
DOCTOR!
LOOK BEHIND YOU
please look after this intern

Doctor! Look Behind You

A Companion for Medical Students

Editors: Yvonne Cossart and Mollie Pegler

CONTENTS

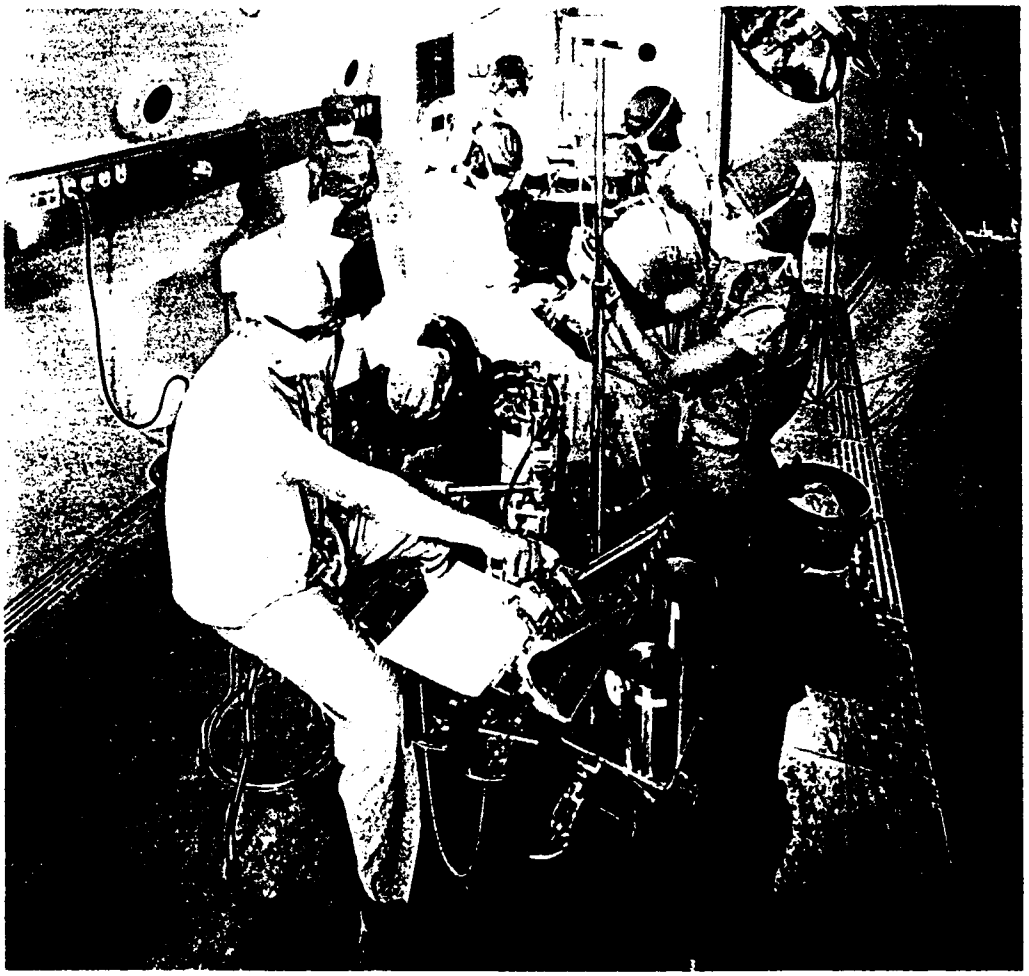
INTRODUCTION

Y. E. Cossart

The phrase "Art is long, but Life is short" encapsulates our situation as individuals in medicine. Our own experience can extend at most to 50 years, whereas the library shelves groan beneath the weight of the myriad of books written by our predecessors. Even the oldest of these records reveal that two millennia ago their writers were indebted to far older undocumented traditions. What are we to select from the past to help us practice medicine today?

Firstly, of course, we need to understand the origin of the techniques that we use and the concepts we employ to diagnose and treat illness and to preserve health. Medicine is continually evolving and within one working life many changes must be assimilated. Knowledge of the background gives perspective to these changes and allows them to be seen as a continuum with both the past and the future.

It is not enough to trace these developments directly through the ages, nor to pay tribute to the famous individuals who have initiated change, as if medicine had a history and philosophy entirely its own and isolated from the world around it. All doctors, past,present and future share the same basic role in furthering the human quest for self-understanding and mastery of the environment, but in different times and in different cultures this role takes many distinctive forms. Study of these patterns provides us with a mirror in which we can see ourselves, and our own problems, more clearly. Medicine is still sometimes described as a "learned profession" in recognition of the value of breadth of understanding in addition to technological expertise for the practising doctor. In the following chapters of this book different authors trace some of the great themes in medicine through the ages and across cultural boundaries. This introduction consists of a series of snapshots of the social and political context of medical practice in the major phases of western history and some comparisons with non-western societies at comparable historic periods.



The Twentieth Century

Our own century is drawing to a close. When it began the countries of the world were effectively isolated from each other by distance, and the world had seen only limited armed conflict for over a century. Since then, the two world wars brought the newly powerful United States and Japan on to the world stage, and the political upheavals related to the wars have resulted in unprecedented population movements. Outrage at the treatment of Jews in Europe under Hitler, as well as the treatment of political prisoners under numerous oppressive regimes has led to attempts to initiate world governments with responsibility amongst other things(!) for health. For the first time health is being included as a human right. This has added a new dimension to medical practice in which the State assumes increasing involvement.

The twentieth century has seen the rise and fall of communism which isolated China, the USSR and their satellites from the rest of the world for many decades. Resurgence of religious fundamentalism in some countries threatens to reverse the trend towards more peaceful co-existence of different cultures within the global village.

The technological capability which has produced aviation and telecommunication as well as the atomic bomb, has also brought great changes to the options for treating of many diseases. The development of antibiotics and vaccination has had very far reaching effects on health in all countries and one consequence of the control of infectious diseases has been explosive population growth. The world population has grown from 1, 590,000,000 to 5, 384,000,000 over the century, and a new industrial revolution is now proceeding in the non-western world. The rapidly growing cities of the third world present social problems of great magnitude, but many factors have limited the success of the birth control pill in limiting the size of families in the poorest and most over populous countries. One of these is the status of women who are only gradually becoming effectively enfranchised.

The memories of our parents and grandparents, and the old-fashioned or out of date objects in our homes give life to the written record of recent times, and there is little difficulty in understanding their meaning, or in imagining how people thought and acted. The problem is to decide what is important, and it is very likely that you would like to alter this account of the twentieth century to fit in with your own views and experience.

	POLITICS	PHILOSOPHY	ARTS
1901	Queen Victoria dies	Swarmi Vivekanand	Art Nouveau movement
1911	Sun Yat Sen deposes Manchu dynasty		Russian Ballet
1914-18	World War I	Bertrand Russell	Conrad
1917	Russian revolution (Lenin)		DH Lawrence
1919	League of Nations		Picasso, Cubism
1923	Attaturk modernise Turkey	Ghandi	Bauhaus, Pavlova
1928-32	Great Depression	Mein Kampf(Hitler)	Gropius, Jazz,
1939-45	World War II	Carl Jung	Stravinski
1945	The Atom Bomb The United Nations	Maynard Keynes Einstein	Cinema Surrealism
1947	Indian Independence - Nehru	R. Steiner	Dali
1948	Apartheid in S. Africa	Camus	
1948-62	The Cold War, Iron Curtain	Jean Paul Sartre	Patrick White
1949	Peoples Republic of China, Mao	Albert Schweitzer	Lloyd Wright
1955-68	Civil Rights campaign - USA	M Luther King Mao's Red Book	Rock and Roll de Beauvoir, H. Moore
1957-1969	Russia's Sputnik (Space) USA - Man on Moon		The Beatles Modernism
1957-70s	Independence in African States	Wittgenstein	Abstract expressionism
1964-75	Vietnam War	Foucault	Andy Warhol
1970-80	Women's Movement		Germaine Greer Gloria Steinham
1980-	African famine Green Movement	David Suzuki	Salman Rushdi
1989-92	Perestroika Berlin Wall - down)	Stephen Hawkings Paul Davies	

The Nineteenth century.

As time becomes more remote this feeling of immediacy is lost, and even though we can read their words, see their photographs and walk in the streets and visit the institutions they knew, we find it much more difficult to understand how our more distant predecessors thought and why they behaved as they did.

Between the French Revolution (1789) and the outbreak of World War 1 (1914) the industrial revolution transformed Europe. Manufacturing replaced agriculture as the main source of wealth and the countryside progressively lost population to the rapidly growing cities. The novels of Jane Austen(1775-1817) give a view of upper-class life in the countryside at the beginning of this period, while those of Charles Dickens (1812-70) show the high cost of change for the new urban poor.

There was also gradual extension of the right to vote, as landholding was discarded as the main qualification , but this process of democratisation was accompanied by increasing nationalism. The nineteenth century saw Britain, France and Germany at the height of their imperial power, their industrialised might giving them supremacy over much of Africa and Asia, though for much of the century China and Japan maintained effective isolation from European influence.

The large scale trade links between East and West brought intellectual as well as commercial contact between Europeans and other cultures. It was also an age of Christian evangelism, and European missionary doctors brought Western medicine into many Asian and African countries for the first time. The need to maintain the health of European troops and seamen stationed in these areas also encouraged the development hygiene and what Europeans called "tropical" medicine. Florence Nightingale's achievements during the Crimea War (1854-6) demonstrated the need for changes in the administration of hospitals while the American Civil War (1861-5) provided a preview of the destructive effects of modern weapons, and at the same time showed that even this carnage on the battlefield still claimed far fewer lives than disease amongst the troops.

The sanitary movement attempted to achieve healthy living conditions both "at home" and "abroad" through control of environmental pollution, and established the principle of governmental responsibility for maintaining the availability of clean air and water. The movement towards privatisation of these services in the last decades of the 20th century has now brought this principle into question. International Sanitary Conventions were held in response to repeated pandemics of cholera..

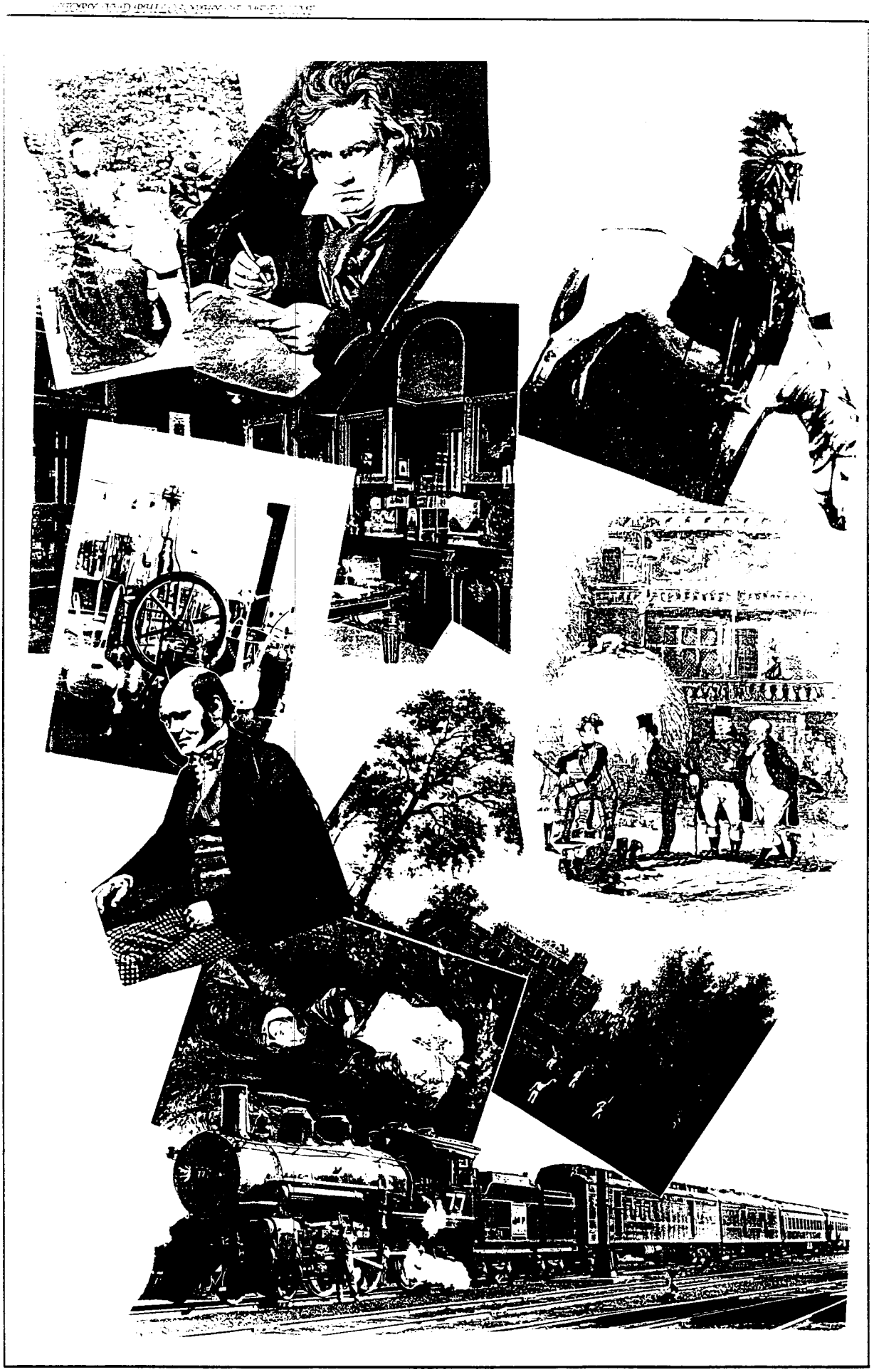
Britain was the dominant world power and Queen Victoria reigned for such a large part of the century that the word "Victorian" is used to describe the spirit of the time. Manifest growth in wealth and the improved standards of education and day-to-day living for most people engendered self-satisfaction and optimism based on the power of technology to achieve "progress". Social conventions, mainly based on narrow interpretation of the Christian scriptures were rigidly observed by the emerging British middle class. Individuals who declined to adhere to the teachings of the Church of England in England (or the Catholic Church in most of the rest of Europe) were denied university education and hence entry into many professions. The first secular Universities, including for instance University College in London, and the University of Sydney, were established to remedy this situation, but only at the end of the century were women admitted as students.

Nineteenth century technology which developed steam power for railways and shipping, the telephone and phonograph, photography and electric lighting

relied heavily on the theories in the physical sciences developed during the Age of Enlightenment, but the new science of biology threatened the tenets of established religion. Darwin concluded that both the fossil record and direct observations of adaptation to changing environmental conditions contradicted the prevailing literal interpretation of the biblical account of creation. The resulting confrontation between Science and the Church polarised intellectual life into "two cultures". The subsequent rift between science and the humanities has had an enduring effect on medicine which by its nature must bridge the two. Freud and other pioneers of psychiatry also upset many firmly held beliefs about character and intelligence.

These new ideas had their main impact on medicine in the twentieth century, but the many technological improvements ranging from the stethoscope to X-rays and especially the identification of many of the bacteria responsible for infectious diseases put clinical observation and treatment on a much firmer empirical basis. Were we to be transported in some time machine into nineteenth century Europe we would know pretty well how to manage day to day life, and we would even be able to read and understand the medical textbooks. If we were to want to practice medicine in England we would require formal qualifications and the drugs we prescribed would have to conform to the standards laid down in the British Pharmacopoeia However, we would find ourselves impotent in the face of pneumonia, tuberculosis and even appendicitis . 3 out of every 10 children died before the age of five.

	POLITICS	PHILOSOPHY	ARTS
1776	American Revolution (Washington)	Pashe	Chardin
1788	First Fleet	Humbolt	Romanticism: Beethoven Schiller Wordsworth
1789	French Revolution	Goethe	Neoclassicism
1792-1815	Napoleon Trafalgar - Nelson Waterloo - Wellington		Lord Byron Shelley
1818	Zulu Empire develops		
1820-	Bolivar frees Latin America		Constable Keats
1821	Greece free from Ottomans		
1832	Britain - Great Reform Bill	Wilberforce	
1838	Boers defeat Zulus		
1837-1901	Reign of Queen Victoria	Mill	Pre-Raphaelites
1840's	Factory Acts		Turner
1839-42	Opium Wars (China vs Britain)		
1848	Revolutions in Europe	Karl Marx	Chopin
1854-6	Crimean War (Nightingale) (Russia vs Turkey &Allies)	Malthus Nietzche	Lizt
1857	Indian Mutiny		R. Browning, E.Barrett Browning
1850-64	China Taipin Rebellion	Darwin	Dickens
1868	Suez Canal Open		Zola
1860-	Unification of Italy (Garibaldi) and Germany (Bismark)		Goya Tennyson
1861-65	American Civil War (Lincoln) Emancipation of Slaves		Tolstoy Grimm Bros
1860-90	French Indo-China	Ruskin	Arts & Crafts Movement William Morris
1880-1914	European domination of Africa Women's Suffragette Movement		The Waltz Strauss
1800-1900 Exploration	America - Lewis & Clark Africa - Livingstone, Stanley Australia - Hume, Sturt, Burke & Wills, Leichhardt		Music Halls French Impressionists Dame Nellie Melba



The Age of Enlightenment

If Britain was the dominant world influence in the Nineteenth century, the Age of Enlightenment belongs to France. Its tone was set by the French court, where the absolute monarchy encouraged innovation and achievement in all the arts and sciences. Music, ballet and theatre all flourished, and philosophy embraced the physical and natural sciences as well as a search for definition of the nature of man.

The universe and man himself were both regarded as intricate machines which could be analysed and understood in mathematical terms. This approach was brilliantly successful in astronomy and mapping, but less so in biology. However the passion for collecting and classifying did result in much better delineation of specific diseases. Often when we read case records of this time we can still recognise the disease, and these collections of cases became the basis for the first modern textbooks of medicine. Although the standard of diagnosis was improved, treatment lagged far behind. At this time, however, doctors began to assess the efficacy of treatments administered to a series of patients with the same disease. This led to the transformation of the mediaeval and older "Herbals" into the Pharmacopoeia.

However this cult of "Reason" and the elegance of the participants in high society contrasted with the political and social realities of life for the majority of Europe's growing population. Few could afford the services of a doctor at all, and the social pretensions of rich doctors and their patients were a fertile field for satire.In England the physicians with their Royal Charter maintained an image of intellectual and social superiority above the surgeons and apothecaries who actually provided most of the medical care. Despite the many advances in understanding the anatomy and physiology of the human body, the medical profession was as powerless before the return of Bubonic Plague as the mediaeval world had been.

The facade of social order was assailed by the philosophers who pondered on the nature of man as well as by the growing indignation of a population suffering onerous taxation and arbitrary justice under the inflexible class system. In France this combination of intellectual leadership and popular discontent erupted into the French Revolution (1789). Absolutism all across Europe was threatened. The revolutionary catchcry of "liberty,equality,fraternity" has been used by countless human rights campaigns, even though in France itself the "First Republic" lasted only 15 years before Napoleon declared himself emperor in 1804. The American War of Independence (1775-81) was also inspired by the ideas of the Enlightenment and can be seen both as the beginning of the end of European colonialism and as the stimulus to further development of the British Empire in other continents.

European influence spread to Russia under the influence of Peter the Great but relations between Europe and the rest of the world were not so good: the Turkish siege of Vienna was the furthest extent of the Islamic conquest of Eastern Europe. This conflict brought some intellectual contact - Medicine gained the technique of variolation, and coffee became the fashionable drink.

The division of India and South East Asia into many warring states assisted the establishment of powerful European trading ventures such as the East India Company. These paved the way for political domination. Large scale slave trade from Africa to the Americas flourished for most of the period, along with appropriation of lands and economic bondage imposed on many indigenous people, most notably in the Americas and Africa.

Throughout this period China and Japan maintained a policy of almost total isolation from the rest of the world. This was at the price of stagnation of their

culture, albeit at a high level of artistic and technological sophistication. Ironically Chinoiserie became one of the most powerful influences on European style. Chinese porcelain and textiles were highly prized and widely imitated.

	POLITICS	PHILOSOPHY	ARTS
France 1643-1715	Louis XIV the Sun King Hugeunots	Galileo	Versailles(France) Moliere Bach
Russia 1612-1725	Peter the Great Serfdom	Descartes	
England 1649-66	Civil War, Charles I beheaded Cromwell in power		Milton Pepys
1660-	Restoration of Monarchy Charles II	Newton	Christopher Wren
1688	Constitutional Monarchy (William & Mary)	Hobbes	Defoe Wren
1600-99	Ottomans expand into Europe Oyo kingdom in Africa Rise of Moguls in India	Locke	Taj Mahal (India)
1603-66	Shoguns rule Japan, close borders, forbid travel		
1644	Manchus overthrow Ching dynasty - China open to west	Voltaire	Canelletto Gainsborough
1665-6	Plague and fire in London East India companies flourish		Dr Johnson
1725-74	Clive of India	Rousseau, Kant	Handel
1700 -	Rama I rules independent Siam	Hume	Mozart
1770	Captain Cook discovers East Coast of Australia		

The Renaissance

The Age of Enlightenment retained the intellectual curiosity of the Renaissance, but lacked its excitement and vigour. The rebirth of European culture following the Black Death and its aftermath had two main strands. Firstly the ideas of the classical world of Greece and Rome were rediscovered, often literally from Greek Byzantine sources or through translations which had been made during the mediaeval period in Arabic centres of learning, but also from manuscripts safely kept and copied in the libraries of the monasteries since the fall of Rome. Secondly Europeans began to explore the world. Marco Polo ventured Eastwards overland to China, while Columbus and the Portuguese, Dutch and English navigators opened sea routes around the world. This brought the isolation of the different cultures of Asia, Africa and America to an end.

All the arts flowered, and the Renaissance "ideal man" was both soldier and scholar, artist and scientist, idealist and pragmatist. An educated gentleman would speak several languages, play musical instruments, compose poetry and be prepared to serve the state in battle or politics. These ideas were most fully expressed in Italy during the rule of the Medicis in Florence, but they spread throughout Europe particularly in the universities where intellectual voyages of discovery were propelling scholars into confrontation with the established churches. Copernicus and Galileo showed not only that the world is round, but that the sun, rather than earth is the centre of the solar system. This was the genesis of Columbus' idea to sail westward to China. In medicine the conservatism of the church in forbidding human dissection was challenged, particularly in Padua where anatomy flourished under the powerful protection of the Venetian state which profited from trade with the East.

The spread of ideas throughout Europe during the Renaissance was made possible by the invention of printing, and in medicine this made textbooks widely available for the first time. It also encouraged the spread of literacy and the first popular works began to appear. Many of these were compendia of folk medicine and other advice in "Almanacs". Printing also made the Bible available to all, and this led to questioning off many of the practices of the Church, though not of Christianity itself. Luther led this Reformation movement which split Western Christianity into protestant and catholic branches.

	POLITICS	PHILOSOPHY	ARTS
1400	Inca gold production peaks		
1455-85	Wars of the Roses (England) Caxton printing press		Thomas Malory
1450-	Italian Renaissance Florence, The Medicis Christopher Columbus-Americas		Rabelais Leonardo da Vinci
1460	Songai Empire, West Africa		
1509-1547	Henry VIII Church of England		Michelangelo Raphael
1530	Spanish & Portugese colonies Cortez conquers Aztecs Pizarro conquers Incas		Durer
1547	Ivan the Terrible (Tzar)	Luther	Bible in German & English
1558-1603	Elizabeth I Sir Francis Drake	Erasmus	Shakespeare, Francis Bacon Spenser
1526	Babur (Muslim) conquers India- Moguls Akbar		Rembrandt
1550	Francis Xavier in Japan	Savanarola Bodin	
1560-1650	Religious Wars in Europe		
1571	Battle of Lepanto	Machiavelli	
1582	Hideyoshi ends 100yrs War	Montaigne	

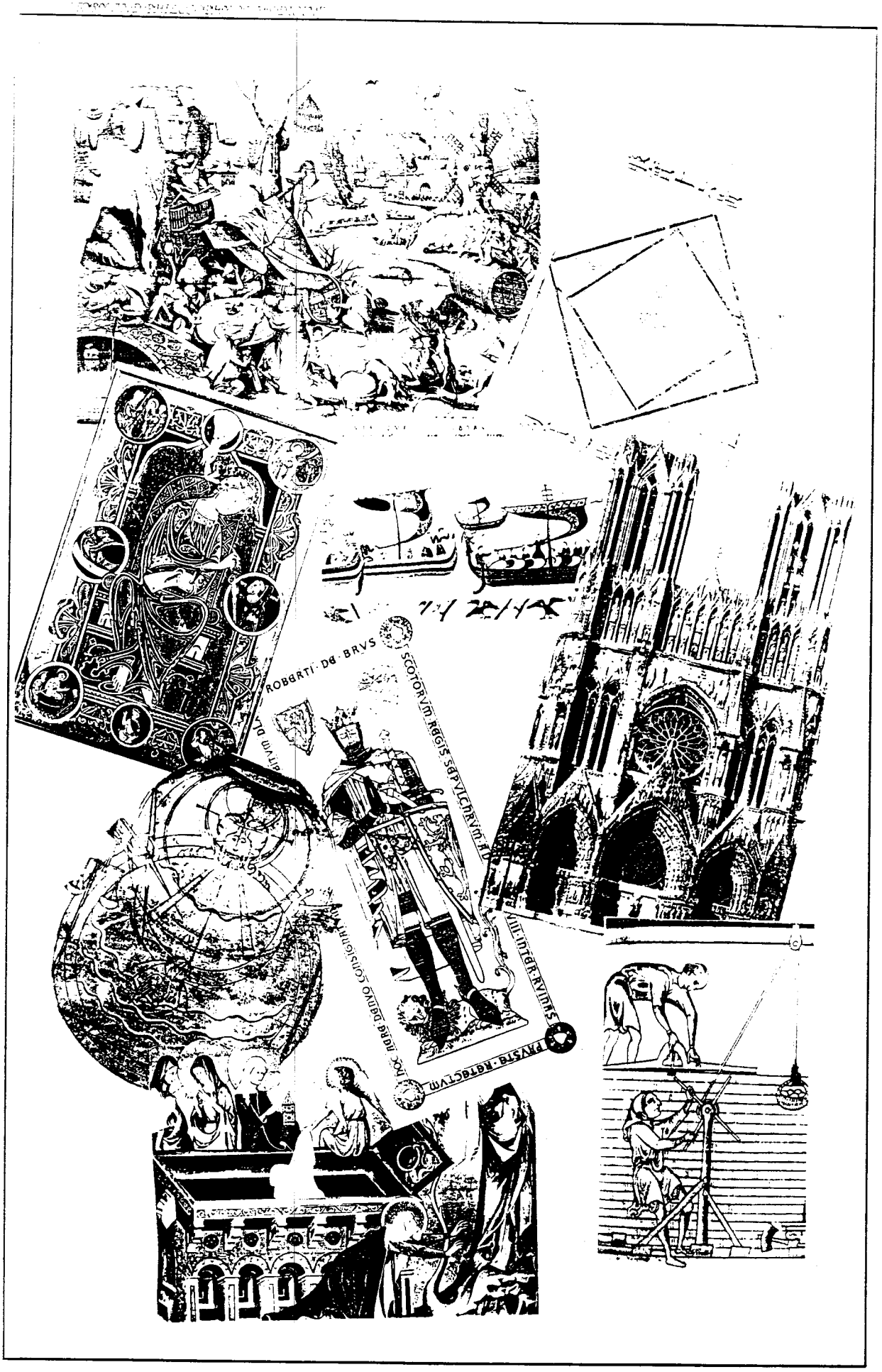
The Middle Ages

The great cathedrals of Europe stand as testimony to the piety and artistry of their builders. Each one consumed most of the resources of generations of its city's inhabitants - a price they were willing to pay in the hope of achieving grace in this life and escaping hell in the next. These cathedrals symbolise the Mediaeval conviction that God demands acts of devotion and homage from all and that He will punish sin with suffering. The cause of sickness was therefore logically sought in an individual's or nation's actions, and a cure was to be found by repentance and the granting of divine absolution. This might be achieved by prayer, acts of charity or by pilgrimage. The relics of the martyred saints were believed to have powers over sin and disease, and the Crusades had their origin in a pious desire to have the most holy Christian relics and sites of all in Jerusalem in Christian hands. The followers of Mohammed also had holy sites in Jerusalem so Islam posed both political and ideological challenges to Europe . Ironically one of the most significant effcts of the Crusades was to severely weaken the surviving Eastern Roman (or Byzantine) Empire, which had been Europes's bulwark against Islam. Constantinople fell to a Turkish Islamic army in 1453.

In Europe the Christian Church provided hospitals as refuges for those "sinners" suffering from disease or destitution Although the prime aim was to minister to the soul, the nuns and monks developed substantial knowledge of herbalism and of the natural history of disease. Outside the Church Alchemy began as a search for the Elixir of Life, and magic and witchcraft remained potent themes in folklore. In England and France, monarchs, ruling by divine right were believed to have the power of healing by the Royal Touch. Throughout the Middle Ages physical needs were regarded as insignificant beside spiritual well-being. In politics, both national and international, religious causes dominated, and the Pope as leader of Western Christendom can be said to have initiated the Middle Ages when he crowned Charlemagne as Holy Roman Emperor on Christmas Day in 800A.D. It was not until the Renaissance that a European monarch (Henry VIII of England) was prepared to defy the Pope.

The gradual growth in prosperity and increasing cultural richness of Europe in the Middle Ages was dramatically reversed by the Black Death. This pandemic of bubonic plague killed almost a quarter of the population and caused a breakdown in social life that took many generations to repair.

	POLITICS	PHILOSOPHY	ARTS
570-631AD	Mohommed	Boethius	The Koran
589	Sui Dynasty unites China		
624	Buddhism state religion of China		
661-750	Rise of Arab Empire		
320-535	Gupta empire in India		
300-600 AD	Mayan Golden Age	St Columba	
618-907	Tang Dynasty		Celtic Illum. Manuscripts
700-950	The Vikings	Venerable Bede	The Book of Kells (Celts)
800	Charlemagne crowned Holy Roman Emperor		
1000	Rise of Samurai		Illuminated Manuscripts
1066	Battle of Hastings William the Conqueror		Bayeux Tapestry
1096	The First Crusade	St Bernard of Clairvaux	
1120-1430	Great Zimbabwe	Peter Abelard Heloise	Chretien de Troyes Geoffrey of Monmouth
1200	Angkor Wat built		Great Gothic Cathedrals
1215	Magna Carta	Moses Maimonides	
1206-27	Genghis Khan conquers East		
1260	Kublai Khan - Marco Polo	Roger Bacon	
1273	Rudolph Hapsburg Holy Roman Emperor		Dante Geoffrey Chaucer
1300	Aztecs construct their pyramids	Thomas Aquinas	
1337-53	The Hundred Years War England vs France	Joan of Arc	
1347-	The Black Death (Plague)		Christine de Pizan
1365-1405	Tamerlaine		Limbourgs- Illum. Manuscripts
1368	Ming Dynasty founded Mongols driven from China		Ming Dynastic Art


ROBERTI · DE · BRVS
SCOTORVM REGIS SEPVLCHRVM
PAVSTA · RETRACTVM
HIC IACET DEVOTVS CONSTANTIA

The European Dark Ages

The fall of the Western Roman Empire removed the administrative structure which had linked the countries of Europe and the Mediterranean for centuries. Anarchy followed, and the Church provided the only effective alternative. The monasteries remained islands of learning and refuge in an impoverished and disrupted Europe. Eastern ("Orthodox") and Western ("Catholic") Churches, already divided by language, (Greek in the East and Latin in the West) took different doctrinal paths and looked to Constantinople and Rome respectively for their leadership.

The Roman Empire

The story of the legendary foundation of Rome in 753 BC by Aeneas and his band of refugees from Troy is told in the Aeneid. Rome grew from a precarious beginning to found and maintain an empire which spread around the shores of the Mediterranean and penetrated as far north as the Scottish border, deep into Africa and west into Asia Minor. The Romans were great administrators with a sense of civic obligation and honour which still influences modern law. Modern highways still follow the routes of the network of roads and bridges which they built to maintain communication between the different provinces of the empire, and their methods of construction were so sturdy that the basic stonework of many bridges, aqueducts, temples and arenas survived the vicissitudes of the European dark ages and the ravages of subsequent development to become present day tourist attractions.

Rome was at first governed by a quasi-democratic system, with effective power in the hands of the great families and a large underclass of free men and slaves. Political rivalries culminated in the seizure of power by Julius Caesar whose own conquests included that of Britain in 55BC and the defeat and annexation of Cleopatra's Egypt. (Cleopatra was the last of the Ptolemaic Dynasty, descendants of Alexander the Great's soldiers). After the murder of Julius Caesar, Rome was ruled by its God-Emperors who wielded absolute power over practically all of the then-known world.

The scale of Roman conquest and colonisation made Rome itself into a relatively tolerant cosmopolitan city. Ideas and customs from its subject people were often embraced with enthusiasm by the Romans, particularly religious cults which flourished simultaneously with the old Roman beliefs, It was the exclusive nature of Christianity which brought the early Christians into conflict with the Roman establishment. The eastern, most populous and wealthiest half of the empire was Greek -speaking. In the arts and sciences, and particularly in medicine, Greeks remained influential. The distinctively Roman contribution lay in the compilation of compendia of knowledge. The works of Galen, himself a Greek, are a good example. The Romans engineering skills were employed to provide clean water supplies to their cities and to erect public baths. Military discipline ensured an elaborate system of health care for the army, including appointment of military surgeons and provision of hospitals

The decline of the Rome began almost as it reached its zenith under Augustus. Successive emperors, some honourable, like Marcus Aurelius some notorious , like Nero, shared the difficulty of maintaining power over such a vast and diverse empire . In the fourth century A.D. , the emperor Constantine founded a new capital at Constantinople (now Istanbul), situated at the geographical centre of his dominions and adopted Christianity as the official imperial religion.This brought Roman influence very much to bear on the organisation of the Church which preserved many of the books of the classical

authors rescued from the great private and public libraries and maintained the use of Latin as a *lingua franca* understood by educated people in Western Europe even after the fall of Rome.

Eventually the army could no longer combat the aggression of the raiding parties of Goths, Vandals and others who overran the Empire from the north and east. Alaric and his Visigoths sacked Rome in 410 AD. The eastern section of the empire, still ruled from Constantinople, and still Greek-speaking, survived for another ten centuries. .

Ancient Greece

Many modern philosophical ideas concerning the nature of the universe and the rights and needs of the individual and the structure of society have their genesis in Classical Greece. The plays, narrative poems and particularly the myths and legends about their Gods and ancestors still speak to us about the meaning of life. This is all the more surprising because Athens, Sparta and the other city- states existed were almost continually at war with each other and with the Persians an other nearby countries. Alexander the Great conquered much of the Middle East including Egypt, but the Greeks were incapable of establishing a stable government to retain their power: his conquests were rapidly divided up by his armies into three large kingdoms centred on Egypt, mainland Greece and Asia Minor and into numerous smaller city-states. Moreover the Greek architectural glories and civilised day- to-day life was built upon the work of slaves.

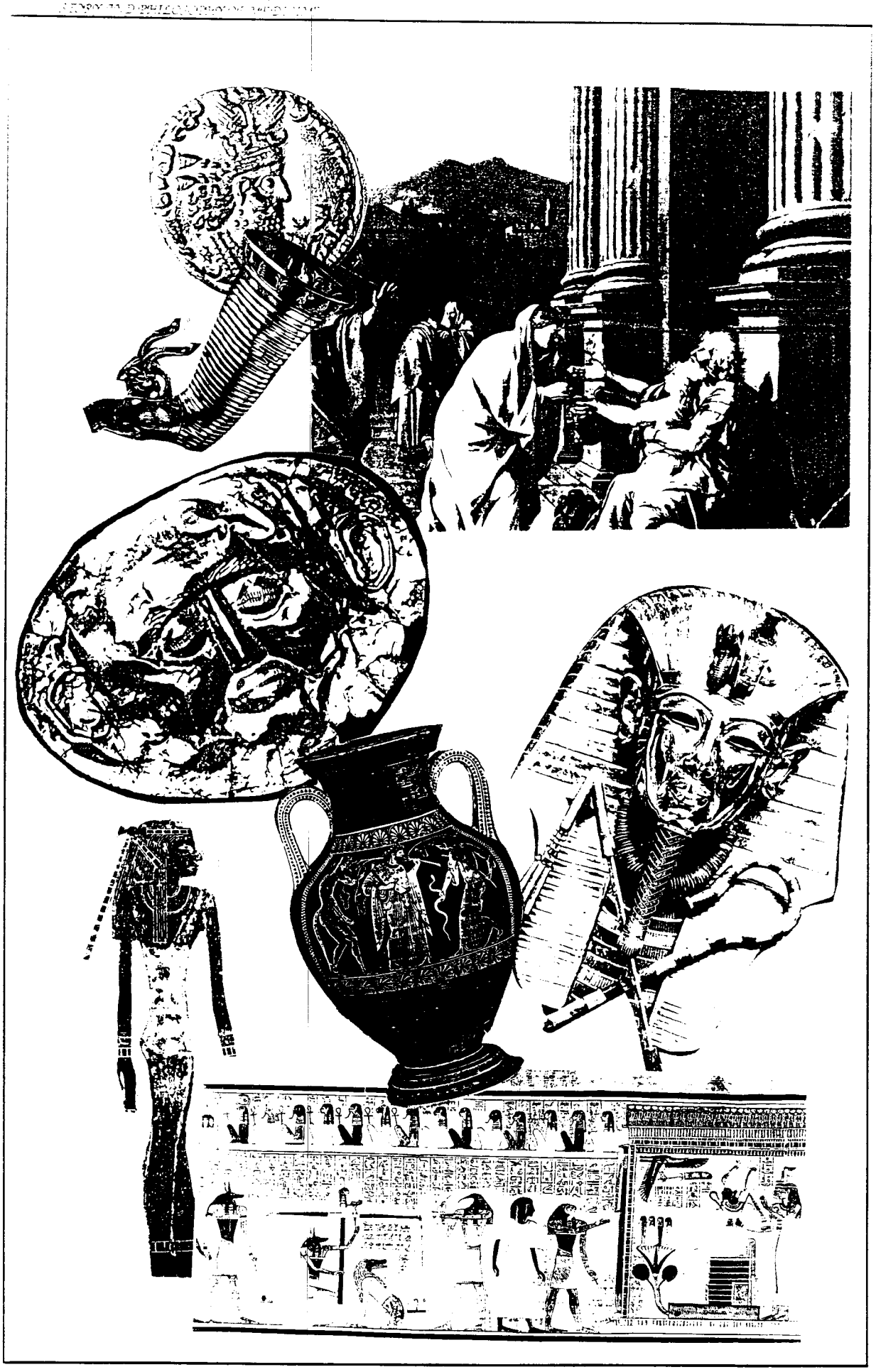
In medicine the Greeks made two giant steps, expressed in the writings of Hippocrates. Firstly they began to look for natural causes and effects in producing disease, and secondly they produced the first clearly recognisable descriptions of diseases and epidemics. These first steps in scientific medicine existed side by side with belief in divine powers of the oracles and priests to treat illness.

Less directly the methods of thought expounded by Greek philosophers like Socrates, Plato and Aristotle began the escape from the power of the supernatural which allowed the development of Western science. The Greek world also encouraged the geographical concentration of scholars and books, for instance in the great libraries at Alexandria and Pergamon.

Ancient Egypt

The pyramids which still stand over their graves show the power and prosperity of the Pharoahs. The grave goods, paintings, and their embalmed bodies provide a picture of life in a self-sufficient society dominated physically by the River Nile and mentally by the cult of the dead. From 3000BC and before Egypt developed an advance technological civilisation with skilled metallurgy, the making of papyrus and the recording of events and ideas in hieroglyphics, as well as efficient irrigation for agriculture. Egypt traded and occasionally made war with her neighbours both in the eastern Mediterranean and in Africa. Her technology was used first by the Greeks and then by the Romans who plundered Egypt for her riches. Although the philosophy of elaborate preparation for the afterlife found little favour in either Greece or Rome, methods of mathematical analysis of the movements of the sun, moon and stars and the concepts of the Egyptian astronomers were absorbed into Greco-Roman thought and were only displaced by Copernicus and Galileo.

	POLITICS	PHILOSOPHY	ARTS
3000BC	Mesopotamia		
2686-2181	Egypt		Pyramids. Sphynx
2000-1450BC	Crete		
1840-609BC	Assyria		
1728-1686	Hammurabi King of Babylon		Stonehenge, Avebury England
1600-1100	Mycenae		
1000 1200	Kingdom of Israel - David Trojan War		King Akhenaton King Solomon
753	Foundation of Rome		
700 600-500	Democracy in Greek City States		Homer Sappho
551	Birth of Confucius	Thales	
546-334	Persian Empire	Buddha	
490	Battle of Marathon (Greeks vs Persians)	Socrates Plato Aristotle	
479-338	Golden Age of Athens		
336-323	Alexander the Great conquers most of known world		
264BC-250AD	The Roman Empire Celts in Britain Queen Boudicca		Celtic metalwork
481-221	Warring State of China liu-Pang founds Han Dynasty		
215	Great Wall of China		Han Dynasty
1-34 AD	Life of Jesus Christ		
274-337 AD	Constantine moves capital of Empire to Byzantium Adopts Christiantiy		
370-476	Barbarians overrun Roman Empire	Neo-Platonists	
410 430	Rome sacked by Barbarians	St Augustine St Patrick in Ireland	
400-	Feudal Japan		
520-631 AD	Constantinople capital of Byzantine Emperors - collapse of Western Roman Empire	St Benedictine Order	Hagia Sophia



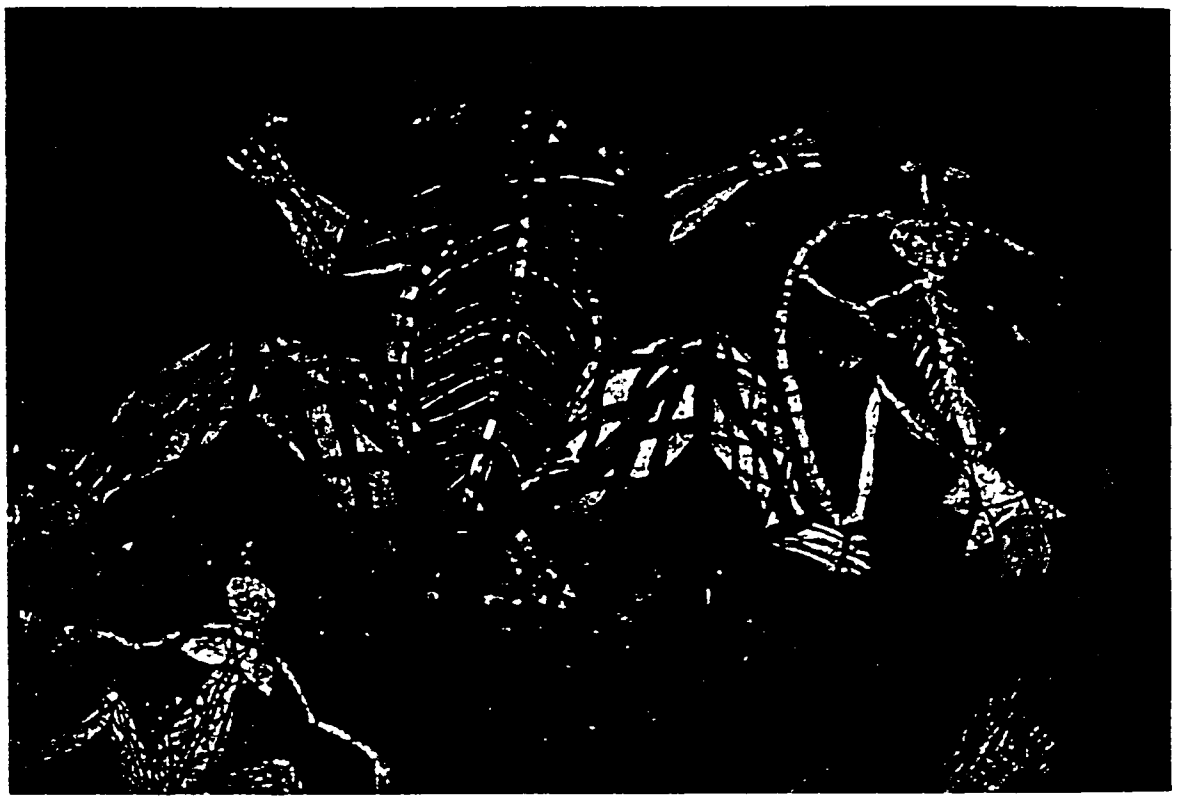
The Dawn of Civilisation

Egypt produced the longest enduring of the early cultures which arose in the near East in fertile valleys which supported abundant life. In circumstances of comparative ease and prosperity human societies were able to enlarge and individuals to develop special roles within society. Organisation of towns and cities was possible only with parallel social organisation which brought with it the development of characteristic artistic styles and cultural values which we can still recognise over the gap of several millennia. In the valleys of the Indus and Yellow Rivers similar developments were occurring, and they too saw the rise off distinctive and complex societies. Lack of means to travel over the great distances which separated these societies ensured that they had little or no knowledge of each other. Moreover the time frame of these first "civilised" societies was not synchronous. In South and Central America the great city states of the Maya and Astec people began at a time when the Mediterranean civilisations had declined or been absorbed into the Roman Empire. Each of these distinctive societies has left us some record of the way they viewed themselves and the world. They all developed some form of writing, but of course much of this record has been lost, and the code-breaking approach to translation still falls short of providing us with deep insight into their languages and their symbolism. In many ways the buildings and the goods recovered by archeologists from the ruins or from the burial chambers of their dignataries have given more comprehensible data about their lives. For their forerummers in pre-literate cultures this archeological record is all we have. Even in the cave paintings and stone implements we can see evidence of human experience with parallels in our own lives. This tells us they they too were preoccupied with the cycle of birth and death, and sought for understanding of the meaning of their lives. We can also infer that they were inventive and imaginative, but also quarrelsome and sought to dominate the natural world.

