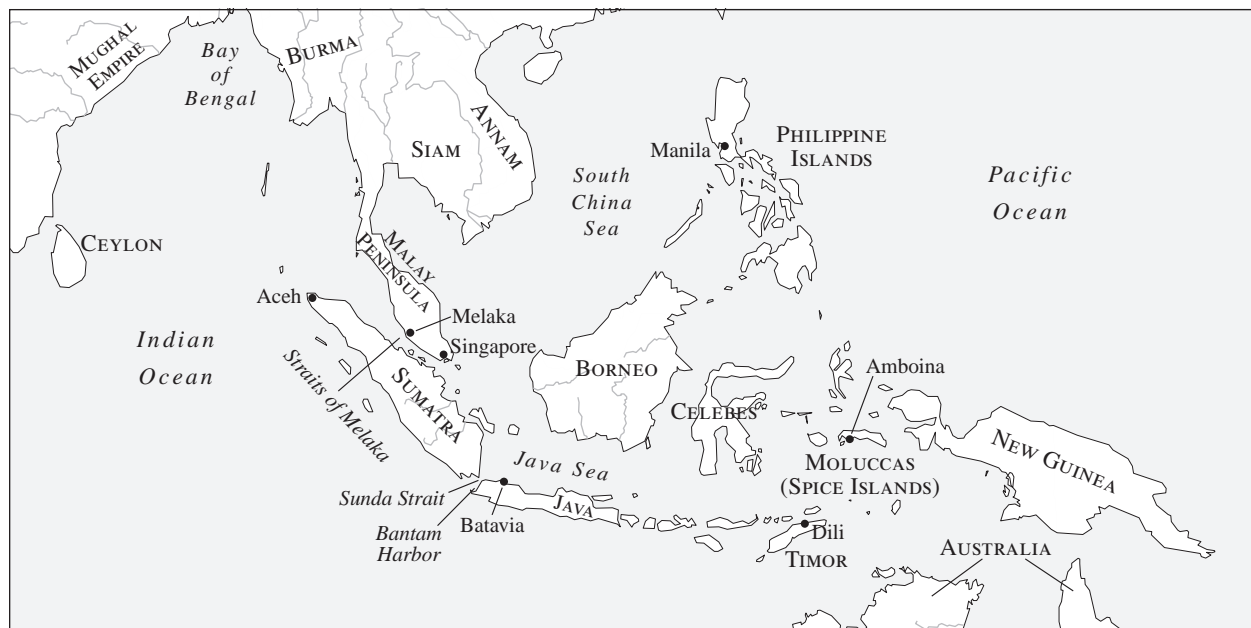
The Southeast Asian cluster of islands now known as Indonesia had long been the primary source of spices for Europe. The islands of the Moluccas were called the Spice Islands, and much of the European Age of Discovery during the sixteenth century involved European efforts to find sea routes to the Moluccas to obtain advantages in the spice trade. In 1511, the Portuguese established the first secure European foothold in the Spice Islands when Malacca fell to Portugal.

The Netherlands, along with Belgium and Luxembourg, had been ruled by the distant king of Spain until the end of the sixteenth century. While still throwing off Spanish control, Holland especially, as the dominant

Dutch province, enjoyed rapid economic growth because of its access to the fishing territory of the North Sea and its central location along the trade routes of Europe. The strong Dutch economy helped the nation expand its shipping and trade economy to the area of the East Indies (Indonesia). In 1602, the Dutch established the Vereenigde Oost-Indische Compagnie (United East India Company), better known as the Dutch East India Company, to trade in the East Indies and to help secure wealth for the continuing struggle against Spain for Dutch independence. Although the Portuguese, Spanish, and other Europeans were active in the islands of Southeast Asia, the Dutch and the English became the primary competitors for control of the region.