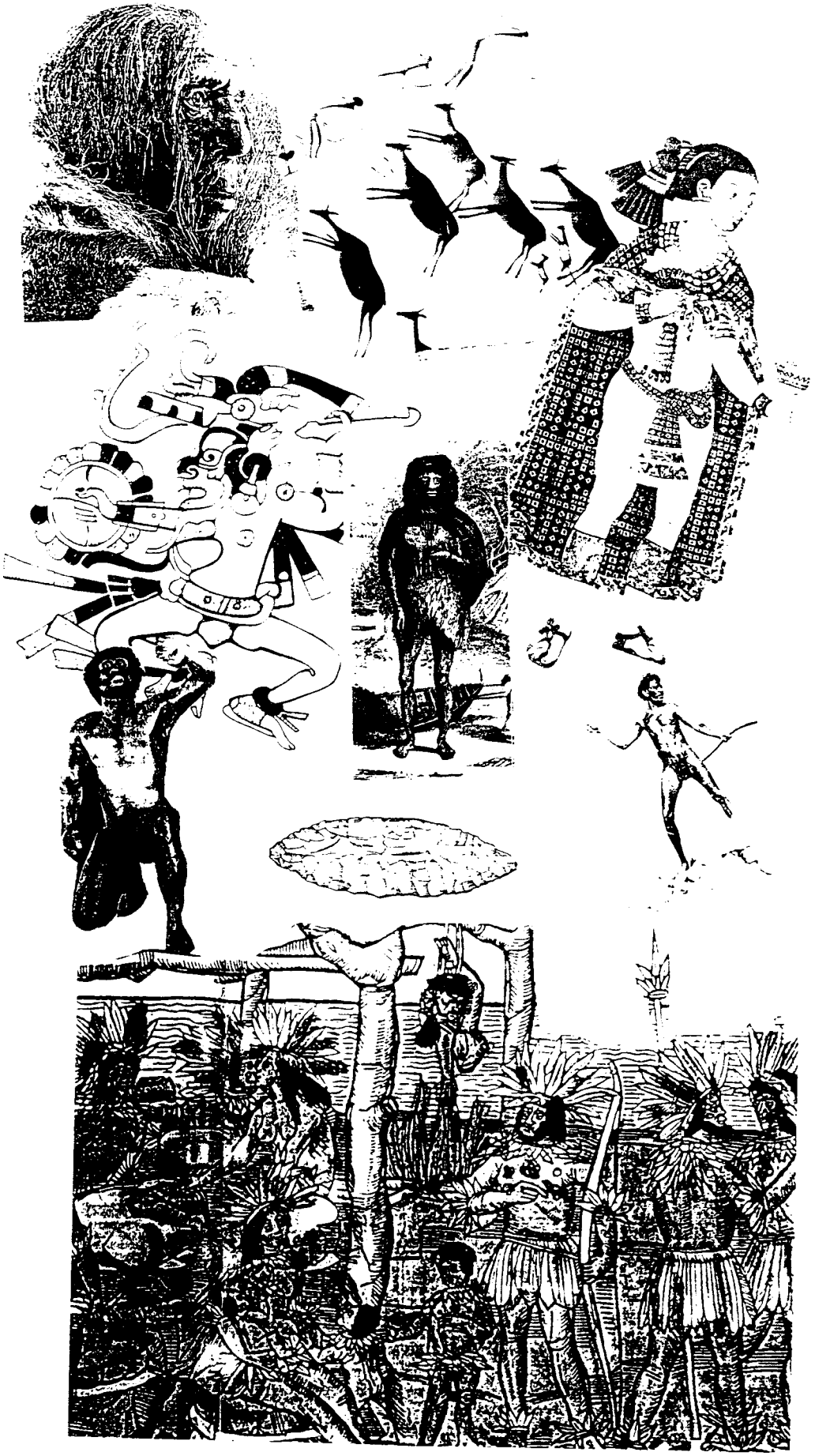
Even today some people live lives little different to that of the preliterate societirs of ancient times. Their societies have persisted where resources for the development of rich agriculture and high density of human population are lacking.

This brief survey of history should be enough to suggest that the differences and similarities of human life in different times and places have much to tell us about our own society. From here on we will concentrate on questions of health and disease and leave it to you to ensure that you also read and think about the social and political context of the people and actions you study in your lectures and tutorials.

PREHISTORIC ART



Namarrkon the Lightning Man and Spirit People.
Nawurlandja, Kakadu National Park, Northern Territory.
Reproduced by permission, The Museum of South Australia



HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 2 MEDICINE IN PRE-LITERATE SOCIETIES

J. C. Reid

NOTES

ABORIGINAL MEDICINE

J. Reid

INTRODUCTION
'THE AUSTRALIAN PROBLEM' (a futuristic fable)

In the year 2070, the first chroniclers were beginning to record the dimensions of 'the Australian problem'. Their accounts began in 2020, when the forces from the north landed in strength on Australia's shores, and the country capitulated. The foreigners closed Australia's parliaments, social services, business houses, schools, churches, theatres and sports-fields, transferred all private property to their own immigrant settlers, and permanently relocated the entire Australian population in tent encampments in the arid country areas.

By the time the Australians attracted the interest and concern of the chroniclers, their camps were in dispirited disarray. Ragged and rotting tents scarred the landscape. Although fifty years had passed since their establishment, the camps had none of the water, sewerage, sanitation or garbage-disposal facilities of the towns. The rations, available from distribution points in exchange for work tokens, were polished rice and weekly supplements of vegetables. Inspectors from the Health Ministry were concerned at the prevalence of malnutrition, gastroenteritis, anaemia, leprosy, tuberculosis, parasite infestations and respiratory tract infections. The lifestyle conditions such as diabetes and cardiovascular diseass contributed heavily to the premature mortality of the adult population. The babies generally were dying from acute infections.

Emotional illness was widespread. Even the relatively well-balanced Australians - among them former doctors, teachers, managers, trades-people, politicians and students - passed the days in a depressed malaise, or buoyed up by intoxicants or the transient excitement of games of chance. There was some discussion among the authorities about whether the high suicide rate and psychological disorders were products of the Australian culture or were a post-invasion phenomenon. Most experts favoured a cultural explanation and rejected suggestions that the stresses of camp life might be implicated.

Early on, some camp-dwellers had aspired to lead and organize community improvement campaigns, but lost interest when officials, while giving their blessing, refused to relinguish control of any administrative or political functions. Field officers of the Department of Australian Advancement made many attempts to solicit the co-operation of the Australians in running projects devised by the Ministry for the betterment of the camps. The populace, however, evinced little interest in dog-farming, medicinal-herb cultivation and dry-rice agriculture. The Australians continued to reminisce perversely among themselves about study, books, free enterprise, salaries and job promotion.

The officials were kindly, but bewildered. They regretted the violent excesses of the early days of the invasion, but they could not understand the present recalcitrance of the Australians; their indifference to the government's exhortations to work the fields and improve themselves. Only the children, many of whom had no patience for the memories, values or traditions of their elders, had mastered the new tonal language and its alphabet of characters. Their Englsh-speaking parents seemed either unable or unwilling to master these simple skills themselves. The adults consistently resisted the adoption of the introduced language, culture or agrarian lifestyle. They also undermined official efforts to recruit the young to a new ideology by covertly teaching them Australian history, English literature, writing and arithmetic. Even more

troubling was the failure of the people to embrace the state religion, a synthesis of Hindu and Buddhist theologies. Most Australians irrationally retained more primitive Christian or agnostic beliefs and seemed foolishly unconcerned about their own enlightenment.

The spirit of the camps was no less a concern to administrative staff. They deplored the internecine strife among camp segments, and extolled the virtues of co-operation between families, whether or not they had known each other or come from the same social strata before settlement. And they despaired of the propensity of residents to 'go wandering' from camp to camp for no apparent reason, or, at best, to join relatives for archaic festivals, which the Australians called 'birthdays' and 'Christmas'. Perhaps the most disruptive force within the camps was the core of people who talked about their former houses, suburbs and jobs, and about 'going home'. These 'fomenters' were few in number, and so were watchfully left alone. However, the young dissident settlers in the towns who agitated for 'home rights' for the Australians were subject to the attentions of security services.

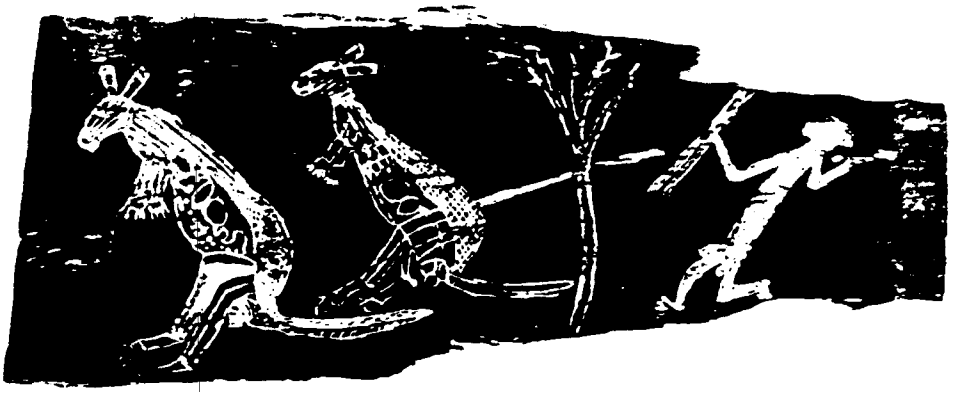
One of the government's greatest concerns was health. The new leaders were discomforted by discussions in the World Assembly about the inferior health status of subject peoples and the frequent references to Australians. They argued strenuously that every effort had been made to promote health, that the infant mortality rate was not only four times the national average, and that the average life expectancy was only ten to twenty years shorter. Everything that a health service could do had been done - even to training some medical assistants to give out medicines, weigh babies and dress sores. The residual morbidity and mortality, they insisted, was the result of the conditions in the camps, which were not their responsibility, and the deleterious customs of the Australians.

The initiatives of health authorities, the government explained to its overseas critics, were being undermined on several fronts. Illicit bands of doctors and nurses (pre-invasion professions no longer recognised) moved among the tents at night, tending the sick. The patients often failed to come to camp aid stations, where excellent practitioners from the mother country offered medical care. Most people seemed unable to grasp the principles of disease causation, patiently explained (though not in English) by the health educators. They did not, or could not, appreciate the logic of the elemental theory of disease (the bodily balance of earth, fire, air and water) and clung doggedly to a belief in 'germs', 'public health', 'physiological dysfunction' and such mystical entities as 'cancer'. Indeed, in all ways, the Australians, through ignorance or defiance, thwarted efforts to help them.

It was generally agreed that governments can only help those who will help themselves: until the Australians recognised the manifest benefits of the post-2020 civilisation and its medicine, the 'Australian problem' would continue to challenge the nation... (J. Reid, 1982, pp.iv-vi).

In this unit we will be looking at the traditional medical systems of Australian Aborigines at a very general level and at the way these have changed in response to white Australian colonisation of the continent.

By 'medical system' we mean that complex of behaviour, practices knowledge, beliefs and strategies which any human group develops to enable it to cope with the threats of sickness and death. We will also be examing the cultural context of Aboriginal medicine, particularly its links with the social, religious and political life of the community. This will be followed by a consideration of the impact of Western medicine and society on Aboriginal health and healing. This unit focuses on Aboriginal medicine, but you may want to reflect as you read on how Aboriginal medicine differs from (or is similar to) the Western medical system. Bear in mind that medical beliefs and practices in every society are sometimes rational, sometimes magical; sometimes physiologically effective, sometime psychologically potent; sometimes solely concerned with causes and symptoms, sometimes interwined with political and social realities.



THE TRADITIONAL MEDICAL SYSTEMS

Before European colonisation of the Australian continent there were as many medical systems as language groups (at least 200), but all shared certain elements in common. Each system consisted of a range of treatments for injuries and sickness and a set of aetiological categories (concepts of the causes of illness).

Treatments were generally either herbal or spiritual - or a blend of both. Herbal medicines were and are the domain of senior community members, usually women, who could assess what medicine was indicated for an illness and knew where to find the appropriate shrub, grass of tree, and how to prepare the remedy. A wide range of bush medicines was known and used throughout Australia. In northeast Arnhem Land alone, surveys have revealed over a hundred medicines, each with its own specific preparation and use.

Spiritual healing is predominantly the domain of the traditional healer, who is expected to discern and to deal with the underlying causes of illness (the 'why' of the condition) as well as the symptoms (the 'what'). Less commonly, ceremonial or individual curing is undertaken by senior men or women who, although not specialist healers, can utilise religious knowledge and powers to this end. The healer is believed to have mystical abilities which he employs to examine and treat a patient. The healer may be aided by spirits or possesses powerful objects acquired during his initiation. Sometimes a promising young man is guided and taught his profession by an older healer. More often a person gains the power of healing as the result of a dream experience or a visitation by the spirits of his ancestors or of his land.

The principal functions of the healer are to divine the identity of the person (that is the sorcerer, someone knowing the magical techniques which cause sickness) or the spirit beings who have attacked the patient. He uses his power to counteract their malignant influence. Treatment may consist of touch, massage, the extraction of objects inserted by a sorcerer, painting with ochre and other magical or ritual techniques.

In the literature on Aboriginal healing, as above, the indigenous practitioner is generally referred to as a man. It does seem from ethnographic writings that the role was generally reserved for men, though we cannot be sure of this since most anthropologists have been men and would not have had the access to or confidence of Aboriginal women. Today there are certainly renowned women practitioners, but women's healing powers are generally exercised in the context of their nurturing and ceremonial roles.

The uniquely Aboriginal response to illness, disregarding for the moment the use today of Western health services, varies according to the nature of the condition, but two general patterns emerge. Trivial or transient conditions such as mild aches and pains, colds, cuts bruises, broken bones and childbirth are an expected part of life. They are treated with rest, massage, family care and herbal remedies or simply ignored in the knowledge that such ailments are generally self-terminating. If any thought is given to their aetiology they are usually attributed to 'natural causes'.

However, acute or debilitating chronic illnesses are another matter. If a person is so disabled that he or she is unable to function in the community and to carry out daily roles and duties, more serious measures will be taken. Often the healer will be asked to diagnose and treat the condition. The healer, patient and family all share a common view of the cause of serious illness. It differs markedly in its content from that of Western medicine, emphasizing not microbes and physiological dysfunction, but relationships with other people and with the spiritual world. It is a unified or holistic model of illness and

health rather than a mechanical or scientific one. Aborgines maintain that conflict between people and antisocial behaviour will result in sickness. Adultery, gossip, murder, jealousy and failing in one's duties towards others are serious social offences. Other offences include stealing the sacred objects or paintings of another group, trespassing or hunting without permission on another group's land, or profaning a religious ceremony. All of these transgressions lead to conflict, which is either expressed openly (as in any angry exchange or fight) or covertly by the use of sorcerly.

Certain individuals are believed to have the ability to harm others by sorcery and will do so, it is said, if offended or seeking revenge. The techniques used are said to include the use of a bone, often dipped in blood and pointed with the recitation of a spell, the use of 'poison' substances, the magical manipulation of an image of the victim, and assault and magical surgery on the victim (R. Tonkinson 1974).

The local group, be it an extended family, clan or other group, is corporate in its responsibility for the actions of its members, so that the wrong-doer or a member of his or her family or community may be the focus of the sorcerer's manipulations. The victim, it is believed, will collapse with a serious illness and may die if the sorcery is powerful enough and the healer cannot effect a cure.

Since attacks by sorcery are provoked by grievances and fights the ritual life of the community, political quarrels, intergroup disputes and troubled relationships between kin are all, ultimately, related to health.

CONTEMPORARY ABORIGINAL MEDICAL PRACTICE AND THEORY

In contemporary times the pattern of use of the different indigenous healing resources has changed. The pills, injections, and other treatments readily available from doctors, community health centres and outpatient departments in hospitals have largely replaced herbal medicines. The faith of Aborigines in the efficacy of herbal medicines has, in many areas, not waned, but herbal medicines take a lot of time and energy to find and prepare, whereas Western treatments are usually available close at hand, and free. People also say that many of the diseases they suffer today are introduced afflictions for which there is no Aboriginal remedy. In some areas and at some times both Western and indigenous treatments may be used at once. This is particularly true if a patient has been treated by, say, Aboriginal health workers, or a nursing sister, doctor or other Western-trained practitioner and does not seem to be getting better. At such times the patient or family , if they have not already done so, may consult a healer. In any community, or in any family, there will be a 'hierarchy of resort in curative practices' which is determined by the course of the illness and the available medical resources.

A distinctive feature of change in the medical systems of Aboriginal societies, and indeed of medical systems all over the world, is that while medical treatments are supplanted quite readily by Western alternatives, beliefs about the ultimate or underlying causes of sickness are not. As Evans-Pritchard pointed out for the Azande of Africa, scientific medical explanations deal with the 'what' and 'how' of illness but not with the 'why'. Aboriginal medical explanations remain an important source of comfort, understanding and guidance in times of sickness and death and remain unsurpassed in the minds of their adherents by many of the explanations Western practitioners have to offer.

In conclusion, the medical theories of traditionally-oriented Aborigines are changing little: young and old still hold that good health is the outcome of good relationships and serious sickness the outcome of trouble. Some Aborigines see the high morbidity and mortality rates in their communities as the result of

the upheaval and social dislocation brought about by the European presence and the loss of land and of control over their own lives. There is little information on the prevailing medical traditions of urban and rural dwelling Aborigines, but there is no doubt that spiritual explanations still underlie much Aboriginal thinking about misfortune and sickness and that at least a few individuals with acknowledged healing powers are still sought out by the sick and worried. Possibly more than any other aspect of indigenous culture, Aboriginal medical theories resist change. This is because they order experience, reinforce social values, explain suffering and give some sense of Aboriginal jurisdiction and identity in the face of overwhelming pressures from the dominant society for change and conformit

REFERENCES

READ REFERENCE 4.1: Janice Reid, *Introduction to Sorcerers and healing spirits*, ANU Press, Canberra, 1983, pp. xvii-xxv.

READ REFERENCE 4.2: N. Scarlett, N. White and J. Reid, 'The traditional medical system', in J. Reid (ed.), *Body, land and spirit*, University of Queensland Press, St Lucia, 1982, pp. 165-171.

READ R. Tonkinson, 'Magic and sorcery', in *The Mardudjara Aborigines*, Cummings, Menlo Park, California, 1974, pp. 106-112.

** READ REFERENCE 4.3: D. Bell, 'Women's changing role in health maintenance in a central Australian community', in J. Reid (ed.), *Body, land and spirit*, University of Queensland Press, St Lucia, 1982, pp. 208-219.

READ REFERENCE 4.4: J. Reid, 'The search for meaning', in J. Reid, *Sorcerers and healing spirits*, ANU Press, Canberra, 1983, pp 99-101.

READ REFERENCE 4.5, J. Reid, 'New puzzles, old understandings', in J. Reid, *Sorcerers and healing spirits*, ANU Press, Canberra, 1983, pp. 153-156.

BIBLIOGRAPHY

Highly recommended

Reid, J. *Sorcerers and healing spirits*, ANU Press, Canberra, 1983

Recommended

Bell, D. *Daughters of the Dreaming*. McPhee Gribble/Allen & Unwin, Melbourne, 1983

Bell, D. and Ditton, P. Law: *The old and the new: Aboriginal women in central Australia speak out*. Aboriginal History/ANU Press, Canberra, 19080.

Berndt, R.M. (ed.). *Aborigines and change*. Australian Institute of Aboriginal Studies, Canberra, 1977.

Berndt, R.M. and Berndt, C.H. *The world of the first Australians*. Lansdowne Press, Melbourne, 1982 (reprint of 1977 and 1981 editions).

Cawte, J.E. *Medicine is the law*. University Press of Hawaii, Honolulu, 1974.

Eastwell, H.D. 'The traditional healer in modern Arnhem Land'. *Medical journal of Australia*, vol. 2, 1973, pp. 1011-1017.

Elkin, A.P. *Aboriginal men of high degree*. University of Queensland Press, St Lucia, 1977, first published 1945.

Gale, F. (ed.). *Women's role in Aboriginal society*. Australian Institute of Aboriginal Studies, Canberra, 1974.

Gale, F. (ed.) *We are bosses ourselves*. Australian Institute of Aboriginal Studies, Canberra, 1983.

Heppell, M. *A black reality: Aboriginal camps and housing*. Australian Institute of Aboriginal Studies, Canberra, 1979.

Hiatt, L.R.. *Kinship and conflict*. Australian National University, Canberra. 1965.

Loveday, P. (ed.). *Service delivery to outstations*. ANU north Australian Research Unit, Darwin, 1982.

Loveday, P. (ed.). *Service delivery to remote communities*. ANU North Australian Research Unit, Darwin, 1982.

Meggitt, M. *Desert people*. Angus & Robertson, Sydney, 1962.

Nathan, P.A. *A home away from home: a study of the Aboriginal health service in Fitzroy*. PIT Press, Victoria, 1980.

Nathan, P. and Japanangka, D.L. *Health business*. Heinemann Educational Australia, Richmond, 1983. Reid, J. 'The role of the Marrnggitj in contemporary health care'. Oceania, vol. 49, 1978, pp. 97-109.

Reid, J. *Aboriginal health in the 1970s and 1980s*. Cumberland College Reports no. 16, 1979.

Reid, J. (ed.). *Body, land and spirit: health and healing in Aboriginal Australia*. University of Queensland Press, St Lucia, 1982.

Reid, J. and Dhamarrandji, B. 'Curing, no caring: Why Aboriginal patients abscond'. *New doctor*, vol. 8, 1978, pp. 27-32.

Rowley, C.D. *Outcasts in white Australia*. Penguin, Ringwood, 1970.

Stevens, F.S. (ed.). *Racism: the Australian experience* vol. 2: Black vs White. ANZ Book Company, Sydney, 1972.

Tonkinson, R. *The Mardudjara Aborigines: living the dream in Australia's desert*. Holt Rinehart & Winston, New Work, 1978.

Turnbull, D. and Farrall, L. *Interpreting the Australian environment* Part 1: The Aboriginal experience (HUX 209 Nature and human nature), Deakin University, 1982.

Warner, W.L. *A black civilization: a social study of an Australian tribe*. Harper, New York, 1937.

Yong, E. *Tribal communities in rural areas*. ANU Development Studies Centre, Canberra, 1981.

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 3 CONCEPTIONS OF DISEASE IN LITERATE NON-WESTERN SOCIETIES

B.J.A. Lovric

NOTES

CONCEPTIONS OF DISEASE IN LITERATE NON-WESTERN SOCIETIES

B.J.A. Lovric

Myth Magic and Morbidity

A universal fact of human life, disease is the most anxiety-ridden and uncertain area of human existence. All societies have sought explanations of disease, and possess a body of knowledge concerning its nature, causation and treatment, as well as a class of healers. On the island of Bali, the predicament of disease and untimely death has prompted a vast explanatory mythology that has shaped the themes of literature, art and ritual. Many of the most characteristic features of Bali —temples, offerings, dance, trance and masked rituals — originate in the experience and conceptualization of disease.

In the traditional Balinese medical system, diseases and the responses they provoke are based on a complex body of observation and interpretation.

The Balinese medical system can be divided into two levels, that of: the response of the individual to acute and chronic illnesses contrasted with epidemics which affect the community as a whole. At the individual level, traditional healers *(balian)* assume the dominant role. At the community level, disease-containing rites -- masked enactments of medical mythology and trance exorcisms of disease are conspicuous features of the society's response to life-threatening diseases.

What is Traditional Medicine?

The "Primitive Medicine" which emerges from western accounts of "The History of Medicine" is not equatable with that of Asian cultures nor should it be confused with "Folk Medicine", "Alternative medicine", nor with "Quack Medicine" of yesteryears.

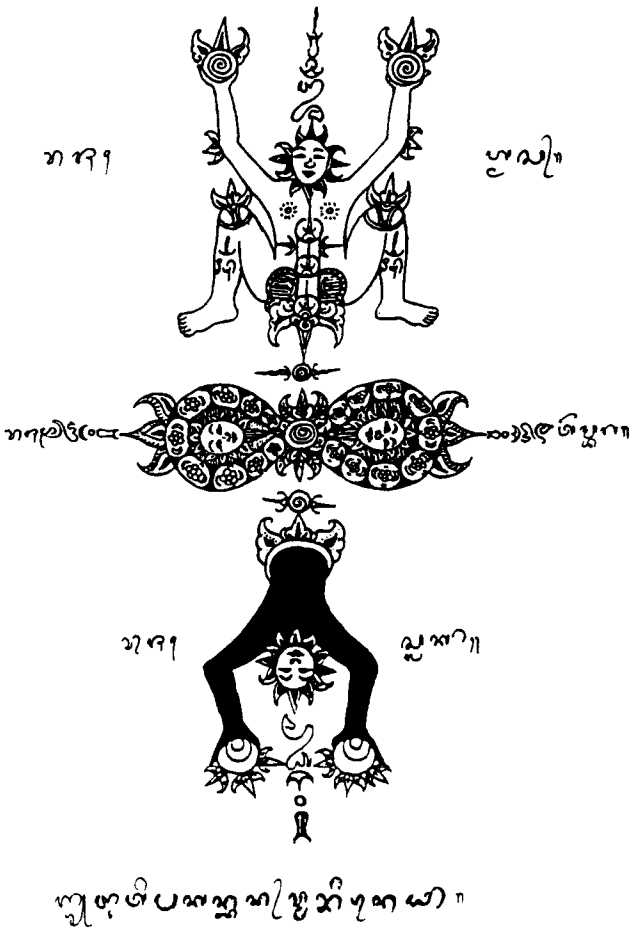
Largely owing to the influence of Hippocrates, Ancient Greece is considered to be the cradle of modern western medicine. Contemporary with this, classical medical traditions were developing in China, India and Persia — the Chinese, Indic and Islamic. Based on observation and experience, they represent quasi-empirical systems. The founding of Chinese medicine, known from the third millenium B.C., is attributed to historical emperors who composed medical treatises. Around the Han period in the third century B.C., Tsou Yen systematized the concept of two fundamnetal principles, the Five-Elements (*wu hsing*) and the two forces or energies — the *Yin -Yang*, complementary cosmological forces of nature, ideas that had probably been in circulation earlier.

The Five-Elements is a concept of the fundamental processes each of the five elements — Fire, Water, Wood, Metal and Earth — manifests when undergoing change. The Five Elements gradually came to be correlated symbolically with every conceivable category of things in the universe: seasons, cardinal points, astrological and meteological phenomena, human psychophysical functions and affective states, colours, musical notation, animals, vegetation and Yin-Yang: wood - lesser Yang; fire - greater Yang; earth - equal balance; metal lesser Yin; water - greater Yin Disharmony between these elements, or a predominance of one over others, manifests in illness. The

humours of Chinese medicine (*chii*) are held in the sway of *Yin-Yang*, as alignments of qualities — hot-cold, wet-dry, heavy-light, dark-bright. Analogous concepts exist in other Asian systems.

The earliest Indian treatise on medicine, the *Atharva-Veda*, dates to 1500B.C. Vedic healers understod the healing powers of plants and herbs. Around first century A.D., a Brahmin surgeon compiled his *Susruta Samhita*, which lists 125 surgical instruments. During the second century A.D., a physician composed the *Charaka Samhita* on internal medicine. A more secularized medical tradition of India is known as *Ayurvedic* meaning "knowledge of life". Speculations about micro- macrocosmic correspondences (the macrocosmic forces of wind, fire and water and the microcosmic forces of breath, bile and phlegm in man), the doctrine of the five universal elements - - earth, wind, ether, water and fire — and five 'breaths', the basis of ayurvedic thought originate in speculative, interpretive Vedic treatises (the *Upanishads)*.

The Indian theory of humoural pathology postulated three constituents (*tri dosha*) *kapha, pitta,* and *vayu,* usually translated as phlegm, bile and wind. More acurately: *kapha* signifies a protective fluid - the concept of a secretary/mucosal immune system; *pitta* signifies metabolism and energy production; and *vayu* signifies movement or tranmission within the body - in western medical terms, nervous impulses and chemical messages (Wijesinha 1982). A fourth humour, blood, is mentioned later.

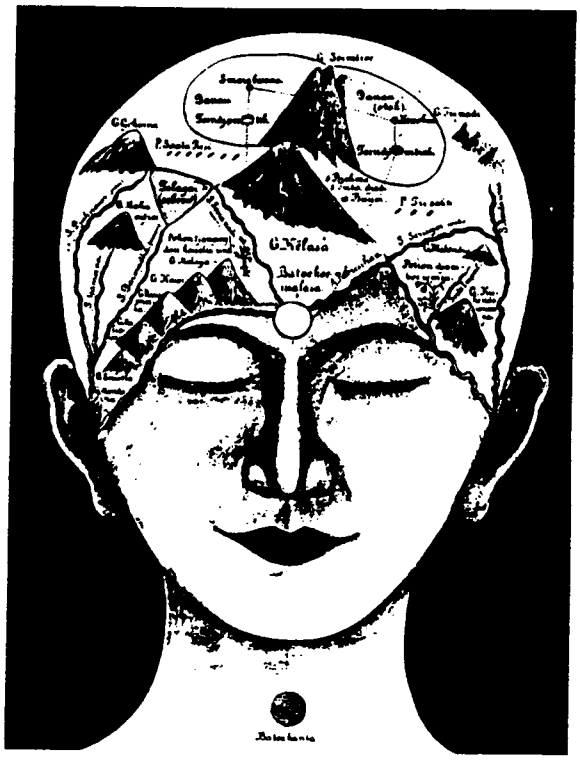


Abstract and anthropomorphic representations of the the Two Complementary Forces (*Rwa Bhineda*) and Five-Elements (*Pancamahabhuta*)from Balinese medical manuscripts.

Elements of *Ayurvedic*, became included in the systems of many Southeast Asian peoples over whom India exerted some cultural influence beginning around the fourth century A.D. A near equivalent of the Chinese Yin-Yang is the Hindu philosophical doctine underlying Balinese medical theory and practice called *Rwa-Bhineda* which expounds the intrinsically two-fold, yet unitary, nature of apparent opposites — death-life, fire-water, ovum-sperm, darkness-light, and so forth. Apparently antagonistic principles such as life and death, disease organisms and antidotes or antibodies are of the same source and origin. Abstract and anthropomorphic depictions of *Rwa Bhineda* and Five-Elements (*Pancamahabhuta*) viz., water, fire, earth, air and ether, are found in ancient medical treatises.

Chinese medical knowledge was exported to Korea, Annam (now Vietnam) and Japan. There was also an interchange of medical knowledge with India and the Muslim world. Incidently, some Western medical writings, acquired from visiting Jesuits in the 17th century, the Chinese preserved as "literary curiosities". Western medicine was formally introduced into China in the mid-nineteenth century. In modern Japan and China the two systems frequently overlap. Ancient herbal remedies are dispensed by physicians who also prescribe products of modern pharmaceutical research.

Eastern medical thought assumes human anatomy and physiology to be intimately bound to other physical systems. The arrangemnents and balance of elements in the body (fire,water,wind) were microcosmic versions of their arrangement in nature (the macrocosmos). The components of the body are classified according to their main physical qualities rather than functions. The



body is made up of elements: earth or solid elements - skin, nails, teeth, bone, hair; wind or movement — breath, air in intestines; fire or temperature —body heat; water or fluid — bile, mucous, blood, perspiration, tears, saliva. Bodily tissues, organs and elements are named in terms of associational relationships or metaphorical correspondences with cosmological and topographical features of the environment. The body is a universe in minature with lakes, rivers, mountains, vegetation, wind, rain, sun etc., and subject to fire, flood and drought.

In Hindu thought, the human being is seen as embodied spirit (*jivatman*) or embodied self (*seririnati*). The dichotoy of soul and body, mind and matter, characteristic of western thought is absent from Indian philosophy.

Non-Western Healers

When non-Western healers first became known to Europeans, they were labelled "Madmen" or else, they were characterized as "Con-Men". Terms such as "witch-doctor", the Siberian term "Shaman" was applied to all healers, irrespective of their roles in different societies, and the existence of various types of healers within the one society. The term witch-doctor — most generally used in African soceties — refers to a healer who divines the identity of witches, that is, human agents imputed to administer disease-causing spells.

Shaman are healers reputed to be able to diagnose and heal disease through inspiration. In a state of voluntary and controlled trance, they diagnose illness and prescribe appropriate treatment. In some cultures, they cure by actually drawing the spirit of disease into their own bodies and there rendering it harmless. Sometimes, but not always, Shaman are people who have themselves undergone a near-death experience — often fever deliriums involving severe mental derangement, but, many other members of the society, who have experienced the same states of altered consciousness, do not become shaman. The Balinese language allows a clear differentiation between the two. A near-equivalent of a shaman, in Balinese society, is the type of healer called *balian katakson*. These are often women who are reputed to be better at inspiration trance.

Another type of healer is the *balian usada* — a healer who relies on ancient medical manuscripts for knowledge. Apart from their literacy, *balian usada* are individuals who show a high level of spiritual awareness and a special rapport with unmanifest essences of existence. Hence they are able to act as intermediaries. They are also reputed to be able to perceive a kind of second or subtle body - an intermediate form between the world of pure spirit and that of gross matter.

In the Balinese system (as in the traditional Chinese) a healer is presumed to know the nature of symptoms through what he can ascertain through his own sense of sight, hearing, smell and taste. Surprisingly knowledge of anatomical structure is relatively elementary. Possibly, a different concept of person and being, precluded the development of a practice of dissection. At death, the individual, and its components physical parts are, as expediently as possible, returned to nature, as fire, water, earth, air and ether. Until then, they hold part of the non-material essence of the individual.

Traditional healers are often philosophers who tend to display a practical as well as esoteric wisdom. They are accredited with having mystical charisma(*sakti*). Those who do not have this, or lose it, cease to be healers. They use therapy which is psychologically-based, social and herbal. Disease is a biological problem woven into the whole socio-religious order, in such a way that the healer plays a significant social as well as a religious role; one which, in western society, is shared by priest, scholar, social worker and physician. They do not differentiate between objective physical treatment and psychotherapy.

However, these healers lack a collegial organization. Though their clients usually move from one healer to another, there is little consultation between healers. Knowledge is passed on only at an individual level, from one healer to a pupil or through ancient medical manuscriots. New knowledge is not produced. Past assumptions are not questioned. It is an essentially static tradition.

Understanding of Disease Causation

Western explanations of other medical systems tend to be either grossly offensive or foolishly simplistic because a magico-religious interpretation of disease contrasts with the European naturalistic-scientific tradition. The problem is that this suggests limitations of cognitive scope and ability of non-western societies. It also denies the keenness of human powers of observation and logical elaboration, regardless of modes of thought and intellectual presuppositions.

In fact, Indian medical thought traces disease to one or other of seven main causes, all of which find correspondences with the "rationality" of western medicine:

1. 'corrupt' sperm from father or ovum or mother (genetically transmitted).
2. indulgence by mother during pregnancy of prohibited substances, non-fulfilment of needs during pregnancy (teratogenic).
3. derangement in the balance of bodily constituents or humours
4. accident or trauma
5. exposure to harsh climatic elements
6. potent (unseen)powers (viral or bacterial agencies)
7. deprivation - hunger, thirst (nutritional deficiency)

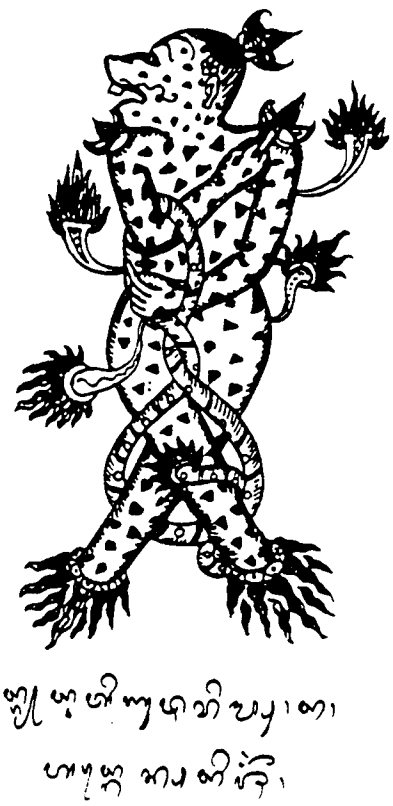
In Balinese medical theory, disease and death are explained in naturalistic, terms, interpreted within a supernatural explanatory paradigm. The forces responsible are unseen, that is, mystical. There is a recognition of predisposing and precipitating factors, coincidental causal factors and accessory causes. The system shares the Platonic concept that disease is an unnatural state of excess, deficiency or imbalance of the elements of existence - - fire, water, earth, air and ether. (analogous to body fluids, tissues, substances and energies and parallels can be made with modern Western ideas of pathogenesis).

Even so, a metaphysical perspective prevails our empirical framework. The intrusion of a disease organism or spirit induces an loss of soul or vital energy. Disease can be activiated by supernatural or manifest agency. The existence of 'germs' (however defined) and the infective nature of certain diseases is recognized in most medical systems. Disease is also basically attributed to extreme excess or extreme deficiency. Chinese medicne divides diseases into those of deficiency (*xu*) and those of excess (*shih*).

The principles underlying Balinese medical theory and practice are contained in medical treatises (*usada lontar*) which contain a complex explanation of disease and its aetiology, course and resolution.

A fundamental intellectual premise underlying medical theory and practice, is that mankind shares his environment with legions of "unmanifest forces" (called *bhuta-kala*, the closest translation of which is "elementals") They are parasitic and pathogenic forms of life . Witches are also part of this paradigm.

Graphic representations of *bhuta-kala* in medical treatises depict them as exaggerated forms of human deficiency, deformity and dysfunction. They cover the whole spectrum of morbid phenomenon — of repugnant appearances, absurd form, overly thin or emaciated, overly obese or oedmatose, sometimes with animalistic facial features or limbs. Their breath can be foul, their posture grotesque, and their gait ludricrous. They might be seen to provide a metaphor of illness.



an "Elemental" specifically associated with smallpox

"Elementals", a metaphor for the body deranged by disease

Daily offerings to these "elementals" demonstrate the recognition of their inevitable presence and power. The objective is: to keep them contented in order that they do not become irascible; and to feed them so they they might not, in the form of life-devouring disease, feed upon the human organism. Healers who understand their potentiality more deeply, seek more direct communiction with them, in order to control them.

Community Disease-Containing Rituals

For the Balinese, even more feared than illnesses that afflict the individual are those which strike the community as a whole. The great dread pestilences, with their characteristic spectacular presentations and legacies of disfigurement and decimated population have been recorded. The particular form of the myths and cults are a response to historical experience interpreted in the Balinese medical tradition.

Certain people such as priests, rulers, healers and witches; objects, such as sacred masks; space, such as graveyards, crosssroads, temple enclosures; unusual landforms and environments such as mountains, forests and the sea; times such as full moon, new moon, dusk or mid-day (as well as certain constellations of time calculated according to complex calendrical systems). Events, such as death, birth, and rituals also have a mystical potentiality. The power to cure illness (*sakti*) is also the power to cause it; they are one and the same and of the same source, according to local medical texts.

The reason why the Balinese classify leprosy as a curse of the gods upon ancestors, plague as the gruesome creation of a powerful witch deified in the

Durga-Rangda cult mask, smallpox as a gift of a god-ruler and cholera as part of the weaponary of a waring practitioner of powerful magic may relate more to facts of history and the natural history of disease than one is prone to assume. In the ethno-medical accounts of each pestilence there is an interesting and at times intriguing interplay between cultural factors and biological and historical variables.

Animal Imagery

In Balinese medical theory, diagnostics rely upon clinical manifestations of disease, the symptoms and signs. Stance, posture, gait, facial expressions, bodily contortions and mental states are all appraised. From these observations, the generic name of the disease is determined. The use of anatomic names equivalent to hepatitis, nephritis and meningitis does not occur. Rather, generic terms are used to demarcate a spectrum of symptoms and signs. . For example, tetanus, rabies, meningitis and epileptiform illnesses fall into the generic category *tiwang*. The Balinese medical term *tiwang* designates the — convulsive seizures —of each of these. Qualifying terms added to the generic differentiate forms within the category.

Local medical treatises also document a range of illnesses with marked neurological disturbance which, in Western medical vernacular, are referred to as "fits, faints and funny turns", in which convulsive seizures are a major clinical manifestation. In a group of trance exorcisms, the pain, deformity and sensory and motor distubances concomitant with what are termed nutritional, infective and toxic neuropathies in Western medical discourse, are encoded in the the actions and the antics of the dancers.

In another large group of animal trance exorcisms, the twichings, tremblings rhythmic movement, rapid eye movement, head nodding, and final seizures of the dancers simulate the disintegration associated with diseases affecting the central and peripheral nervous systems — the almost animal-like deviation from what is normal human control of mind, movement and speech. In the medical treatises, animal classificatory names encapsulate specific symptoms and signs .

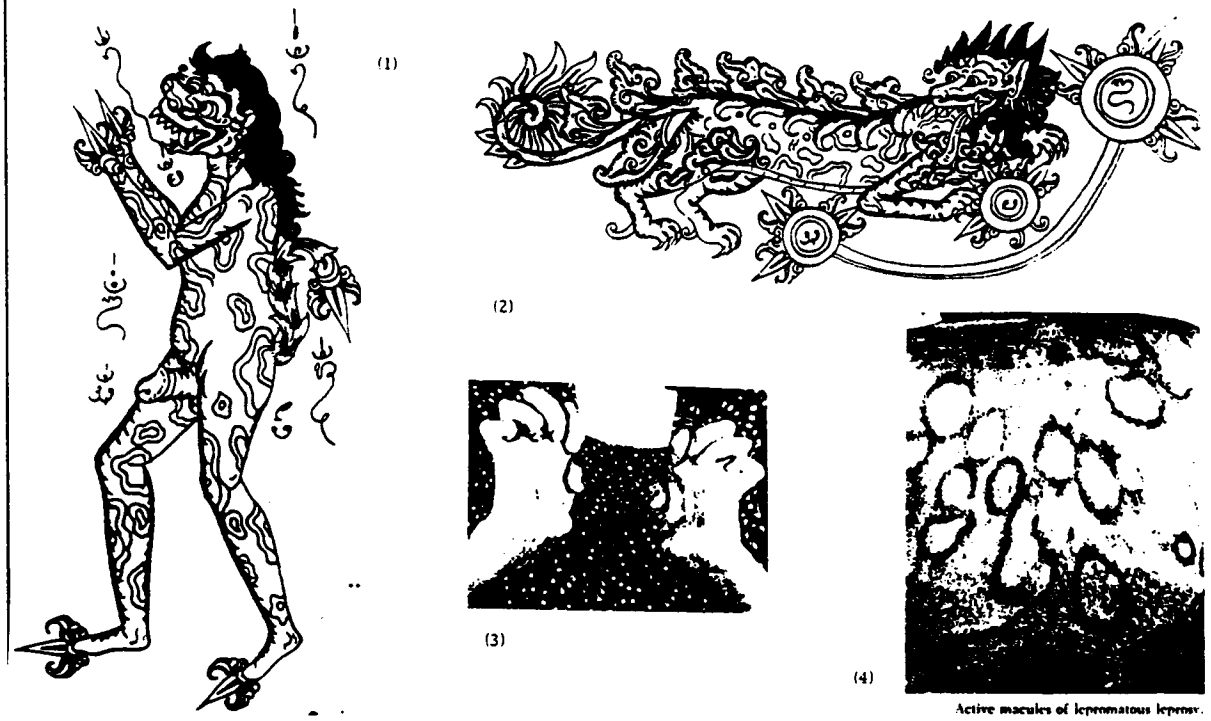
Metaphorical Thinking and Metaphysical Encoding

The Balinese express the phenomenology of disease primarily in metaphor, because that is their way of knowing. But the predispotition to think in metaphor is human, rational and universal. The Balinese postulate the existence of unmanifest powers which influence human well-being and who are themselves amenable to intercession through ritual action - even to the point of assuming protective roles.

Supernaturals — deities, demons, witches, animal-spirits, witches — are part of a system of references, actions, reactions and explanations in the Balinese construction of disease, no mere religious idiom.

(left): A manifestation of the agent responsible for a specific life-threatening pathological process in the body.

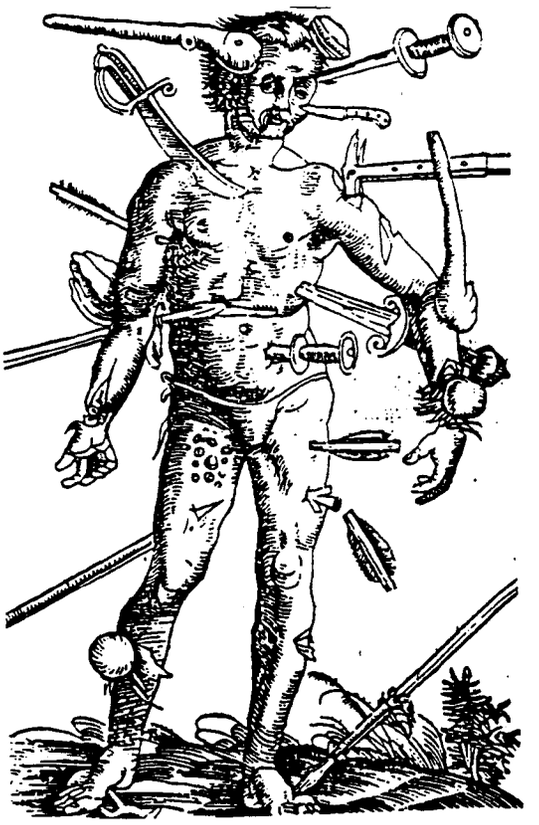
(right): A composite human-bird-danawa figure able to act as an antidote to the toxicity produced.



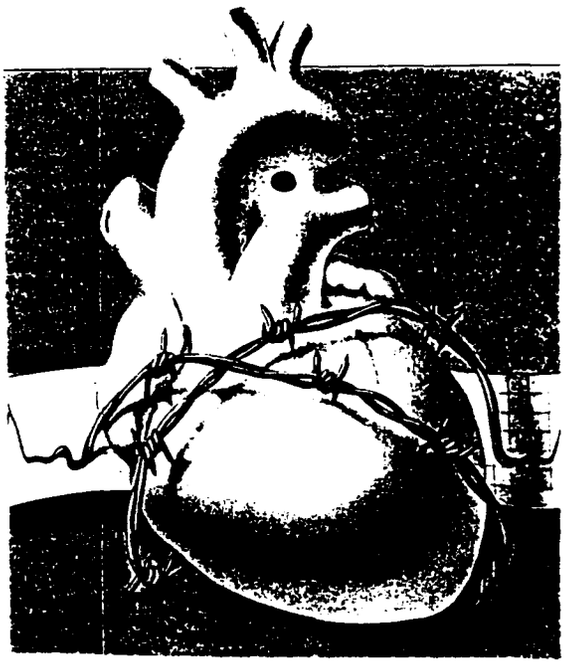
(1) & (2) Balinese depictions of the disease state. Note the texture of the skin, absent appendages and claw-like paws.
(3) & (4) The claw-hand of leprosy. The skin surface of a leprosy sufferer (taken from Cecil & Loeb, 1955)

There are different ways of knowing and other systems of intelligent observation. Metaphorical correspondence of the human organism with nature is the basis of Balinese principles of disease labelling. For example, burning and inflammed eyes find analogies with the sun; the aura of major generalized or epileptic seizure with an electric storm. Behavioural changes, abnormal stance and gait, and skin changes find analogies in characteristic animal behaviour. In short, the Balinese rely on similes and metaphor to distinguish and differentiate. Ready analogies, between the world of nature — particularly animal behaviour and physiognomy — and disease symptomatology do exist.

In fact, Western medical discourse also draws on obvious analogies. One finds terms like "dromedary gait", "scissors gait", "larval epilepsy" or the "setting-sun sign" of infants with hydrocephalus. It also uses analogies to portray the quality of pain and express pathological changes in the texture. The Balinese do likewise.



From a drawing by Paracelsus (1536).

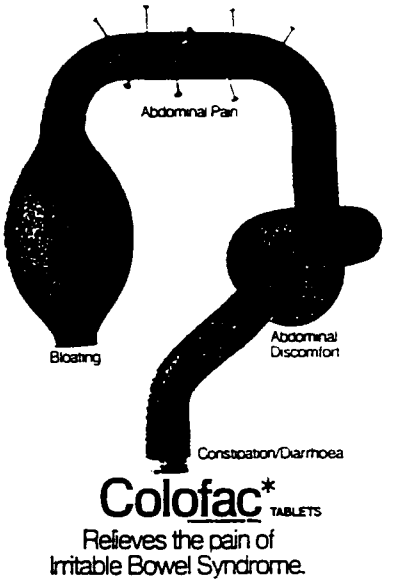


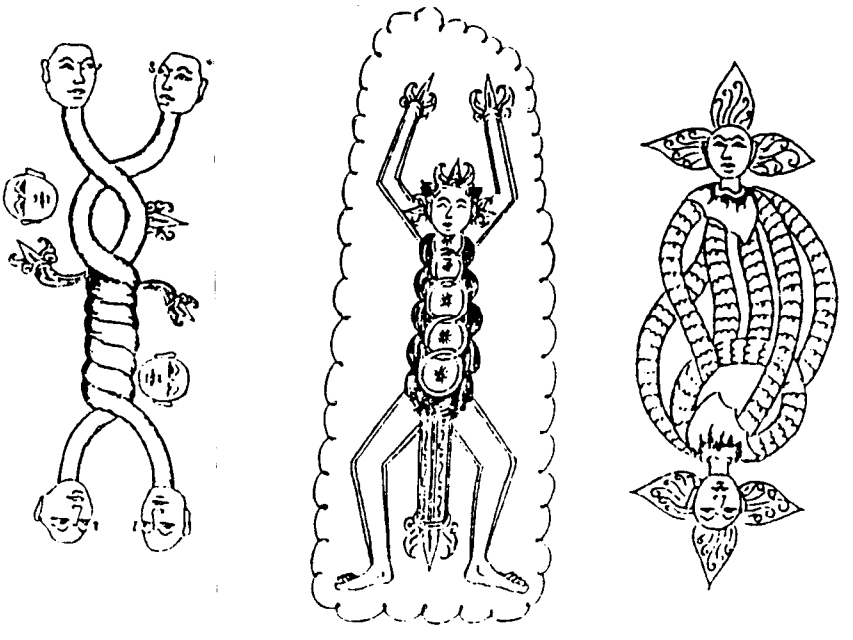
The quality and location of chest-pain associated with angina as illustrated in an article in **Modern Medicine** 29(10), 1986.

Perceptions and Simulations of Pain

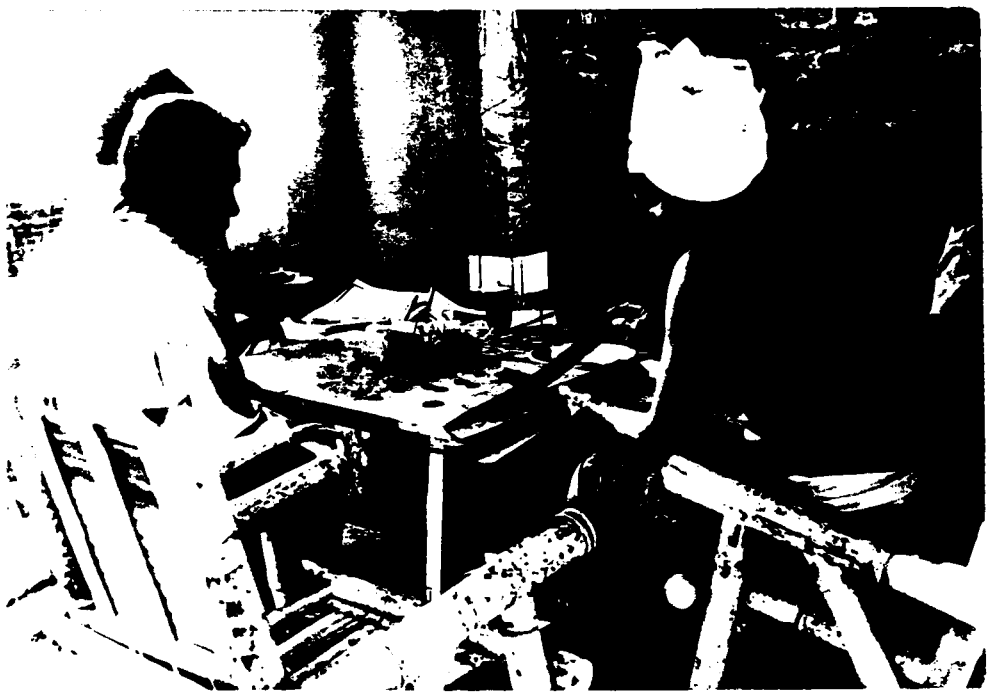
Ritualized simulated self-stabbing and dancing on burning coals relate to the experience and quality sensations of the pain associated with a group of diseases termed nutritional neuropathies in Western discourse (and labelled *tuju* in the Balinese). Simulation implies identification, control, and anticipation of relief. This ethno-medical discourse is a poetical-metaphorical one, reflective of a cultural tendency to turn abstraction — unseen powers — into images, into tangible forms. Poetic imagination has not been replaced by the precision characteristic of scientific description.

Ritual stabbing (ngurek) trance dance (taken from Meerloo, 1962)





Perceptions and Simulations of Pain



A literate healer reading from a palm-leaf medical manuscript.

Contextual Logic

'Other' systems of medical knowledge, such as the Balinese, span an enormous field in time and space. Yet, they have been little studied historians and anthropologists. Approaches have often been overly narrow — sorting out the "rational from the irrational" and the "useful from the useless" — from, of course, the perspective of the beholder. A more interesting approach involves efforts to understand the nature of the thought, experience and imperatives embodied in artistisic representations used in healing rites.

An essential difference between Balinese and Scientific thought lies, not in the logical mechanism, but in different premises, interests and values. However, the observations and explanations are not incompatible with the scientific germ theory of disease. This different way of thinking and system of knowledge is characterized by associative thinking; a system that works by association and intuition. It has its own internal logic and laws of cause and effect. It seeks patterns, resonances and symbolic correlations.

The western medical system tends to be more descriptive than explanatory. Western science is embedded in matter. It assumes a purely material planet, the constituents of which are the products of chemical and physical forces; phenomena of higher order are explained in terms of lower ones. In the thought-form characteristic of science, emphasis is on external causes, breaking wholes into parts and seeking a mechanical explanation of cause and effect of the universe and the human body. Science uses the metaphor of the Body as Machine.

However, the Balinese also have a logical code. The way of thinking (reasoning) and the magico-medical technologyof traditional medical systems is not unfathomable.

Notwithstanding its fame as 'The Last Paradise' and the image of the island as 'The Morning of the World', Bali appears to have been and some would say still is, 'a dangerous paradise' in terms of health. The fear of becoming seriously ill appears to be a constant preoccupation of many Balinese villagers. Balinese culture reveals an extreme concern with problems of morbidity and mortality. A large proportion of productive time and resources are expended on healing and disease preventive rites. A tropical environment is not favourable to health, an unsanitary one even less so. Whilst not logical on the basis of empirical premises, these rites are logical on the basis of their own context — the intellectual presuppositions held by the society.

Many of the seemingly senseless taboos of traditonal societies originate in recogition of the dangers of contagion, the necessity of quarantine in the event of epidemics and caution in the face of dangers associated with giving birth, being born and the hazards of early infancy.

Traditional medical systems exhibit a holistic character, in that there is no dichotomy in medical thinking between mind-body. And the soul or spirit does not exist merely by tolerant indulgence on the part of secular society. On the other hand, through magical therapy, disease itself is depersonalized and dissociated from the individual. Diseases are seen as entities with a metaphysical existence of their own, manifest in separate and dissociated signs and symptoms. Thus the Trance Exorcisms, referred to earlier, create a realm of disembodied disease spirits or 'pathogens'. Trancers impersonate 'pathogens' and the abnormalities their presence yields. The condition, not the person, is stigmatized. The western concept of a leper, an epileptic, or an AIDS sufferer is not prominent.

People in traditional societies are accepting of the fact that: man's ills are legion and diverse in nature; and that, in the final analysis, the death rate is 100 percent. Traditional healers are not entangled in the almost quixotic attempts to defeat death, and the rising and insatiable expectations of the

consumers of health services characeristic of western societies. Death is a part of life — and not something reserved only for the aged.

Belief in a supernatural should not be labelled "superstition" (any more than the explanatory paradigms of Christianity should be thus labelled) and as such does not constitute an obstacle to acceptance of the scientific notion of disease causation. Health professionals and educationalists can work within local frame of reference, as can local people comprehend the western model of disease. A non-western belief system is not necesssarily an impediment to an acceptance of western germ theory of disease nor of hygienic practices. In Bali, as in most traditional societies into which a version of scientific medicine has been introduced, people display a pragmatic approach; provided they can afford it, people partake of what each offers. They use both types of healers, usually simultaneously.

References and Further Reading

Garrison Fielding. *Contributions to the History of Medicine*. New York: Hafner Publishing Co., 1966.

Hastings Peter. 'Bali: A Dangerous Paradise', *Sydney Morning Herald*, May 25, 1981.

Kapferer Bruce. *A Celebration of Demons,Exorcism and the Aesthetics of Healing in Sri Lanka*. Bloomington: Indiana University Press, 1983.

(ed.) The Power of Ritual: Transition, Transformation and Transcendence in Ritual Practice. Special Issue *Social Analysis*, University of Adelaide, 1984.

Ronan Colin A *The Shorter Science and Civilization in China* An Abridgement of Joseph Needham's Original Text London: Cambridge University Press.

Lovric, B.J.A. . 'Bali: Myth, Magic and Morbidity'. In *Death and Disease in Southeast Asia*: Explorations in Social, Medical and Demographic History. Ed. Norman Owen. Singapore: Oxford University Press, 1987.

'Rhetoric and Reality: The Hidden Nightmare'. Ph D Diss. University of Sydney, 1987.

Marr David . 'Vietnamese Atitudes Regarding Illness and Healing'. In Owen, 1987.

Spillane John. (ed.) *Tropical Neurology*. London: Oxford University Press, 1973.

Warren, Kenneth & Adel Mahmoud. *Tropical and Geographical Medicine*. New York: McGraw-Hill Book Company, 1984.

Weck Wolfgang. *Heilkunde und Volkstum auf Bali*. Stuttgart: Ferdinand Enke, 1937.

Wijesinha SS and CY. Medicine in Early Sri Lanka. 1982 *Asian Medical Journal* 25(9).

Young, Allan.'An Anthropological Perspective on Medical Knowledge'. 1980. *Journal of Medicine and Philosophy* 5(2):102-16.

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 4 THE FOUR ELEMENTS AND THE FOUR HUMOURS

M. G. Taylor

NOTES

THE FOUR ELEMENTS AND THE FOUR HUMOURS

M. G. Taylor

Medical knowledge at any time, contains many ideas and concepts stretch far into the past. Even today one may find traces of long-forgotten notions embedded in our language. To say nowadays that someone is "in a bad humour" or that they have an unstable "temperament" is slightly colloguial but perfectly well understood; but, a few centuries ago, these terms would have been just as specific and just as technical in their import as, for example, a current description of someone as being hyperthyroid.

I shall therefore approach this topic of the four humours and the four elements a little obliquely, not by working backwards from a current concept or usage, but by taking a more distant example, and seeking to show how the ideas expressed in it reach not only forward to us, but backward to the beginnings of recorded science.

The example I am taking is from William Harvey's celebrated work on the circulation of the blood. "Exercitatio anatomica de motu cordis et sanquinis in animalibus:" An anatomical disputation concerning the movement of the heart and blood in living creatures. This was published in 1628, and represents in many ways the beginning of rigorous experimental medical science. In this work the flow of the blood in a circle is demonstrated and proven, from the left ventricle through the arteries, through the organs and tissues to the veins, back through the veins to the right side of the heart, from there via the pulmonary artery to the lungs and finally back to the left ventricle again.

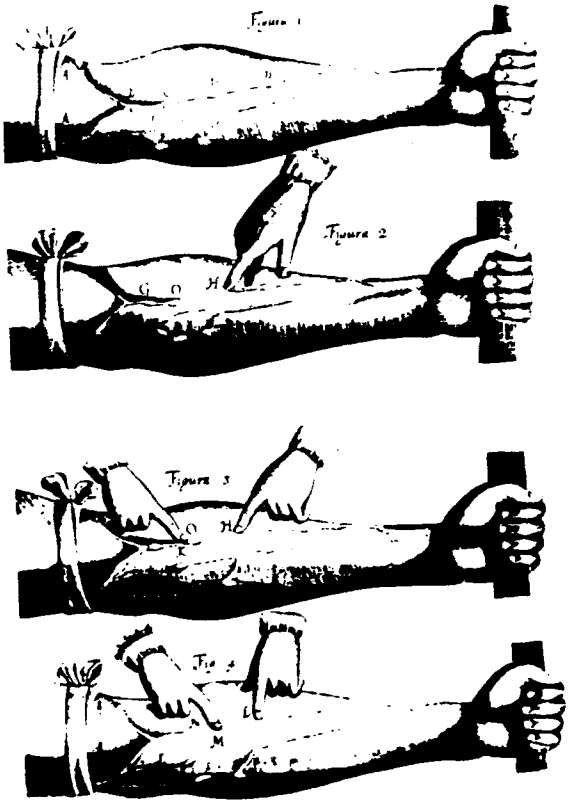
The fact that in this respect Harvey's analysis was so spectacularly successful almost leads one to overlook the questions which his work did not address and the fallacious beliefs which he did not correct. His description of the movement of the blood through the body is so exact, so correct and so convincing, that one is almost persuaded to give the same credence to what he says about other things, including the blood itself. The fact is that while his great work in one way is entirely modern and enduring, in other ways it remains very much a thing of its own era, and contains concepts which are barely intelligible to a modern reader.

To illustrate what I mean,consider two passages from the De Motu Cordis, in the translation by Gweneth Whitteridge. The first comes from the dedication to King Charles I:

Most Gracious King, "The Heart of all creatures is the foundation of their life, the Prince of all their parts, the sun of their microcosm, that on which all growth depends and from which all strength and vigour flows. In like manner, the King is the foundation of his kingdom, the sun of his microcosm, the heart of his commonwealth, from whom all power flows and all mercy proceeds."

The second comes from Chapter 15: "First, (according to Aristotle, De respiratione and De partibus animalium, Bks II and III and elsewhere), since death is a corruption which befalls by reason of defect of heat, and since all living things are warm and all dying things are cold, there must be a place for and a source of heat, a home and hearth as it were, wherein are contained and preserved the touchwood of Nature and the primordia of innate heat; from whence life and heat may flow as from their origin into all the parts and to which aliment may come and on which concoction and nutrition and all enlivening may depend. That this place is the heart and that the heart is the foundation or first principle of life and that it is this in the way I have just said, I trust no one denies".

What did these passages mean to Harvey and to his contemporaries in the



Wood cuts used by William Harvey to demonstrate his proof of the circulation of the blood in De Motu Cordis.....(1628).

early seventeenth century? Is his allusion to Charles I as the sun in the microcosm any more than an elaborate courtesy? What is a microcosm, anyway? What was this "heat", upon which life appeared to depend? What is "innate heat"? Why is the heart its source?

To answer these questions, we have to have some understanding for the traditions and doctrines in which Harvey had been educated at Cambridge and Padua. His reference to Aristotle gives us a starting point.

Aristotle was born in 384 BC, and is regarded as the greatest biologist of antiquity, and the greatest scientist after Hippocrates (who died when Aristotle was 14). He wrote on botany, zoology, comparative anatomy, embryology, teratology and physiology. He was a pupil of Plato, and a geometer and logician as well as a scientist. He was in many ways what would now be called a naturalist, and a great collector and systematiser of information about animals and insects. He made many direct and personal observations of animals, but it must be confessed that some of his descriptions, derived from travellers' tales are a little fabulous. His curosity was boundless.

The passage from Harvey refers to his book De partibus animalium, and it is interesting to see, in the introductory section of that work, that Aristotle was concerned not only with biological matters, but with questions of the origin and nature of the material world itself. I quote first from Book I:

"Now that with which the ancient writers, who first philosophised about Nature, busied themselves, was the material principle and the material cause.

They inquired what this is, and what its character; how the universe is generated out of it, and by what motor influence, whether, for instance by antagonism or friendship, whether by intelligence or by spontaneous action, the substratum of matter being assumed to have inseparable properties; fire, for instance to have a hot nature, earth a cold one; the former to be light, the latter heavy." Aristotle, in a discussion of the nature and function of the heart, begins by disagreeing with those who have maintained that the blood vessels of the body all originate in the head, and then continues: (III 665b, 33)

"From time it is quite evident that the heart is a part of the vessels and their origin; and for this it is well suited by its structure. For its central part consists of a dense and hollow substance, and is moreover full of blood, as though the vessels took thence their origin. It is hollow to serve for the reception of the blood, while its wall is dense, that it may serve to protect the source of heat. For here and here alone in all the viscera and indeed in all the body, there is blood without blood vessels, the blood elsewhere always being contained within vessels. Nor is this but consistent with reason. For blood is conveyed into the vessels from the heart, but none passes into the heart from without, or in itself it constitutes the origin and fountain, or primary receptacle, of the blood. It is, however, from dissections and from observations on the process of development that the truth of these statements receives its clearest demonstration. For the heart is the first of all parts to be formed; and no sooner is it formed than it contains blood. Moreover, the motions of pain and pleasure, and generally of all sensation, plainly have their source in the heart and find in it their ultimate termination. This, indeed, reason would lead us to expect. For the source must, wherever possible, be one; and of all places the best suited for a source is the centre. For the centre is one, and is equally or almost equally in reach of every part. Again, as neither the blood itself, nor yet any part which is bloodless, is endowed with sensation, it is plain that that part which first has blood, and holds it as it were in a receptable, must be the primary source of sensation. And that this part is the heart is not only a rational inference, but is also evident to the senses, or no sooner is the embryo formed, than its heart is seen in motion as though it were a living creature, and this before any of the other parts, it being, as thus shown, the starting point in their nature in all animals that have blood."

We see, therefore that Aristotle regarded the heart as a source of heat, located at the centre of the body; he also referred to it as the "one" and the origin. We begin, therefore to see some of the ideas that underlie Harvey's imagery. But there are more, and we must go back still further in time to find them. Why is "heat" so important, and what is so significant about "one"? And what was all that business about the Universe being generated by friendship and antagonism?

The great intellects of ancient Greece, the first philosophers, did indeed devote themselves to attempts to explain the origin of the Universe, man and nature. This may sound a bit like The Hitch-hiker's Guide to the Galaxy, but the product of their thought is still, in many ways, fundamental to our science and culture today.

Aristotle

Thales of Miletos.

One of the earliest speculations was that of Thales of Miletos (639-534 BC), who had studied in Egypt and taught that water was the primary element.

Anaximander (611 BC) thought that earth was the indivisible and primordial matter; Anaximenes of Miletus (570-500 BC) added pneuma or air, the breath of life, and Heraclitus of Ephesus (556-460 BC) added fire. We next arrive at Empedocles of Argrigentum in Sicily (504-428 BC), who propounded the doctrine that the universe consisted of four elements, earth, air, fire and water. These elements are ruled by two forces, Love and Strife. Love is the cause of unity and happiness. Strife is the cause of separation and misery. When the elements are solely ruled by Love, they become united, single and whole as the perfect form of the Sphere. Under the influence of Strife, the perfection of the Sphere is disturbed, the elements are dispersed, become many and are set in motion. The existence of the universe represents the cyclical passage of the elements from the perfection of the Sphere, through the stages of diversity under the influence of Strife and then, under the recurring influence of Love, returning back to perfection of the Sphere. All very poetic and beautiful. The four elements are of different degrees of lightness. Earth is the heaviest, next is water, which lies above, and still lighter is air. Fire is the lightest of all, and in the separated state lies above the air.

You will appreciate now the significance of Aristotle's comment about the universe being generated by friendship and antagonism, that is, Love and Strife; or, as we might translate it now, attraction and repulsion.

Empedocles was a physician as well as a philosopher, a religious teacher, a politican and a poet. His doctrine of the four elements naturally extended to the functioning of the human body, and he held that health depended upon a

proper equilibrium between them; if this was disturbed, disease resulted. The four elements had four corresponding qualities, hot and cold, moist and dry, which were combined, two by two, as follows:

* Earth is cold and dry,
* Water is cold and wet,
* Air is hot and moist,
* Fire is hot and dry.

These terms refer to what might be termed the pure elements; the substances which are found in the world are impure. Thus the water which we know contains a preponderance of elemental water, with small amounts of the other three. The element 'water' is an essence which is not knowable, but like the other three elements, it is one of the roots of all things.

Empedocles believed that blood is the seat of "innate heat", which he identified with the soul, and that the heart was the centre of the system of blood vessels, through which innate heat was distributed to the body. He had a tremendous reputation as a physician, and was so successful that he was regarded by many as a magician. It is said that he perished by falling into the crater of Mount Etna.

An important influence on Empedocles was Pythagoras (born 582 BC) who founded in Croton in southern Italy, about 530 BC, a school of philosophy

Pythagoras.

which came to bear his name. It is worth spending a little time on Pythagoras. Not only did he prove the famous theorem in geometry that the sum of the squares on the sides of a right-angle triangle is equal to the square on the hypotenuse, but he saw in numbers the mystical basis of existence. Some of the beliefs of the Pythagoreans were summed up by Aristotle, as follows: "The Pythagoreans devoted themselves to mathematics. They thought that its principles were the bases of all things. In number they saw many resemblances to things that exist and are coming into being .... one modification of number being Justice, another Reason, another Opportunity .... almost all things being numerically expressible. Again they regarded the attributes and ratios of the

musical scale as expressible in number. They therefore regarded numbers as the elements of all things, and the whole heaven as a musical and numerical scale. The very arrangement of the heavens they collected and fitted into their scheme. Thus, as ten was thought to be perfect and to comprise in itself the whole nature of numbers, they said that the bodies which move through the heavens were ten in number; but since the visible bodies are but nine, they invented a counter-earth."

One of the consequences of the Pythagorean belief that the sphere was the perfect form was the belief that the earth was a sphere and that the heavens moved in concentric spherical shells. It was the notion that the radii of these shells were in certain proportions to each other like the ratios of the musical scale, that led to the conception of the music of the spheres. These notions of the mystical significance of number, and the harmonies of nature passed, through Plato to Aristotle, and, as we shall see, still further, into mediaeval times.

The idea that the universe is constructed as a series of concentric shells is also related to the properties of the four elements. Earth being the heaviest lies at the bottom, with water and air above. Fire, being the lightest of all elements lies outside the air, and indeed was said to be located at the level of the moon's orbit. Beyond the sphere of elemental fire lay a region of the mysterious ether (which is Greek for 'shining') and then in turn the seven spheres of the planets. The eighth sphere was that of the fixed stars, and the tenth sphere which moves all the others.

Now, just as the components of the great universe (the macrocosm) had been identified with the four elements earth, water, air and fire, with their qualities cold, hot, moist and dry, so were the elements of the small universe (the microcosm) the human body, identified with four elements, called, in this case, the four humours and they are as follows:

blood, hot and moist,
yellow bile, hot and dry,
black bile, cold and dry,
Phlegm, cold and moist.

Health depended upon a proper balance between these, and disease was caused by their imbalance. It was the concept of the four humours which underlay the practice and writings of the greatest of the Greek physicians, Hippocrate (460-370 BC) although the doctrine of the four humours was probably elaborated before his time.

His writings probably are not all by him, but they establish a presence and a personality which is still alive for us today. His greatness lies not only in the fact that he put the rational procedures of the philosophers to the test of experience, but also that he carried out his work with the most scrupulous regard for his patients and with the highest moral standards. The Hippocratic Oath, with its code of proper medical behaviour has been a guide to generations upon generations of medical people.

Charles Singer in his Short History of Scientific Ideas to 1900, sums up the character and contribution of Hippocrates as follows:

It is impossible to exaggerate the influence on medicine of the picture that was early formed of him. Learned, observant, humane, with a profound reverence for the claims of his patients, but possessed of an overmastering desire that his experience should benefit others; orderly and calm; anxious to record his knowledge for the use of his brother physicians and for the relief of suffering; graven thoughtful and reticent; pure of mind and master of his passions; such is the image of the father of medicine as he appeared to his successors.

Map of the eastern Mediterranean in the time of Hippocrates.

While the philosophers developed the conception of a rational world, it was the physicians, typified by Hippocrates, who first put the rational conception to the test of experience. It was they who first consciously adopted the scientific procedure which, in its relation to medicine is sometimes called the Hippocratic Method."

In his book on The Nature of Man, Hippocrates wrote:

"The body of man contains in itself blood and phlegm and yellow bile and black bile, which things are in the natural constitution of his body, and the cause of sickness and of health. He is healthy when they are in proper proportion between one another as regards mixture and force and quantity, and when they are well mingled together; he becomes sick when one of these is diminished or increased in amount, or is separated in the body from its proper mixture and not properly mingled with all the others."

The humours were thought to be kept in proper proportion by the action of innate heat, which, when the balance is disturbed has a tendency to restore the humours to their proper proportions. This was the natural power of the body to restore itself. The excessive humours were discharged by the body, often by way of a crisis, that is, by a sudden change in the patient's condition. In the first half of this century students were still taught about the distinction between the resolution of lobar pneumonia by lysis (that is, by gradual degrees) or by crisis (that is, by the patient quite suddenly becoming afebrile). As is common in medical practice today, the physicians of Hippocrates' time were anxious to be able to predict the course of an illness. The mysterious Pythagorean properties of numbers were used to explain their observation about the "critical days" in a disease.

It has been said that Hippocrates' work on epilepsy represents a monument to the human spirit in that it is perhaps the first book in which there is clear opposition between the claims of science and of religious tradition. And as a

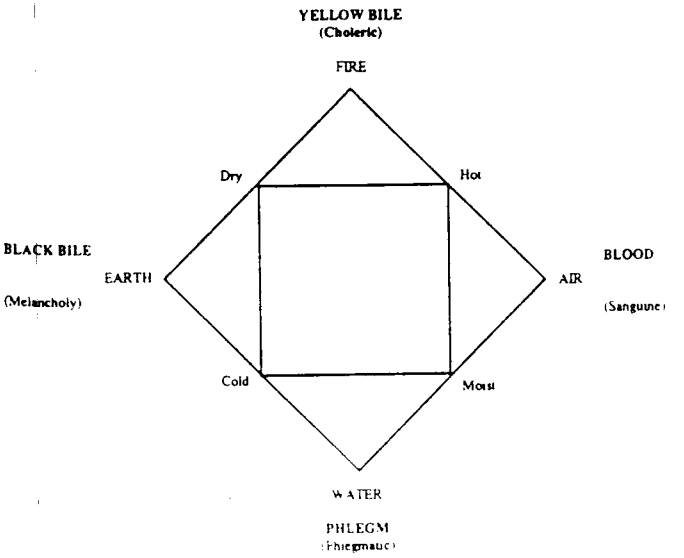
monument to his meticulous powers of observation and description, it has been said that his description of malaria was the basic medical text on the subject until about 1840.

The Alexandrian School was a centre of great intellectual significance. It had the greatest library in existence at that time, reputed to have 200,000 books, and also boasted the presence of such distinguished scientists as Archimedes, Euclid and Ptolomey. It is perhaps worth remarking that the books were handwritten on papyrus, and as vulnerable as they were valuable. The medical school there was important as it was here that for the first time dissection of the human body was performed. Until then it had not been permissible, on religious grounds, to do this in Greece, but the Ptolomies of Egypt allowed it.

The Alexandrian anatomist Erasistratus (about 310 - 250 BC), made detailed studies of the heart and the circulation, and described the aortic and pulmonary valves, the chordae tendinae, and recognised that the heart was a pump, but thought that the blood moved from the liver to the heart, by the arteries, and then to the lungs by the veins. He also thought that vital spirit was extracted from the air in the lungs and was responsible for the heart beat and for the innate heat of the body, being carried from the heart to all its parts. He distinguished this vital spirit from animal spirit, which was elaborated in the brain and sent to the muscles and other parts of the body through the nerves. Thus, vital spirit was responsible for heat and nutrition, while animal spirit was responsible for movement, sensation and the special senses.

There was little further development of the concept of humours until we come to the time of the great Galen (131-201 AD). When, as we shall see, the medical science of the Greeks returned to Europe in the renaissance, Galen's works were immensely influential and he ranked with Aristotle as an ultimate authority.

Galen's approach to medical problems combined the humoral concepts of Hippocrates with the Pythagorean teachings on numbers, together with his own belief in a spirit or pneuma which permeated the body. On these bases he erected an enormous system of classifications and descriptions of diseases and of physiology and pathology. He was a great anatomist and a great experimenter, and his output was encyclodedic. From the experience of fifty years of teaching, practice and experimenting he produced 120 books which, in modern print would occupy nearly 10,000 pages of Greek text.



The four humors and four elements

His view of science was teleological, following Aristotle's teaching that Nature makes nothing in vain. This led, of course, to all sorts of mistakes,

when the physical facts were interpreted, or misinterpreted to fit with his preconceptions, but their persuasive force contributed to his tremendous and enduring success and authority.

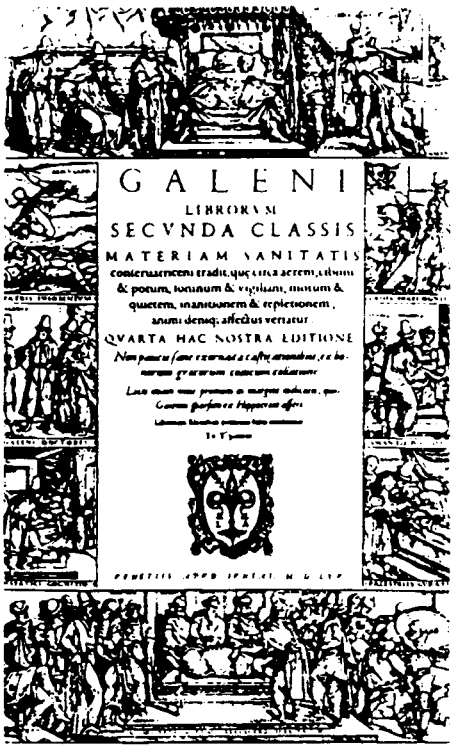
Galen identified four temperaments of man, and noted the parallels with the four ages and the four seasons. The four temperaments were:

Combined Primary Qualities	Element	Humour	Temperament
Hot and moist	air	blood	sanguine
Moist and cold	water	phlegm	phlegmatic
Cold and dry	earth	black bile	melancholic
Dry and hot	fire	yellow bile	choleric

These definitions carry the usual meanings of the words today, but it is necessary to be aware that the word 'temperament' is a latin translation of a Greek word which refers to the mixing of the humours. Tempero means to combine or to regulate. Galen assumed a different psychological effect of each humour, according to its action on the brain, which he regarded as the organ or instrument of the soul. Thus, once again, we meet the notion that health and disease depend upon the balance of the humours; if they are combined in the proper proportions we have health, if they are disturbed, we have disease. As one example, we can consider Galen's view of Melancholy.

Melancholy comes from the two words meaning 'black' and 'bile', and its definition in the Galenic texts is worth repeating:

"Melancholy is an affection which damages the judgement, causes a grave disturbance of the mood and estrangement from those most closely associated. There is no fever. Those patients who have an abundant production of black bile suffer from stomach disease which causes emesis, and their mind becomes clouded."



Title page of an edition of the works of Galen printed in Venice in 1565. The voluminous writings of Galen were looked to as the ultimate medical authority for about 1,500 years. Collection Bertarelli Milan.

Galen described what clearly is the same condition which we now call a depressive illness. According to him it manifests itself as a state of mental dejection, the hate of other people and of life itself, occasional suicidal tendencies and the fear of impending death. He observed that the fear of death can coexist with the fervent wish to die. Suspicion and envy, sorry and grief keep these patients restless. The association of depressive illness with digestive symptoms and various abdominal complaints is well known to modern psychiatry; Galen's linking of the two is simply the reverse of the cause and effect.

Galen's description of the heart and blood vessels and the movement of the blood in them is important because it persisted, practically without challenge,

for 1500 years, until William Harvey demonstrated the "true" state of affairs.

Galen held that the blood originated in the liver, where the products of digestion, arriving from the gut, endowed it with natural spirits. It then passed to the heart, where, mixing with pneuma from the air it was enriched with vital spirits. The waste products, brought from the liver and from the rest of the body, were discharged through the lungs. The motion of the blood in the veins was thought to ebb and flow like the tides. Some small quantity of the blood was believed to pass through the septum between the right and left sides of the heart, to be warmed in the left ventricle and enriched with the vital spirit from the air in the lungs; it was then distributed, via the arteries, to the body as a whole, carrying heat and vital spirits to every part. Galen differed from Erasistratus, who said that the arteries contained air; he maintained that they were like the veins, filled with blood. He stated that the blood passed through pores in the interventricular septum where no clear pathway can be demonstrated. This view of cardiovascular physiology was accepted, along with the rest of the vast body of Galen's teaching, as I have said, without question for the next fifteen hundred years.

How was it, then, that after Galen medical science stood still for so long? We have been looking at a progressive development of scientific and medical knowledge, over about eight hundred years, from Thales in the sixth century BC to Galen in the second century AD, and now there is an extraordinary interruption, a blank of over a thousand years. What went wrong? Why was it that the great authorities whom William Harvey in 1628 called on for support or aimed to disprove, were all so far in the past?

Sir William Osler, in his splendid lectures on the Evolution of Modern Medicine, lists three causes for the paralysis of science and medicine. The first was the fall of the Roman empire; the second was the spread of the Christian religion where science, not being a path to salvation, was regarded as unnecessary; and the third was a desolating plague in the sixth century. The decline of the Roman Empire was completed when the barbarians entered Rome in 410 AD, and with the fall of that civilisation came the destruction of the libraries and the centres of learning. It is true that the Romans were less concerned with speculative philosophy than were the Greeks, and more concerned with practical administration. They had not been responsible for any great advances in science or medicine, but their public health services were excellent, and they had hospitals and proper sanitation. They built great aqueducts, many of which are still standing as monuments to their skill, to bring fresh water to their cities.

The Schools of Alexandria continued for a time but nothing of great note was achieved. Alexandria remained a meeting place for scholars from many countries and different religions. The early Greek father of the Christian church, many of whom lived in or were in contact with Alexandria, were thus in touch with Jewish and Greek philosophy.

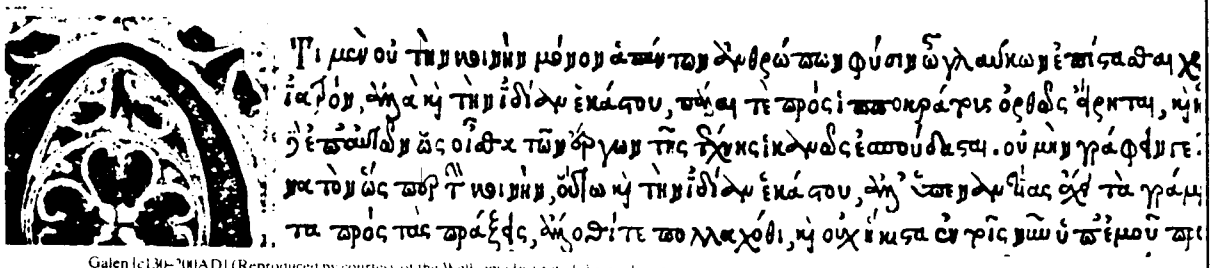
The consciousness of sin, in the Christian religion, brought with it not only redemption and the hope of heaven but also the fear of hell. The Day of Judgement was near, and it is hardly surprising that with such spiritual preoccupations before them, the people of those days had small interest in knowledge for its own sake. Saint Ambrose is said to have observed quellingly that "to discuss the nature and position of the earth does not help us in our hope of the life to come".

Although Europe, after the fall of Rome, was in disarray, and science was abandoned, the knowledge which had accumulated was not all lost. Memories of past learning were preserved in some of the South Italian cities, where Salerno was famous for its physicians as early as the ninth century, and later became one of the first great medical schools of the middle ages. In Byzantium, from the third century, there was a continuation of the traditions of Hippocrates

and Galen until its fall in 1453. The third inheritor of Greek science was the Arab world.

By the beginning of the seventh century, the Greco-Roman Christian world had extended to the East, almost to China. But within another century the greater part of this area had been conquered by the Arabs. The Eastern Empire, Egypt, North Africa and Spain had all been occupied, and Western Europe itself was in peril at Tours, in 732. The Arab conquerors, however, were eager to acquire not only the lands but the learning of the people they conquered, and once again the libraries of Alexandria saw Greek works being translated into Arabic.

At the end of the eighth century, their whole scientific posession consisted of a translation of one medical treatise and some books on alchemy. Before the ninth century had run to its close, the Arabs were in posession of all the science of the Greeks; they had produced from their own ranks students of the first order, and had raised among their initiators men who, without them, would have been groping in the dark; and they showed from this to have an aptitude for the exact sciences, which was lacking in their instructors, whom they



Galen [c130-200AD] (Reproduced by courtesy of the Wellcome Institute Library, London)

Galen c130 -200 AD.

henceforth surpassed.

There thus came into existence a second great line of medical science, and by the time that the stream of knowledge returned to Europe, the Arab world could boast of medical scientists such as Avicenna and Averroes, the equals of Hippocrates and Galen.

This contrasts with Europe after the fall of Rome where there was very little of civilization left to sustain science and medicine.

Although science was ignored or despised, the Church did not avoid the duty of tending the sick. In monasteries the ills of the flesh were attended to, though less expertly than the ills of the soul. There was not a great deal of literature available. Since Latin was the only common language in the West, scholars had to rely on what had been translated from Greek into Latin, and in the Dark Ages as they are called, from about 400 to 1200 AD, Aristotle was known, through the translations by Boethius (480-524 AD), for his logical and not his biological writings. There were also some elementary encylopedic works of the seven liberal arts; the trivium, grammar, rhetoric and dialectic, and the quadrivium, geometry, arithmetic, astronomy and music. Pliny's Natural History was also widely read. Bishop Isidore of Seville (560-636 AD) produced an encyclopedia of sciences. He considered that the moon had an influence over plant and animal life and over the humours of man; he advised physicians to study astrology.

About the year 1000 AD the inflow of Greek knowledge into Europe began again, with Latin translations being made of the Arabic versions, to a large extent in Spain, and frequently with the help of Arabic-speaking Jewish scholars. The ancient Greek sources, largely held in Byzantium, were not as accessible, nor since they were in classical Greek were they entirely intelligible to the contemporary Byzantine Greeks.