Within Indonesia, local empires were expanding and, like the Europeans, trying to control trade and establish monopolies. The small kingdom of Banten (Bantam), founded in the mid-sixteenth century at the northwestern end of the island of Java, engaged in a series of wars and established control over some of the pepper-producing regions. As a result, Banten became a major pepper port. Bordering Banten, a Muslim ruling class took over central Java in 1600 and founded the kingdom of Mataram. Mataram sent out raiders, also attempting to take control of the profitable sea trade of the islands. In eastern Indonesia, the kingdom of Gowa had made itself the center of a loosely tied empire and a great trading power.

SOUTHEAST ASIAN TRADING REGION



Mercantile policies brought the Dutch into Southeast Asia, putting the Dutch in contact with Southeast Asian powers who had similar monopolistic goals. This meant that the Europeans would not simply trade with the people of the Asian states, but would compete with the Asian rulers for the domination of commerce. At the beginning of the seventeenth century, the Dutch established a headquarters at Jacatra (Jakarta), on the northern coast of Java between Banten and Mataram. The ruler of Jacatra was a vassal of Sultan Abul Mafākhir of Banten. In 1617, Abul Mafākhir tried to expel the Dutch by laying siege to the European camp.

England also entered the competition for control of the spice trade in much the same way as the Dutch. Queen Elizabeth I granted a charter to the English East India Company in 1600. This brought England and Holland into fierce competition for spices. The Dutch tried to force local rulers to grant monopolies to their own company, and the Dutch called the English “smugglers” for attempting to set up trading posts.

Abul Mafākhir attempted to make use of the English-Dutch competition by encouraging the English admiral Sir Thomas Dale to take part in the attack on the Dutch camp outside Jacatra. Dale drove away a Dutch fleet under the command of Jan Pieterszoon Coen. Dale’s forces were about to take the Dutch camp when soldiers of Banten arrived, took over Jacatra, and forced the English to leave. Although Abul Mafākhir wanted to get rid of the Dutch, he did not want to replace them with other European competitors. In May, 1619, Coen returned with a larger fleet, drove the Banten troops away, and destroyed Jacatra. The city was renamed Batavia, and it became the center from which Holland established its rule over the islands of the region. Coen became one of the most important Dutch figures in the region, serving as governor-general twice, from 1619 to 1623 and from 1627 to 1629.

After securing Batavia, Coen led an armed expedition against the Banda Islands, the world’s primary producers of nutmeg and mace, in 1621. The people of the Banda Islands had a contract to sell exclusively to the Dutch, but they also had been trading with the English. Coen took the Banda island of Lonthor, killing or exiling most of its inhabitants. He returned to the Netherlands in 1623 to serve as head of the Dutch East India Company. After returning to Batavia four years later for his second term as governor-general, he defended the Dutch headquarters against two sieges by the ruler of neighboring Mataram, in 1628 and 1629.

In eastern Indonesia, the Gowa kingdom was an obstacle to Dutch attempts to create a monopoly and end

smuggling. Sultan ‘Ala al-Dīn, the ruler of Gowa until 1639, worked with traders from Asia and other European nations to undermine Dutch efforts to impose a trade monopoly. From 1615 until 1637, the Dutch East India Company and Gowa were in a state of sporadic warfare. In 1637, and again in 1655 and 1660, the Dutch and Gowa signed treaties. After 1660, though, the Dutch joined together with the Bugis prince Arung Palakka, a rebellious subject of the Gowa Empire. With the defeat of Gowa, the Dutch had eliminated most of the major hindrances to establishing a spice monopoly, although the subjugation of what would become known first as Dutch East India and then Indonesia would be a long process.

SIGNIFICANCE

The quest for monopolies of profitable goods and the surplus of wealth created by government efforts to increase national treasuries created capital for investment. Surplus wealth, which paid for large military forces in Western European nations, made possible European domination of other parts—and peoples—of the globe, leading to the establishment of European colonialism.

The Dutch gained control of the Spice Islands and the surrounding region, and out of this region came the nation of Indonesia. Other nations in Southeast Asia that were initially seeking spices seized other territories, creating other nations. To the north, much of the long southern peninsula of Southeast Asia fell under the English and became Malaya (now called Malaysia). To the west, the Spanish held on to islands they had taken in their quest for the spice market in the late sixteenth century, and these islands became the Philippines.

—Carl L. Bankston III

FURTHER READING

- Magnusson, Lars. *Mercantilism: The Shaping of an Economic Language*. New York: Routledge, 1994. Magnusson looks at the development of mercantile theory and practice. Chapter 4 is devoted specifically to seventeenth century developments.
- Ricklefs, M. C. *A History of Modern Indonesia Since c. 1200*. 4th ed. Stanford, Calif.: Stanford University Press, 2001. Part 2, “Struggles for Hegemony,” explores the establishment of colonial power by the Dutch East India Company in the seventeenth century. Includes excellent maps.
- Taylor, Jean Gelman. *Indonesia: Peoples and Histories*. New Haven, Conn.: Yale University Press, 2003. A general history of Indonesia. Chapters 5 and 6, on the entry of Europeans and on the Indonesian sultanates,

deal directly with economics. Scattered throughout the book are capsules summarizing key topics.

SEE ALSO: 17th cent.: The Pepper Trade; Dec., 1601: Dutch Defeat the Portuguese in Bantam Harbor; 1602-1613: Japan Admits Western Traders; Mar. 20, 1602: Dutch East India Company Is Founded; Beginning Spring, 1605: Dutch Dominate Southeast Asian Trade; 1606-1674: Europeans Settle in India; Apr. 29, 1606: First European Contact with Australia; 1609:

Bank of Amsterdam Invents Checks; 1609: China Begins Shipping Tea to Europe; Jan. 14, 1641: Capture of Malacca; Apr., 1652: Dutch Begin to Colonize Southern Africa.

RELATED ARTICLES in *Great Lives from History: The Seventeenth Century, 1601-1700*: Piet Hein; John IV; Maurice of Nassau; Michiel Adriaanszoon de Ruyter; Abel Janszoon Tasman; Maarten Tromp; Zheng Chenggong.

17th century

BIRTH CONTROL IN WESTERN EUROPE

Historians and demographers believe that seventeenth century individuals in Europe understood the ramifications of large families during demographic crises and the risks to women of multiple pregnancies. Thus, couples used coitus interruptus, abstention, abortion, potions, condoms, prolonged lactation after the birth of a child, late marriage, and other methods of birth control.

LOCALE: Western Europe

CATEGORIES: Health and medicine; biology; historiography; cultural and intellectual history

SUMMARY OF EVENT

Modern historians have debated the idea that premodern peoples employed primitive forms of birth control. Many historians working in the 1960's and 1970's viewed any practice of contraception prior to the nineteenth century as unimaginable. Discussions related to premodern contraceptive behavior became tied to larger examinations of religious attitudes, sexual conduct, gender relations, family structures, and demographic fluctuations.

Using these avenues of research, historians gradually came to agree that rudimentary forms of birth control, including coitus interruptus, abstention, abortion, herbal potions and lotions meant to inhibit sexual ability, primitive condoms, prolonged lactation after the birth of a child, and late marriage to reduce fecundity were all forms of contraceptive technologies employed consciously in the seventeenth century to limit family size. E. A. Wrigley, a demographic and economic historian, has argued that the English in the sixteenth and seventeenth centuries limited family size by coitus interruptus, abortion, and infanticide, whereas Lawrence Stone, an early modern historian, determined that the English no-

bility was using some methods of birth control by the mid-seventeenth century.