This time also saw the founding of the European universities, beginning with Paris (1110), Bologna (1158), Oxford (1167) and many others, and soon they were intensely active centres of teaching and intellectual discourse. Some were devoted to general studies, others were specialised in the law and theology and medicine. The latter was at first taught as a branch of philosophy.

It is a study in itself to trace the return of knowledge to Western Europe. Despite the Church's preoccupations with spiritual matters to the exclusion of things of the intellect, by the thirteenth century there were great scholars in the Church; the Franciscans Alexander of Hales, Robert Grosseteste, Bishop of Lincoln and Chancellor of Oxford, Roger Bacon; the Dominicans Albertus Magnus and St. Thomas Aquinas.

It was at this time, between 1200 and 1225 that the works of Aristotle became available in Latin, and caused something of a stir. At first they were condemned, and in 1209 they were prohibited in the University of Paris. In 1225, however, this eventually was repealed, and they were placed in the curriculum. The absorption of Aristotelian thought into the dominant Christain theology was largely the work of St. Thomas Aquinas (1225-1274 AD), and this accounts for Aristotle's subsequent dominance in the development of science and medicine.

St. Thomas' task was the reconciliation of faith with reason, of Aristotle's logic and science with Christain doctrine. He succeeded so well that his work had an effect of petrifying authority. The combination of divine revelation through the scriptures and the sublime exercise of human reason (also a divine gift) proved irresistible. Such certainty was not an encouragement to, and was scarcely compatible with an experimental approach to Nature.

Europe's intellectual engine was once again charged with fuel and although life was by no means easy through the Hundred Years War, and with the plagues of the Black Death, at first in Italy, and later in the north of Europe, learning

and enquiry took off. This "Renaissance" was hastened after the fall of Constantinople in 1453 when many Greek scholars came to Europe, bringing with them not only manuscripts but knowledge of the language in which they were written.

It is also important to be aware of the consequences of the invention of printing. The Gutenberg Bible was printed in 1454, and thereafter the classical works, both in the sciences and the humanities, became far more readily available. Aristotle's biological works were printed, in Latin, in 1476, and by the sixteenth century there were scores of editions of Hippocrates and Galen, both in the Greek, the Latin and in the vernacular.

The times produced some extraordinary people, Leonardo da Vinci (1452-1518), not only a superb artist, but a great anatomist: Paracelsus (1493-1591), who attacked the Aristotelian doctrine of the four elements, and started a line of enquiry in the direction of modern chemistry; Andreas Vesalius (1514-1564), who published, in 1543, his great work De Corporis Humana Fabrica, based on his own extremely accurate dissections, and illustrated with drawings which are both beautiful and exact.

Until Vesalius most anatomists had been content to use dissection simply as an illustration of the teaching of Galen or some other authority, but he was not content with that. The frontispiece of his book shows him at the dissecting table; illustrations of other and earlier anatomists at work usually showed them reading from a book, at a safe distance. He not infrequently disagreed with Galen's descriptions, some of which derived from dissections not on man but on other animals, and his book aroused some hostility. As far as the anatomy of the heart is concerned, Vesalius almost, but not quite, denied the existence of Galen's pores in the interventricular septum. He could not see them, but since he was convinced that the purpose of the pulmonary vein was to convey air from the lungs to the heart, he could find no other way of bringing blood into the left ventricle save through invisible pores.

Vesalius taught principally in Padua, where a university had been founded in 1222, and it was to Padua that William Harvey went as a student in 1598, where Fabricius had held the Chair of Anatomy since 1565. Fabricius was in a direct line of succession from Vesalius, and continued the practice of personal anatomical dissection and observation. At Padua Harvey was also trained in Aristotelian philosophy and the methods of Aristotelian thought, in which his teacher was the Professor of Philosophy Cremonini, a friend of Galileo who at that time held the Chair of Mathematics. There is however no evidence that Harvey was ever taught or influenced by Galileo, fascinating though such a prospect is.

Having begun with Harvey and his proof of the circulation of the blood we now come full circle. Behind the formal courtesy of that royal dedication lie the pathways of over two thousand years of human thought and speculation, and in front of it lies the great road of experimental medical science on which we are still travelling.

READING MATERIAL FOR LECTURE ON THE FOUR ELEMENTS AND THE FOUR HUMOURS

1. *A short History of Scientific Ideas to 1900*, Charles Singer, Oxford University Press, 1959.

2. *History of Medicine*, 4th Edn., F.H. Garrison, Saunders, 1960.

3. *The Evolution of Modern Medicine*, William Osler, Yale University Press, 1921.

4. *William Harvey and the Circulation of the Blood*, Gweneth Whitteridge, Macdonald, Elsevier, 1971.

5. *Lectures on the History of Physiology during the 16th, 17th & 18th*

Centuries, Michael Foster, Dover, 1970.

6. *A History of Science*, W.C.D. Dampier-Wetham, Cambridge, 1929

.

In addition, students may be interested to read a more literary study of the mediaeval mind in *The Discarded Image, an Introduction to Mediaeval and Renaissance Literature*, C.S. Lewis, Cambridge University Press (paperback) 1970.

NOTES

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 5

ANATOMY AND THE ANATOMISTS

P. McGrath

NOTES

DISSECTION

P. McGrath

ANATOMY and DISSECTION were originally synonymous. To do an anatomy was to do a dissection - to study the body by the separation of the whole into parts.

With the progressive development of investigative techniques, anatomy has widened in scope. It now includes the study of the development, cellular detail, metabolism, function and biomechanics of the human body.

Dissection on which the cumulative knowledge of the microscopic structure of the human body and its parts is based, continues to be regarded as the most satisfactory way for the medical student to learn anatomy. By undertaking a dissection, the student can best see what the various structures of the body look like, how they are placed in regard to neighbouring structures and how they are disposed for the efficient carrying out of their functions.

The logistics of the study of human anatomy by dissection has always been formidable. From ancient time, religious beliefs and customs have often forbidden or discouraged any study of the dead body. On the rare occasion when a body was available for dissection there was no effective way of preserving it and the maximum time available for dissection was therefore, about four days. In the seventeenth century the use of alcohol as a preservative was introduced, while the discovery of the preservative quality of formalin late in the nineteenth century marked a major advance. At about the same time, cadavers in the numbers required in modern teaching became available, their acquisition, dissection and disposal being regulated for example, in England and Australia by appropriate Anatomy Act.

PREHISTORIC TIMES

In prehistoric times man learnt the anatomy of the animals he hunted and the foes he fought. Prehistoric man knew the significance of the well placed hit in the front of the upper body, the back of the neck and the lower part of the spine. He knew of muscles and organs, bones, tendons and teeth and put such anatomical knowledge to varied uses. Dissection therefore in its most practical form is as old as man himself.

Dissection as a scientific venture, to establish data on the form of the body and its parts is our particular interest. In our search for its development we turn first to the records of the earliest civilisations.

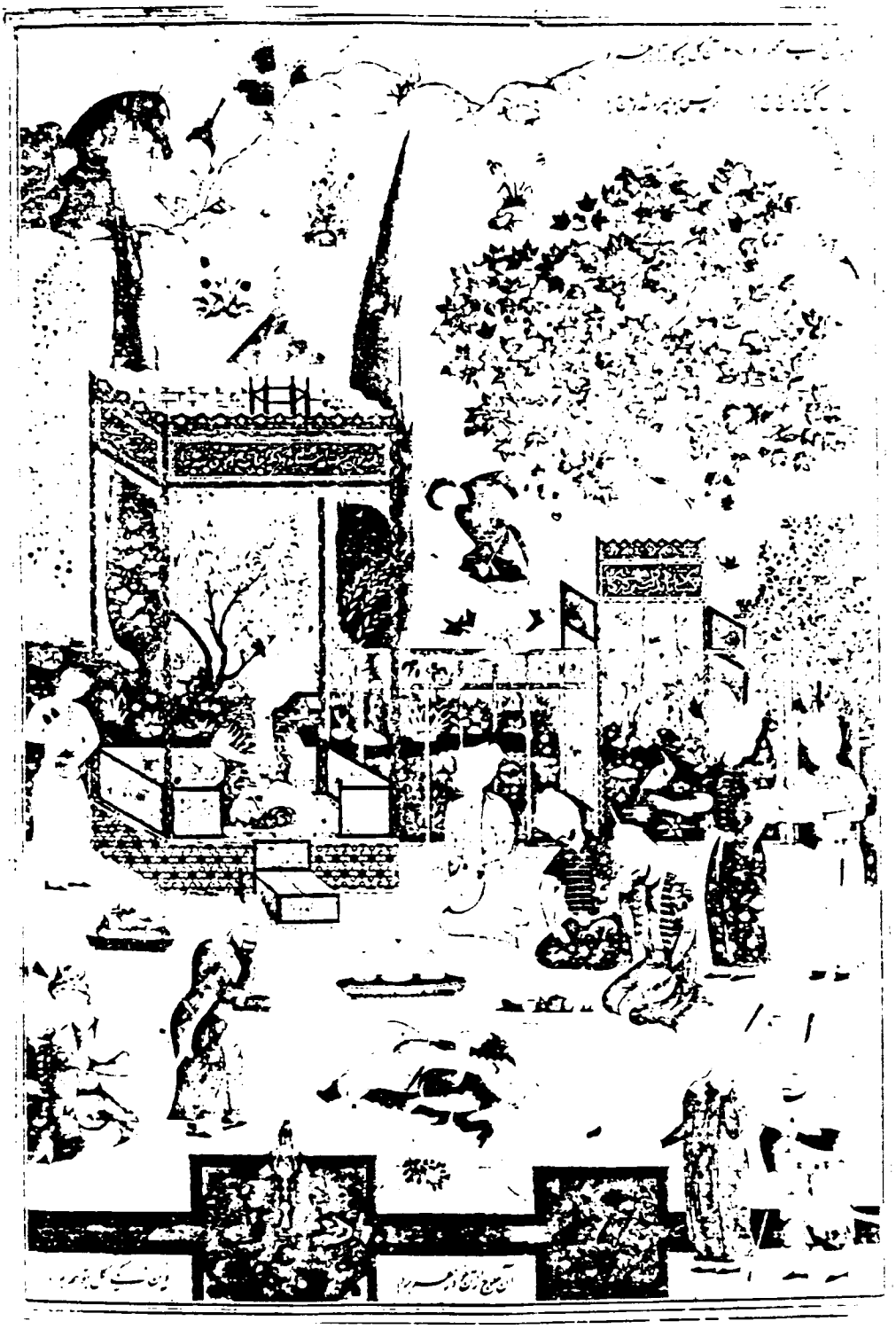
THE ANCIENTS AND DISSECTION - from 3000 BC

About 5000 years ago literate civilisations were flourishing in China, India, Mesopotamia and Egypt.

CHINA

The teaching of the religious sects in ancient China forbade the mutilation of the dead human body. It is recorded however that in the northern Sung dynasty in the 11th and 12th centuries AD bodies of executed criminals were sometimes dissected and drawings of the viscera were made for the benefit of medical studies. This approach was not generally accepted in China and traditional Chinese an-atomy has no real, scientific foundation. It is based on the cosmic system which

Illustration of The Rival Physicians



postulates the presence of such hypothetical structures as the 12 meridians. The human body is said to contain two groups of four organs. Each organ is associated with one of the planets and also with one of the colours, tones, smells and tastes. In describing traditional Chinese medicine in 1921, Osler commented that its stage of development as similar to that of the ancient Egyptians. Osler suggested that this stagnation in medical knowledge resulted from the lack of knowledge of anatomy, pathology and pathology.

JAPAN

Japanese medicine was largely based on Chinese tradition. While a Japanese medical book of 1304 contains anatomical drawings associated with the northern Sung dynasty Japanese medicine followed traditional Chinese medicine in concept and practice until the middle of the eighteenth century. Then in 1741 Toshuku Negoro who live in Kyoto wrote an article based on the examination of the skeletons of two criminals condemned to the stake. In the article he described the bones and joints with pictures and explanations. He emphasised the importance of real observation rejecting the emphasis on meditation as the basis of medical studies. In 1754, Toyo Yamawaki gained permission for a dissection to be carried out in Kyoto on an executed criminal. He published the findings in 1759 in 'Zoshi' or 'Notes on Viscera.' These findings indicated many errors of the 5-Zo, 6-Fu theory of classical Chinese medicine. In 1771 a dissection was done in Yedo (now Tokyo) on a female body after execution. Among those present during the dissection were three physicians who had in their possession a Dutch anatomical book by Kulmus. They were deeply impressed by the coincidence of their own observations of the interior of the human body with the anatomical pictures in the textbook. With great persistence they undertook to familiarise themselves with the Dutch language and to produce a translation of Kulmus' book. Such a book titled 'Kaitai-Shinsho' or 'New Book of Anatomy' was published after 4 years of strenuous work. The significance of the book for the medical world in Japan was very great. The circulation and the lymphatic system were already known in Japan but the existence of the nervous system and the meaning of the brain and the spinal cord were a surprise to Japanese physicians. In the following decades dissections were frequently carried out on executed criminals or on those who died in prison. such dissections were done under great difficulties as it was not permitted to move the cadaver to a suitable place for study and the dissection had to be completed by sunset. Sometimes more than one hundred persons attended the dissection each group being allotted a special task. As the preservation of bones was prohibited teachers prepared elaborate models of the human skeleton by wood carving.

In 1857 a Dutch medical school was established in Yado. In 1873 the first Japanese institute of anatomy was established in Tokyo. From this period the development of Japanese medicine was rapid.

INDIA

Indian medicine is very ancient with precepts set out in writings dated at 2,000 BC. The golden age of Indian medicine was from 800 BC to 1000 AD. The two ancient schools of medicine in India were those of Charaka and Susruta. It appears unlikely that dissection of the human body was undertaken in the school of Charaka, but dissection of human bodies was known and practised in the school of Susruta.

The Compendium of the School of Susruta contains a passage which gives detailed instructions regarding the procedure to be adopted in preparing a dead body for anatomical examination. As the Hindus were prohibited by their religion from cutting the dead body, Susruta recommended that a body should be place in a basket and immersed in a river for seven days. On its removal from the river the parts could be separated without cutting. As a result of these crude methods of preparation the anatomical data obtained were mainly of bones and to a lesser extent muscles, ligaments and joints. There were few data on nerves, blood vessels and internal organs.

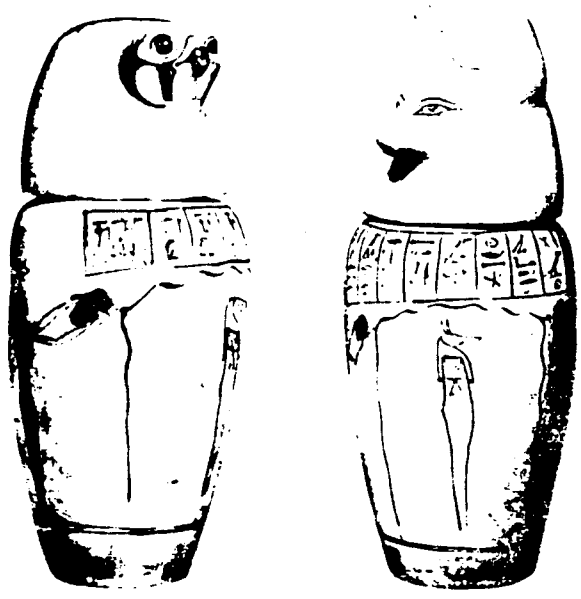
MESOPOTAMIA

The records of ancient Mesopotamia show that the Assyrians and the Babylonians did dissect a sacrifical animals. They inspected a number of organs but their particular interest was in the liver which was regarded as the seat of life. The earliest known anatomical model is a clay model of a sheep's liver with the divination text dating from about 2000 BC. The Art of Divination was highly developed and the practice spread widely. There are many references in the Bible to the practice.

EGYPT

There is nothing in their records to suggest that the ancient Egyptians dissected the human body in search of anatomical knowledge. However, the preparation of the body for the 'Voyage of the Dead' entailed the removal of the heart, liver and intestines through a small incision along the side of the trunk. The Egyptian papyri such as the Ebers Papyrus, show that the position and function of the stomach and the intestines, the action of the larger blood vessels and the relation of the pulse to the heart were appreciated.

Pliny the Elder writing in Rome in the first century AD states in his Book XIX (a dissertation on the efficacy of radishes in lung disease), that dissections to find the cause of death - autopsies - were performed. 'In Egypt ....caused dead bodies to be cut up and anatomies to be made .... to search out maladies whereof men died.



Two canopic jars used to preserve liver, lungs, stomach and intestines extracted from deceased during embalming. Lids represent sons of the god Horus, who protected remains in eternity.

The Egyptian papyri show that detailed case histories were collected in ancient Egypt and certain pathological theories were developed.

China continued its development in isolation but there was considerable interchange of knowledge between India, Mesopotamia and Egypt. The accumulated knowledge from these three civilisations was inherited by Ancient Greece.

THE GREEK ERA

The Age of Hippocrates - 4th and 5th Centuries BC

Schools of Cos and Cnidus

During the period from 430 to 330 BC many authors wrote on medical subjects. Some authors belonged to the School of Cos said to have been founded by Hippocrates, others to the rival school of Cnidas in Asia Minor. The writings of these authors were formed into a collection in the third century BC possibly by the scholars of Alexandria. The collection is known as the Hippocratic Writings.

The Hippocratic Writings came to include almost all the anonymous medical writings of the classical age. As described in these writings, the Hippocratic healing art did not move along anatomical lines. The ancient Greek physicians had only a rudimentary knowledge of anatomy and physiology. The knowledge of surgeons at this time was mainly confined to surface anatomy and that data obtained from the treatment of injuries and war wounds.

The writings provide evidence of experimentation as the basis of knowledge as in the treatise titled 'The Nature of the Child'

Furthermore (if you accept the evidence which I am about to give) you will find that the growth of the infant is from the beginning to end exactly as I have described it in my discourse. If you take twenty or more eggs and place them to hatch under two or more fowls, and on each day starting from the second, right up to the day on which the egg is hatched, you take one egg, break it open and examine it, you will find that everything is as I have described making allowance of course for the degree to which one can compare the growth of a chicken to a human being.

In the same treatise is the following observation -

Those who are bald are so because their constitution is phlegmatic: for during intercourse the phlegm in their heads is agitated and heated and impinging upon the epidermis burns the roots of their hair so that it falls out.

Included in the writings are many wise medical sayings reflecting attitudes and the level of basic knowledge among the ancient Greeks.

The School of Crotona

Another feature of the fifth century BC was the establishment of medical schools in colonial towns in the south of Italy such as that of Crotona founded by Pythagoras.

One member of the Crotonian School, Almaeon, is said to have been the first to recognise the brain, to have dissected nerves and to have described the optic nerves and the auditory tubes.

Dissection was practiced by the members of this school on a large scale - Alcmaeon, Democritys, Diogenes and others - but such dissection was not undertaken on the adult human body. The Age of Aristotle - 4th century B.C.

Diocles of Carystus wrote a text on anatomy. His writings show little know-ledge of human anatomy, but his writings do show an awakening interest in anatomical study. At this time moral and aesthetic attitudes opposed the dissection of human beings but animals were dissected and from data thus acquired the structure of the human body was inferred.

Aristotle whose writings included anatomical matters, stated that 'the inward parts of man are known least of all' and that he had never seen the human kidney or uterus.

The School of Alexandria - 3rd century B.C.

The city of Alexandria was founded by Ptomley I in honour of Alexander who died in 323 BC. Alexander became the pre-eminent centre for classical knowledge and remained such for centuries.

The School of Alexandria reached its zenith at the time of Herophilus and later Erasistratus, Greek physicians who settled in the city. It is thought that these scholars and those working with them were responsible for collecting the sixty treatises which form the Hippocratic Writings. The writings stand at the beginning of systematic medical inquiry in Greece. Records of Egyptian and Mesopotamian medicine are impressive but there is nothing in such records which is comparable to the systematic debates on, for example, the causes of disease and the nature of medicine itself which are so prominent in the Hippocratic Writings. Such a collection of knowledge was a new phenomen.

Herophilus while accepting in general the deductive and philosophical Hippocratic tradition, was also a remarkably able anatomist. He wrote a

treatise on anatomy in at least three books which were greatly prized in antiquity. Herophilus gave detailed accounts of human organs comparing them with those of animals. He is credited with describing and naming the duodenum and prostate. It is not known for certain whether he systematically dissected the human body.

Erasistratus dissected animals and some human organs - the heart, the larynx, the liver and the brain which he described in great detail. He described the valves of the heart and with Herophilus recognised the true nature of nerves as distinct from tendons. However Erasistratus concluded that arteries carried air and named these vessels accordingly. Erasistratus made postmortem examinations on humans (autopsies) and wrote a book on the causes of disease.

The works of Hemophilus and Erasistratus are lost. However there is included in the Hippocratic Writings a short treatise titled 'The Heart'. This treatise is considered to belong to a period contemporary with or slightly later than Erasistratus. Unlike most of the Hippocratic writings which make little or no use of dissection, the account of the heart depends on dissection. 'The Heart' is the first extant treatise to mention the valves of the heart and it provides valuable direct evidence concerning the advances in anatomical knowledge which stemmed from the use of dissection in the third century BC.

The School of Alexandria reached its zenith at the time of Herophilus and Erasistratus. Its importance slowly diminished but it retained its reputation as a centre of learning for almost 1000 years.

THE ROMAN ERA - 2nd Century AD

During the second century AD a renowned Greek physician, Galen of Pergamun, lived and practised in Rome for extended periods. Galen presented lectures in anatomy and demonstrated the anatomy of the animals in dissecting room sessions. Shorthand writers provided by one of his patrons took down verbatim reports. Several of his books on anatomy were based on these reports. It appears that Galen did not dissect the human body. He lamented the prejeudice which prevented such dissection.

Galen was the first to carry out experiments on a large scale. He investigated the circulation of blood, the functioning of the laryngeal nerves, the motor and sensory function of the spinal nerve roots and the effect of transverse section of the spinal medulla.

The circulation according to Galen: There are two kinds of blood - the venous blood which is dark, thick and rich and provides general nutrition. The origin of this blood is the liver. One vena cava carries the blood to the head, neck and upper extremity. From this sectionan a branch passes to the lungs. This system is closed. - the arterial blood which is thinner, brighter and warmer with an abundance of vital spirit. The arterial blood is warmed in the ventricle and distributed to all parts of the body.

Galen knew of the valves of the heart and the direction of blood flow but he did not appreciate the heart as a pump regarding it as a fireplace from which the innate heat of the body was derived.

2nd - 5th Century AD

In the centuries after his death, Galen became the chief authority on questions of anatomy, physiology and pathology. Perhaps in keeping with the general decline of the Roman Empire, medical and biological inquiry declined and the main effort of medical writers was directed towards summarising and systematising medical knowledge.

THE DARK AGES 5th - 10th centuries A.D.

Rome fell to Alaric in 410 and Europe entered the Dark Ages. For the next five hundred years the monasteries of the Christian churches were the repositories for learning in Europe. Some works on medicine and related subjects survived in poor translation but many others were lost. No active study of anatomy by dissection appears to have occured in Europe during this period.

This same period however was a time of great intellectual endeavour in the East particularly in Bagdad. The works of the great Greek physicians were translated into Arabic and their contents rapidly assimilated. Al Razi (died c.925) wrote extensively on human anatomy but it is generally accepted that dissection of the human body did not occur in the Arab world.

Constantine of Africa, 1010-1087.

THE MIDDLE AGES - 10th - 11th centuries AD

The School of Salerno

A centre of learning developed in Italy, in Salerno, from 848 AD. Legend relates that a medical school was founded in Salerno by four doctors - a Greek, a Roman, a Saracen and a Jew who met together and decided upon the joint composition of a book of recipes or prescriptions. A medical faculty, the first medical faculty of the West thus came into being. Women were among both the faculty and the students.

The textbooks of the Salerno medical school were Latin translations of the writings of the great Greek physicians and renowned Arabic practitioners. The translations were the work of Constantine of Carthage (1010-1087). Constantine a physician, translated the works from the Arabic thus providing Europe with a greatly expanded source of medical information and concept.

15th. century minature of the autopsy of Agrippina AD 59

The study of anatomy was undertaken. Animals, especially swine, were pre-pared for anatomical demonstrations and brief handbooks on the subject were written. One of the decrees governing the conduct of the school set down that the dissection of the human body should take place at least once every five years but it was only with the greatest difficulty that permission could be obtained to carry out the dissection. The teaching of anatomy therefore continued to be based on the dissection of animals, but even this limited procedure of direct observation was largely superseded by the Arabic influence which favoured the teaching of anatomy wholly from textbooks.

The doctors of the Salerno school saw no reason for formulating new theories. The Greco-Arabic science whose wealth had been disclosed to them through the translations of Constantine provided sufficient explanations and fully gratified their scientific interest.

12th - 15th Centuries AD

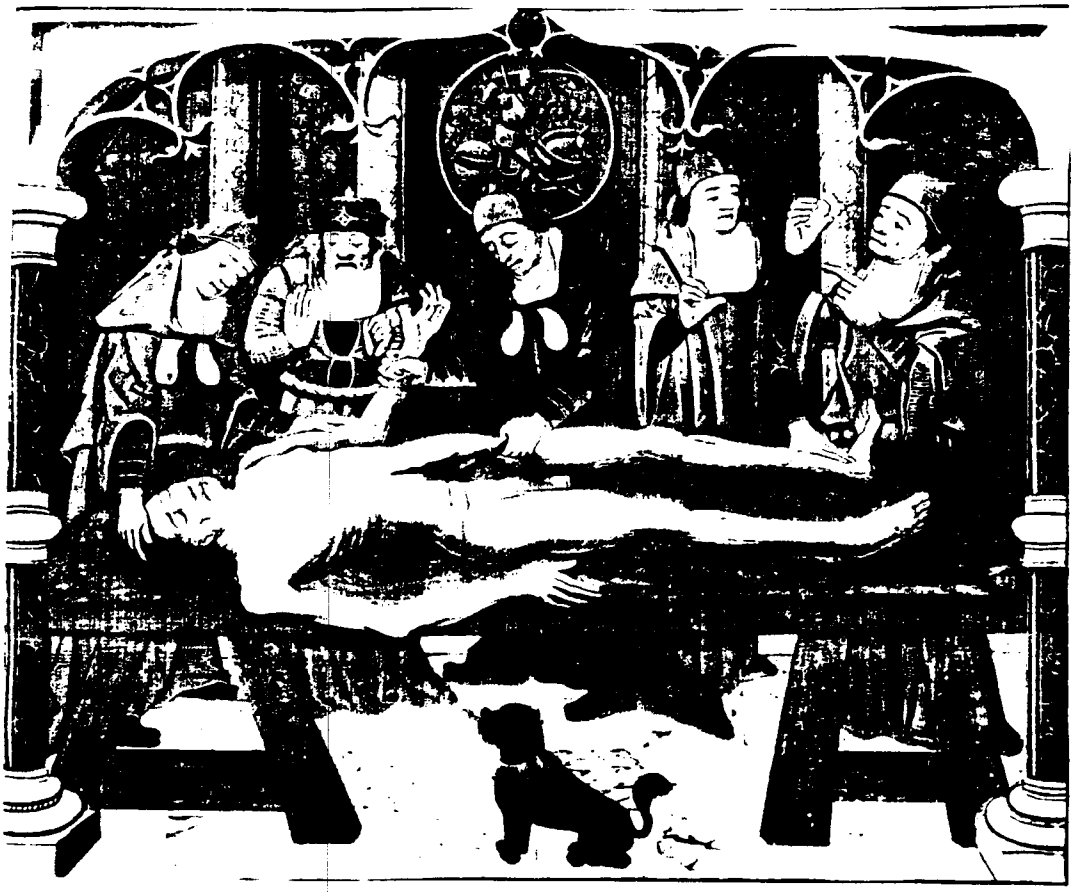
The Rise of the Universities

With the beginning of the twelfth century came the establishment of centres of learning throughout Europe. The growing spirit of inquiry led to questioning of established authorities in many fields including medicine.

A papal bull, De sepultaris, issued in 1300 was incorrectly interpreted as a prohibition against dissection. Despite obstacles of this kind, there was a limited knowledge of human anatomy, partly traditional, partly the outgrowth of surgical experience and very likely from time to time, the reflection of surreptitious dissection. The first official record of dissection of the human body was of one performed in Italy in 1286 as an autopsy. Further reference to dissection for a similar purpose in Bologna in 1302 is made in such terms as to suggest that the procedure was not uncommon by that time. It would also appear that by the beginning of the fourteenth century the pressing need to know more about the human body led to dissection of human bodies for this specific purpose.

Mondino de'Luzzi was a professor at Bologna University from 1306-1326. The Anothomia of Mondino de'Luzzi appeared in 1316. This book was the first devoted entirely to anatomy. Although the Arabic tradition was still strong, it was obvious that Mondino incorporated the results of dissection and performed the dissections himself. He used preparations dried in the sun and where these were unsatisfactory, bodies in varying states of maceration. The bodies were usually those of executed criminals but other sources were also found - in 1319 legal proceedings were taken against four students for body snatching. One of Mondino's assistants was Alessandria Giliani, a young woman who is said to have been the first to inject vessels with coloured liquids.

Dissection was formally authorised at the University in Florence in 1387, in Bologna in 1405 and in Padua in 1429. The authorities would place the body of an executed criminal at the disposal of the University. Doctors and students would be invited to attend. The professor sat at his desk reading aloud from a textbook of anatomy. Meanwhile a surgeon was dissecting and a demonstrator was indicating with a wooden pointer the parts as they were successively mentioned. It was clear to all hearers that the human body must have greatly changed since the days of antiquity.



Teaching at the dissection table, 15th. century.

By the end of the fourteenth century, dissection was accepted as a scientific undertaking. It was performed as an autopsy to determine the cause of death but it had also become an established part of medical studies. The influence of the ancients would remain pervasive for many years but direct observation through dissection was to be the scientific basis of anatomy in the future.

FURTHER DEVELOPMENTS IN EUROPE

14 to 16th centuries (Peak - 1542)

Over this period the immutability of the ancient authorities was contested. Foundations were laid of an accurate knowledge of the human body and methods were devised to study the function of the body.

The Renaissance artists were very interested in anatomy. Many attended the public dissections at the medical schools. However, it appears likely that the anatomical knowledge was no greater than that obtained from close observation of the lean, living subject or from the superficial study of a cadaver from which the skin had been removed.

The one exception was Leonardo da Vinci (born 1452) who came to recognise the value of anatomy in its own right. He dissected numerous bodies and drew up plans with the anatomist, della Terre, to produce a great anatomical

work. This work was never completed. Leonardo da Vinci may be regarded

VESALIUS GIVING A DEMONSTRATION OF ANATOMY

B A S I L E AE.

as the first of the modern anatomists.

Andreas Vesalius was the first anatomist to insist that to know the human machine and its working it is necessary first to know its parts. Vesalius worked initially in Paris. When lack of material threatened to limit his enquiries, he risked his life and his reputation among his colleagues by removing bodies from the gibbets of Montfaucon and from the graves at the Cemetery of the Innocents in Paris. Vesalius studied in many centres. He took his degree in Padua and was appointed Professor of Anatomy and Surgery at that University at the age of 24 years. He became convinced by dissection and from a close study of Galen's anatomical writings that Galen had never dissected the human body. Vesalius then set about writing an authoritative work on the anatomy of man. The book, De humani corporis fabrica libri septem, was published in 1543. It consisted of 663 folio pages and over 300 illustrations of his own dissections. It is regarded as the first complete textbook of human anatomy.

DISSECTION IN THE ENGLISH-SPEAKING WORLD

Universities were established in Oxford in 1167, in Cambridge in 1209 and in St Andrew's in 1411. However the natural repugnance to dissecting the human body, reinforced by religious sentiment had formed an insuperable barrier to anatomical research for centuries.

In 1495 for the first time, a picture of dissection appeared in a book printed in England. In Edinburgh the earliest official provision for dissection was made in 1505. Such provision was not in association with a university. The Town Council of Edinburgh granted a charter to the Incorporation of Surgeons and Barbers which ensured that one malefactor's body per annum was made available for dissection by the entrants.

PRESERVATION - Alcohol Injection

Up to the seventeenth century permission and provision of material were the two major barriers to dissection. The short period of time available to dissect the body was of relatively minor importance. However with the acceptance of dissection into routine medical studies and the need for preservation became urgent.

During the 17th century attempts were made to preserve cadavers for use in the dissecting room by the injection of various forms of alcohol. The enthusiasm for the new injection technique was remarkable and although injections were responsible for many errors of anatomical fact, no other single factor at the time gave greater energy and more direction to anatomical study. The method however was expensive, it caused shrinkage, it did not preserve colour and it bleached the tissues.

Among those who benefited from the new injection technique was William Harvey. Harvey studied at Padua ;under Professor Fabricus. He became a doctor of medicine in 1602. Padua at this time was regarded as the workshop of anatomy and Harvey left Padua obsessed by anatomical ideas. He dissected innumerable animals in his quest to explain the movement of blood. In 1628 Harvey published 'De Motu Cordis' - a small quarto volume of 74 pages. The publication of this book marks the beginning of experimental medicine.

Another anatomist for whom the ability to preserve the cadaver was of particular importance was John Hunter. He dissected the human body and numerous species of animals convinced that one who wishes to describe and to understand the organs of the human body must acquaint himself with the organs of the lower animals. Many of the specimens prepared by John Hunter can still be seen in the Museum of the Royal College of Surgeons in London. John Hunter's advice to his students was - don't think - TRY.

In 1694 a school of anatomy was established in Edinburgh. Bodies of condemned criminals and deceased workhouse inmates were made available for dissection. The lawful supply of bodies however was wholly inadequate to meet the needs of the new school. The surgeons' and barbers' apprentices were in the habit of tilling the soil and reaping the harvest of 'Death's Mailings'. Complaints of rifled graves were frequent.

In 1705 Alexander Monro became the first professor of Anatomy in Edinburgh. He was an excellent teacher of anatomy and the success of the school lead to an increase in body snatching. At first surgeons' apprentices were the only body snatchers but the popularity of the medical school and the great increase in the number of students led to the appearance of a group of men who raised the dead as a business and came to be called the Resurrectionists. In addition to supplying local schools, a brisk export trade developed in both London and Ireland to supply the thriving medical school in Edinburgh.

By the end of the 19th century, dissection of the human body was well established as an integral part of practical instruction in human anatomy. Unable to meet their wants by lawful means, teachers of anatomy came to depend for their material upon ruffians of the most abandoned character. In Edinburgh in addition to the teachers in the official medical school, there were several abler and more attractive private teachers who competed with each other to provide material for their demonstrations. This rivallry was shared by their student groups. The private teachers were concentrated in the Surgeons' Square. By day six such teachers were busy teaching and demonstrating in their respective rooms to crowded and enthusiastic classes. By night the silence was broken only by the furtive footsteps of the Resurrection men whose business

JOHN HUNTER, 1728–1793

it was to furnish material for the day's activities. Two such men Burke and Hare found a ready market for their wares in the demonstration room of the renowned anatomy teacher Dr. Robert Knox at seven to ten pounds per delivery. After a time Burke and Hare became impatient and proceeded to accelerate the rate of demise among citizens of Edinburgh. They lured destitute men and women to their den, plied them with drink and killed them by smothering them. During nine months Burke and Hare were responsible for at least sixteen murders. On receipt of a body Dr Knox is recorded as approving of its freshness but asked no questions. Their activities in due course came to the notice of the authorities. Hare turned King's witness and Burke was hung. The disclosure of the crimes ruined Dr Knox and lead to the enactment of the Anatomy Act, 1832. This put an end to the illicit trade in bodies and regulated schools of anatomy.

LONDON

In the middle of the century Henry Gray, a student at St George's Hospital Medical School in London, was known as 'a most painstaking and methodical worker and one who learnt his anatomy by the slow but invaluable method of making dissections for himself'. In 1858 Gray published the first edition of Gray's Anatomy which covered 750 pages and contained 363 figures. The 37th edition of Gray's Anatomy is now in preparation.

PRESERVATION - Formalin

In 1863 the gas formic aldehyde was produced by von Hofmann, a chemist working at the Royal Mint. The forty per cent solution of this gas known as formalin attracted the attention of anatomists, who soon found a suitable formula for its use in preservation and fixation. The particular formalin technique established by Kaiserling has served for almost a century as the basis for the most satisfactory method of preservation. It does not cause excessive shrinkage or hardening; it is non-inflammable and of little cost. Over the years, dissectors have learnt the importance of effective ventilation and care of the hands in minimising the irritant effects of formalin.

New chemicals are being tested in the search of a preservative which is as effective as formalin but which is less prone to vapourise.

THE SYDNEY SCENE

The Medical School at the University of Sydney was established in 1883. That anatomical work could proceed in the Medical School was contingent on the passage of an Anatomy Act operative in the state of New South Wales. The first of these acts was proclaimed in 1881. Conditions under which bodies could be acquired were laid down and dissection had to be conducted 'in an orderly and decent manner'.

Dissection was an obligatory component of the course. It involved two hours per day in Lent and Trinity terms of both second and third years. In these periods 'Each student with his own hands dismembers or dissects the body to see and feel each constituent of it, recognise its characters and learn its relations to the surrounding structure'. Prosectors were to be chosen from the best dissectors.During the dissection programme in 1883 a total of eleven bodies were dissected. The Renwick Medal for dissecting proficiency was established in May, 1883. The first recipient, however, failed in chemistry and did not proceed with the course. The prize is now awarded for general proficiency in the first and second year examinations.

In the 1950s the hours allotted to the anatomy course for medical students were about 600 hours, of which 400 hours were allotted to dissection. In 1949, 387 students in Medicine II were accommodated in the main dissecting room. The students worked in groups of nine, four groups to each cadaver. The dissecting room, open Monday to Friday, 9am to 5pm, was the social centre for the year. A white coat worn unwashed beyond an acceptable period was subject to immersion, complete with wearer, in the large washing trough which lined the wall. The intercadaveric football competition was a feature of the dissecting experience. It was fiercely contested and played with due formality over the year on St John's Oval. The last intercadaveric competition was held in 1973.

With the change to the five-year curriculum in 1973, dissection was eliminated from the medical course. In response to student demand a vacation dissection programme was introduced in 1974. The programme, while limited in scope, attracted about 100 students each year.

Dissection for the purpose of providing museum specimens has always been a special feature of the medical school. In the 50s and 60s about 30 second-year medical students took part in a Prosectors' Competition during the long vacation, and those prosections judged to be of appropriate standard form a major part of the Wilson Museum collection. With the introduction of the non-dissection course, the competition has been restricted to senior students working in their Elective and Option Terms.

Henry Gray, 1858–1860, seen here in the Dissecting Room of St. George's Hospital 1860

BIBLIOGRAPHY

Browne, E.G., 1921. *Arabian Medicine*. University Press: Cambridge.

Edwards, J.J. and Edwards, M.J., 1959. Medical Museum Technology. Oxford University Press: London.

Encyclopaedia Britannica, 1968. William Benton: Chicago.

Goldscheider, L., 1954. *Leonardo da Vinci*. The Phaidon Press New York

Gray's Anatomy, 1980. 36th edition. Eds. Williams, P.L. and Warwick, R. Churchill Livingstone: London.

Hippocratic Writings 1978. Ed. G.E.R. Lloyd. Penguin Book.

Hoernle, A.F.R., 1907. *Studies in the Medicine of Ancient India*. Clarendon Press: Oxford.

Le Gros Clark, W.E., 1946. *Practical Anatomy*. Edward Arnold: London.

Ogawa, Teizo, 1975. *The Beginnings of Anatomy in Japan* Okajimas Fol. anat.jap. S2; 59-72.

O'Malley, C.D. and Saunders, J.B. de C.M., 1952. *Leonardo da Vinci on the human body*. Henry Schuman: New York.

Oster, Sir William 1921. *The Evolution of Modern Medicine*. Yale Uni. Press.

Polson, C.J. and Marshall, T.K., 1975. *The Disposal of the Dead*. Third Edition. English Universities Press Limited: London.

Roughead, W., 1921. *Burke and Hare*. Butterworth & Co. (Australia) Ltd.

Sigerist, H.E., 1933. *Great Doctors*. George Allen & Unwin Ltd.: London.

Singer, C., 1957. *A Short History of Anatomy and Physiology from the Greeks to Harvey*. Power Publications Inc. New York.

Tompsett, D.H., 1956. *Anatomical Techniques*. E. & S. Livingstone: Edinburgh.

+NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS

Chapter 6 DRUGS AND HERBS

L. Cartwright

NOTES

PLANTS IN MEDICINE

L. Cartwright

The use of plants as medicinal agents is as old as medicine itself. People from ancient times learned by trial and error which plants to use for certain ailments and which to avoid because they were poisonous. At that time, medicine was allied closely to magic and religious ritual.

The first written records of medicinal plants come from China. Around 2000 BC the Emperor Shen Nung recorded and catalogued some 350 plants, some of which are still used in medicinal preparations today, for example aconite and rhubarb. The Ebers Papyrus, found in Egypt and written around 1500BC, lists plants such as the opium poppy, garlic and aloes. In this document mention is also made of preparations such as gargles, inhalations, enemas, infusions, pills and lotions. The Rig Veda, the ancient Indian text, around 1000 BC, listed some 760 plants tor use medicinally.

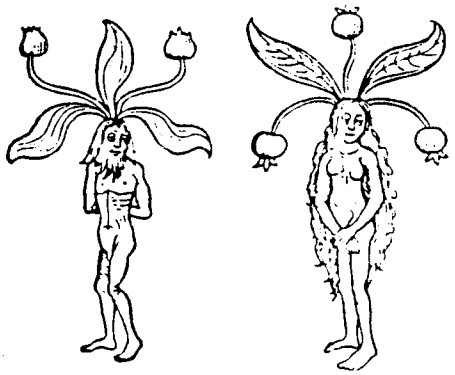
Aloe spicata

Alium sativum (Garlic)

Claviceps purpurae (Ergot)

Carium carvi (Caraway)

The most influential book for Western medicine was De Materia Medica by DIOSCORIDES, AD 77. Dioscorides was a physician travelling with the Roman armies in the early first century. He collected and described some 500 plants and classified them according to use - aromatics, sharp herbs, bitters and so on. One plant he described was Nasturtium or Nosetwister. It was said to drive out worms, or act as an aphrodisiac, stop hair falling out, cleanse impetigo and spotty skins and when mixed with flour and vinegar to relieve sciatica.



"Male and female mandrakes"

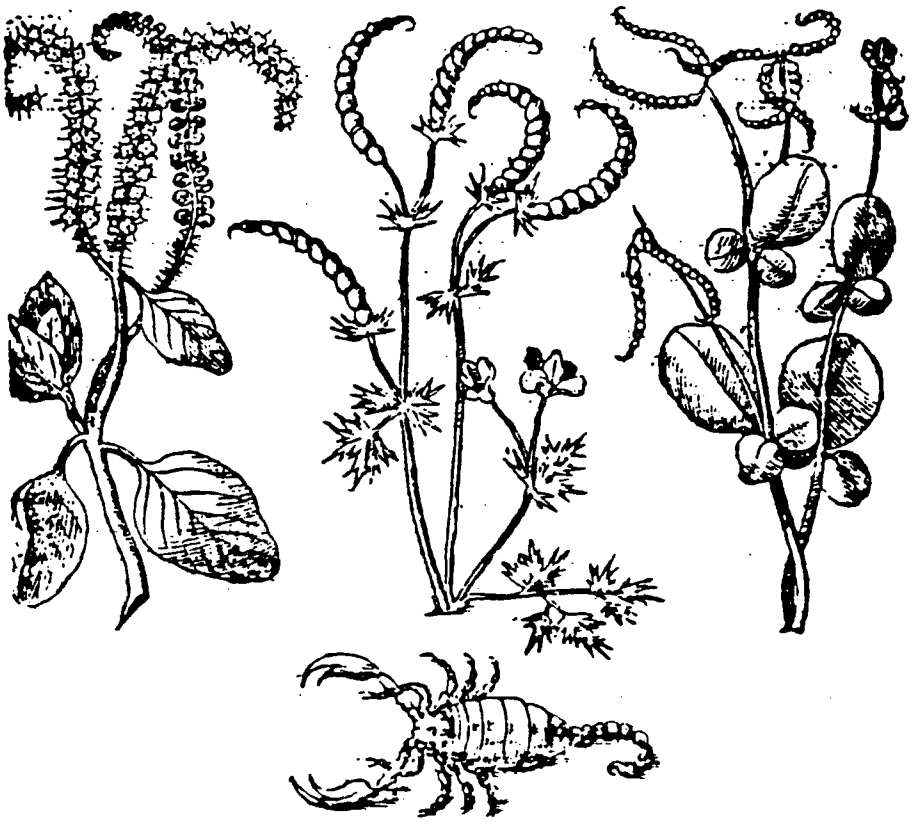
GALEN, another Greek physician, who practised in Rome around AD 160 was the most influential of all the Roman physicians and his dogma was not questioned for 1500 years. He wrote some 300 books and documents which included over 400 drugs of plant, mineral and animal origin. He also developed many medicinal preparations such as extracts, tinctures and others which bear his name - „galenicals". His theory of disease, following Aristotle, depended on the four humours - blood, phlegm, black bile and yellow bile and his first requirement of treatment was purification of the body by purgatives, emetics and enemas. One preparation refined by Galen was Theriac. This preparation was first formulated around 100 BC but the number of ingredients was brought to 73 by Galen. It was a preparation of the powdered ingredients mixed with honey and had several variations depending on the place in which it was formulated but was considered a universal remedy. Galen was very authoritative and no doubt successful. His theory ot medicine was approved by the church and the times did not favour change.