Much contemporary evidence exists that premodern people practiced birth control. Catholic priests in the early Middle Ages, for example, issued prohibitions against coitus interruptus, popularly known as the "sin of Onan" from a story in the book of Genesis in which Onan "spilled his seed" instead of potentially impregnating his wife, Tamar. Cultural and medical historian Angus McLaren has argued that the sheer number of premodern penitentials referring to the sin of Onan undermines the argument of contraceptive ignorance. He further postulated that the growth of printing during the Reformation period and the publication of Bibles in the vernacular probably augmented general knowledge about coitus interruptus. In addition, there is some indication that couples may have practiced anal intercourse as a preventive measure against unwanted pregnancy. While anal intercourse was certainly viewed as a serious sin in the seventeenth century, it was not associated exclusively with homosexuality. Priests, pastors, and judges in the period discussed sodomy as an offense that both men and women might commit.

Knowledge of birth control methods in the seventeenth century was drawn not just from biblical sources but from ancient, medieval, and Islamic texts as well. Physicians in the Greek, Roman, and Islamic worlds wrote about contraception, and this knowledge was well known in the early modern period. Herbals and medical manuals in the sixteenth and seventeenth centuries reprinted age-old recipes that included oral potions meant to induce abortion, penis ointments used to promote abstinence, and recommendations for postcoital exercise. Oral contraceptives made from different combinations

of ingredients, such as pepper, woodbine, rue, hemp, cumin, calamine, radish root, and castor oil, were meant to dampen the appetite for sexual intercourse.

Another form of abstinence involved refraining from sexual relations during certain months of the year. Demographers have argued that this was a conscious effort by agrarian peoples to limit births during the summer and early fall, when labor needs on the farm were most critical. Condoms made from animal bladders were also available to wealthy men in the seventeenth century. Historians, additionally, have identified a largely female subculture that disseminated knowledge about contraception. Midwives and wise women were familiar with techniques to prevent unwanted pregnancies and bring about abortions even though the seventeenth century midwife's oath included a statement against giving abortifacients.

Angus McLaren noted that early modern women secured abortions by magical, physical, pessary, and herbal means. Magical means might include a spell that could reverse a conception or involve an amulet to bring on a miscarriage. Physical means referred to bleedings, beatings, and vigorous exercise. Many of these recommendations actually were written in medical texts to reverse amenorrhea and prevent sterility, but remedies devised to restore menstruation might also be used to induce abortion. Pessaries, often made of iris root, almonds, or roots of lilies and sometimes mixed with vinegar, also were placed inside the vagina to induce abortion. Finally, women also used toxic and nontoxic substances in herbal potions to end unwanted pregnancies. The three most common abortifacients were pennyroyal, ergot of rye, and, the strongest, savin. In the seventeenth century, many women believed that an abortion was neither a sin nor immoral if it occurred before the "quickening," around the fifth month of pregnancy, when mothers become aware of fetal movement.

Dorothy McLaren, a historian of women's history, underscored that women in the seventeenth century knew of the contraceptive effects of frequent breast-feeding. She examined female marital fertility patterns in women of the upper class as well as the lower class in the seventeenth century and found that wealthy women who used wet nurses were more fertile than less wealthy women who breast-fed their own children. Prolonged breast-feeding produced amenorrhea of lactation in early modern women, making it harder for them to conceive and thus allowing them some mark of forethought in attempts to plan family size. Breast-feeding women tended to reproduce every twenty-four to thirty

months. This allowed women to space births over the course of their reproductive years. Wealthy women who used wet nurses, however, tended to have larger families because they became pregnant every twelve to fifteen months.

Recent statistical studies on northern European society in the seventeenth century also reveal one final observation of past contraceptive behavior. Wrigley and other members of the Cambridge Group for the History of Population and Social Structure developed an innovative technique called "family reconstitution" to study early modern European population shifts. Family reconstitution involves linking data drawn from parish records to reconstitute fertility and death rates for any given period. Rates of illegitimacy, premarital pregnancy, and family limitation practices can also be determined. These findings reveal a northern European marriage pattern predicated on late marriage, usually age twenty-five to twenty-seven for women and twenty-seven to twenty-nine for men. Late marriage was an especially effective form of premodern birth control that allowed for the adjustment of fertility to changing economic conditions. The later a woman married, the less time she spent in the childbed or birthing chair, thus reducing the number of pregnancies she experienced in her lifetime. Late age at marriage was not popular, however, in southern Europe, where women tended to marry between the ages of seventeen and nineteen.

SIGNIFICANCE

Twentieth century historical and demographic research reveals that people in seventeenth century Europe had a number of contraceptive options that they could pursue. The idea that they were ignorant of various aspects of reproduction and their abilities to prevent conception, affect the outcome of conception, or both is no longer tenable. While some of their methods of birth control were both crude and ineffective, others offered viable and successful means of limiting family size. This research shows that seventeenth century Europeans had real agency when it came to reproductive decision making and underscores that they did not always abide by religious strictures that linked intercourse with procreation only. Their behaviors indicate a willingness to use "family spacing" technologies that decreased fertility and allowed women more control over their bodies.

Some scholars have indicated, moreover, that even the more crude abortion potions, bloodletting regimes, and exercises might have been quite effective in the seventeenth century when pregnancies overall were more

precarious because of diet and poor standards of living and miscarriages were much more commonplace than today. The most significant decline in fertility before the advent of the contraceptive pill occurred in the modern period between 1870 and 1920 in northern European urban centers. Nonetheless, Angus McLaren points out that this decline was based not on the development of new contraceptive knowledge or techniques but on increased use of methods that were already well known and employed in the seventeenth century.

—S. Annette Finley-Croswhite

FURTHER READING

McLaren, Angus. *A History of Contraception from Antiquity to the Present Day*. London: Basil Blackwell, 1990. Offers a key chapter on early modern contraceptive behavior.

_____. *Reproductive Rituals: The Perception of Fertility in England from the Sixteenth Century to the Nineteenth Century*. New York: Methuen, 1984. The author argues persuasively that premodern people employed rudimentary contraceptive practices.

McLaren, Dorothy. "Marital Fertility and Lactation, 1570-1720." In *Women in English Society, 1500-1800*, edited by Mary Prior. London: Methuen, 1985. This article argues that lactation amenorrhoea was a seventeenth century contraceptive "technology."

Stone, Lawrence. *The Family, Sex, and Marriage in England, 1500-1800*. London: Weidenfeld and Nicholson, 1977. Stone argues that marriages were loveless before the eighteenth century. He also discounts knowledge of contraception by the majority of the population before 1700. Current historians reject this thesis.

Wrigley, E. A., et al. *English Population History from Family Reconstitution, 1580-1837*. New York: Cambridge University Press, 1997. A major work exploring the logic between fertility and mortality.

SEE ALSO: 17th cent.: Advances in Medicine; 1689-1694: Famine and Inflation in France.

RELATED ARTICLES in *Great Lives from History: The Seventeenth Century, 1601-1700*: Louyse Bourgeois; Justine Siegemundin.

17th century

EMERGENCE OF LUBA GOVERNANCE

Institutions of royalty among the Luba of central Africa were among the earliest and most influential political traditions in medieval and early modern Africa, marking the first centralized state in the Congo region.

LOCALE: Upper Kasai River area, Democratic Republic of Congo

CATEGORIES: Government and politics; expansion and land acquisition

KEY FIGURES

Nkongolo (fl. seventeenth century), a legendary magical hunter, possible founder and then king of Luba

Mbidi Kiluwe (fl. mid-seventeenth century), a legendary magical hunter, whose son Kalal Ilunga was threatened with murder by King Nkongolo

Kalal Ilunga (fl. late seventeenth century), son of Mbidi who overthrew Nkongolo after he was threatened with death by the king

Mwine Kadilo (fl. early eighteenth century), Luba king
Ilunga Sungu (fl. late eighteenth century), grandson of Mwine, and Luba king, r. 1780-1810

SUMMARY OF EVENT

The Luba political system emerged after the fifteenth century among peoples of the grasslands of central Africa, on the shores of Lake Kisale, near the upper Kasai, a tributary of the Congo River. The founders of the Luba kingdom were probably immigrants from the north who spoke a language of the Bantu family. Settlers were initially drawn to the region by the opportunities for fishing in the marshes and streams.