The whole of medical practice stagnated in the dark ages, kept alive only in the great Arab schools of Alexandria and Ispahan.

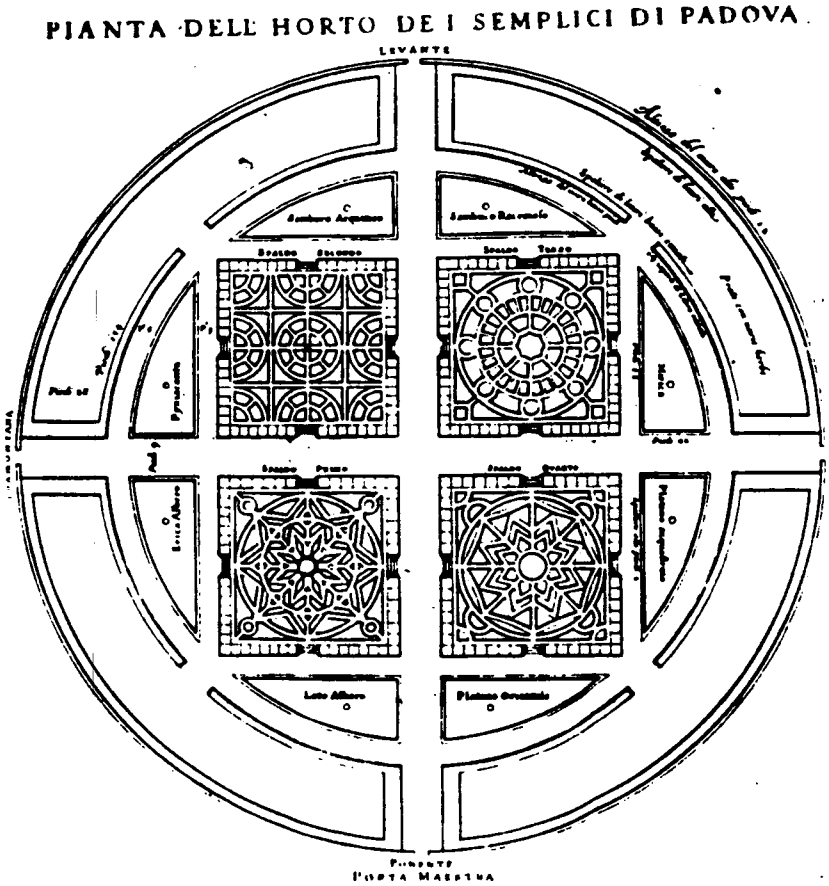
Sixteenth century woodcut showing the preparation of Theriac, the anceint universal panacea that Galen further elaborated by increasing the number of its ingredients beyond seventy.

Only one woman is credited with a book on medicinal plants. In the 12th century the Abbess of a Benedictine convent at Bingen wrote a herbal called *Physica*. This was strongly scientific in spite of her visionary and mystic views. Her remedy for use in difficult childbirth is a little more obtuse - a lion's heart placed on the chest of the woman.

The next step was to grow useful plants in physic gardens so that there would be a constant supply of the right plant and they could be studied and documented.

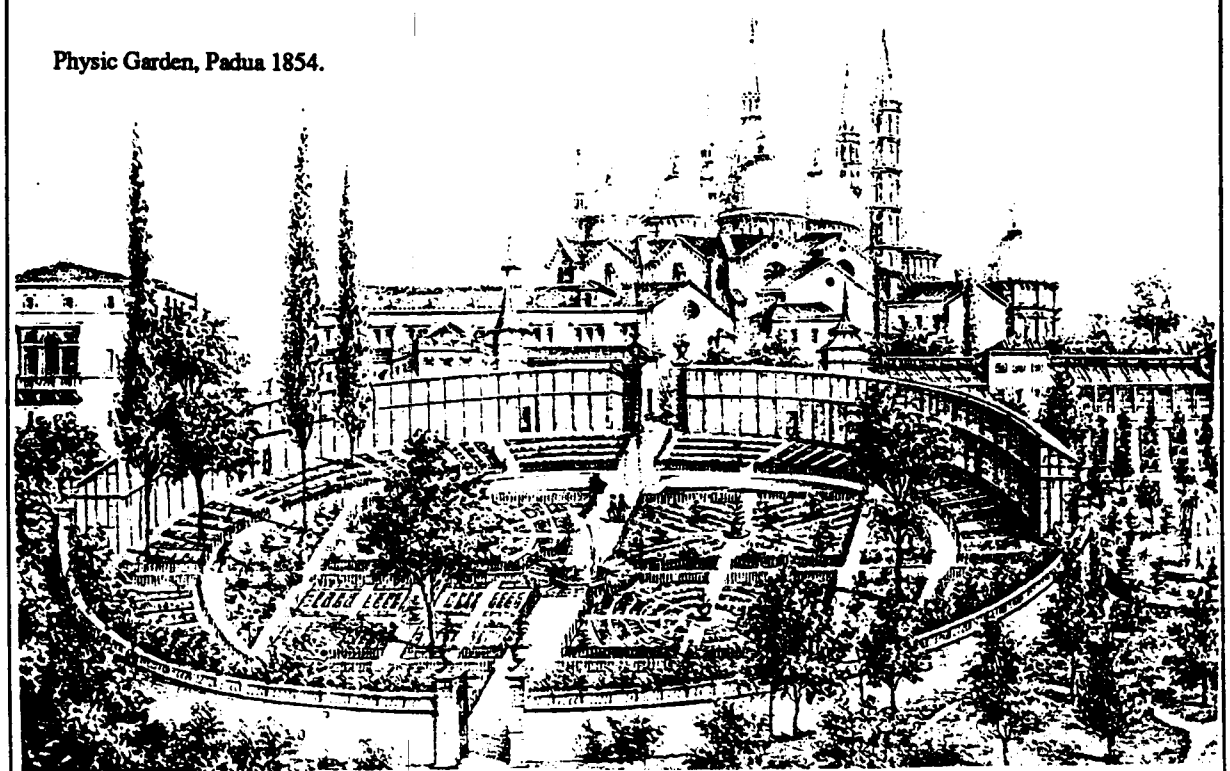


According to the Doctrine of signatures elaborated in the sixteenth century, a plant's external appearance offered clues to its effectiveness. Thus the "scorpion tail" heliotrope and similar plants were believed to cure scorpion bites.
Drawing from Giambattista della Porta's "Phytognomica" (1558).



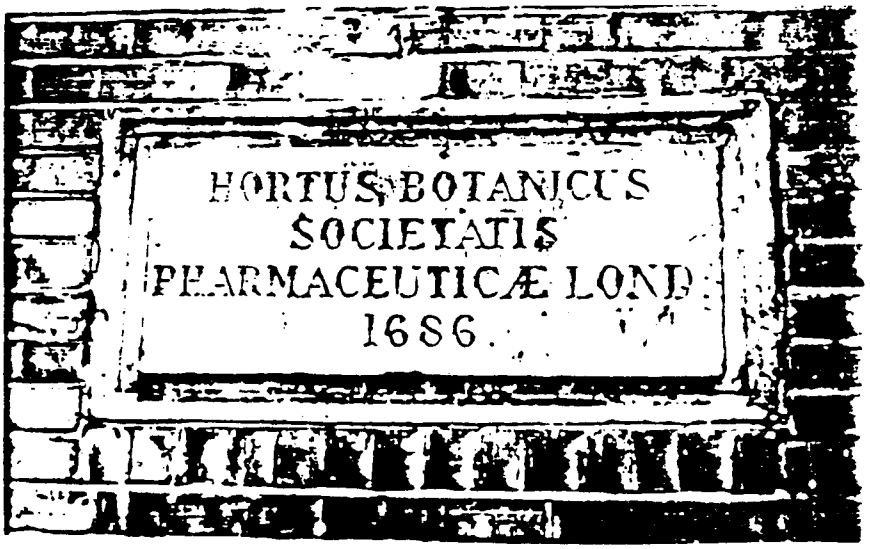
Plan of the Physic Garden in Padua 1545.

Physic Garden, Padua 1854.



In 900 AD the Benedictine monastery near Lake Constance had a separate physic garden near their infirmary and the physician,s house. During the dark ages while most knowledge stagnated, the monasteries did keep records of what was known about medicinal plants. However it was not until the Renaissance that physic gardens really flourished and were used to train medical students, such as in Padua 1545.

The Renaissance saw the rise of Universities and within them physic gardens to train physicians. From the physic gardens rose the development of HERBALS. William Turner wrote the first English Herbal in 1551. It was a truly scientific account with the plants listed alphabetically under their Latin names. This was closely followed by Gerard in 1597 who used the catalogue from his physic garden as the basis of his herbal. Gerard listed some 1030 plants with uses. One such, is Lettuce, of which he said "eating it before meat stirs up appetite and eaten after supper it keepeth away drunkennesse which by wine".



Chelsea Physic Garden - Plaque

The last of the great English herbal authors was John Parkinson, who wrote *Paradisus* (1629) and the largest herbal in the English language *Theatrum Botanicum.* One quote from this opus suggests that he was the first aromatherapist. "That as many herbes and flowers with their fragrant sweet smels doe comfort, and as it were revive the spirits and perfume the whole house."

In the Renaissance and even into the 17th century, medicine was a mixture of science and mysticism. Such a mixture of beliefs were those of Paracelsus, a 16th century physician whose chemical knowledge and iconoclastic beliefs in therapy were far ahead of his time. However, he was also a mystic and felt the need to show divine confirmation of his views. He therefore developed the Doctrine of Signatures which states, that if a plant resembles an organ of the body, it was useful for diseases of that organ.

Lungwort for diseases of the lung.
Red plants for the blood (Burdock).
Yellow plants for jaundice (Dandelion).

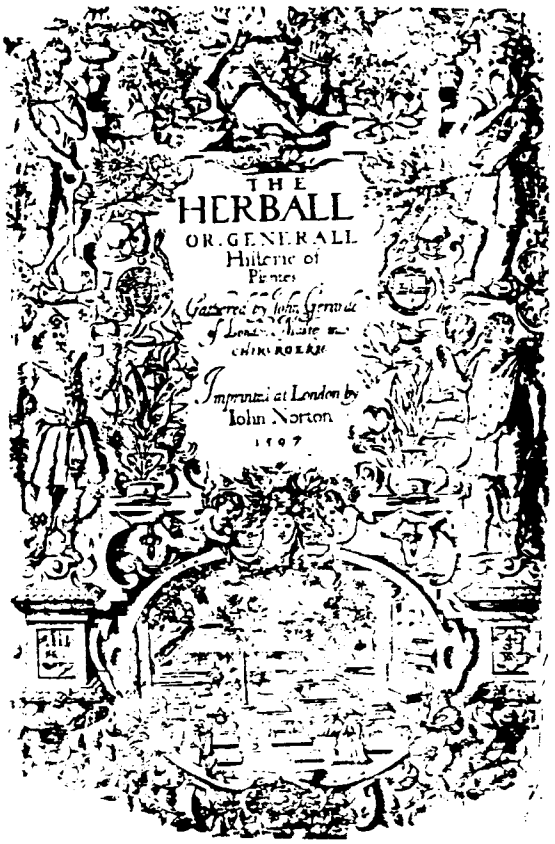
The most popular medicinal book which described and recommended usage of plants was Nicolas Culpepper,s *The English Physisician* 1652. This book went through many editions into the 20th century. Culpepper was an astrological herbalist and physician who believed that illness was governed by different planets. Astrological medicine was practised in several places Thurneisser in Basel, Carrichter in Strasburg and Porta in Naples.

Plants were governed by certain planets and used for diseases of the organs ruled by those planets.

Broom - a plant ruled by Mars "being of a gallant, cleansing and opening quality". Broom has diuretic and laxative properties.

Henbane (Hyoscyamus) - a plant ruled by Saturn growing in dark places with cooling properties and used for the pain of sciatica, gout and other hot pains. Hyoscyamus is a sedative/ anaesthetic and anticholinergic.

Marigold - herb of the Sun used to strengthen the heart. Folk remedy use now is for bronchitis.



Title page of Gerard's Herbal

The Elizabethan times were the peak in folk medicines. In fact, the 15th, 16th and even into the 17th centuries were times when fairies and witches governed the practice of medicine in spite of a slowly developing belief in scientific method. Fairies were fun-loving, mischievous creatures like Puck in *A Midsummer Night,s Dream*, whereas witches were more pragmatic, earthy creatures. White witches were good and black witches were evil. Probably they were all just women of the villages, known as "herb women", who made up medicinal preparations. Their knowledge, no doubt, came from observation but they liked to think their gifts came from fairies.

It is not surprising that there are several references to plant potions in Shakespeare. The drops Puck put into the eyes of the Sleeping Titania to make her fall in love with the first person she sees upon waking were from Heartsease, *Viola tricolor* which was used in love potions. It does help with inflammation of the eyes. Shakespeare also mentions *Mandragora*, the Mandrake, in *Othello*. It was used as a mild pain killer and sedative and is from the same family as Belladonna, the Solanaceae. However, because of its shape, myths and legends abound about the root.

Title page - "Paradisus", 1629

Because they wished to believe they had supernatural powers, the witches developed covens and rituals. They often believed they could fly and during the ritual covered themselves with an ointment made with Belladonna, Aconite and Hemlock. The active constituents or these plants can be absorbed through the skin and cause arrhythmias, excitement, dizziness, mental confusion and delirium. They certainly flew but it was hallucination.

Nicolas Culpepper 1616 - 1654

The Elizabethan era was the time of the great explorers and with the discovery or the new world, new medicines. One such was Cinchona or Peruvian Bark which was useful for fever, and, malaria in particular, containing quinine and quinidine. In England, one Talbour, an apothecary's apprentice developed a preparation containing cinchona bark, rose leaves, lemon juice in wine. He set himself up as a doctor and treated some very important people including Charles II. He kept his formulation secret by changing the wine. The formulation was quite sound but his ethics were definitely dubious.

Digitalis

One potion developed by a Shropshire medicine woman in the 18th century, when analysed by the gifted physician, William Withering (later Sir), led to the discovery of the cardiac glycosides still used today. Digitalis was included in the London Pharmacopoeia of 1650 but was not used to any extent until Withering published his treatise supported by clinical trials.

In the 17th and 18th century, there arose a new philosophy where all things had to be proved. Physicians began to question medical dogma and gradually changes came about. There was better personal and community hygiene, better understanding of the causes of disease and therefore better treatment of disease.

Chemistry became more exact but plants were still the major Source of medicinals. The scientific study of plants was given the name, Pharmacognosy (1815). Although some chemicals were used as drugs, the study of plants was the central core of the training or pharmacists in the 19th and early 20th centuries. There are still several plants in the British Pharmacopoeia and many more in the European and Asian Pharmacopoeias.

Plants produce a large number of chemical substances, and in the nineteenth century it was not always possible to isolate which chemical was responsible for which effect. Purification was difficult and the dose was variable. These drawbacks are still true of many plant constituents. Very few unrefined plant extracts remain in use in modern western medicine; those that are unrefined have chemical constituents that have been isolated and can be used to standardise the extract, for example, extract of belladonna. This preparation is still included in the British Pharmacopoeia and is prescribed in numerous stomach mixtures and powders. Although few crude extracts are used today, a number of substances derived from plants are used in modern medicine. The 1980 British Pharmacopoeia has reintroduced 24 monographs on plant substances.

Aconitum (Monksfoot)

A great many more plants are included in remedies that are manufactured and recommended in herbal medicine. All of these plants have been used in medicine at one time or another. The chemical constituents of these plants are not always known, either because they do not appear to offer any advantage over established drugs or because research has not produced easily isolated chemicals responsible for the actions or the plant. It is very expensive and time-consuming to isolate a chemical entity from a plant, measure how much the plant produces and then establish exact pharmacological properties. However, a reading of current newspapers, magazines and posters will show that there is are increased public interest in natural products generally, and in plant medicinals in particular. In Europe this interest in plant remedies has been dubbed the "green sweep". In Australia it takes the form or alternative medicine, such as herbal remedies, and the use of Chinese medicinal plants and aboriginal medicinal plants. There is also an interest in plants generally as sources of therapeutic agents.

Research into plants or new substances was not pursued in the 1950s because of the boom in the manufacture of synthetic chemicals. These were relatively easy to produce. identity and sterilise. However, since the 1950s the synthesis of new molecules and the alteration or known molecules to form new ones has slowed down. Scientists have once again turned to the plant kingdom in the hope of finding new remedies for old diseases. Plants manufacture far more chemicals than have been devised by humans and there are now sophisticated techniques and machines available for analysis and purification of the chemicals in the plant materials. The new research is taking a number or different approaches. Well-known plants such as liquorice are being re-examined. Plants used by other cultures, such as the Chinese remedy, ginseng, are being tested by scientific methods. Surveys are being carried out on plants for specific agents, for example for use in the treatment of cancer. The Pink or Madagascan Periwinkle, *Cathanthus roseus* was found to contain anticancer agents, Vincristine and Vinblastine. They were useful in Hodgkins disease and leukaemia in children. Recently the Australian plant *Castanoxpernium australe*, the Moreton Bay Chestnut was found to contain an alkaloid, castanospermine with anticancer and possibly anti-AIDS action. The other specific research was into steroids, notably the oral contraceptives. The Mexican yam, *Dioscorea villosa* was found to contain precursors for the production of steroids. The industry in Mexico exceeds $1,500 million per year.

New remedies are needed because a number of diseases have no effective treatment, people vary considerably in their reactions to any therapy, and resistance develops to most drugs that are used. In turning to plants, the hope is that some plants may produce a new drug, a less toxic drug, or a cheaper drug.

The "green sweep, has spread to international bodies and the scientific fraternity. In May 1978 the World Health Organisation adopted a resolution that requested the Director-General to initiate programmes designed to evaluate and utilise folk medicine in order to meet world needs by the end of the twentieth century.

Reflecting the world wide interest in traditional medicines, the World Health Organisation held a conference in 1990 specifically to discuss such medicines. The two main concerns were the safety and efficacy of the preparations and the education and training of all health professionals including traditional practitioners. Although different countries had different approaches, the conference arrived at some general conclusions. There was a need for legislation and regulation for herbal medicines analogous to those applied to other drug products. Herbal products should be of good quality, safe and efficacious, although in the case of products containing ingredients long established in use, safety and efficacy could be assumed empirically for purposes of registration, at least in the first instance. Examples of this are the traditional medicines of China and Japan. There was general agreement on the need to develop a system for international exchange of information.

Research into plants, as well as being time-consuming, requires the skills of several disciplines. This takes money which is the main stumbling block with any new development. However in the 1990s there certainly is a revived interest in plants as sources or medicinal substances whether for convention~l drugs or traditional medicines.

SOME REFERENCES.

Anderson, F. *An Illustrated History of the Herbals* 1977.

Cartwright, L. *A Commonsence Guide to Medicinal Plants* 1985.

Grieve, M. *A Modern Herbal* (ed.) C. Leyel 1974.

Hollman, A. Chapter in Welton and Beeson (ed.) The *Oxford Companion to Medicine* 1986.

Lewis, W. & Elvin-Lewis, M. *Medicinal Botany* 1977. Le Strange, R. "A History of Herbal Plants" 1977.

Thomson, W. *Healing Plants* 1978.

Trease, G. & Evans, D. *Pharmacognosy* 12th. ed., 1983.

Tyler, V., Brady, L. & Robbers, J. *Pharmacognosy* 8th. ed., 1981.

NOTES

HISTORY AND PHILOSOPY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 7

ALCHEMY

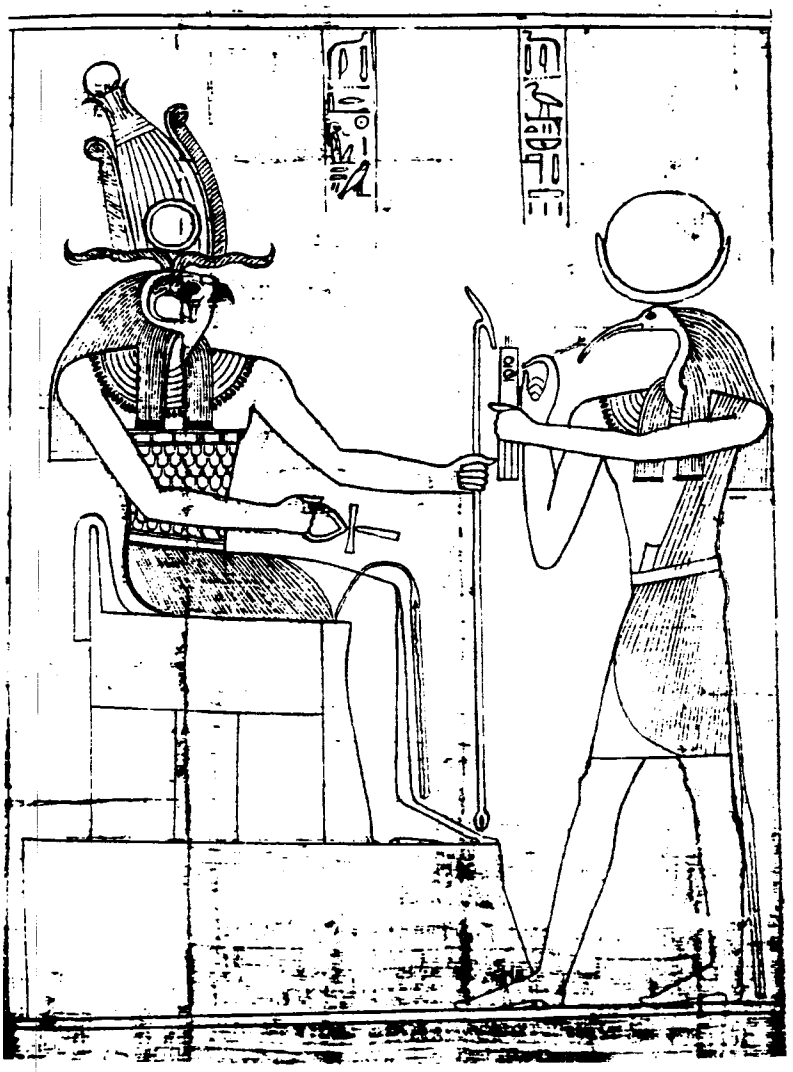
C.Thompson

NOTES

ALCHEMY

C. Thompson

The European alchemists who proliferated from the thirteenth to the eighteenth centuries AD were merely the inheritors of a tradition which had first appeared at the time of the ancient Egyptian and Mesopotamian civilizations, and had been developed to a more mature form by the Graeco-Egyptian alchemists of the third to first centuries BC. The word "alchemy" is probably derived from the Arabian definite article al prefixed to a Graeco-Egyptian word (chemi or cham) meaning "the Black Land" - an ancient name for Egypt.



Egyptian drawing of XX1st Dynasty (c.1000 BC) from the Payrus of Nesanebanshru showing Tehuti (Thoth) standing before Ra Hormachis wearing symbols of creation on his head.

Although no definite origin can be ascribed to alchemy, its development does appear to be closely linked with the growth of sophisticated metallurgical techniques among certain ancient civilizations, including those of China, India and Africa, from around 1200 BC onwards. During this early period a metallurgical mythology arose which incorporated magico-religious symbolism with beliefs concerning ritual union and blood sacrifice. The idea that creation could be effected by immolation in the flames of the furnace also came into being around this time. The beliefs and practices of metallurgy interacted with a complex ancient cosmology which endowed all things in the natural and supernatural world with gender: even ores, stones and precious metals were assigned either masculine or feminine qualities by many early civilizations. A particularly strong gynaecological symbolism was applied to the images of the Earth Mother. Metal ores were supposed to have been conceived in the womb (i.e. in caves or mines) of the Earth Mother, where they "grew" and "ripened" in a state akin to gestation, until they were extracted by miners. If given sufficient time to develop and reach their ultimate state of perfection, these ores could become "fully ripened" metals such as gold and silver. These ideas regarding the subterranean growth and maturation of metals and ores persisted until the eighteenth century or later, withstanding both technical experience and rational thought. Mines were commonly believed to be able to re-create their ore deposits, providing they were blocked up and allowed to rest for a minimum of fifteen years.

Since the metallic ores were thought to undergo a natural maturation in the earth it was logical to expect that the alchemist could assist in this process, just as the farmer co-operated with the Earth Mother in agricultural production. According to the eighteenth century writer and alchemist Jean Reynard:

"What Nature did in the beginning we can do equally well by following Nature's processes. What Nature is still doing, assisted by the time of centuries in her subterranean solitudes, we can make her accomplish in a single moment, by placing her in more convenient circumstances. As we make bread, so we will make metals...Let us then co-operate with Nature in its mineral as well as its agricultural labours, and its treasures will be open to all."4

These simplistic assumptions were elaborated by the spiritual and philosophical beliefs of more sophisticated cultures. Although alchemy may have begun with the study of metals it soon became associated with magic and astrology. The Babylonians connected each of the seven metals with one of the seven planetary bodies, the two sharing a common symbol, and this association persisted through the ages. Gold was ruled by the Sun, silver by the Moon, copper by Venus, tin by Jupiter, mercury by Mercury, lead by Saturn and iron by Mars. It was believed that no planet could undergo modifications without arousing a corresponding sympathy in its associated metal.

Much of our knowledge about the practical workings of Graeco-Egyptian alchemy has come from translations of an old Alexandrian manuscript, the *Leyden Papyrus X*, dated to about 100 AD. It contains more than seventy formulae for making alloys, colouring metals and for assaying. Ancient Graeco-Egyptian tradition attributed a legendary figure, Hermes Trismegistus, supposedly a priest serving the god Thoth, with the origin of alchemy. Moreover, Hermes was claimed to have been the inventor of the alphabet, the first to observe the orderly arrangement of the stars, and the first to observe the harmony of musical sounds. His major contribution to alchemy was his ideas concerning the interdependence of all things - the essential Oneness of the universe. His name is perpetuated to the present day in the term applied to the enclosure of substances in a glass tube by fusion or sealing ("hermetically sealed").

ALCHEMICAL SYMBOLS

The Seven Planetary Metals

☉	Gold	Sol
☽	Silver	Luna
♀	Copper	Venus
♂	Iron	Mars
☿	Mercury	Mercury
♄	Lead	Saturn
♃	Tin	Jupiter

The Twelve Processes in Zodiacal Time

♈	Aries	Calcination
♉	Taurus	Congelation
♊	Gemini	Fixation
♋	Cancer	Solution
♌	Leo	Digestion
♍	Virgo	Distillation
♎	Libra	Sublimation
♏	Scorpio	Separation
♐	Sagittarius	Ceration
♑	Capricornus	Fermentation
♒	Aquarius	Multiplication
♓	Pisces	Projection

Some other Symbols

☐	Common Salt
✳	Sal ammoniac
⊛	Salt fixed
♂	Realgar

☿♁ Sublimate of Mercury [Example of combined signs ☿♎]

The Four Elements

Air	🜁	△	Fire
Water	▽	🜄	Earth

The preoccupation of early Greek philosophy with the idea of a unitary process in nature led to the hypothesis that behind all physical matter was a *prima materia*, which could be revealed by dedicated investigation. Perhaps the most significant philosophical contribution to alchemical doctrines was Aristotle's theory of the four elements and the four qualities, which dominated the teachings of science, as well as the beliefs of the alchemists, for almost two thousand years. According to Aristotelian tenets, each element possessed two of the four primary qualities (fluid, dryness, heat and cold). Therefore the four possibilities were hot and dry (fire), hot and fluid (air), cold and fluid (water) and cold and dry (earth). In each element one quality predominated over the other: in earth dryness; in water cold; in air fluid; in fire heat. A readiness to believe in the possibility of transmutation is an obvious consequence of the acceptance of this theory, since any element may be transformed into another through the quality they have in common. The final substance and form of any thing depended on the proportions in which the four elements were present: therefore transmutation might be effected by changing the elemental proportions of a substance through alchemical processes such as burning, calcination, solution, distillation, crystallization and sublimation.

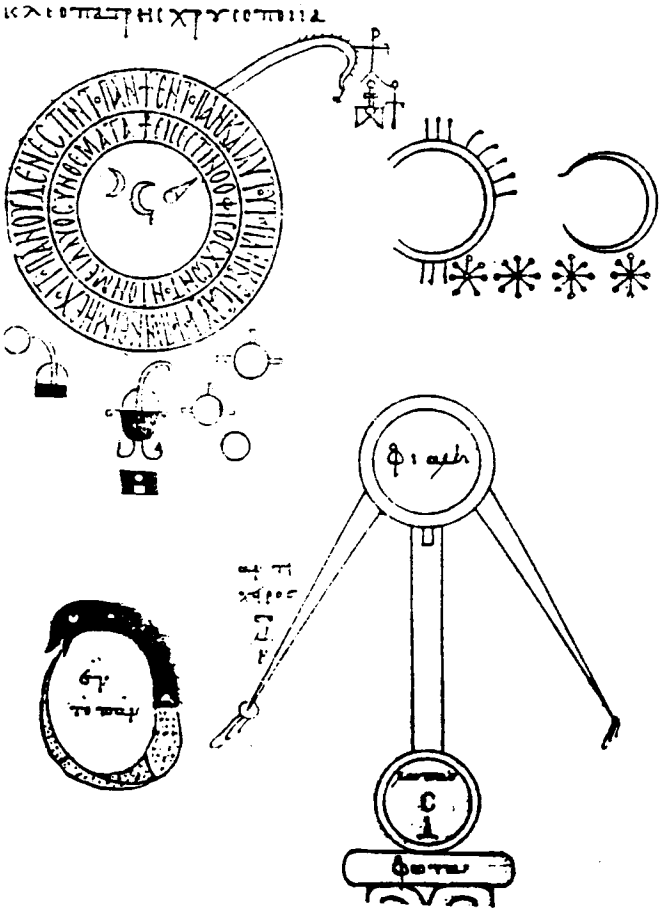


Illustration from the Leyden papyrus showing the symbols of the moon and planets and the self-consuming serpent.

An alchemical derivative of the theory of the four elements presented the two opposed elements, fire and water, in a new guise: fire became "sulphur" and water "mercury". The seven metals - gold, silver, mercury, iron, lead, copper and tin - were not seen as separate elements but as different forms of metallic substance. Gold, the most desirable metallic form, consisted of sulphur and mercury in their most perfect proportions and free of all impurities. The other metals were inferior to gold because their essences were mixed with contaminating impurities as well as being combined in different proportions. It was the role of the alchemist to correct these imperfections by developing processes which would remove the impurities from the base metals and recombine their essences in the correct proportions to make gold.... in other words, to assist the natural process of transmutation.

One of the most influential of the later Graeco-Egyptian alchemists was Zosimos, who probably lived and taught in Alexandria around 300 AD. He is attributed with the authorship of a number of alchemical works, including *The Great and Divine Art of the Making of Gold and Silver*. Zosimos believed that the yellow tint of certain alloys, such as those containing copper, was essential for the transmutation of other metals to gold. A female alchemist living around the same time was Maria (or Miriam) the Jewess, who was credited with the development of the apparatus for distillation. Her name is perpetuated in the *Balneum Mariae*, or Bain Marie, which according to tradition was also invented by her.

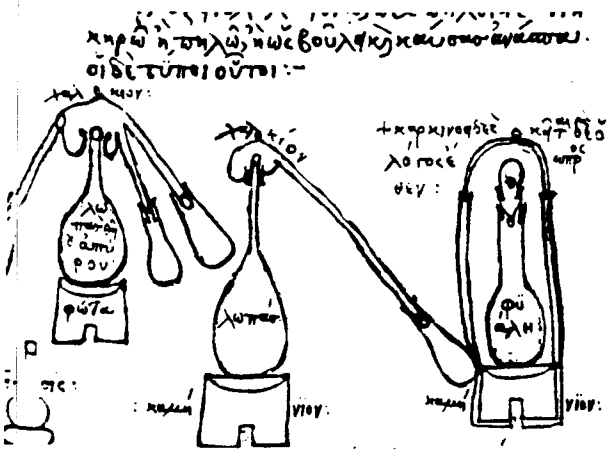


Illustration from an early Greek manuscript showing apparatus for distillation and digestion.

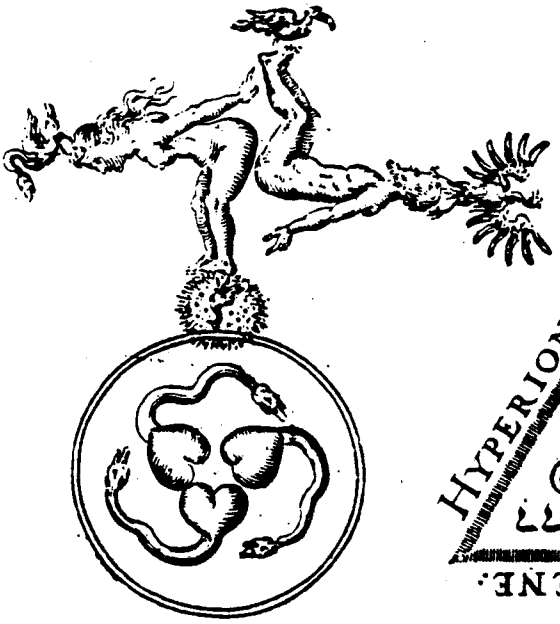
The collapse of much of the Roman Empire in the sixth and seventh centuries resulted in the virtual disappearance of alchemists in Europe for many hundreds of years. However, alchemy continued to be practised by the Byzantine Greeks in their eastern remnant of the Roman Empire. The first reference to the hypothetical Philosopher's Stone is found in a Byzantine manuscript of the seventh century AD. This "stone" was an undefined substance which, if found, would pave the way for the transmutation of base metals into gold and provide the essential ingredient for an elixir - the "Elixir of Life" - which would impart youth and immortality to those who drank it. The Moslems who conquered much of the eastern Mediterranean, Egypt, North Africa and Spain in the early seventh century also took an intense interest in alchemy, especially following their capture of Alexandria in 642 AD. Several Islamic alchemists, such as Jabir-ibn-Hayyan (known as Geber to later European alchemists) made notable advancements in alchemical knowledge and greatly improved processes such as distillation, sublimation and calcination. Geber considered that all metals were compounds of mercury, sulphur and arsenic. Gold he believed to be composed of purified mercury mixed with a small quantity of sulphur. He is attributed with the discovery of white arsenic and was familiar with the properties of many chemicals, including silver nitrate, sulphuric and nitric acids, the alkaline carbonates, red oxide of mercury and terchloride of gold. Islamic alchemists were also responsible for introducing certain Eastern (Persian, Indian and Chinese) concepts of alchemy into the Graeco-Egyptian tradition, although striking parallels between these Eastern alchemical cosmologies and their Graeco-Egyptian counterpart already existed. For example, the Chinese contributed the doctrine of the Two Contrary Principles (Yin and Yang), while the Hindu belief that metals were born of the union of a god (Shiva, represented by mercury) and his consort (Parvati, represented by earth or the crucible) through the aid of the god of fire (sulphur) was also incorporated into alchemical doctrine. Because of these developments the original Hermetic doctrines became even more heavily saturated with mythological and religious beliefs, including those derived from Gnosticism, Manicheeism, Nestoranism and the worship of Isis, Osiris and Seraphis.

Alchemical knowledge and skills (along with many other aspects of science and medicine) were re-introduced into Europe by the Arabs at a time when the need for gold was acute. After the collapse of the Roman Empire few gold mines remained in workable condition, and gold reserves were largely in the hands of the generally hostile Byzantine and Moslem powers. The European alchemists of the Middle Ages learnt their art from the Arabs in Southern Italy and Spain, who allowed many Christian scholars to attend their universities in Palermo, Toledo, Barcelona and Segovia. This knowledge was soon followed by translations of Arabic manuscripts by Adelard of Bath, Robert of Chester, Gerard of Cremona and others in the twelfth century. Over the next hundred years original alchemical works by Europeans began to appear. The greatest of the early practising alchemists were Albertus Magnus (who at one stage taught St Thomas Aquinas), Roger Bacon, Arnold of Villanova and Raymond Lully, all of whom were prominent Catholic churchmen.

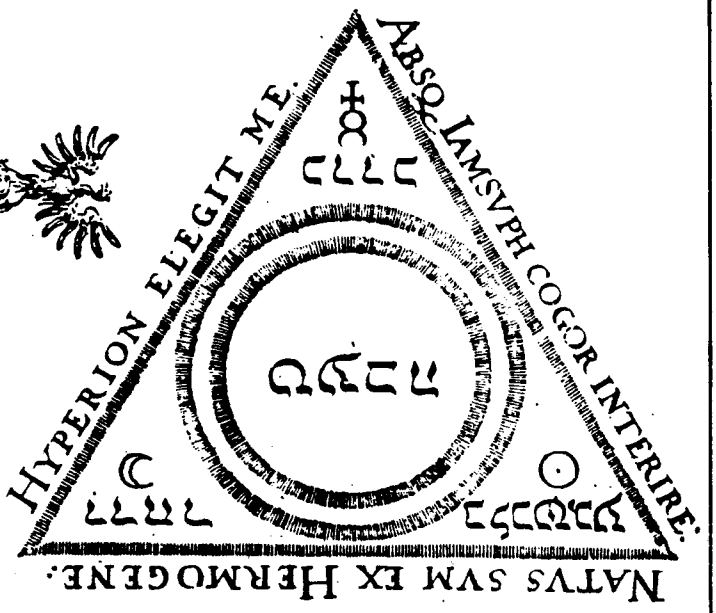
However, in spite of these orthodox beginnings the alchemists eventually came to form a kind of sub-culture in mediaeval Europe. Although they were at least nominal Christians the alchemists worked in a world which was steeped with ideas and symbolisms which were largely alien to Western Christianity. In 1317 Pope John XXII issued a decree prohibiting the practice of alchemy:

"Alchemies are here prohibited, and those who practise their being done are punished.... If they are clerics they shall be deprived of any benefices they may hold"

This was followed by decrees forbidding alchemy in France (1380) and England (1414). Nevertheless, the acts prohibiting alchemy were rarely enforced, and rulers who lacked sufficient funds often overtly encouraged its practice by issuing licences to alchemists to generate gold and silver from base metals.



The Triad forms a unity supporting the duality which developes the spiritual quaternity



The Sun, Moon and Mercury in symbols of holiness.

A German alchemist's workshop showing the disorder in which they worked.

By the end of the fourteenth century alchemy was firmly established in most European countries, and the alchemists' quest had become familiar to the general population, as seen in the frequent references to alchemy in the literature and plays of the time, such as Chaucer's *Canon's Yeoman's Tale* (c.1390). The imagined transmuting agent - the Philosopher's Stone - became the most famous of all alchemical concepts, even though its seekers were doomed to failure. In spite of their spectacular lack of success, the alchemists' enthusiastic attempts to discover the secret of the Philosopher's Stone had a number of favourable consequences. The alchemical manipulations of virtually any material (including blood, urine and faeces) resulted in the discovery of many useful chemical substances, including ammonia, alcohol, various alkalis and acids, sugar of lead and antimony compounds. Many of the various types of alchemical apparatus developed during this and earlier periods still survive in laboratories today, such as flasks, retorts, stills and beakers.

During the sixteenth century the study of alchemy attracted many men of intelligence and vigour. Some of these combined their alchemical training with that of medicine and began to rationally apply their knowledge for the treatment of bodily ailments and diseases, in pursuit of their belief that the vital processes of the body were essentially chemical in nature.

The distinguished but mysterious alchemist known as Basil Valentine had a wide knowledge of contemporary science, but is best known for his alchemical works *The Triumphal Chariot of Antimony, The Revelation of the Hidden Key and The Twelve Keys*. He advocated the use of chemical preparations for medical purposes and was a strong protagonist for the use of antimony compounds to treat disease. His reason for choosing antimony was in accordance with traditional alchemical tenets:

"It is I, Antimony, that speak to you. In me you find mercury, sulphur and salt, the three great principles of health".

Valentine's choice of a panacea was less than fortunate. Antimony irritated the skin and mucous membranes, induced emesis, slowed the heart and severely depressed the nervous system. The large numbers of deaths which resulted from the abuse of antimonial preparations led to their banning by the French parliament in 1566. Nonetheless, Valentine's prestige remained high and his works remained in heavy demand well into the seventeenth century. These writings included esoteric alchemical doctrines and instructions, embellished with a great deal of allegory and symbolism, on how the preparation of the Philosopher's Stone might be achieved.

The most prominent and influential 16th century medical alchemist, at least to modern eyes, was Philippus von Hohenheim, better known as Paracelsus. He acquired practical experience working as a physician in the Austrian mines and the army after taking his degrees in medicine, and was appointed Professor of Medicine at Basle in 1527. Paracelsus was outspokenly derogative of the doctrines of Galen and Avicenna: actions which eventually caused him to lose his post and be driven out of Basle by his medical opponents. It was largely through his work and writings after his expulsion that the school of iatrochemistry was established. Paracelsus insisted that the primary duty of alchemists was not to make gold but to prepare chemicals for the cure of disease. To this end he prepared and investigated the pharmacological actions of many drugs, including numerous metallic compounds. Paracelsus was probably the first to demonstrate that mercury could be successfully used in the treatment of syphilis. He also made considerable technical advances in the distillation of the essential oils of many plants, such as those of roses, violet, peppermint and juniper, which he called "quintessences". However, Paracelsus remained a traditional alchemist in other respects: maintaining his beliefs in transmutation and the four elements of Aristotle.

Four sisters and the four degrees of fire governing the "circular work" of the Zodiac.

The rise and triumph of humanism during the Renaissance , with its associated emphasis on more critical and rational scientific standards, does not seem to have created an immediate disillusionment with alchemy. Alchemical medicine continued in strength well into the seventeenth century, undergoing revival and renewal similar to that of neo-Platonic philosophy, and maintaining its appeal to many of the intellectuals of the sixteenth and seventeenth centuries. As medical practitioners the iatrochemists attracted numerous followers, royal patronage and enduring reputations, despite opposition from established medical bodies such as the Royal College of Physicians. The continued extent of widespread interest in alchemy and magic is indicated by the frequent use of these subjects in popular literature, such as Marlowe's *Dr Faustus* (1588) and Johnson's *The Alchemist* (1610). Alchemical cures, such as aurum potabiles ("drinkable gold"), distilled cordials and phials of quintessences, were in demand at all levels of society.

An alchemical workshop which, according to Jung, reflects the processes of the unconscious mind.

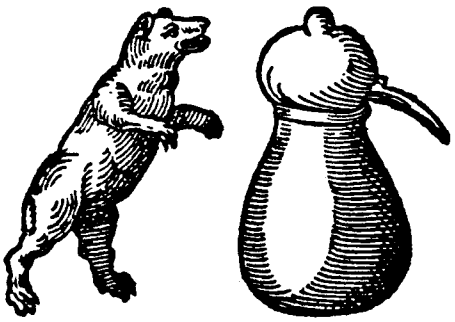
During the late seventeenth century alchemy began to lose its power and influence amongst the educated classes - largely due to the publication of works by chemists such as Johann Glauber, Nicolas le Fevre (*Traicte de la Chymie*, 1660) and Lemery (*Cours de Chymie*, 1677). The most devastating blow to alchemy was delivered by Robert Boyle (*The Sceptical Chymist*, 1661), the first truly rational English investigator of chemical phenomena. By painstaking laboratory experi-mentation Boyle produced overwhelming evidence which denied the possibility of metallic transmutation. He even offered a substantial amount of money to anyone who could demonstrate that gold was composed of mercury, sulphur and salt (no one claimed the money!). Boyle was pioneer of the inductive method in science, which emphasises the three vital stages of experimentation, observation and measurement. He postulated the existence of a large number of elements (substances which could not be split into simpler ones) and directly confronted the teachings of the Aristotelians and Paracelsians. Other rational chemists such as Robert Hooke and John Mayow followed in Boyle's footsteps, but it was not until the late eighteenth century that Joseph Priestly and Antoine Lavoisier finally discredited the phlogiston theory of combustion, bringing to a close the domination of the physical sciences by spurious neo-alchemical concepts.

Despite the overwhelming accumulation of antogonistic evidence which modern science has produced against it, alchemy has continued to exert a strong attraction for some of the more credulous sectors of society. As recently as the 1930s an alchemical hoaxer was able to extract large sums of money from his gullible victims by promising to reveal his process for transmuting base elements into gold by splitting and recombining atoms!

After more than two thousand years of experimentation, alchemists failed to achieve their two basic objectives: the transmutation of base metals into gold and the discovery of an "Elixir of Life". Despite these "failures", alchemy has made significant contributions to medicine and science. The modern disciplines of chemistry, physics and pharmacology have their roots in the centuries of alchemical dabbling with elements and potions which provided a practical basis for more rational experimentation. Many of the metallic compounds which are still used in modern medicine, such as gold, iron and arsenical preparations, are based on the remedies first formulated by the alchemists and iatrochemists. Moreover, even modern psychology has found a role for alchemy, based on the research of Carl Jung (*Psychology and Alchemy*, 1944) who showed that alchemical symbolism resembled the dream world of his patients:

"Not only does the modern psychological discipline give us the key to the secrets of alchemy, but conversely, alchemy provides the psychology of the unconscious with a meaningful historical basis.... Most accounts of alchemy are vitiated by the erroneous assumption that it was merely the precursor of chemistry."

Perhaps the ideals of mankind have not substantially altered from those of the early alchemists. Although we may dismiss the concepts of transmutation and an "Elixir of Life" as fanciful and misguided, are we not, through the ever advancing medical technologies of transplantation and cryogenics, still striving for perfection and immortality?



BIBLIOGRAPHY

Boyle, Robert, *The Sceptical Chymist*, Facsimile of 1661 edition, Dawsons, London, 1965, OR Everyman's Edition, J.M. Dent & sons, London, 1911.

Eliade, Mircea, T*he Forge and The Crucible*: *The Origins and Structures of Alchemy*, 2nd Edition, trans. Stephen Curin, Univ. Chicago Press, Chicago, 1978.

Fabricius, Johannes, Alchemy: T*he Mediaeval Alchemists and their Royal Art*, Rosenkilde and Bagger, Copenhagen, 1976.

Pearsall, Ronald, *The Alchemists*, Weidenfeld and Nicolson, London.

Read, John, T*he Alchemist in Life, Literature and Art*, Thomas Nelson & Son, London, 1947.

Thompson, C.J.S., *The Lure and Romance of Alchemy*, G.G. Harrop, London 1932.

von Stoltzenberg, Daniel, *The Little Mystic-Magic Picture Book for the Industriously Practising Abecadaran of the Fraternity of the Rose Cross*, Lucas Jennis, Frankfort, 1624 (trans. Nicolaus, Aries Press, Chicago, 1937).

Waite, Arthur Edward, *The Secret Tradition in Alchemy*, Kegan Paul, Trench Tribner and Co., London, 1926.

Webster, Charles, "Alchemical and Paracelsian Medicine" in *Health, Medicine and Mortality in the Sixteenth Century*, ed. Charles Webster, Cambridge University Press, Cambridge, 1979.

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 8 CONTAGION

Y. E. Cossart

NOTES

CONTAGION

Y.E.Cossart.

The words "infection" and "germs" have precise meaning to the modern mind, but the understanding that specific micro-organisms cause each of the diseases which spread from person to person developed very slowly. To the ancients, epidemics of diseases were all too familiar. In some circumstances, contact with a sick person was known to carry a risk; for example, precautions to be adopted in the case of leprosy are to be found in the Old Testament:

And the Lord spake unto Moses and Aaron, saying, When a man shall have in the skin of his flesh a rising, a scab, or bright spot, and it be in the skin of his flesh like the plague of leprosy; then he shall be brought unto Aaron the priest,.....and the priest shall look on him, and pronounce him unclean. .....and he shall dwell alone; without the camp shall his habitation be

Leviticus 13:1-3

The dietary injunctions in the Bible have also been interpreted as hygienic in intent, the proscription of pork and shellfish serving to avoid parasitic infestation and food poisoning respectively.

However the basic causes of all diseases was believed to be divine intervention, and especially a punishment for sin - either individual transgression:

And the Lord smote the king, so that he was a leper unto the day of his death.....

2 Kings 15:5

or as a judgement on society as a whole:

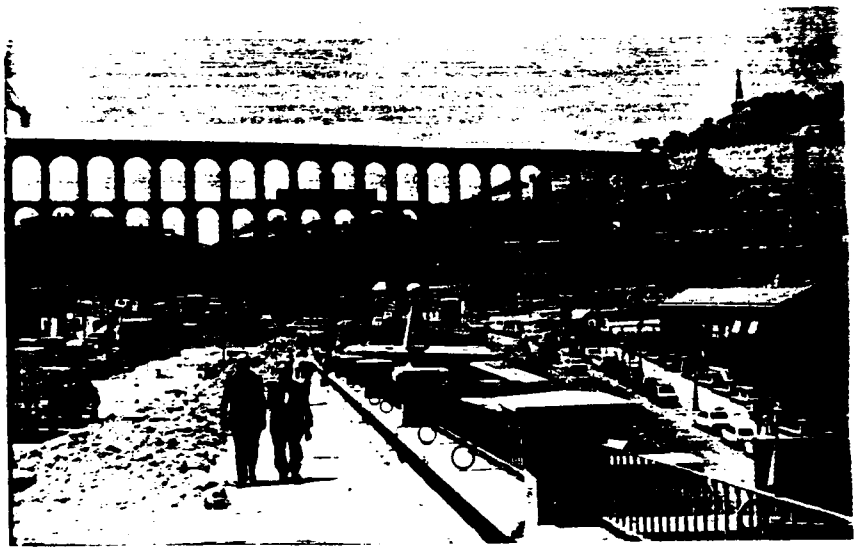
So the Lord sent a pestilence upon Israel from the morning even to the time appointed: and there died of the people of Dan even to Beer Sheba seventy thousand men.

2 Samuel 24;16

Although biblical translators named diseases in these passages it is doubtful if the original writers had any concept of specific disease entities. It was not until systematic collections of individual case histories were made in Greco-Roman times that the features of even such distinctive diseases as malaria were appreciated.. Hippocrates differentiated "epidemic" and "endemic" diseases and developed the "miasma" theory to explain localised outbreaks of groups of cases with similar symptoms. He thought that the air became tainted either by a conjunction of adverse meterological factors or by the presence of dirt and decay. This idea dominated formal medical teaching for more than 15 centuries. It was elaborated by Galen, and transcribed into the medieval texts which also preserved his pronouncement that pus formation was essential to wound healing. Surgeons, even up to the 19th century, paid little attention to suppuration, following Galen in describing it as "laudable pus."

The Romans were the first great sanitary engineers. They provided their cities with clean water supplies by the construction of enormous aqueducts and had elaborate drainage systems as well as their famous domestic and public baths.

Cauterizing the sores of a leper
(From a Persian work of the 13th century)



Roman Aqueduct at Segovia, Spain.
(Still the town water supply)

The motivation for these works seems to have stemmed from civic pride on the one hand and aesthetic pleasure on the other, but there are slight indications that they were seen as direct contributions to health. Galen commented (A.D. 64) "The beauty and number of Rome's fountains is wonderful.

Fumigation using foul smelling smoke was a favourite Medieval method for "decontamination".

None emits water that is foul, mineralised, turbid, hard or cold." and Frontius when appointed Chief Commissioner for Water in Rome in A.D. 97 described the post as "an office which concerns not merely the convenience but also the health and even the safety of the city."

Even so, some concept of the danger of direct contact with a sick patient persisted. Lepers were outcasts from society, compelled to live outside city boundaries, to wear a costume which identified them from afar and to ring a bell and cry "unclean" if approached, but this was justified on Biblical

The French king undertaking ritual ablutions before "touching" the scrofulous subject who is kneeling outside on the right.

authority, rather than by appeal to the writings of Galen or by any direction observation.

The influence of Arab medicine at this time was to introduce the wearing of charms to prevent diseases and to invoke astrological as well as meterological influences in the formation of miasmas.

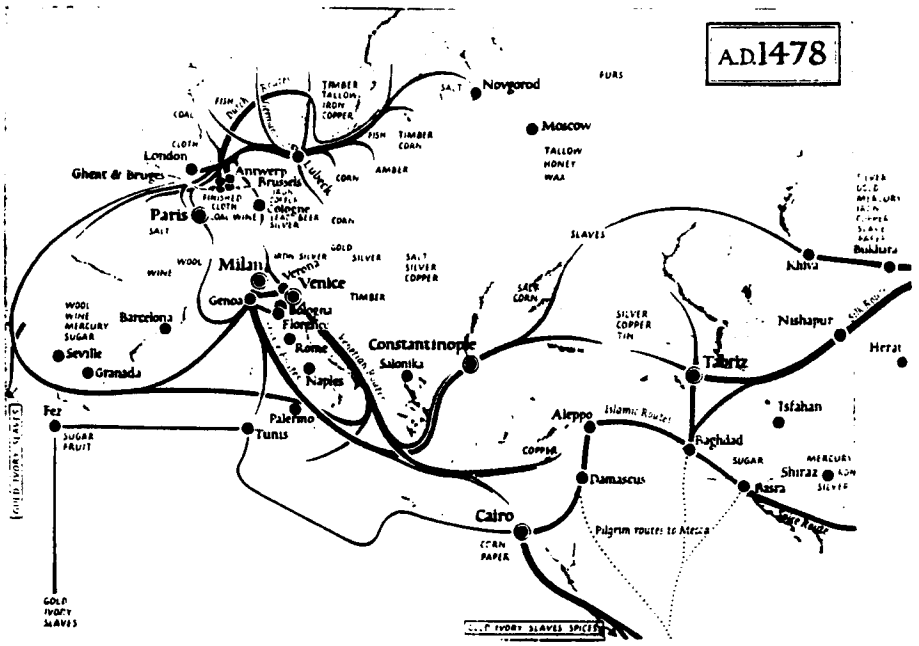
Just as disease might be due to divine wrath so cures might be obtained by prayer (or indulgences?) or by the touch of a saint or king. "Touching" of subjects suffering from "the King's Evil" became institutionalised in England, and persisted until the end of the Stuart period.

The appearance of plague in Europe challenged the miasma theory. All seemed susceptible and few recovered. A quarter of the population perished. The dreaded symptoms of the "Black Death" were summarised in the nursery rhyme:

"Ring a ring of roses (skin lesions)
A pocket full of posies (nosegays)
Atishoo atischoo (pneumonic plague)
We all fall down." (dead!)

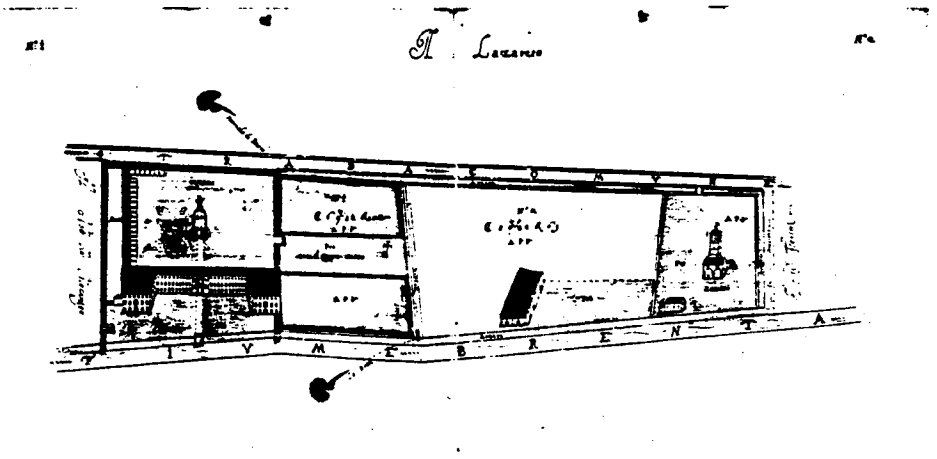
Plague costume (16th. century) - the nose held medicinal herbs.

People fled from infected towns, often carrying the disease with them to new areas. Boccaccio's "Decameron" (1358) is a series of stories supposed to have been told by a group of ladies and gentlemen to while away 10 days as they took refuge in a villa in the countryside while plague raged in Florence. The introduction to the first day's story includes a sophisticated description of plague and also explains how it is transmitted by contact with objects used by the sick. A remarkable costume was even made to protect doctors who attended people with plague.



Plague spread to Europe via Crimea (1346) Constantinople (1348) Italy and then to the North Sea and Baltic (1350)

The series of pandemics of plague which swept Europe had their source in



Plan of the Quarantine station at Brentelle - 16th. cnetury.

Asia and spread via the major trade routes.

During the 14th century the maritime powers recognised their especial vulnerability. Venice appointed inspectors with the power to prohibit the entry of passengers or goods arriving from plague infested ports and to hold them for the 40 day (quaranti giorni) deemed necessary for them to become safe. The practice, therefore, became known as quarantine, and buildings - part hospital and part prison were erected for the purpose. They were called "lazarettes" because the first was sited near the Church of San Lazzaro in Pisa.

The introduction of syphilis into Europe, possibly by Columbus's crew returning from the New World, was followed by an enormous epidemic. Spread was first by contact with the conspicuous skin lesion of the "great pox", and later, as the disease became endemic the acute clinical features where less dramatic transmission characteristically occurred by sexual intercourse.

HIERONYMI FRACASTORII
SYPHILIS.
SIVE MORBVS GALLICVS
AD P. BEMBVM.

Vi casus rerum uarij, quæ semi-
ne morbum
q Infectum, nec longa ulli per se-
cula usum
Attulerint: nostra qui tempesta-
te per omnem
Europam, partimq; Asiæ, Libyeq; per urbes
Sæuit: in Latium uero per tristia bella
Gallorum irruptit: nomenq; à gente recepit.
Nec non & quæ cura: & opis quid comperit usus,
Magnaq; in angustis hominum sollertia rebus:
Et monstrata Deum auxilia, & data munera cœli,
Hinc canere, & longe secretas quærere causas
Aera per liquidum, & uasti per sidera olympi
Incipiam, dulci quando nouitatis amore

Opening text from "Syphilis, Sive Morbus Gallicus".

The formal teaching in Renaissance medical schools then began to take account of what had become common knowledge, and doctors at last began to compare epidemic diseases of man with those of animals and crops in which contact transmission was already obvious to farmers. Fracastorius, a contemporary of Leonardo da Vinci, was both a physician and scientist with interest in fossils and magnetism as well as biology. He is famous for his literary poem "Syphilis Sive Morbus Gallicus," which sums up the history, clinical features and treatment of the disease which bears the name of the poem's hero.

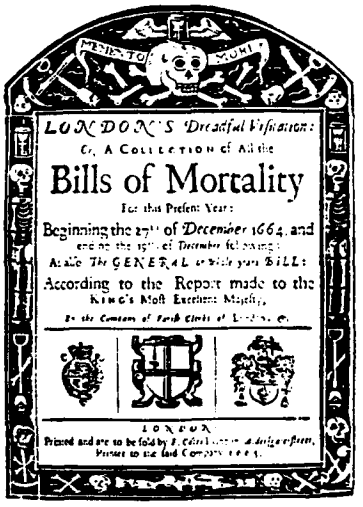
Of even more significance, is his treatise "De Contagione" in which he states his theory that infections are caused by "germs", (seminae contagion). He also said that contagion was of three types:

a) spread by contact alone

b) spread by 'fomites' (he invented the word to describes "clothes and other things which themselves are not corrupted but are able to preserve the 'germs' of contagion", and,

c)spread even at a distance

However, it is not certain if Fracastorius regarded his "germs" as living things in their own right. Their invisibility made them inaccessible to the types of experiments performed by the physiologists of the period, and proof of Fracastorius' ideas had to await the invention of the microscope.



LONDON'S Dreadful Visitation:
Or, A COLLECTION of All the
Bills of Mortality
For this Present Year:
Beginning the 27th of December 1664, and
ending the 19th of December following:
As also The GENERAL or Yearly BILL:
According to the Report made to the
KING's Most Excellent Majesty,
By the Company of Parish Clerks of London, &c.

LONDON
Printed and are to be sold by [illegible] Printer to the said Company [illegible].

The Diseases and Casualties this Week.

Abortive	4
Aged	45
Bleeding	1
Broken legge	1
Broke her scull by a fall in the street at St. Mary VVoolchurch	1
Childbed	28
Chrisomes	9
Consumption	126
Convulsion	89
Cough	1
Dropsie	53
Feaver	348
Flox and Small-pox	11
Flux	1
Frighted	2
Gowt	1
Grief	3
Griping in the Guts	79
Head-mould-shot	1
Jaundice	7
Impostheume	8
Infants	22
Kingsevil	4
Lethargy	1
Livergrown	1
Meagrome	1
Palsie	1
Plague	4237
Purples	2
Quinsie	5
Rickets	23
Rising of the Lights	18
Rupture	1
Scurvy	3
Shingles	1
Spotted Feaver	166
Stillborn	4
Stone	2
Stopping of the Stomach	17
Strangury	3
Suddenly	2
Surfeit	74
Teeth	118
Thrush	6
Tissick	9
Ulcer	1
Vomiting	10
Wind	4
Wormes	20

Christned { Males — 90, Females — 81, In all — 171 } Buried { Males — 2777, Females — 2791, In all — 5568 } Plague — 4237

Increased in the Burials this Week — 249

Parishes clear of the Plague — 27 Parishes Infected — 103

The Assize of Bread set forth by Order of the Lord Maior and Court of Aldermen,
A penny Wheaten Loaf to contain Nine Ounces and a half, and three half-penny White Loaves the like weight.

THE DISEASES AND CASUALTIES DURING THE PLAGUE YEAR

A bill of mortality for the week August 15 to 22, 1665. During this week 171 children were christened, but 5,568 persons died, and 4,237 of these deaths were attributed to the plague. The causes of death as recorded were ascertained by old women employed by the parish authorities to inspect the body at each death. As may well be imagined, the diagnoses were often mere guesses; except in time of plague the only reliable statistics were for accidental deaths and executions. The latter, however, do not figure in this bill of mortality because courts and executions were suspended for the duration of the epidemic; when it was over most of the prisoners, both those condemned and those awaiting trial, had died of the plague.

Even in the 17th century, plague was combated by prayer and the Baroque plague monuments which adorn many European cities were raised in thanksgiving for deliverance. Insights into the effect of the Plague in this comparatively modern period can be obtained from the comments of educated men of affairs such as Samuel Pepys.

THE CROWDED CHURCHYARD

From a plague poster. During the plague many bodies were buried together in large graves and when the plague subsided the level of the yard was sometimes raised a foot or more above its original height.

While the horror of the plague and the degradation of life it brought are often described, individual instances of heroism or altruism also occurred. In one of these, a country clergyman in Derbyshire persuaded his parishioners that they could contain the plague which had entered their village of Eyham in a box of clothes sent from London in 1665. The villagers isolated themselves within the parish boundaries and avoided contact with strangers. Food was delivered by neighbours to the outskirts of the area, while within the infected village plague killed 259 of the 350 inhabitants, including the vicar's wife and child. The monument in the church records the fact that the disease "did not spread further into the country." Few others had the strength of will to apply the results of this "experiment" to their own situation.

The Age of Enlightenment was characterised by an analytical approach to all aspects of life. In medicine, this resulted in much more definite criteria for clinical diagnosis so that we can clearly recognise some disease descriptions from this period. For instance, Thomas Sydenham's 17th century picture of scarlet fever (Appendix VI) differs little from that of the latest edition of Harrison.

Sydenham was a puritan who consciously revived the Hippocratic method of collecting objective case studies. He also analysed the number of cases, the circumstances surrounding their occurrence and their outcome. This approach, combined with the mathematical analysis of the Bills of Mortality was the

Lady Mary Wortley Painted by Jean Baptiste Vanmour 1717

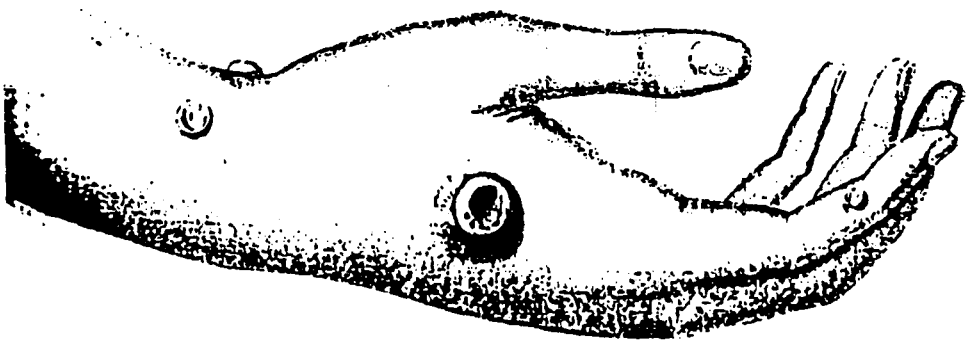
foundation of Epidemiology.

Once diagnosis of individual diseases could be made with some certainty, it became clear that second attacks of some disease, such as measles and smallpox, was very rare. As far as the latter disease is concerned, Arab medicine had long advocated the inoculation of young children with small amounts of material taken from the skin lesions in a mild case. This practice of "variolation" was introduced into England by Lady Mary Wortley Montague, who had allowed one of her own children to be inoculated in Turkey while her husband was Ambassador in Constantinople. Her connection with the court as lady-in-waiting to Queen Anne ensured wide publicity for the procedure at a period when about one in five of all infants died of this disease before they were two years of age.

While variolation was effective, it was also risky since the "mild" case of

CASE XVI.

SARAH NELMES, a dairymaid at a Farmer's near this place, was infected with the Cow Pox from her master's cows, in May, 1796. She received the infection on a part of the hand which had been previously in a slight degree injured by a scratch from a thorn. A large pustulous sore and the usual symptoms accompanying the disease were produced in consequence. The pustule was so expressive of the true character of the Cow Pox, as it commonly appears upon the hand, that I have given a representation of it in the annexed plate. The two small pustules on the wrist arose also from the application of the virus to some minute abrasions of the cuticle, but the livid tint, if they ever had any, was not conspicuous at the time I saw the patient. The pustule on the fore-finger shows the disease in an earlier stage. It did not actually appear on the hand of this young woman, but was taken from that of another, and is annexed for the purpose of representing the malady after it has newly appeared.



modified smallpox in a semi-immune person often transmitted fully virulent infection to the unfortunate vaccinee.

This situation was well known while Edward Jenner was training in London as a pupil and assistant of John Hunter half a century later. Smallpox was still producing epidemics with great loss of life and most of the survivors carried the evidence of infection in severely pock marked skin.

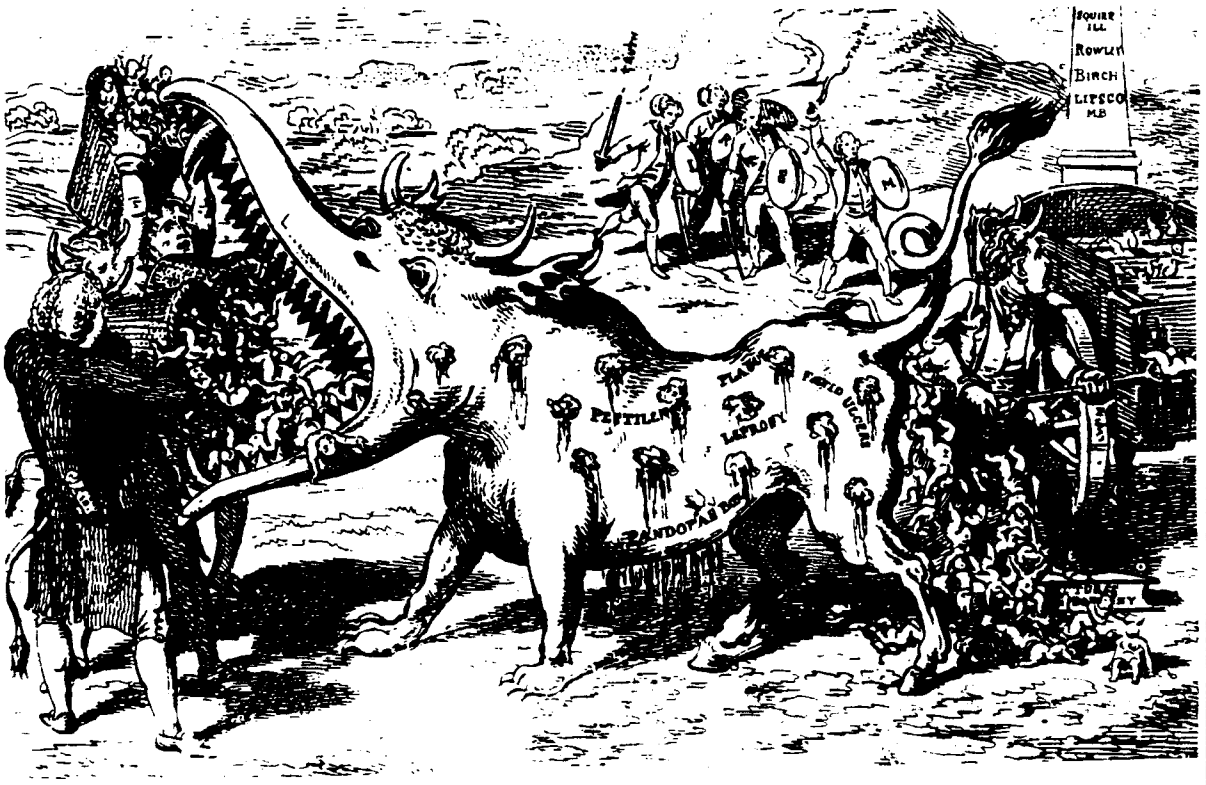
Jenner decided to return to rural life and practice medicine in his home town of Berkeley in Gloucestershire. In the countryside, it was believed that infection of the hands with cowpox from milking effectively prevented subsequent smallpox. Presumably, this is the basis for the traditional beauty of dairymaids, since their faces were unmarked by smallpox scars.

A Dorset farmer, Benjamin Jesty, had deliberately inoculated his family with material from cow pox lesions and showed that they were protected when

smallpox appeared in the village.

Jenner was aware of these stories and in 1798, decided to collect observations and eventually, 8 years later, to make a deliberate experiment in order to

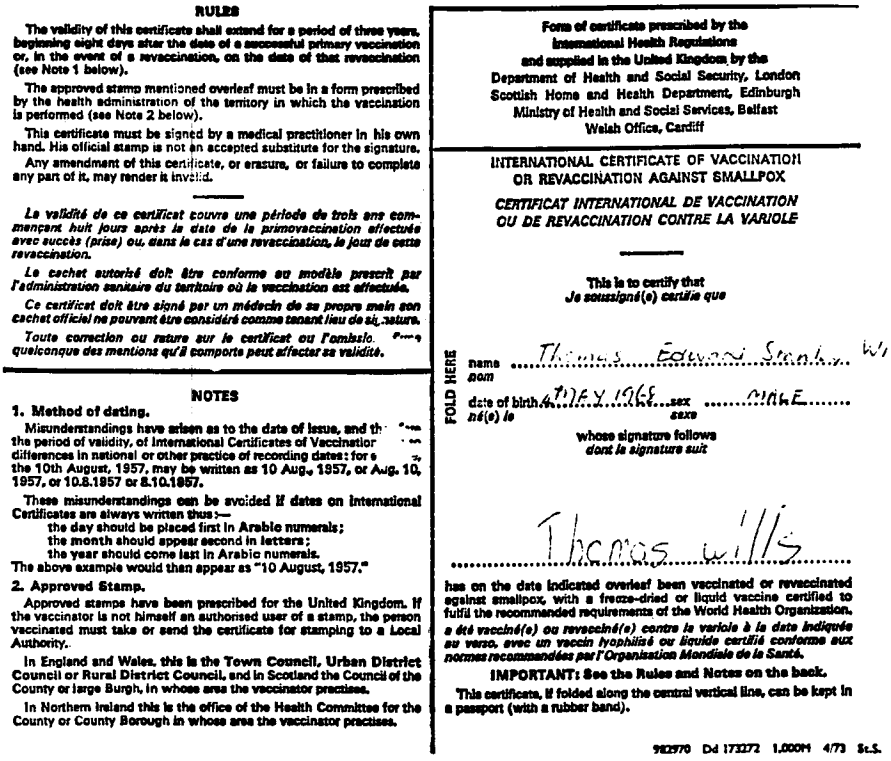
Jenner inoculating his son with cowpox.



Early Nineteeth Century Anti-vaccination Cartoon.

decide if this method could be generally applied. He took material from the arm of Sarah Nelmes, a milkmaid with cowpox and inoculated it into the arm of a boy, James Phipps. Two months later, he showed that the boy was immune by injecting him with matter from a case of classical smallpox.

Within two years, Jenner could produce the results of a experiment in his monograph, "An Inquiry Into the Cause and Effect of Variola Vaccine". This book put the method on a secure scientific footing and the practice spread rapidly throughout the world. Even in the remote colony of Sydney, Jenner's book was republished and vaccination energetically applied. All this was done



RULES

The validity of this certificate shall extend for a period of three years, beginning eight days after the date of a successful primary vaccination or, in the event of a revaccination, on the date of that revaccination (see Note 1 below).

The approved stamp mentioned overleaf must be in a form prescribed by the health administration of the territory in which the vaccination is performed (see Note 2 below).

This certificate must be signed by a medical practitioner in his own hand. His official stamp is not an accepted substitute for the signature.

Any amendment of this certificate, or erasure, or failure to complete any part of it, may render it invalid.

Le validité de ce certificat couvre une période de trois ans commençant huit jours après la date de la primovaccination affectuée avec succès (prise) ou, dans le cas d'une revaccination, le jour de cette revaccination.

Le cachet autorisé doit être conforme au modèle prescrit par l'administration sanitaire du territoire où la vaccination est affectuée.

Ce certificat doit être signé par un médecin de sa propre main son cachet officiel ne pouvant être considéré comme tenant lieu de signature.

Toute correction ou rature sur le certificat ou l'omission quelconque des mentions qu'il comporte peut affecter sa validité.

NOTES

1. Method of dating.

Misunderstandings have arisen as to the date of issue, and the period of validity, of International Certificates of Vaccination differences in national or other practice of recording dates: for e the 10th August, 1957, may be written as 10 Aug., 1957, or Aug. 10, 1957, or 10.8.1957 or 8.10.1957.

These misunderstandings can be avoided if dates on International Certificates are always written thus:—
the day should be placed first in Arabic numerals;
the month should appear second in letters;
the year should come last in Arabic numerals.
The above example would then appear as "10 August, 1957."

2. Approved Stamp.

Approved stamps have been prescribed for the United Kingdom. If the vaccinator is not himself an authorised user of a stamp, the person vaccinated must take or send the certificate for stamping to a Local Authority.

In England and Wales, this is the Town Council, Urban District Council or Rural District Council, and in Scotland the Council of the County or large Burgh, in whose area the vaccinator practises.

In Northern Ireland this is the office of the Health Committee for the County or County Borough in whose area the vaccinator practises.

Form of certificate prescribed by the International Health Regulations and supplied in the United Kingdom by the Department of Health and Social Security, London
Scottish Home and Health Department, Edinburgh
Ministry of Health and Social Services, Belfast
Welsh Office, Cardiff

INTERNATIONAL CERTIFICATE OF VACCINATION OR REVACCINATION AGAINST SMALLPOX

CERTIFICAT INTERNATIONAL DE VACCINATION OU DE REVACCINATION CONTRE LA VARIOLE

This is to certify that
Je soussigné(e) certifie que

FOLD HERE

name / *nom* Thomas Edward Smith Wills

date of birth / *né(e) le* 7 MAY 1968 sex / *sexe* MALE

whose signature follows
dont la signature suit

Thomas Wills

has on the date indicated overleaf been vaccinated or revaccinated against smallpox, with a freeze-dried or liquid vaccine certified to fulfil the recommended requirements of the World Health Organization.
a été vacciné(e) ou revacciné(e) contre la variole à la date indiquée au verso, avec un vaccin lyophilisé ou liquide certifié conforme aux normes recommandées par l'Organisation Mondiale de la Santé.

IMPORTANT: See the Rules and Notes on the back.

This certificate, if folded along the central vertical line, can be kept in a passport (with a rubber band).

982970 Dd 173272 1,000M 4/73 St.S.

International Certificat Of Vaccination

without any clear understanding of the agent which caused smallpox, and though unbiased assessment showed vaccination was successful, it was also subjected to vehement ridicule.

The risks of vaccination were quite trivial compared with smallpox as the epidemics of the disease decreased, these risks became less acceptable. Public disquiet about the risks and the failures of vaccinations and was the start of the movement which continues to demand ever more stringent safety requirements for drugs and biological substances.

The smallpox vaccine now used and the technique of administering it are almost identical to Jenner's. Industrialised countries were relatively quick to adopt it on a national basis, and many legislated to compel all infants to be vaccinated and to demand that travellers produce a certificate of vaccination before entering a port.

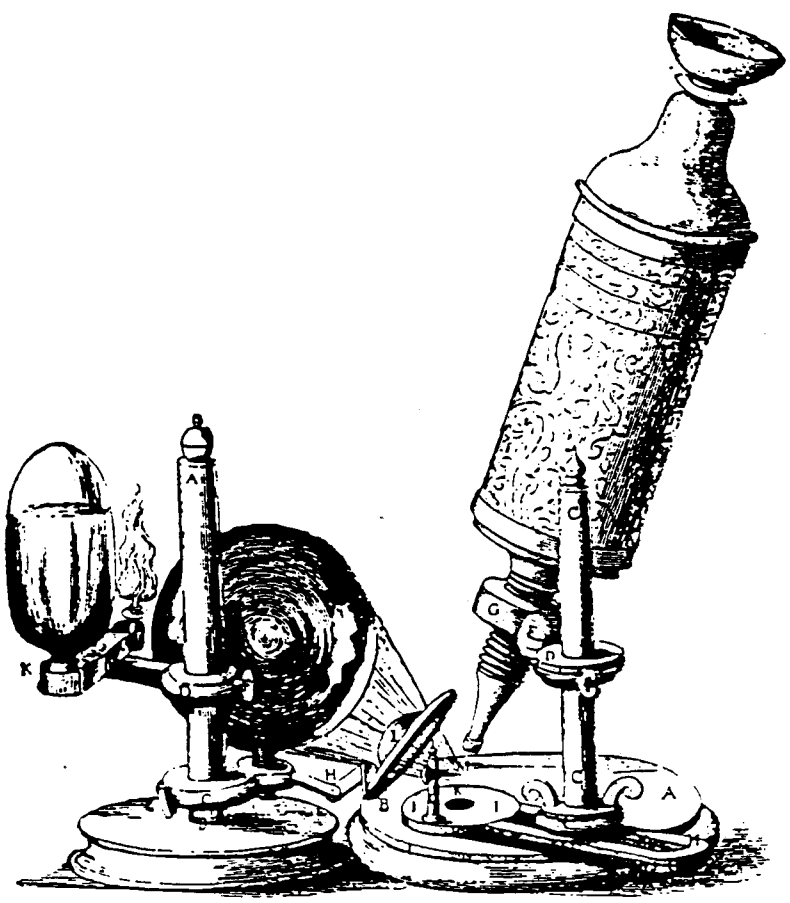
By the 1970's only Ethiopia and the Indian subcontinent still experienced endemics of smallpox. The World Health Organisation produced and admin-

istered a programme to complete the eradication of the disease from the globe by vaccination, followed by intensive surveillance for further cases. In 1980 the Director General of WHO could claim that for the first time, man had successfully eradicated a human disease from this planet. There is a certain irony in the announcement since the achievement took almost 200 years after the means became available.

The invention of the microscope made the microscopic world visible and stimulated intense interest in the nature and origin of this new category of living things.

Antonie van Leeuwenhock (1632-1723) was a prosperous merchant in Delft during Holand's great commercial and intellectual period. His interest in mathematics and science led him to the study of optics and he began to manfacture and mount lenses and to use them to examine a great variety of biological specimens, (for instance, he was the first to describe spermatozoa). Leeuwenhock made his findings known to the scientific world by corresponding with the Royal Society in London. In a letter of 1683, he gave a clear description and sent drawings of all three morphological types of bacteria. The specimen was a scraping from his own teeth.

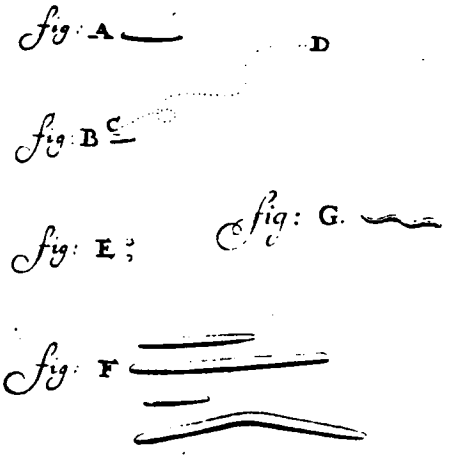
He also described motility and commented on the great number of organisms, estimating "that there are more animals living on the scum of the teeth in a man's mouth than there are men in the whole kingdom."



Microscope made by the Englishman Robert Hooke in 1665

Several of Leeuwenhock's microscopes still survive. They were capable of magnifying about 200 times, but instruments of this quality were not widely available until almost a century after his death.

The first process shown to depend on the metabolic activities of micro-organisms was alcoholic fermentation. This was a subject of great commercial and scientific interest to chemists during the early part of the nineteenth century. The structure of sugars, alcohols and organic acids was worked out at the time. The necessity to use yeast to start fermentation was, of course, recognised but there was no understanding that the substance was composed of living organisms. Louis Pasteur became interested in brewing and wine making because of his interest in the structure of organic molecules. In 1848, he had demonstrated the laevo and dextro-rotatory forms of tartaric acid and he proceeded to study the causes of spoilage of wine due to vinegar fermentation. He showed that the two different "ferments" involved were living organisms and defined the chemical natures of the starting materials and products as well as describing the effect of anaerobic conditions.



Leeuwenhok (1695) diagram of bacteria showing motility.

This work was fundamental in establishing the infant science of microbiology, but Pasteur soon became involved in the most important scientific controversy of the time. This was the debate about spontaneous generation." In ancient and mediaeval times, it was believed that, for instance, maggots and flies developed de novo in decaying flesh. This had been formally disproved by Redi in the seventeenth century by demonstrating that he could prevent the appearance of maggots by denying flies access to decaying meat.

However, once microscopic examinations of putrefying organic material and pus had revealed a host of different "animalicules", an essentially theological controversy began between those who believed that some non-specific "vital force" in the substrate was transformed directly into the multiplicity of living organisms, and their opponents who declared that each individual must arise from a parent like itself. It proved technically difficult to make stringent tests of these hypotheses, though Spallanzani made a convincing demonstration of heat sterilization of vegetable broths in experiments which were published in 1765.

Inconclusive experimentation and acrimonious pamphleteering between

the two camps dominated the field for about a century and the main arena for the debate was Paris. Pasteur finally disproved the theory of Spontaneous Generation in the following experiment demonstrated to the French Academy of Science in 1861.

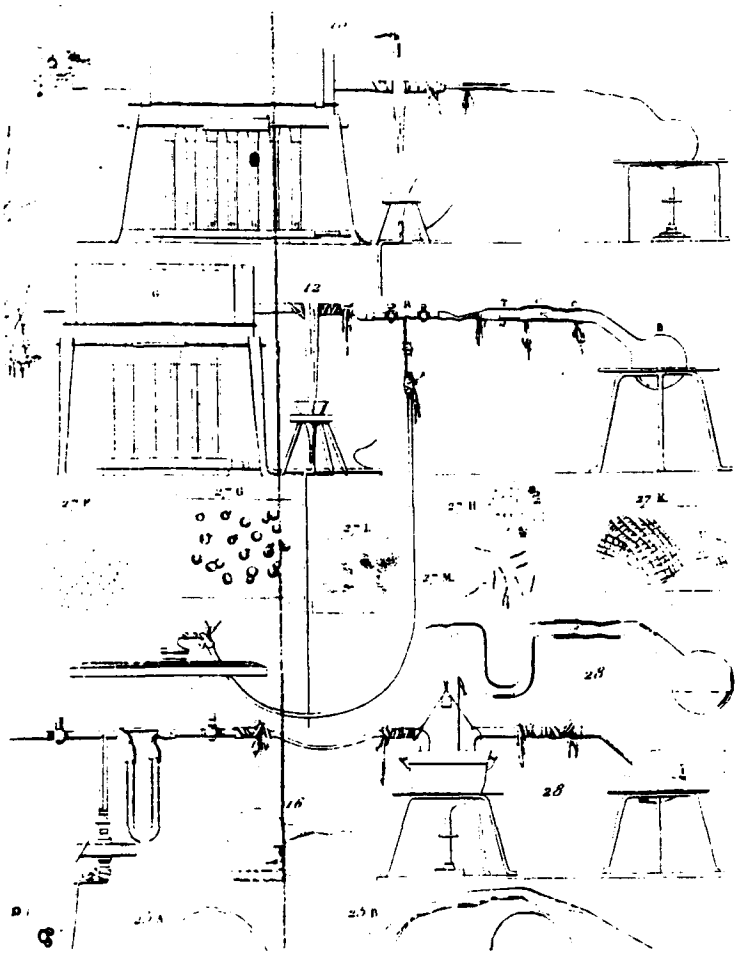


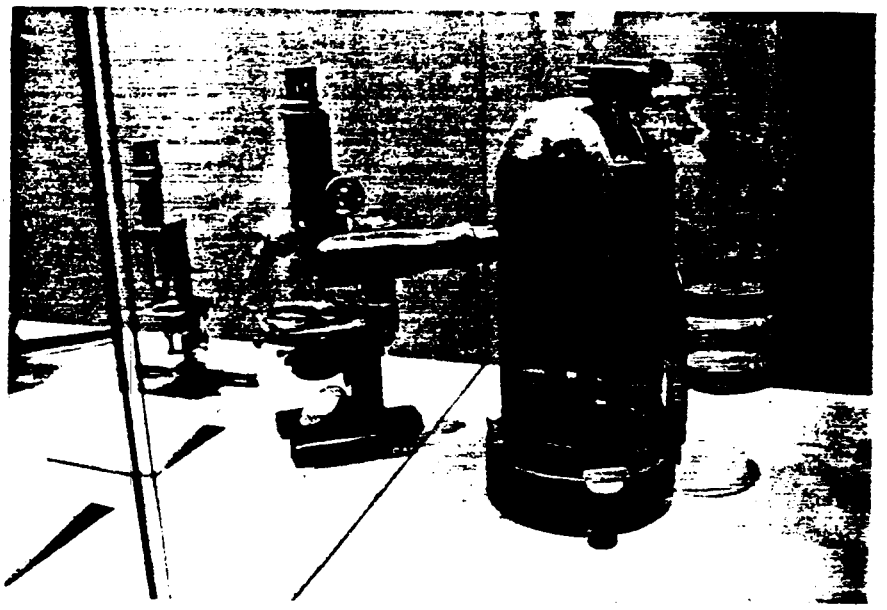
Diagram of apparatus used by pasteur in demonstration experiments at the French Academy.

The idea that the air might be the source of the organisms which caused putrefaction was taken up in Scotland by Joseph Lister who realised that surgical sepsis must result from contamination of the wound at the time of operation. He put this hypothesis to the test in his own practice using strong disinfectant (since heat was impracticable) on his own hands, in the wound and its dressings, and even as a spray to decontaminate the air.