By 1000, the economy of the region was expanding, with fishing communities being joined by farmers who raised sorghum, beans, and millets, and domesticated chickens and goats. The area had significant deposits of iron and salt, which were traded with neighbors who lived downstream. In addition to food production, hunting remained an important dietary supplement as well as a source of prestige for experts.

Economic diversification encouraged significant population growth, which in turn allowed for the social stratification that resulted in the emergence of the Luba kingdom. This is reflected in burials in the region, which by 1000 include copper grave goods, signifying the emergence of individuals with elite status. Since copper

is not found in the immediate vicinity, its appearance likely means that trade existed with the mineral rich regions to the south. This suggests that by 1000 a political hierarchy had developed to deal with the challenges of allocating land and water resources, and to protect and foster commerce. Flood-plain agriculture and fishing both necessitated a degree of economic specialization and political centralization that encouraged the emergence of “big men,” or authorities, who could organize and protect access to natural resources. Commerce also flourished best in areas where local leaders could assure the protection of traders and trade routes. Political authority fell naturally to religious leaders, those members of society who maintained connections to the ancestors and to the spirit world. Thus, the early Luba rulers successfully joined religious prestige with political power.

Luba oral traditions attribute the emergence of their political system to the conflict between their first ruler and a magical hunter. The first Luba king was Nkongolo, a mythical figure whose name means rainbow. Remembered as a tyrannical and barbarous ruler, Nkongolo and his people became civilized only with the arrival of a magical hunter named Mbidi Kiluwe, a foreigner who attempted to tutor the king. The two men quarreled, leading Mbidi to leave, but not before he had married and impregnated two of the king’s sisters, each of whom bore sons: Kalal Ilunga and Kisulu Mabele. Suspicious of the stranger’s children, Nkongolo tried to kill Kalal Ilunga, who escaped and returned to his father’s village. Kalal returned with an army and overthrew the tyrannical Nkongolo.

This origin myth hints at the important political transformations that took place among the Luba after 1000. Socially stratified chiefdoms appear to have merged into a unitary state sometime during the fourteenth century. During this era, early Luba kings combined existing social institutions with novel political concepts to create a dynamic royal institution. Rulers over a relatively large population, and wealthy in salt and iron resources, the Luba kings established a confederation of tributaries over a wide swath of the eastern savanna, tributaries that recognized the authority and legitimacy of the Luba kingdom.

The Luba royal clan drew legitimacy from their founding myth, and the throne was available only to those who could claim to be descended in a line of male relatives from Kalal Ilunga. Because the great ancestor was believed to have been invested with magical powers, Luba kings also claimed to rule by divine right, which

was associated with an inherited magical property called *mulopwe*. However, all male members of the royal family were expected to rule as chiefs on behalf of their monarch, and the claims of Luba kings did not prevent weak or unpopular rulers from being challenged by rivals. To administer the kingdom, Luba rulers relied on members of the royal family as well as secret societies, social organizations that probably predated the rise of the monarchy and used to monitor the chiefs and their domains.

From its homeland, Luba influence expanded to the north and south along the trade routes linking the rain forest to the north with the copper belt of the southern savanna. The court grew wealthy from the tribute it exacted from neighboring peoples who accepted the authority of the Luba monarchs. Luba power came less from its military force (which was never very formidable) than from the immense prestige of its ruling dynasty. However, the actual influence of the Luba state was limited by the constraints on population and travel that were a fact of life in the region. The prestige of the monarch and his ability to exact tribute from his subjects diminished the farther one got from the Luba center. To assert their authority, Luba kings used a system of spies, administrators, and military men to keep its tributaries in line. Parties of warriors were sent by the king as a last resort to coerce tribute out of recalcitrant village leaders. Such parties also played an important role in disseminating Luba traditions into new regions.