His operative mortality (previously about 45% for amputation) fell dramatically, but publication of his results in 1867 aroused fierce controversy amongst his colleagues. Lister lived long enough (1827-1912) to see his method generally adopted and to receive international recognition as the founder of antiseptic surgery. He was, for instance, the first doctor to be elevated to the peerage.

Underlying Lister's great success in surgery was a first class scientific background. His father, a Quaker wine merchant, had been an eminent

microscope maker and Lister himself published papers on the structure of the iris (showing it to be smooth muscle) and on coagulation of the blood (disproving the then current theory that clotting was due to the liberation of ammonia) and he was also the first to obtain a pure culture of a micro-organism, using the limiting dilution method.



Lister's Carbolic Spray.

The development of the science of microbiology gave Lister a rational explanation for the success of his antiseptic method. Semmelweiss had not been so fortunate just a few years earlier when he advocated handwashing and general cleanliness to prevent puerperal fever. He had recognised that obstetric wards in the lying-in hospital in Vienna where medical students were assisting, had much higher mortality from puerperal fever than wards where only midwives worked. He suspected that his was the consequence of students returning directly to wards after attending or assisting at post mortem examinations. When a colleague perished following an accidental cut during an autopsy, Seumelweiss even showed that in both cases the pathology was "blood poisoning". He instituted compulsory handwashing in calcium chloride before assisting at labour and reduced the maternal mortality from about 10 percent to less than 2 percent. However, lacking the support of micro-biological evidence, he was unable to sustain his handwashing regime in the face of vitriolic condemnation from the medical establishment. He left Vienna to found a department of Obstetrics in Budapest where the university now bears his name, but died young, after a psychotic illness which had been exacerbated if not caused by the controversy.

Although surgeons now rely on exclusion of micro-organisms (asepsis) rather than antisepsis, Lister's methods reduced the mortality to such an extent that operations on the internal organs in the chest and abdomen could at last be undertaken.

In the last quarter of the nineteenth century, the new science of microbiology turned its attention from commercial processes such as brewing to the problems of clinical medicine. The development of pathology under the

influence of Virchow had by this time also greatly improved the precision of diagnosis. Convergence of these two streams in medical science led within the short period of about 20 years to the discovery of the causes of most of the important infectious diseases. Underlying these discoveries was the concept that each disease was caused by a single micro-organism. This "germ theory" of disease had been formulated by Pasteur during his study of the silkworm disease, "pebrine", but it could not be tested until reliable methods for identifying bacteria had been devised. Two approaches were used. Firstly, the newly synthesised aniline dyes were sued to stain preparations of killed organisms on microscope slides. Secondly, solid culture media were developed so that individual colonies could be obtained from the multiplication of individual bacterial cells.

Both these advances were initiated by Robert Koch who was the first medical microbiologist to exploit Pasteur's theories directly in the study of disease. Koch was a District Physician in the small Prussian town of Wollstein where his experience of treating anthrax in farmers stimulated him to study the bacteria found in anthrax in both man and animals. He succeeded in observing spore formation and germination and showed how this related to the clinical features and epidemiology of the disease. He wrote an account of his findings to Ferdinand Cohn who was Professor of Botany in Breslau and already celebrated because of his work on the classification of bacteria. Cohn arranged for the famous public demonstration by Koch, and following this recognised the significance of the findings and not only arranged for their publication, but also secured an academic position for Koch.

This established the German School of Microbiology which produced a generation of workers whose efforts are often commemorated in the names given to the bacteria they described: Koch himself discovered both the tubercle bacillus and the cholera vibrio. Perhaps his most significant theoretical contribution was the formulation of a set of rules "Koch's Postulates" which could be used to decide whether a new micro-organism isolated from a sick patient was actually the cause of his disease. He required 1) that the organism be regularly isolated from the diseased tissues. 2)that it be grown in pure culture outside the body for several generations 3) that the culture of organisms reproduces the disease when inoculated into suitable animals. While the German school concentrated on a systematic search for the causes of specific disease, Pasteur turned his attention to the problem of immunity. He chose to study chicken-cholera, an economically important disease of fowls. After demonstrating that the bacterium maintained its virulence after severeal serial passages in the laboratory, he founod that alteration of tihe culture conditions sometimes produced bacteria (an attenuated strain) which caused only minor disease in fowls. If these birds were later challenged with the fully virulent strain, they remained unaffected. This finding was later taken up on a larger scale to benefit the poultry industry & Pasteur even conceived the idea of using the fowl cholera (which he found caused a fatal disease in rabbits as well as birds) to eliminate the rabbit pest from Australia. This was tested in experiments conducted on Rodd Island in Sydney Harbour by Pasteur's nephew but shown to be impracticable. However he anticipated myxomatosis by almost a century.

Pasteur next applied his idea of attenuating bacteria by growing anthrax under unfavourable conditions. The public demonstration of anthrax vaccination in 1881 was intended to bring this method to the attention of the farming community but it was publicised to an international audience by newspaper journalists who recognised the significance of the event.

Pasteur's last main work was his study of rabies. This virus disease which is transmitted to man by the bite of a "mad dog" is universally fatal and has

justifiably been viewed with terror over the centuries. It was known that rabbits could be infected by intracranial inoculation of brain tissue from an animal or human who had died of the disease. Pasteur made "attenuated" virus by drying infected rabbit brain. He then showed that animals which had been inoculated with a series of injections of this material were immune to challenge with the unmodified virus and the injections even gave protection if given soon after experimental infection in animals. The efficacy of this vaccine in humans who had been bitten by rabid animals were soon demonstrated in a most dramatic way.

The case was that of Jean Jupille, a 15 year old shepherd boy who had been savagely bitten while protecting a group of younger children from attack by a rabid dog. The treatment was begun six days later and its success is commemorated in a statue which stands in front of the Institute Pasteur in Paris.

Pasteur's own tomb is also in the Institute, and is a fitting tribute to his life and work. Along the corridor approaching the mausoleum, the walls bear a touching series of bronze wreaths for these early microbiologists' "morts pour la Science". Ricketts and Prowazek are amongst those commemorated.

The colleagues and successors of Pasteur and Koch now turned their attention to the question of how microorganisms actually induce disease and how the body responds to infection. The concept of infectious diseases was extended by the discovery that toxins are produced by bacteria and cause diseases such as diphtheria and tetanus when liberated in the body. Following Pasteur's example Behring showed that inoculation of heat killed cultures of diphtheria or tetanus conferred resistance to the disease and that the protection could be passed on to another individual by injecting serum from the inoculated subject. Investigation of the basis of this "humoral immunity" led Paul Ehrlich to develop quantitative measurements of antibodies bymethods which have served as the basis of many of the diagnostictests for infection and immunity which are now in use.

Meanwhile experimental studies of the cells found in blood and pus had led the Russian zoologist Metchinokoff to propose that the leucocytes might engulf bacteria and kill them in the same way as the Mesenchymal cells of the

starfish digest food particles. He called this process "phagocytosis"

The explanation of the relationship between phagocytosis and humoral immunity (antibody formation) did not become clear for over half a century. Modern theories of the mechanism of the body's recognition of antigens and its defence against microorganisms were first proposed by Sir Macfarlane Burnet (working in Melbourne) and Sir Peter Medawar (working in London). They showed that the lymphocytes control the process of immunity and that there is a genetic basis for the ability to recognise and respond to infection.

As insight into the causes of infectious diseases deepened in the first part of the 20th century, the explanation for the success and failures of the sanitary movement became clear. An association between poverty, dirt and disease had long been recognised, and during the 19th century, a political movement arose to improve living conditions in the industrialised cities of Europe. Although some gains in health followed local schemes to provide clean water supplies, destroy vermin and introduce some form of sewage disposal, it became obvious that such public health measures would only succeed if they were to become the responsibility of the State. The early advocates of such legislation were often active in other reform movements - for instance, John Howard, the prison reformer, also campaigned for improvements in quarantine procedures. The opponents on the other hand, included both industrialists who objected to the cost, and conservative politicians such as Edmund Burke, regarded these measures as an infringement of civil liberty.

The general philanthropic impulse of the sanitary movement acquired greater impetus when a series of cholera pandemics swept the world in 1831, 1854 and 1882. The transmission of cholera by contaminated drinking water was recognised by John Snow, an English medical practitioner, after the first epidemic. In 1849, he was even awarded a prize of 73,000 francs by the Institute of France for an essay stating his idea. In 1854, cholera again broke out in London and affected his own district of Soho. He outraged local opinion by having the handle of the Broad Street pump removed, because he observed that all the cases in his practice drew household water from this particular source.

Criticism turned to praise once the outbreak ceased. The first attempt to quantitate the need for public health measures and to observe their effect was made by Edwin Chadwick, who used the figures of the British Census and the bills of mortality for his purpose. His successors, John Simon and William Farr, developed the Science of Epidemiology still further. Through their association with the Public Records Office, they influenced the Civil Service and successive British governments, particularly by showing the savings which resulted from expenditure on preventive health programmes.

The geographical extent of the British Empire exposed her armed forces, administrative officers and their families to a wide variety of tropical infections. Both the Colonial Medical Service and the Army undertook research into these problems. Probably the most important of their many discoveries was Ronald Ross' proof that the life cycle of the malarial parasite involves growth in the mosquito. As a result, malaria has been eradicated from many areas of the world by mosquito control.

As the causes of the major infections were delineated one by one, diagnosis and prevention were greatly advanced but little could be done to treat a patient once the symptoms of the disease appeared. Ehrlich had first conceived the idea of "selective toxicity" by which he meant the use of a drug which would interfere with the metabolism of the micro-organisms in a concentration which was harmless to the patient. He used dyes to treat protozoan infection and manufactured organic arsenical compounds which were used to treat syphilis successfully. (Appendix 12)

Redrawn map of Soho showing distribution of Cholera cases.
After Snow

In 1935, Domagk in Germany, reported the use of the dye "Prontosi" to treat streptococcal infection. It was rapidly shown that the active principle was sulphanilamide which acted by blocking the metabolism of the closely related compound para-amino benzoic acid, an essential nutrient for many bacteria.

Subsequently, the sulphanilamides were overshadowed by the discovery of penicillin, an antibiotic derived from a penicillin mould. It had been described by Fleming in 1928, but it was not until Florey, Chain and the other members of wartime Oxford research group, realised its potential value.

The original culture plate showing the action of penicillin.

The effect of penicillin and other newer antibiotics completely changed the list of main causes of death in industrialised nations. This freedom from the mortality due to bacterial infections is in marked contrast to the situation with viral diseases. As early as 1900, it was known that the agents which caused tobacco mosaic disease and foot and mouth diseases were so small that they passed through the porcelain filters used to retain bacteria in laboratory experiments. The list of "filterable viruses" grew to include poliomyelitis, influenza and many other common childhood infections, as well as diseases with high mortality rates as smallpox, yellow fever and rabies. Once these organisms could be viewed by the electro-microscope and analysed chemically, it was discovered that they consisted only of nucleic acid encased in a protein shell. There was then considerable doubt about their nature - were they living things or not? The comparative simplicity of virus structure made them ideal subjects for studying the molecular basis of inheritance and the mechanisms of gene expression. The bacteriophages (viruses which infect bacteria), have been particularly important in this aspect of genetics.

Bacterial studies also give the first indications of the role of DNA as genetic material and the new developments of genetic engineering stem from this discovery. The control of epidemic disease and the treatment of many infections, has been accomplished within the short span of about a century. Malignant tumours and cardiovascular diseases are now the main causes of death in the Western World. The Third World still awaits implementation of these discoveries - a political and economic problem rather than a simple scientific one. The World Health Organisation is at present undertaking the task of providing infant vaccination for all children by 2000.

In the West, there is a growing interest in this possibility that even malignant diseases may be caused by viruses. In animals and birds, cancer viruses have long been known. Workers in this field are motivated by the belief that control of some malignant diseases may be achieved once a virus cause is clearly identified and its mode of action understood.

In the past, epidemics of new diseases have arisen whenever there has been a marked change in human activity. Some infections, such as plague, typhus and cholera, have themselves affected the course of history. Despite the sophistication and success of modern microbiology, AIDS has now appeared to challenge both our scientists and our society.

BIBLIOGRAPHY

Bulloch, W. *A short History of Bacteriology* Oxford 1949
Longmate,N. *Alive and Wel* , Penguin 1970
Morton,H.V. *The Waters of Rome Michael Joseph 1966*
Zeigler, P. *The Black Death* Collins 1969
Zinsser, H. *Rats, Lice and History*
Lewis, S . *Arrowsmith, Signet 1967*
Douglas C. *The Houseman's Tale* Fontana 1971
Cook,R. *Fever* Pan 1975

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 9 BODY BRAIN AND MIND IN MEDICINE

C. Bridges-Webb

ABSTRACT

The successes of medical science and technology in the past 100 years in curing or controlling disease processes in the body have extended life without necessarily greatly reducing the sum of human suffering. This has led to renewed interest in a more comprehensive view of illness and healing under such headings as psychosomatic or holistic medicine. However the relationship of disorders on the mind and the emotions, have been perennial topics of Western medical thought over centuries, paralleling the more general concern of philosophers with the relationship of human mind and body.

Understanding of the interaction of mind and body in health and disease at different periods of history is exemplified by considering the ideas of specific individuals at different times: an Egyptian surgeon about 2900 BC (the Edwin Smith papyrus); Hippocrates about 400 BC (the Complete Works of Hippocrates); Thomas Sydenham 1681 (Epistolary Dissertation); Jerome Gaub 1747 and 1763 (Mind and Body in Eighteenth Century Medicine: a Study Based on Jerome Gaub's De regimine Mentis); Daniel Tuke 1872 (Illustrations of the Influence of the Mind Upon the Body in Health and Disease); Sigmund Freud 1905 (Project for a Scientific Psychology); and Karl Popper and John Eccles 1977 (The Self and Its Brain).

Body Brain and Mind In Medicine

C. Briáges-Webb

A fact without parallel, which defies all explanation or description, is the fact of consciousness." Sigmund Freud.

Ideas *"contain no matter and have no energy, and therefore, according to the laws of science, do not exist except in people's minds ... of course, the laws of science contain no matter and have no energy either and therefore do not exist except in people's minds ... the contradiction scientists are stuck with, is that of mind. Mind has no matter or energy, but they can't escape its predominance over everything they do."* Robert Persig.

"The relation of the body to mind in human ailments, both mental and physical, is one of the perennial topics of Western thought ... from its origins ... down to the present day." L.J. Rather.

Primitive medicine is holistic and unitary; there is no body, no mind, just man. Medicine is subjective as well as objective, with confession and suggestion the basis for healing, mediated by magic.

From this holistic understanding man first developed awareness of his living body, and its various parts, as an entity in its own right. With this came awareness of consciousness and self as something not entirely coexistent with the body. The whereabouts in the body of the seat of consciousness, or mind, and later the means by which mind and body interacted, became matters of interest, particularly in relation to illness.

Instead of the usual historical approach of unfolding new knowledge and insights as they were discovered, this paper demonstrates changes in understanding3 of the relationship between body, brain and mind by considering a number of books which reveal the thinking of their authors at various times during the period from 3000 BC to 1977. The selection of the books was quite arbitrary, and the story could equally well have been told using entirely different ones. For the most part the ideas are presented by selected passages quoting the authors' own words.

Site of the Plane Tree of Hippocrates on the island of cos, in the shade of which he is said to have instructed his pupils.

The Edwin Smith Surgical Papyrus
ed. James Henry Breasted - University of Chicago Press 1930

This is a translation of a copy made in about 1700 BC of an Egyptian surgical document dating from about 3000 BC, together with glosses (explanations) added about 2500 BC. There is no evidence of author, but it could have been written by the earliest known physician, Imhotop, who lived in the 30th Century BC, grand vizier, chief architect and royal medical adviser to the Pharaoh, and was the historical personage who may be the original basis of the leading patron god of medicine in Greek (Asclepios) and Roman (Aesculapius) times.

Statuette of the god Imhotep the Vizier-Physician who became an Egyptian god of medicine.

All that is preserved of this ancient treatise consists of forty-eight case histories of injuries arranged in a systematic way. The cases are grouped in relation to regions of the body, starting with the head and proceeding down to the face, back, arm, thorax and spinal column. The original may be supposed to have continued down to the feet.

Within each regional group the more trifling cases precede the more serious or fatal ones. Within each case there is a systematic order; title, examination, diagnosis, treatment (if any), glosses. The diagnosis includes a description of the injury followed by one of three statements: "*an ailment which I will treat,* " "*an ailment with which I will contend*", and "*an ailment not to be treated*". These correspond to three verdicts: successfully treatable, possibly curable, and untreatable. They are statements about proposed action rather than about prognosis. The treatments recommended are rational and mainly surgical.

In 14 of the cases the verdict is untreatable, evidence of the author's interest in recording and discussing cases even when no treatment was proposed. This is very early evidence of interest in the discipline of medicine as a body of knowledge. There is internal evidence that even many of the terms did not previously exist and had to be created. The word "brain" here occurs for the first time in recorded writing.

From earliest times the Egyptians had considered that the seat of consciousness and understanding in the body was the heart or abdomen. There was, however, no systematic knowledge of or discussion about the body, and ideas about disease were so mixed up with superstitious belief in supernatural intervention that a rational understanding of the organs and function of the human body in health or in disease was impossible. It is significant that this treatise relates to conditions which were the obvious result of observable physical causes, in which there was no need to postulate the intervention of demons and magic.

Case 6, a gaping wound in the skull, contains the first known reference to brain, describing it as like "*those corrugations which form in molten copper, something therein throbbing and fluttering under thy fingers, like the weak place in an infant's crown*". The gloss states that this means "*the smash is large, opening to the interior of his skull, to the membrane enveloping his brain*". The case also refers to "*stiffness of his neck*".

In Case 8, a similar one, there is reference to "*his eye is askew because of it, on the side of him having that injury which is in his skull; he walks shuffling with his sole, on the side of him having that injury which is in his skull*". The gloss explains shuffling as "*the sole dragging, so that it is not easy for him to walk ... while the tips of his toes are contracted ... and they walk fumbling the ground.*" Not only did this surgeon refer to the brain and its meninges, but he observed that injury to it was associated with effects on other parts of the body, the eye and the foot, and he noted the association of laterality between the injury and the affected side of the body (though he was misled by a case of contre-coup regarding the side of the lower limbs affected). He did not, however know anything of the means of this association, nor did he associate the brain with consciousness or understanding.

The Genuine Works of Hippocrates
The Classics of Medicine Library: Birmingham, Alabama, 1985

Hippocrates was a Greek physician-priest at the Temple of Health dedicated to Aesculapius, the God of Health, on the island of Cos, who lived from about 460 BC to 370 BC. He also practised and taught his profession at many other places in Greece.

The works of the Hippocratic collection were all originally published at different times, mostly now unknown, and include works by Hippocrates and others, with varying degrees of authenticity. This edition was translated and annotated by Francis Adams, surgeon, for the Sydenham Society, and published in 1849.

Adams says that the Aesclepidae, the priest-physicians, "*endeavoured to cure the sick partly by superstitious modes of working on the imagination, and partly by more rational means, suggested by observation and a patient study of the phenomena of disease*".

Statue thought to be Hippocrates.

Greek medicine was closely related to philosophy. All schools of Greek philosophy from the time of Pythagoras in the 6th century BC regarded the universe as being made up of a primary substrate, matter, which was acted upon by powers or contraries or qualities, to form substances in which the powers resided. These substances or elements were fire, air, water and earth, and "*all things are mixed of these*" (Ovid). The powers or contraries which could produce change in the elements were active (heat and cold) or passive (moisture or dryness). The peripatetic philosophers would "*analyse any substance, as, for example, man into head, hands, and feet; and these into bones, flesh and nerves; and these into the four elements; and these again into matter and form.*" "*Aristotle thought that there is a fifth element, from which the stars and the souls of individuals are made*" (Cicero).

Ideas about God were intermingled with ideas about soul, mind, reason and understanding, and related to the powers. "*The active cause is the pure and perfect soul of the universe ... the passive subject is of itself without life and motion, but ... enlivened by mind, it was changed into a most perfect work*" (Philo). "*The first principles of all things are two - the active and the passive: the passive is matter ... the active... is the reason residing in it, that is, God... God and mind are one and the same*" (Diogenes, Life of Zeus the Stoic). Some philosophers considered fire the essence of the soul, but Aristotle wrote "*Some improperly call fire or some such power the soul; but it would be better to say that the soul subsists in such a body, because heat is, of all bodies, the one most obedient to the operations of the soul*". He regarded fire as but the instrument of the soul, or reason. Hippocrates, eschewing theory, wrote little about the mind or soul or God.

While the philosophers did much to free medicine from superstition, they substituted hypothesis or theory "*such as hot, or cold, or moist, or dry or whatever else they choose*". Hippocrates discarded both superstition and hypothesis in favour of empirical action based on the results of observation. He even disagreed with those such as Empedocles who said it was necessary for the physician to know how man was "made and constructed", discarding this as but hypothesis. He wrote: "*One cannot know anything certain respecting nature from any quarter other than from medicine.*" He thought that every physician should know "*what man is in relation to the articles of food and drink, and to his other occupations, and what are the effects of each of them to every one*". He recognised the risk of wrong attribution of cause to chance association: "*this ought not to be so; one should know the effects of a bath or a walk*".

In his dissertation on the Sacred Disease (epilepsy) Hippocrates sets out much of his understanding of anatomy and physiology, and even the relationship of disease to pathology, with particular reference to the brain, which he recognises as the seat of this disease, which is, he states, "*nowise more divine or more sacred than other diseases, but has a natural cause*".

"*The brain of man is double ... and veins run towards it from all parts of the body.*" He describes quite accurately some venous anatomy of the head, trunk and limbs. He is aware of embryology: "*the brain, like other organs, grows before birth*". His ideas of physiology or function are less in tune with modern ones. "*By these veins we draw in much spirit, for they are the spiracles of our body, inhaling air to themselves and distributing it to the rest of the body ... and they cool and afterwards exhale it ... The breath goes first to the brain ... (where it) imparts sensibility and motion to all the members.*" He notes that in epilepsy "*the brain becomes more humid than natural*", and that in goats with a similar disease "*if you cut open the head, you will find the brain humid, full of sweat and having a bad smell*".

Many of the Greek philosophers, including Plato, regarded the heart as the organ or seat of the passions, but the brain as the seat of the understanding. Hippocrates writes "*Some say that we think with the heart, and that this is the part which is grieved, and experiences care. But it is not so*". The heart "*has valves, so as to perceive if any pain or pleasurable emotion befall the man ... the heart and the diaphragm are particularly sensitive; they have nothing to do, however, with the operations of the understanding, but of all these the brain is the cause*". However in another passage he appears to relate emotions also to the brain. "*And men ought to know that from nothing else than thence (brain) come joys, delights, laughter, and sports, and sorrows, griefs, despondency and lamentations. And by this ... we acquire wisdom and knowledge, see and hear, and know what are foul and what are fair, what are bad and what are good, what are sweet and what unsavoury ... by the same organ we become mad and*

delirious, and fears and terrors assail us ... and dreams and untimely wanderings, and cares that are not suitable ... and unskilfulness. All these things we endure from the brain, when it is not healthy ... As long as the brain is at rest, the man enjoys his reason ... I am of the opinion that the brain exercises the greatest power in the man ... the air supplies sense to it. And the eyes, the ears, the tongue and the feet, administer such things as the brain cogitates ... It is the brain which is the messenger to the understanding."

It is quite clear that Hippocrates not only recognised the brain as the organ of thinking, receiving input from "*the eyes, the ears, the tongue, and the feet*", but knew of its effect on other parts of the body in health ("*imparts sensibility and motion to all the members*"), and in disease ("*by the same organ we become mad and delirious, and fears and terrors assail us ... and unskilfulness*").

There was little advance in understanding of the relationship between body, brain and mind from the time of the Greeks until the renaissance. Then in the sixteenth century philosophical enquiry flourished, and science, the process of formulating hypotheses and testing them against empirical evidence, began to be applied more systematically. Applying scientific processes to hypotheses about the relationship between body and brain has been fruitful, but the relationship between brain and mind is more difficult.

Epistolary Dissertation (on hysteria) 1681, in The Works of Thomas Sydenham MD translated from the Latin edition of Dr Greenhill with a life of the author by RG Latham MD, 1848 Albama: Classics of Medicine Library, 1979.

Sydenham has been called the Father of English Medicine, whose printed works were greatly influential in the seventeenth century. Little is known of him. He was born in Dorset in 1624 and went to Oxford in 1642 at the age of eighteen. His studies were interrupted soon afterwards by the revolution and there is some evidence that he served in the Parliamentary army as did others in his family. He graduated, somewhat irregularly, MB in 1648, possibly having spent some time in the Montpellier School of Medicine in Paris. He established himself in London about 1660, and much of his work relates to accounts of a succession of epidemics in that city over the next 15 years. In 1663 he became a Licentiate of the College of Physicians, but despite his eminence, he was never made a Fellow, possibly because of his republican leanings. In 1677 he took the degree of MD, this time at Cambridge, perhaps because that is where his eldest son was attending. He himself suffered from gout and kidney stones for most of his professional life, and he died in 1689 at the age of sixty-five.

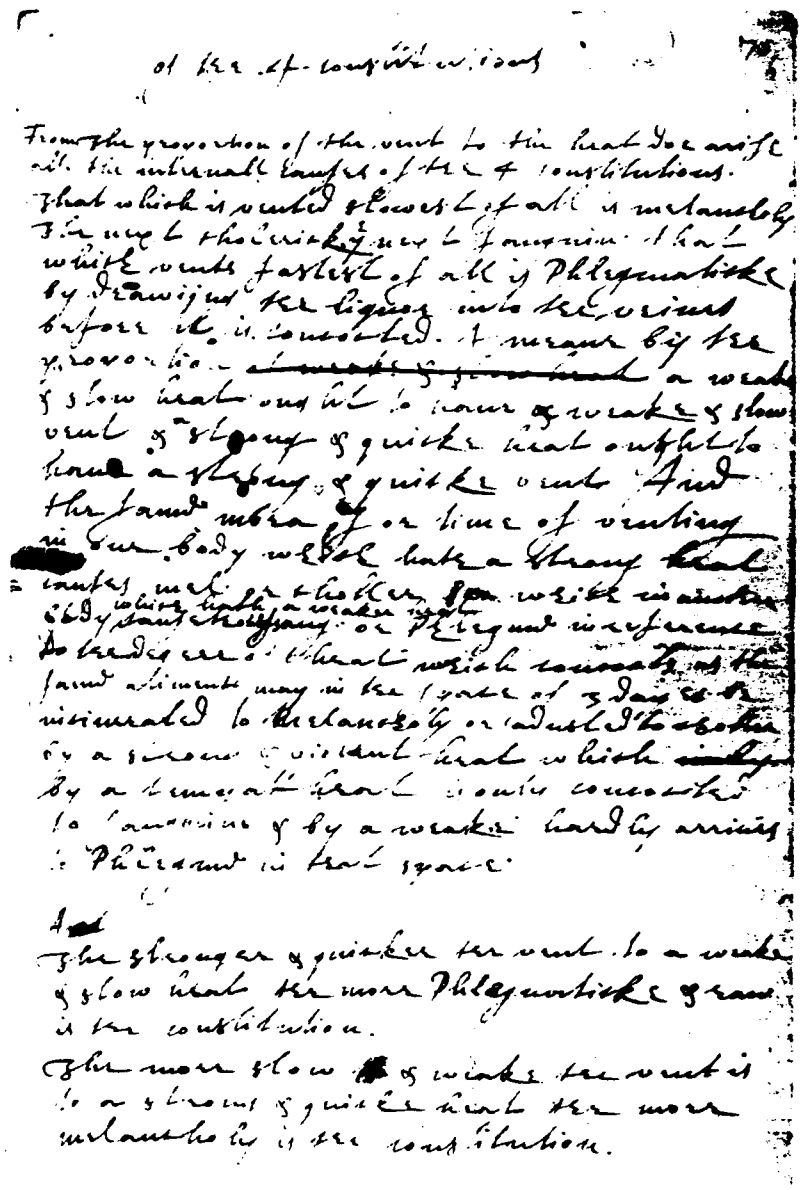
Sydenham's first book was published in 1666. There is controversy as to whether he wrote originally in English or Latin. In the dedication he wrote: "*the art of medicine was to be properly learned only from its practice and its exercise... On the one side I had no guide whatsoever; on the other only the fancies of my own brain.*" In the preface he says "*it is exceedingly easy to propound some commonplace cure for a complaint. It is far harder, however, to translate your words into actions, and to square your results with your promises.*"

An engraving of Mary Beale's portrait of Thomas Sydenham, reproduced from the first edition of his *Observationes Medicale*. ets. (1676).

In 1681 he wrote an "*epistology dissertation*" in reply to a letter from a Dr William Cole, who asked that he lay before the public his observations on the "*rare facts concerning the hysterical disease (which) have long exercised, and tired, the wits of physicians ... (and) eluded recognised methods of treatment.*" Sydenham agrees that it "*presents the obscurest diagnosis, and the most uncertain treatment*" because of the "*multiformity of the shapes which it puts on. Few of the maladies of miserable mortality are not imitated by it.*" He regards hysteria in women and hypochondriasis in men as equivalent, and notes that "*the mind sickens more than the body.*"

He considers the affliction to arise from "*a disorder of the animal spirits*", rather than from any "*corruption of the semen or the menstrual blood ... or malignant halitus towards the parts affected, or perverse deprivation of the juices ... The disease is not referrable to any material source.*" He believes that "*the framework of the mind is a structure far more skilful and delicate than that of the body, a structure consisting in the harmony of eminently excellent and almost divine faculties*" which "*so long as it lies in this our bodily crust of clay, depends most especially on the strength and constancy of the spirits that lodge along with it ... on the very verge of the immaterial entity.*"

Sydenham comments that "*of all chronic diseases hysteria is the commonest.*" He describes many of its varied manifestations, including some that we would now attribute to organic diseases such as stroke, migraine, and anaemia, but also refers to what we would consider as psychosomatic symptoms such as "*cough ... without spitting,*" *pains when "the diagnosis is difficult ... just as if there were a calculus,*" vomiting, diarrhoea, and toothache "*without the smallest cavity.*" However, he says, "*of all the pains the most certain is pain in the back. The least touch of the complaint brings it on.*"



The first page of *The Four Constitutions* in Sydenham's handwriting.

He also emphasises the associated emotional lability, depression and anxiety. "*Immoderate fits, sometimes of laughing, sometimes of crying, and that without any manifest cause, is known the world over ... An incurable despair is so thoroughly the nature of this disease, that the very slightest word of hope creates anger. The patients believe that they have to suffer all the evils that can befall humanity, all the troubles that the world can supply ... they brood over trifles, cherishing them in their anxious unquiet bosoms ... the worst passions of the mind arise without cause .. there is no moderation. All is caprice. Sleep is disturbed ... They are racked both in mind and body.*" He recognises that "*in all this, it is neither the maniac nor the madman that we write about.*" He thus differentiates what we would now call neurosis from psychosis. Sydenham says that when "*bodily ailments are difficult to be determined by the usual rules for diagnosis, I never fail to carefully inquire whether they are not worse when trouble, low spirits or any mental perturbation takes hold of them,*" thus demonstrating the long history of neurosis as a diagnosis of exclusion.

Sydenham states that "*the chief curative indication is the restoration of the blood, the fount and the source of the spirits.*" However bleeding and purging is needed first, and the administration of steel or iron filings, or syrup of wine. The iron would certainly "*restore the blood*" in cases of anaemia. His recommended treatments appear to run the full gamut of his therapeutic armamentarium and pharmacopoeia and to differ little from his approach to organic diseases. However, when he does not expect to be able to benefit the patient he says "*I do no more than my duty as an honest and conscientious physician, when I just do nothing at all, simply visiting the patient from day to day.*"

In another publication, Medical Observations, Sydenham comments "I *wear a body which is made up of the gross and the vile parts thereof, and of necessity determined to that sudden change and dissolution whereunto the laws of its constitution have subjected the whole. But nevertheless I have an intellectual nature, which incessantly aspires after another, and that a more happy state of being ... it shall vanquish the irregular suggestions of my body, to which, for a while, it is coupled*" - a clear statement of dualism.

He also describes two kinds of apoplexy, or stroke, the one "*for the most part deadly ... caused by an extravasation of blood upon the brain, as is often found by dissecting those that die thereof*" (cerebral haemorrhage), and the other "*though very dangerous, not yet so certain of death ... there happens oftentimes a solution by way of a palsy,*" due to "*obstructing the capillary arteries in the brain, and so hindering the access of blood*" (cerebral thrombosis).

Mind and Body in 18th Century Medicine: a Study Based on Jerome Gaub's "De Regimine Mentis", LJ Rather, Berkeley: University of California Press, 1965.

Jerome Gaub was Professor of Medicine and Chemistry and three times Rector, of the University of Leiden, Holland, from 1734 until his death in 1780. He was born in Heidelberg in 1705 and became interested in medicine when in the care of his uncle Joan Gaub, a well known physician in Amsterdam. He studied at first at Harderwyk and then under Herman Boerhaave at Leiden, whence he graduated in 1725. He did further study in France, lived in Heidelberg briefly, and then returned to Holland as a physician. In his main book on medicine and pathology he sought for the middle ground in medical theory between the mechanism of Boerhaave and the psychologism of Stahl. The book remained in use well into the nineteenth century.

In 1747 and 1763 he published two essays on the mind-body relationship in medicine which became well known in the 18th century but were then lost

sight of. He said little that was new, but expressed well the common understanding of his time. These essays have been translated and annotated by LJ Rather, Professor of Pathology at Stanford University, California, who says in his preface that he "*aims to show something of the extent to which the relation of the body to mind in human ailments, both mental and physical, is one of the perennial topics of Western thought ... from its origins in the Greek world of the fifth century BC down to the present day*". He emphasises that the relation between mind and body in health and disease is not the same as the mind-body problem which troubles philosophers. To doctors over the centuries the effect of the mind and emotions on the body, and the origin of some mental disorders in diseases of the body, were accepted every day aspects of reality to an extent not easily understood after the triumph of somatic medicine ("*medicine centering almost exclusively on the body as an object of scientific study*") in the nineteenth century. Gaub regards mind as "*man's better part - nay more, his divine part as well, it is said.*"

In his first essay Gaub emphasises the interrelationship of mind and body, "*wherever there is mind there is body, and wherever body, mind*", to the extent that "*the mind cannot be managed properly unless account is taken of the body ... those whose calling it is to keep the human body healthy should carefully take into account the power of mind over body to aid or hinder their efforts.*"

"*Thought pertains to the mind ... motion or any other feature restricted to corporeal nature is to be attributed to the body, the body is active and the mind passive. There is no function, member, or smallest part of the body that a disturbed mind cannot change or bend, as it were, to its will. Contrariwise, there is no faculty of the mind that an afflicted body cannot disturb .. no disturbance, no really important change, can arise in one part that will not sooner or later affect the other and be communicated to the whole man.*"

Gaub comments on the effects of anger on the body, "*the heart and pulses beat unnaturally, the digestion and distribution of nutriment, the circulation of the humours, the secretions and excretions, all are deranged. Yet the mind when undisturbed has no power over most of these activities.*" Further, "*the body can no less violently assault the mind*"; who, he asks, can think freely and calmly "*while plagued with the worst agonies of the gout or the colic?*" He regards anxiety as a symptom of disturbance in the body, of the same nature as pain. He notes that strokes, fits, seizures and other complaints which attack "*the part of the body said to be the seat of the mind, so powerfully suppress all of its faculties that they seem to be completely wiped out, the mind itself being unsure of whether or not it survives*". While stating that the mind can sense what is going on in the body, Gaub elsewhere states that it is not the concern of the physician to resolve the problem of how this can come about, given the radical difference in the nature of body and mind which he accepts.

Rather comments that Gaub took a view different from that posited by Descartes in the sixteenth century, which gives to the mind or soul a purely passive role in noting the physiological changes initiated by stimuli causing an emotional response, and designates the pineal gland (not the brain) as the primary site of this interaction (not as the seat or place of residence of the soul, as is commonly mis-stated).

Both mind and body are held to have separate powers of arousal, of initiating change. That of the mind leads to willed thought or action; that of the body, which Gaub terms "*neural man*", governs "*all of those movements spontaneously carried out by the body in the absence of awareness of the mind*", *such as heartbeat and respiration. The two systems interact and communicate, and disturbances in either end up affecting both.*

Hermann Boerhaave.
(1668–1738)

Gaub goes on to point up the implications of these ideas for physicians, those "*who properly supervise man's health, maintaining the good and correcting the bad.*" Although, he says, the physician can in his thoughts "*abstract body from mind and consider it separately in order to be less confused in the marshalling of ideas, yet in the actual practice of his art, where he has to do with man as he is, should the physician devote all his efforts to the body alone, and take no account of the mind, his curative efforts will pretty often be less than happy ... The reason why a sound body becomes ill, or an ailing body recovers, very often lies in the mind. Contrariwise, the body can frequently both beget mental illness and heal its offspring.*" He notes "*the frequency with which the faculties and habits of the mind are altered when age, illness, or any other such factor changes the bodily temperament.*"

The temperaments are regarded as bodily phenomena resulting in psychological traits, but their basis is left unstated, though their importance is not. "*The manifold dissimilarity of minds is in large part due to diversities of the temperaments, and hence physicians will understand more accurately, explain more clearly, and cure more happily only when they at last achieve a fuller view of the nature of the temperaments.*" "*The excesses to which all temperaments are prone (and Gaub instances drunkenness) are made worse by wrong modes of life and not uncommonly amount to disease.*" Gaub laments the failure of physicians adequately to emphasise "*the proper handling of the temperaments*", although he admits "*it is not easy by any manner of means to mould or even to modify the constitution of* the body *so that it stays within*

modest bounds."

He notes the absence of pathological lesions to correlate with mental illness. "*The parts of the body that serve the workings of the mind are of a fineness that masks the extent of man's industry and intelligence ... The most careful scrutiny of the bodies of men whose actions while they lived were extremely disturbed usually discloses nothing whatsoever that is corrupted or departs significantly from normal.*"

Gaub recommends that in cases of mental disorder, "*even in the absence of any idea as to its causes or effects, present or feared, in the body ... it will be more prudent to take measures towards altering the body*" for bodily conditions tend to become chronic, whereas emotional disturbances "*of their own accord grow weaker and weaker and finally disappear.*"

He finishes the essay by calling for the art of medicine to be "*finished and perfected until it can make men not only as robust, but also as superior in character and behaviour as possible ... The love of humanity requires that we attack this task and keep at it until we discover ... remedies with which we can awaken, sharpen or strengthen any faculty of the mind whatsoever, and moderate, arouse, or repress its paroxysms, instincts and propensities as needed.*"

In his second essay Gaub deals with "*health coming to the body from the mind*", *and the "safeguards of health offered by the mind in fortune and misfortune.*"

He considers the mind to have two parts, one with reason and serenity, the other without reason, impulsive and disturbing. Too often men fail to use their mind to adopt healthy habits or moderate their appetites, and some "*put all hope of improving their health in the continual use of remedies ... as if physicians could at will make all alike.*" He asks "*how many persons are calm and steadfast enough not to be overwhelmed at sometime by the unbelievable number of chance accidents to which we are continually exposed?*"

He describes the effects of emotions on the body. Anger "*rages in the lower viscera and vomiting, diarrhoea, bile and jaundice set everything in disorder*" ... or in the "*special workshop of the mind (the brain) explodes as a brief madness ... More that is dreadful may happen to the ailing ... the feverish, the gouty, the epileptic, the colicky and the asthmatic ... grow worse when anger swells ... Even repressed anger is not without its bad effects ... (and) attacks the body more violently within to the extent that it is not allowed to discharge itself without.*"

Sorrow, "*when not discharged in lamentation and wailing ... is repressed, eats up and destroys*" the body no less than the mind. The motive powers of the whole bodily economy grow fatigued with continual mourning, the strength decreases ... the movements become sluggish ... whence follow loss of appetite, indigestion ...feeblemindedness, palsy....lethargy". This is quite a good picture of what we would call depression, with bodily as well as mental effects.

Terror often has fatal effects, its "*instances ... are everywhere to be seen.*" "*The origin of pestilences and the like spread by contagion ought especially to be attributed to terror and fear.*" Gaub's contempories widely held the view that fear may cause or increase susceptibility to most diseases.

Even emotions aroused by anticipated good, such as "*extravagant laughter, the companion of foolishly unrestrained joy*", may have harmful effects on the body, as may an unfulfilled "*ardent wish ... or yearning.*" "*Regardless of whether the mind is moved by the thought of something good or bad, danger of disease or death threatens whenever the excitement disturbs the harmonious course of the bodily economy, as it so often does.*"

"*These ailments become worse and so much the more difficult for the physician to cure, since the underlying affection commonly hides behind the*

mask of disease and the true source of origin is often difficult to discover."

The mind also helps the body "*by providing the most powerful safeguards ... a tranquil mind making use of right reason aids the health in may ways.*" Gaub recommends moderation in all things so that the mind "*adjusts and regulates both its own functions and those attributable to the body.*" He also emphasises "*how much a serene mind does for the ill, and how injurious are impatience, fretfulness and lack of self-restraint.*"

Gaub states that the mind rather than the body "*initiates, governs, and regulates*" such essential physiological functions as breathing and eating, which other philosophers attribute to "*some, I know not what, instinct.*" "*The restless concern of the mind with the body leads the ill to prefer to try something doubtful or dangerous rather than do nothing at all when a safe remedy, recommended by reason and science, is wanting*", even to the extent that "*those who hold the art of medicine in mockery and contempt fly to the physician at the onset of illness.*"

"*Hope not only arouses the mind but breathes strength into all the bodily powers as well. Hence the misery of old age which, when it forbids distant hopes arise, is not sustained even by immediate ones.*" Physicians use hope and faith so that they are able to "*breathe new life into (patients) with words alone*" and so increase the power of their remedies. Joy is also curative, as may be "*the more violent emotions ... the more forcefully the whole man is shaken ... the greater is its weight to overthrow disease*", whereas less violent emotions such as grief, fear, hate, envy "*cause injury by hidden erosion.*"

"*The physician has a double role in controlling the mind for the benefit of the body - on the one hand to amend or ward off such causes of disease as are due to mental excess and on the other to relieve the ill by making good and skilful use of the mind's curative faculties.*" Gaub comments on the difficulties of putting this into practice, of how often it is necessary, because of the differences of men, "*to deviate from the path of correct treatment ... compassion sometimes makes us silently regret that man is denied the power of altering circumstances ... to afford relief to a body troubled by an unquiet mind ... We cannot avoid being involved in other people's affairs, and even with the most careful management this is rarely accomplished so happily that the thanks obtained equal the troubles endured.*" Since there is "*such difficulty in controlling the events which strike men down, the only thing remaining is for the physician to direct his attention to the management of mind itself ... when we cannot fully rely on the power of reason to control the emotions, and hence cannot govern the mind by means of the mind itself, the wealth of our art is such that we have many measures available which act first on the bodily parts and movements only, yet these same effects act equally on the mind, and can restrain the overhasty or rouse and stimulate the sluggish.*"

"Illustrations of the Influence of the Mind Upon the Body in Health and Disease" by Daniel Hack Tuke MD MRCP (formerly Lecturer on Psychological Medicine at the York School of Medicine) London: J & A Churchill, 1872.

Tuke explains in his preface that "*the whole subject of the influence of the mind upon the body deserves more serious and systematic consideration than it has received.*" On the title page he quotes John Hunter "*There is not a natural action in the body, whether involuntary or voluntary, that may not be influenced by the peculiar state of mind at the time.*"

John Hunter: "He alone made us gentlemen."