Little is known about the early expansion of the Luba kingdoms. In approximately 1700, the first major expansion of one of the kingdoms began, led by King Mwine Kadilo. Upon his death, after a protracted succession dispute, this ruler’s grandson Ilunga Sungu emerged as the ruler of the greatest Luba state. His raids expanded the wealth and authority of the Luba throughout the region. Some historians see the rapid Luba expansion of the seventeenth and eighteenth centuries as part of a “new” Luba kingdom brought about in part by a shift from matrilineal to patrilineal descent among some Luba communities. Luba political expansion reached its apex in the nineteenth century, and then the Luba rulers fell victim to the encroachment of Arab-Swahili raiders from the East African coast.

SIGNIFICANCE

The emergence of Luba political institutions transformed the loosely affiliated farmers and fishing peoples who lived in the upper tributaries of the Congo River basin into the first centralized state in the region. Utilizing novel principles of divine kingship, Luba rulers were

able to take advantage of a rising population and of economic diversification to claim tribute from and authority over the previously scattered peoples of the central African savanna. Luba governance proved easily adaptable by neighboring peoples. Thus, the most important result of the rise of the Luba dynasties was not in Lubaland itself, but in the adoption of Luba political traditions among the Lunda, their southern neighbors.

Under quite different environmental and geographic circumstances, the adaptation and reformulation of Luba kingship by the Lunda helped to create one of the most powerful empires of modern African history. The close connection between Luba and subsequent Lunda political traditions has encouraged scholars to speak of a Luba/Lunda political tradition. Lunda expansion in turn gave rise to other “copycat” states, such as Kazembe, which lies several hundred kilometers southeast of the Lunda heartland, or the more distant Bemba of Malawi, whose oral traditions also speak of Luba/Lunda origins. Thus, the emergence of Luba governance played a role in the rise of dynastic states throughout the central African savannas.

—James Burns

FURTHER READING

De Heusch, Luc. *The Drunken King: Or, The Origin of the State*. Bloomington: Indiana University Press, 1982. A structuralist comparison of central African oral traditions that treats Luba creation myths extensively.

Edgerton, Robert B. *The Troubled Heart of Africa: A History of the Congo*. New York: St. Martin's Press, 2002. Edgerton provides a thorough and complete

history of the Congo region, from the arrival of the Portuguese in the 1500's through the twentieth century.

Ehret, Chris. *The Civilizations of Africa: A History to 1800*. Charlottesville: University of Virginia Press, 2002. A textbook that relies heavily on linguistics and archaeology in its reconstruction of Luba history and regional influence.

Gondola, Ch. Didier. *The History of Congo*. Westport, Conn.: Greenwood Press, 2002. A survey of Congo's history, covering the Kuba and other kingdoms and peoples. Provides, also, biographical sketches of key figures in the region's history.

Reefe, Thomas. *The Rainbow and the Kings: A History of the Luba Empire to 1891*. Berkeley: University of California Press, 1981. The only monograph devoted entirely to Luba history.

_____. “The Societies on the Eastern Savanna.” In *History of Central Africa*, edited by David Birmingham and Phyllis M. Martin. Vol. 1. New York: Longman, 1983. Reefe continues his examination of the Luba kingdom and other societies of the region.

Vansina, Jan. *Kingdoms of the Savanna*. Madison: University of Wisconsin Press, 1968. The definitive work on state formation in central Africa, by an author of dozens of books on central African precolonial history, art, and politics.

SEE ALSO: Early 17th cent.: Rise of Rwanda; c. 1625: Formation of the Kuba Kingdom; 1644-1671: Ndongo Wars; Late 17th cent.: Rise of Buganda.

RELATED ARTICLE in *Great Lives from History: The Seventeenth Century, 1601-1700*: Njinga.