The aims of his book are "*to collect in one volume authentic illustrations of the influence of the mind on the body ... arranging them on a definite physiological basis ... to show the power and extent of this influence not only in health in causing disorders of sensation, motion and the organic functions, but also its importance as a practical remedy in disease ... (and) to ascertain as far as possible the channels through, and the mode by which this influence is exerted.*"

He hopes that the medical reader "*may be induced to employ psychotherapy in a more methodical way than heretofore, and thus copy nature in those interesting instances, occasionally occurring, of sudden recovery from the spontaneous action of some powerful moral cause, by employing the same force designedly.*"

He comments on the way doctors attribute healing to the imagination "*when some new nostrum, powerless in itself, effects a cure ... We attribute to this remarkable mental influence a power which ordinary medicines have failed to exert, and yet are content, with a shrug of the shoulders, to dismiss the circumstance from our minds without further thought ... as if the imagination could solve a great many difficult and inconvenient problems, but could never be employed for any useful practical purpose.*"

He intends to convey by "*the design of illustrating by a considerable collection of striking cases the often admitted, but too frequently forgotten, and still more frequently neglected, truth, that the state of mind, comprising therein intellect, emotion and volition, exerts an enormous influence, for good or evil, on the body.*" His book is arranged in three parts dealing with three divisions of mind, the intellect, the emotions and the will. He sets out the influence of each of these on the functions of each of four divisions of body; sensation, voluntary muscles, involuntary muscles, and organic functions. There are then chapters on the influence of mental states on disorders of the body, and on psychotherapeutics.

He questions "*whether pure emotion is a function of the hemispheres, and if not, to which of the lower ganglia it should be consigned, but has no doubt that the cerebral hemispheres act on the ganglia below them, so far as the intellect and will are concerned.*"

He concludes by referring to "*the importance of the automatic action of the mind (or brain) upon the body on the one hand, and of the will on the other,*" and emphasises "*the far-reaching influence of that antagonism which appears to exist between the two great divisions of the nervous system in regard to vascularity ... (as) the mode in which so many striking physical phenomena succeed to varying mental states. The normal equilibrium ... is obviously more or less interfered with, when the mind or brain is unable to exercise its accustomed force, or when it transmits a more than wanted impulse ... The general impression is that the emotions act especially on the sympathetic system ... in the sense that this system is liberated to act with excessive force or prevented from acting as in health, by the change wrought, in the first instance, in the organ of the mind.*" Tuke gives as examples of the way the intellect affects sensation, association of ideas (nausea as a result of thinking of a rough sea crossing), hypnotic anaesthesia, hallucinations and dreams.

"*If twenty persons direct their attention to their little fingers for five or ten minutes ... a few will be unconscious of any sensation in this member; some will experience decided sensations, aching, pain, throbbing; and the majority will feel a slight sense of weight or tingling.*" He asks, are the sensations "*always there but unobserved except when attention is directed to them? Or does the act of attention excite increased vascularity of the sensory ganglia, and cause subjective sensations? Or do the sympathetic centres become excited ... so as to cause temporary vascular changes in the finger which involve sensation?*" Tuke feels that the feeling experienced is partly subjective, but also that "*there is a real effect produced upon the finger if thought is sufficiently long directed to it.*"

In relation to visions, Tuke quotes Muller's book on physiology of 1838: "*The process by which phantasms are produced is the reverse of that to which the vision of actual external objects is due. In the latter case particles of the retina thrown into an active state by external impressions are conceived in that condition by the sensorium; in the former case, the idea in the sensorium excites the active state of corresponding particles of the retina.*" He says that Muller "*objects to the term hallucination ... because it implies that the phantasm is a mere idea, instead of being truly a sensation.*"

In relation to the effect of the intellect on voluntary muscles, "*it almost requires the guiding influence of an expectant idea to induce any well marked action. Simple attention to the finger or the foot seems, however, to render it more difficult to keep it motionless.*"

"*The confident assertion that a person subject to epileptic fits will have an attack has frequently proved sufficient to produce one.*"

"*The simple belief or conviction that a muscle cannot be contracted or relaxed is sufficient ... to cause temporary loss of power.*" Tuke gives examples of paralysis by suggestion.

As an example of the effect of the intellect on involuntary muscles he states: "*The direction of attention to the heart has an embarrassing influence upon its regular action ... medical students when their thoughts are directed by their studies to this organ, are frequent sufferers from its disturbed action.*"

Fainting is often induced by states of mind, such as at the sight of blood. Waking at will after sleep "*involves an automatic calculation of the lapse of time.*"

The intellect affects the organic functions of nutrition, secretion and excretion. "*The mere idea of food is sufficient to excite the function of the salivary glands.*" He believes that "*intense mental application ... interferes with nutrition ... sufficiently to justify the oft quoted line from Shakespeare respecting Cassius's lean and hungry look, "He thinks too much.*" However "*purely intellectual pursuits influence the organic functions much less powerfully than pursuits involving the passions ... Sir Isaac Newton's intense concentration of thought did not imperil the action of the heart, while John Hunter's intense indignation suspended its action.*"

Tuke cites anaesthesia caused by hysteria as an effect of the emotions on sensation, and loss of sight or hearing due to fright as another. He also refers to troops in battle, the "*most patient set of sufferers I ever saw; the certainty of victory chloroformed their pain.*" "*Anxiety causes innumerable organic sensations including the well known indescribable sensation referred to as the pit of the stomach.*"

The effect of the emotions on facial expression is well known. "*Grief involves wringing the hands, grinding the teeth, tearing the hair.*" "*The shrug of the shoulder is a familiar and striking mark of contempt.*" Fear may choke the breath.

"The sobbing of grief, the laughter of joy, afford examples of spasmodic involuntary muscular contraction from emotional stimulus." Tuke gives much emphasis to the effects of emotion in precipitating convulsions, epilepsy, and chorea, ideas which would not often be thought relevant today.

"*The influence of the emotions upon the heart is remarkable.*" Tuke discusses "*through what avenues do the emotions influence the heart?*" but concludes that there is "*so much contradictory evidence that it really seems hopeless to arrive at any definite conclusion.*"

"*It is not surprising that in the present day, when the worry of life, and strain on the feelings in all ways, are so vastly intensified, that there should be strong evidence to show the increase of cardiac affections.*" How modern that sounds!

The effect of emotion on the blood vessels is claimed to include "*apoplexy from fright or anger*", and other examples are the dilated pupil of terror, the phenomenon of "*hair standing on end*" with fear, and the increased intestinal peristalsis of anxiety.

Changes in the constituents of the blood are cited as resulting from emotions such as fear, and instances of the affect of fright on the foetus are quoted. "Fear checking perspiration, and other emotions causing congestion, it is not surprising that definite skin eruptions should occasionally have a similar origin. The influence of grief or fright in blanching the hair has generally been recognised. The action of mental anxiety or suspense in causing a copious discharge of pale urine is familiar enough to all, especially the medical student about to present himself for examination."

Tuke gives as examples of the effect of the will upon sensation the ability some people have of "*forming a voluntary image of any object at will, on shutting the eyes.*" The effect of the will in activating voluntary muscles is a matter of everyday experience, but it may be taken further in feigning epileptic convulsions or other forms of malingering, and in acting scenes of laughter and sneezing. *"The direct action of the will upon the heart and non-striated muscles of ordinary life, if it can be ever exerted, is altogether exceptional, although it may powerfully influence them indirectly by directing the course of the emotions and ideas to them."* He cites rare individuals who have in fact altered their heart rate or caused dilation of their own pupils.

Tuke questions "*whether the psychical cures of disease performed by mesmerism and kindred processes, are due to a force proceeding from the healer to the healed, or are simply the result of the particular mental state of the healed, excited by the healer.*" He inclines to the latter, although stating that "*emanating power is not intrinsically absurd.*" He gives examples of relief of symptoms by "*change of air*", by fear, and by prayer, all acting through "*expectant faith.*"

In the treatment of patients by psychotherapeutics Tuke gives examples of the "*general influence of the physician upon the patient in exciting those mental states which act beneficially upon the body in disease ... the importance of arousing the patient's will ... the systematic excitement of a definite expectation or hope, in regard to the beneficial action of totally inert substances (placebos) ... systematic direction of the attention to a particular region of the body ... lightly touching the affected part ... (and) Braidism*" (hypnotism).

Project for a Scientific Psychology (1895), in Volume 1, the Standard Edition of the Complete Works of Sigmund Freud, London: The Hogarth Press, 1966.

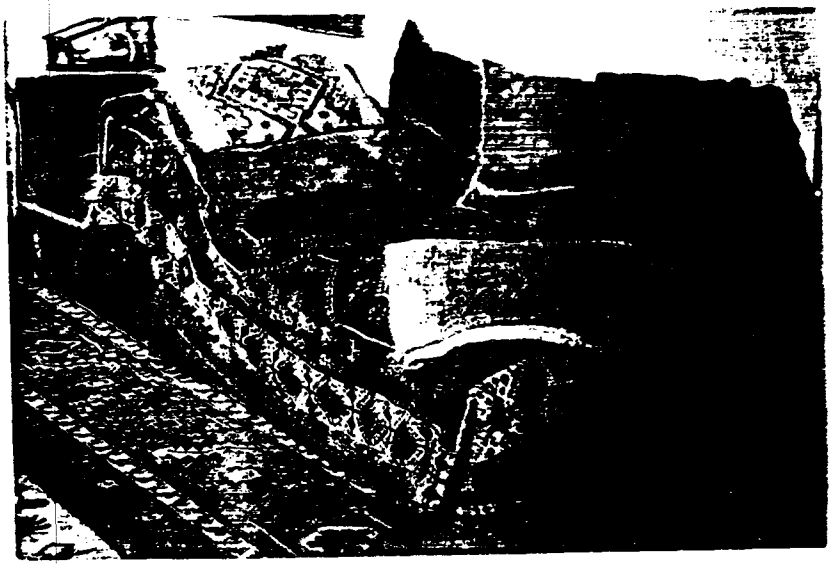
Sigmund Freud was born in 1856 and educated in Vienna, from where he graduated MB in 1881 and began a career as a clinical neurologist. He obtained a bursary to study with Charcot at the Saltpetriere in Paris in 1885, and then returned to Vienna where he spent most of the rest of his life.

In 1888 he contributed an article on hysteria to Villaret's encyclopedia. Hysteria was still regarded as common and important a condition as it had been in Sydenham's time. Freud says that it is *"a constitutional anomaly rather than a circumscribed illness ... an anomaly of the nervous system which is based on a different distribution of excitations, probably accompanied by a surplus of stimuli in the organ of the mind."* It is "*a neurosis in the strictest sense of the word — not only have no perceptible changes in the nervous system been found in this illness, but it is not expected that any refinements of anatomical techniques would reveal any such change.*" He regards it as based *"wholly and entirely on physiological modifications of the nervous system"* the formula for which had not yet been discovered.

Seven years later he wrote Project for a Scientific Psychology as part of his extensive correspondence with Wilhelm Fliess. It was not published in his lifetime. In it he attempted to describe mental activity in terms of the physiology of the brain, to formulate a neuropsychological theory to relate body and mind, and to provide a psychopathological basis for neuroses such as hysteria.

Freud based his model on two principal ideas, the newly discovered cells of the central nervous system, the neurones, and what he called Q. This Q has two aspects, one related to what he variously called "*excitation*" or "*current*" flowing through and between neurones, the other related to a substance or state which could be present in differing amounts within neurones. He emphasised that he knew nothing about the physical nature of Q. He proposed a theory of

Freud, after a drawing
by Dali (1938)



Freud's couch

neural physiology based on the principle that "*neurones tend to divest themselves of Q*", to discharge it if possible. Stimuli causing Q to flow arise from external sources via the sense organs, and internally from "*the cells of the body (which) give rise to the major needs: hunger, respiration, sexuality.*" Barriers to the passage of Q exist at some of the "*contacts*" of one neurone with another or with end organs (what we would now call synapses), and provide resistance to the discharge of Q. Freud proposed two systems of neurones, the one conveying external information involving large quantities of Q, the other transmitting endogenously derived data involving only small quantities of Q. "*Permeable neurones, offering no resistance and retaining nothing, serve for perception; and impermeable ones, with resistance holding back Q, are the vehicles for memory and so probably of psychical processes in general*" (Because their state is changed by the amount of Q held back after each excitation). "*Memory ... must consist in the contact-barriers becoming more capable of conduction ... their degree of facilitation.*" Freud related the two kinds of neurones to the grey and white matter of the brain. He suggests that the quantity of Q generated by external stimuli is large compared with that generated by endogenous stimuli, so large that it passes most contact-barriers, whereas endogenous stimuli are small and are selectively stopped at these barriers.

"*Pain consists of the irruption of excessively large Q's into*" the semipermeable system of neurones, causing "*failure of the contrivances*" which usually protect it. Pain is "*the most imperative of all processes ... and leaves permanent facilitations behind, as though there had been a stroke of lightning.*"

Turning his attention to the issue on consciousness, Freud states that "*consciousness gives us what are called qualities — sensations which are different in a great variety of ways ... there are no quantities in it.*" He suggests that they cannot originate in the outside world, where "*there are only masses in motion and nothing else*", and proposes "*a third system of neurones ... whose states of excitation give rise to the various qualities — that is to say, conscious sensations*" ... This system could not be moved by even smaller quantities than the small quantities than move to the impermeable system, and still have the permeability required for "*the transitoriness of consciousness, the easy linking of qualities simultaneously perceived*", so Freud proposes that it is transmitted not by the quantity of Q, but by the period of Q, to which there is no barrier at the contacts.

As well as physical sensations, the content of consciousness includes "*the sensations of pleasure and unpleasure. Since we have certain knowledge of a trend in psychical life towards avoiding unpleasure ... (this) would have to be regarded as coinciding with a raising of the level of Q ... Pleasure would be the sensation of discharge.*" The will could arise in conscious states from the fact of some Q always remaining. "*In sleep an individual is ... rid of his store of Q. Sleep is characterised by ... paralysis of the will.*"

Freud regards the ego as the organisation of neurone passages determined by the facilitations between neurone connections into a state "*in which a permanent component is distinguished from a changing one and which holds the store of Q.*" He describes ways in which this ego could inhibit unpleasurable stimuli by diverting discharge into side channels.

The need for an indicator of reality "*to distinguish between a perception and a memory*" (idea) is posited to arise from the third neurone system which gives "*the indication of quality or reality.*" This indication does not arise from ideas because inhibition by the ego prevents the exhibition of the indication of reality. Judgement arises from "*the dissimilarity between ... a memory and a*

perception."

In discussing the psychopathology of hysteria Freud refers to "the compulsion *which is exercised by excessively intense ideas*" as always having "*a corresponding repression (at least for consciousness) ... It is plausible to suppose that repression has the quantitative meaning of being denuded of Q, and that the sum of the two, the compulsion and the repression, is equal to the normal ... The pathological process is one of displacement.*" He goes on to suggest that the repression is not so much excluded by the ego from consciousness as "*excluded from the process of thought.*"

Freud later discarded this whole neurological framework because his neuronal machinery could not explain what he regarded as the most important feature of psychology, "the fact of consciousness."

The Self and Its Brain, by Karl Popper and John Eccles, Springer International, 1977

Sir Karl Popper is a distinguished contemporary British philosopher deeply interested in science. Sir John Eccles is an equally distinguished Australian neurophysiologist who has had a lifelong interest in the problem of the relationship between brain and mind.

Popper suggests that we "*accept things as real if they can causally act upon, or interact with ordinary material things.*" He then describes three worlds of reality; the world of physical objects and states; the world of conscious or mental states; and the world of ideas, the content of human thought and the products of the human mind. The world of physical objects and states is that of "*ordinary material things*"; that of conscious states includes such things as knowledge, emotions and memory and makes up the self-conscious mind; and that of ideas includes cultural heritage, such matters as technology, science, theology, history, and art, and depends for its existence upon imagination and language. Both authors feel that considering the interactions among the three worlds casts light upon their ideas about the interactions between the first two, body and mind.

Eccles begins his section of the book by describing the cerebral cortex, its fundamental microscopic and macroscopic parts, and some of the known localizations of function in different parts of the brain. He emphasises the importance of modules of neurones in the cortex which act by conflict with adjacent modules to build up power so that there is "*immense power interaction of excitation and inhibition.*"

"*The sensory system with various receptor organs for touch, vision and hearing for example ... fires impulses or messages that in the manner of a code transmit to the brain the place and intensity of the stimulus ... Each sense has a primary receiving area laid out as a map in the cortex.*"

"*Conscious sensation does not occur immediately the neuronal messages reach the cerebral cortex.*" There is a period of up to 0.5 seconds "*during which there is progressive spread and complication of the neuronal patterns until they reach the appropriate level for action across the interface between the brain and the self-conscious mind.*" However "*the self-conscious mind can antedate the perception so that it is perceived to happen ... before the triggering neuronal events*", about the time of initiation of the original sensory message.

Conscious perception "*is greatly modified by emotions, feelings and appetitive drives ... the prefrontal lobes, the hypothalamus and the limbic system modify and colour with emotion the conscious perceptions derived from sensory inputs*", so that for example the sight of food causes a different sensation before and after a meal. The prefrontal cortex is "*the area where all*

emotive information is synthesised with some aesthetic, visual and auditory to give conscious experiences ... derived from spatiotemporal patterns of neuronal activity in special modules of the neocortex."

The motor (voluntary movement) areas of the cortex match the sensory areas. Willing an action generates a negative electric potential over the cortex which starts 0.8 seconds before the muscular action begins. *"It can be presumed that during the readiness potential there is a developing specificity of the patterned impulse discharges in neurones so that eventually there are activated the pyramidal cells in the correct motor cortical area for bringing about the required movement. The surprising features of the readiness potential are its wide extent and its gradual build up. Apparently, at the stage of willing a movement, the influence of the (mind) is widely distributed onto the patterns of neuronal operation."*

There are anterior and posterior speech areas in the brain, but only on one side, in 95% of people on the left, where the areas are larger than the corresponding areas on the right. This dominant hemisphere is the one *"associated with conscious experiences ... it is analytic and sequential ... it is verbal .....The minor hemisphere on the other hand is superior in pictorial and pattern sense and in musical sense, its synthetic abilities matching the analytical abilities of the dominant hemisphere."*

There are three kinds of memory; *"brief rehearsal memories of seconds ... longer memories for hours ... and the slowly developing memories that are dependent upon synaptic growth."* The brief ones are lost as soon as the conscious brain stops rehearsing them and turns its attention elsewhere. The hippocampus is the part of the brain which *"participates in the consolidation of memory"*, but is not the storage area. The self-conscious mind has command of the data banks of the brain from which it can retrieve data for matching by memory recognition.

Certain actions are associated with increased blood flow in the appropriate area of the cerebral cortex. *"Abstract thinking ... results in increased circulation in the frontal, parietal and occipital association areas."*

Eccles suggests the hypothesis *"that the self conscious mind is an independent entity that is actively engaged"* in selecting information from the liason areas of the dominant cerebral hemisphere of the brain *"in accord with its attention and its interests, and integrates its selection to give the unity of conscious experience from moment to moment. It also acts back on the neural centres ... (and) thus exercises a superior interpretive and controlling role"* upon the brain. He quite understands that this *"raises the most severe scientific problems in relation to the interface between the world of matter-energy and the world of states of consciousness", but relates it to known brain anatomy and physiology, and finds it "not refuted by any existing knowledge."* There are parallels with Freud in his qualification of the mind-brain interface as involving only minimal amounts of energy. In this model the self-conscious mind is not a part of the material world, of the brain substance, and can no more be located to a particular site than can love, mathematical concepts or truth.

"The self conscious brain is responsible for the act of attention, selecting from all the immense activities of our brain, the neural bases of our experiences from moment to moment. The unity of conscious experience with all its perceptual qualities is also there in memory ... (it) is not just there receiving ... it is actively involved in modifying the brain ... The creative imagination is being driven by the self-conscious mind into flights of imagination which are the greatest achievements of humanity."

Eccles believes in God and *"a supernatural origin of my unique self conscious mind or my unique selfhood or soul"*, a means of escape from *"the incredible improbability that the uniqueness of my own self is genetically*

determined." Popper believes that "*it is the practical certainty of death which gives value to our lives ... and makes more urgent and attractive the task of using our lives to achieve something for others, and to be co-workers in the world (of the imagination), which embodies more or less what is called the meaning of life.*"

Both authors agree that "*we do not have an explanation for the emergence of life, or for the emergence of the human brain*" or for the emergence of the self-conscious mind. They think that it is improbable that the problem of the relationship between brain and the mind "*will ever be solved, in the sense that we shall really understand this relation.*" They conclude that "we live in a world in which everything which is very important is essentially unexplained ... especially everything concerned with existence."

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 10 PAEDIATRICS

B. Storey

NOTES

PAEDIATRICS

B. Storey

Paediatrics is a young speciality in medicine deals with the prevention and treatment of diseases of children. Until the end of the nineteenth century children were thought of as miniature adults, but gradually it became apparent just how much they differed physiologically, immunologically, and psychologically from their adult counterpart.

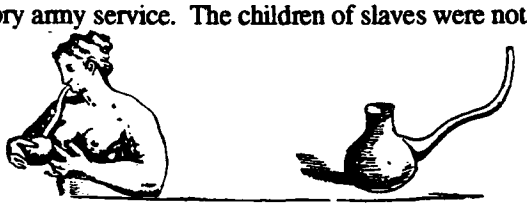
Society has not always looked upon children with a kind eye and the history of child care and paediatrics is closely allied with the development of public health. Roman law alloted the power of life and death to the head of the family. English law has seen the slow evolution of child protection from the "rights of wardship" in the 13th century to legislation in the 19th and 20th centuries pertaining to compulsory school attendance, fair labour standards, factory act and social rights of children and the unborn fetus.

In tracing these changes through a chronological narrative we can develop

The poor physical condition of recruits for the Boer War caused disquiet about the nation's health, and set in motion events leading to the establishment of a national school health service.

an understanding of the present approach to the physical and mental wellbeing of children.

The word Paediatrics is derived from the Greek Pais Child and iatricos relating to a physician. The first civilisations after primitive man extend from about 5000 BC. Their medical writings are sparse with scant reference to children. Egyptians were conservative with their approach to care and in the Sumerian era there was no objection to the destruction of the newborn baby. The Greeks were cognisant of the different manifestations of disease in children and adults. They believed that babies were children of the state and subsequently emphasis was placed upon education and development with compulsory service in the army, navy or garrison after the age of eighteen. However, the Roman's believed that the father was responsible for the child and that funds should be provided for needy families. Education received a high priority, particularly for boys destined for careers in public life after their compulsory army service. The children of slaves were not so fortunate.



DE LACTE OB ALIQVEM TERROREM
DEPERDITO VEL IMMINVTO.
CAP. XVIII.

SI per somnum, uel per tonitruum, uel per terræmotum, uel per casum, uel per armorum strepitus aliquo modo expergefacta, uel ut dicitur græcè εφιαλτεις, nutrix lac deperdat, uel imminutum habeat, statim exerceat se bra CAVSAE. MEDIC. RATIO.

A breast-pump in the sixteenth century (from Ferrarius', *De arte medica infantium*)

With the fall of Rome, Western civilisation entered the dark ages and the era of medieval medicine. The chief role of the child seems to be to die by drowning, smothering or abandonment. The infant mortality was between 50 and 60% of those who were born alive, even though 50% of the population was under the age of 21. Illustrations of this era rarely picture children and it is recorded that women were not motherly by instinct. Childhood ended at the age of 7 and from 8 to 14 years the child became a page, servant or apprentice. Some would become Squires upon turning 14.

The Great Plague was associated with death, squalour, appalling sanitation, and famine affected all classes of society. With the rise of christianity Monks and Nuns undertook the medical care of people and the philosophy that disease was punishment for sins was widely promulgated. However, the Arabian influence insured the resurrection of Greek medicine and the expansion of pharmacology. The foundation of a cosmopolitan medical school at Salerno in the 9th century saw the separation of medicine from the church and the subsequent development of a curriculum and the awarding of degrees in medicine. From 1000 until the Renaissance the subject of "paediatrics" seems to be in abeyance.

During the 15th century these influences led on one hand to the development of foundling homes in Europe and on the other, to the publication of the first medical text book devoted to children's diseases. This text echoed Greco-Roman writers.

Experimentation, imagination and new ideas were the characteristics of the

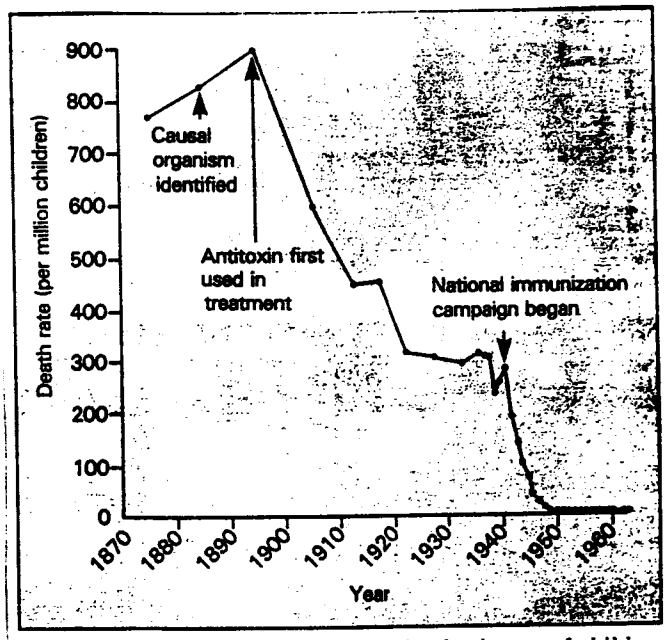
Renaissance. Filthy cities with contagion were the norm and it is recorded that 50% of all babies died before their 6th birthday. Great advances in mathematics and chemistry were documented in the 17th century and a new systematic approach to medicine included description of the serious childhood diseases

A COURT FOR KING CHOLERA.

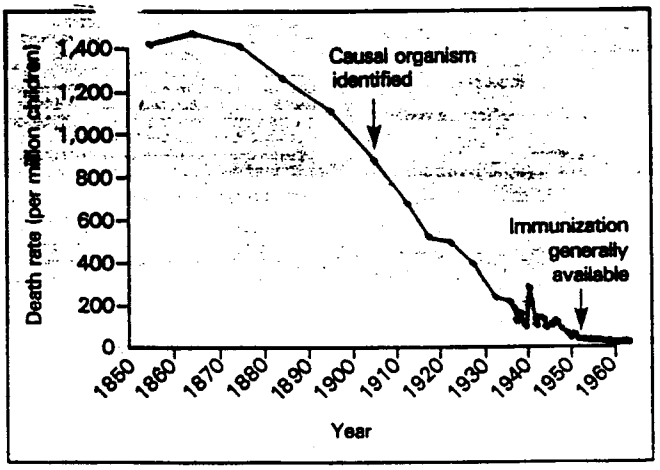
pertussis, measles, scarlet fever and ricketts.

The 18th century is considered an age of enlightenment because of the attitude to observation, recording of findings and the classification of these results. The bills of mortality in 1736 showed that 40% of deaths in London were children under the age of 2, emphasising the standard of care. Medical writings were concerned with feeding practices and a code of rearing of children for parents. Philanthropic gestures created more foundling hospitals in London and the first of these institutions changed to provide lodging for the sick. The impact of the industrial revolution turned official attention to public health. Persisting high child mortality, scarcity of hospital beds for children and the need for a special type of person to nurse sick children witnessed the building of multiple small childrens hospitals. The concept that children were different to adults received further acknowledgement with creation of a

Chair of Paediatrics at Harvard USA in 1888 and the formation of a society to advance the understanding of children's diseases. At the turn of the century, children still experienced considerable morbidity due to prevalence of the various infectious diseases and the limited therapeutic measures available. Vaccination against the common childhood diseases gained general acceptance through the work of Pasteur and Koch. The full impact of chemotherapy



Diphtheria: decline in the death rate of children under 15 years; England and Wales, 1870 to 1960.



Whooping cough: decline in the death rate of children under 15 years; England and Wales, 1850 to 1960.

and antimicrobial agents did not become evident until the 50's and 60's.

The 20th century has to date been characterised by unprecedented achievements in medical and technical fields of health and disease. Paediatrics entered the scientific era following a period of elucidation of the natural course of disease. There soon followed the elaboration of laboratory investigations, specific determination of aetiology and the determined development of research and clinical investigation. Much of the improvement was due to a

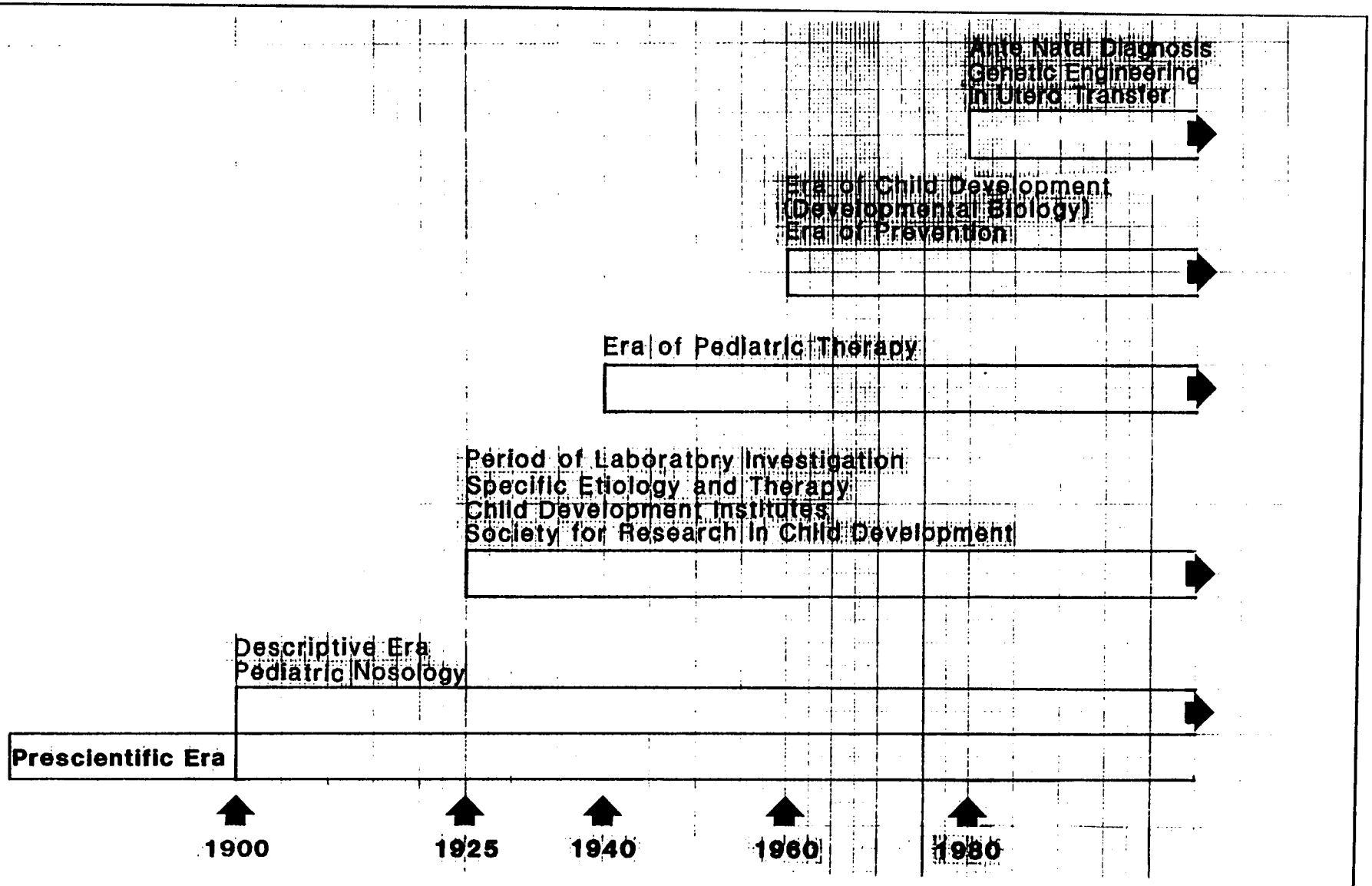
philosophy which necessitated the collection of data, statistical analysis of same, verification in test tube and animal, an audit of morbidity and post mortem confirmation of the suspected clinical diagnosis. Associated with the pragmatic side has been an attempt to achieve a high level of medical education with regular review of the curriculum and approaches to government bodies to

Improved post-natal care helped cut the infant mortality rate. Here, babies are placed in early incubators heated with stone hot-water bottles, at the Port-Royal Maternity Hospital, Paris, 1884

assist in legislation that would ensure improving child health.

An attempt to understand mental retardation encouraged research into metabolic disturbances. In 1908 Garrod had described a group of disorders which he had labelled inborn errors of metabolism. He postulated there was an excessive formation of waste products due to a congenital deficiency of a specific enzyme necessary in the normal metabolic pathway. This concept was confirmed in 1958 at a time when biochemistry was being involved with paediatric care. As impaired mental development was frequently associated with physical anomalies, there developed a wide interest in genetic disorders in those children with multiple physical signs and no specific aetiology. This has given impetus to the studies in developmental biology and genetics which ushers in the era of genetic engineering.

A new look at provision for child health in the United Kingdom in the late 60's questioned the viability of small hospitals. It was observed that resources were spread too thinly, there was inadequate post-graduate teaching, no research and insufficient trained staff to give 24 hour coverage in such institutions. Hospital care and accommodation was expensive and it was suggested shared laboratory facilities could be incorporated in large institutions. Assessments could be performed in outpatient departments so children did not have



Periods in the historical d velopment of pediatrics.

to suffer the mental trauma of admission to hospital and separation from their home environment. This 'high-tech' approach brought great improvement in the management of children with rare and life threatening problems.

Despite a better understanding of basic food factors, vitamins and control of infection, there was still much to be learnt about the disturbances of growth. Paediatricians excluded organic disease with the aid of many subspecialists but were slow to appreciate the non organic causes of failure to thrive. These were deprivation and physical abuse. Both lesions were well documented in the medical literature of the late 60's and today appear frequently in the lay press.

In the 1970's it became that in Western countries there were as many infants lives lost during the last stage of pregnancy, during birth and the first week of life as there are in the next few years. Since that time there has been a dramatic improvement in mortality, morbidity..With the type of special care required there are incredible costs - educational courses for nurses, new electronic equipment, follow-up clinics and evaluations centres all staffed by highly skilled personnel. The advances have not been made without problems, nurses emotionally strained, doctors experiencing burnout and parents being aware of the disruption of their home life. The very small baby will do better in a big centre and as most units are small they tend to require refurbishing with new technology and staff which is not readily available. An alternative is for the fetus to travel in utero. But to where? There is an acute shortage of intensive care beds in the large centres, and an attempt to pool resources has highlighted the shortcomings of the system.

Societies expectations are constantly changing. Zero population growth, antenatal monitoring and ethical issues all need consideration in the care of children. Such problems as how small is too small, who is resuscitated, who pays the costs all have to be decided in the near future. An increased sense of responsibility is necessary to consider the effects of social abuse from alcohol, tobacco, drugs and alternative lifestyles. Hepatitis B and now AIDS are all having an impact upon the paediatricians patients. Some timely advice could be considered from the late Professor Ackerknecht, Professor of History at Wisconsin, USA. "It must also be emphasized that disease is more than the physiological and psychological breakdown of an individual. Powerful social factors determine whether people fall sick or not, and how and with what results they are treated. A doctor cannot appreciate too early the fact that his profession is a part and product of society and that it is always closely connected with religion, philosophy, economics, politics, and the whole of human culture. His education, social status and remuneration - and, unfortunately, his specialisation as well depend in the last instance on the tastes and decisions of society. Medical history is forced to deal with this nonscientific social background of medicine and thus serves, as no other medical discipline can, to open the eyes to those social factors without which the problems of health and disease cannot be properly understood".

REFERENCES

1. *The History of Paediatrics.* George F Still.

2. *Science and Secrets of Early Medicine.* Jurgen Thorwald.

3. *Encyclopaedia of Medical History.* Roderick E McGren.

4. *The Evolution of Clinical Methods in Medicine.* Kenneth D Keele 1963.

5. *History of the American Paediatric Society 1887-1965.* Faber & McIntosh.

6. *Paediatrics in the Seventies.*
Developing the Child Health Services.
Donald Court and Anthony Jackson 1972. Oxford University Press.

7. *A Short History of Medicine.* Evian Ackerknacht 1955.

8. *History of American Pediatrics.* Thomas E Cone.

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 11 OBSTETRICS

J. Murray

NOTES

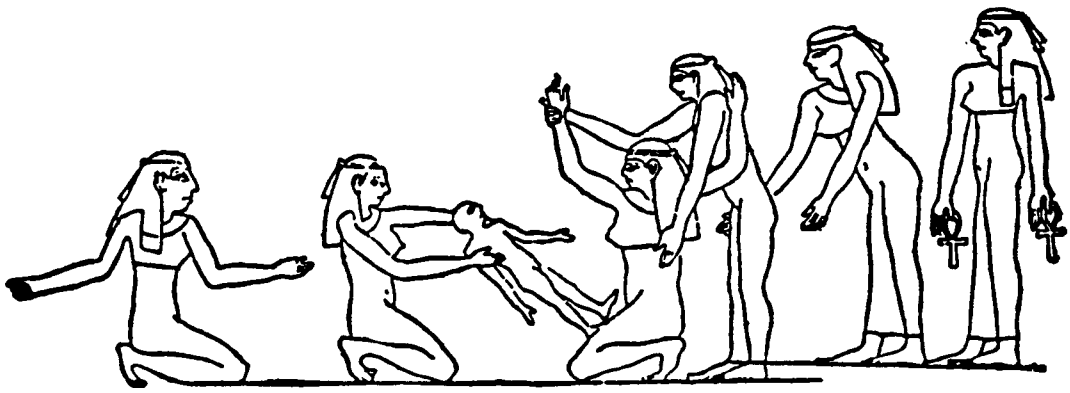
OBSTETRICS

J. Murray

In prehistory it is thought that loose family groups expanded into the primitive tribe. At this stage the more senior matriarchs probably took steps to comfort and assist the juniors in the extraordinary experience of childbirth. Thus they developed a skill, the knowledge of which gave the primitive midwives power and position within their social groups. This position is reflected in the French term for midwife: "Sage femme".

SAGE-FEMME.

The attendance at childbirth was a jealously guarded and highly secretive position for midwives in primitive and ancient civilisations. It was invariably a woman's position and as men were the recorders of events it is not surprising that few records exist. The earliest medical records are from Mesopotamian and later Egyptian sources. Any references to midwifery are mixed with sorcery, superstitions and religious practice. The papyrus records of Egypt are more fulsome than the Sumerian clay tablets and from several pertaining to obstetrics it appears that midwives were consulted by members of the royal court about a number of matters and held a position superior to that of the doctor.



From a bas-relief on the Temple of Esneh. The amazingly large size in which the child is represented is indicative of its royal parentage. The position taken by Cleopatra is still used during childbirth by many primitive peoples.

Birth of Cleopatra's child.

Ancient civilisation in India also recorded the need for care in childbirth. The early Vedic period to 800 B.C. was similar to other contemporary civilisations except the Indians had greater surgical knowledge. This was to be repeated by the Incas in South America. After 800 B.C. the priestly Brahman cast became involved in medical care. This lasted till 1000 AD. The three great books of Medicine were Charaka (AD 0), Susruta (AD 500) and Vagbhata (AD 600). Much of what they contain came from the earlier Vedic period. The Susruta in particular contains many dietary rules for pregnant women and is explicit about the value of prenatal care. The doctor attended normal childbirth assisted by the midwife.

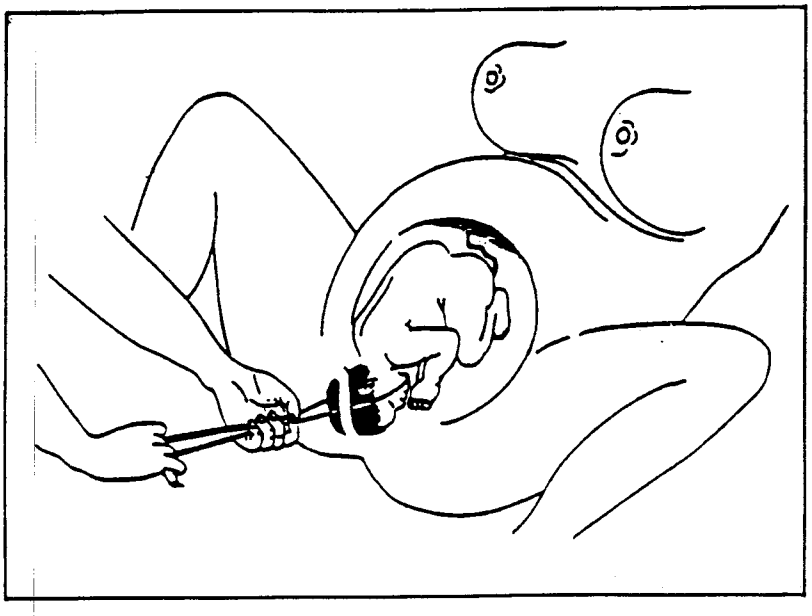
Visiting a chinese lying-in woman. The midwife holds the child in her arms.

Chinese obstetrics is lost in semi-mystical beginnings linked with Fu-hsi (2800 BC), the first Emperor a semi-amphitrian who expounded the *yang* male principles and *yin* female. He is supposed to have curbed social disorder by initiating the institution of marriage before which "children knew only their mother and not their father". As a reward the man was made head of the

household. The advent of the three great Eastern religious philosophies in the 5th century B.C. that is; Taoism - Lao-tzu, Buddhism - Yantama Buddha, Confucianism - Confucius, added to the birth customs and a new respect for life in Asia. Pregnant women were respected and cared for. There were strict codes of behaviour and diet. Lai Hsuang 100 B.C. wrote a book of Instruction and carefully documented the midwife's role centuries before any European equivalent appeared. His was just one of a number of such books.

In 1060 A.D. a department of Obstetrics was formed in the Imperial Medical College. China's advanced position can be judged by reading any of the 10 discources of Yang Tse Chien which contain descriptions of how to manage many complicated births. Such advice was not available in Arabic or European medicine for many centuries.

Japan with its similar religious background followed Chinese medicine and midwifery closely. However, Shintoism, still the major religion in Japan in the first 600 years A.D. was far more subordinating of women. The use of instruments to assist in birth is recorded in both Japanese and Chinese reports from this time. However, unlike India the conduct of childbirth was still firmly in the hands of the midwife.



Instrumental delivery in ancient Japan, presumably for a dead fetus.

Greek civilisation, from which so much of our own culture has derived, had little interest, medically in childbirth. Hippocrates referred to childbirth but there is doubt that he practised the art. Aristotle speaks of the wisdom of the midwives, who by law had to be married and have children of their own. Pericles' wife was a midwife as was the mother of Socrates. The first Greco-roman obstetric work which had the mark of practical knowledge was written by Soranus of Ephesus. Born in Asia Minor educated in Greece Soranus practiced in Rome in 100 A.D. At this time noble Roman households boasted a Greek physician. The works of Soranus were to be the backbone of recorded European obstetric experience until the 15th century.

Ancient methods of hastening labour.

Arabic medicine, much of which was intertwined with Hebrew medicine, was becoming dominant around the Mediterranean as Islam spread through these lands. Muslim obstetric texts have not been as thoroughly studied as the Latin but those that have show a background of Greek, Persian and Indian influences. This ensured that there was far greater obstetric enlightenment in the Muslim world than in the European countries at that time.

An Indian brave hastening labour.

With the advent of the printing press in Europe there was a wider spread of medical knowledge. The earliest surviving book was *The little book for Women* printed in Wurzburg in the mid 15th century for Von Bayerland. This was rapidly followed by the more famous *The Rose-garden for Pregnant Women and Midwives*, Eucharius Rösslin of Worms, 1513. In content these books were really no more than a distillation of the works and drawings of Soranus with some additions from the works of Hippocrates and Galen.

In 1540 *The Rose-garden* was translated into English and published as *The Byrthe of Mankynde.*

Eucharius Rösslin presentinghis book to the Duchess of Brunswick.

So in all the centuries while Indian, and to a lesser degree Chinese, Japanese and Arabic doctors were actively involved in obstetrics, the Europeans were not. It is not surprising that the early European medical reports involving Obstetrics were concerned with the management of childbirth injuries; treating the results not the causes. The role of the midwife in Europe was also one of respect and, to a degree, of authority.

In Germany a maternity hospital was founded in 1339 and laws were passed governing the training and practice of midwives. Doctors were permitted to attend a birth only when asked to by a midwife. In the early 16th century one of the first schools for midwives was established in Paris. This was the Htel-Dieu an ancient monastic foundation which had a lay management imposed upon it in 1505. In the following three centuries graduates of the Htel-Dieu, both midwives and obstetricians, were to keep French obstetics preeminent in Europe.

The height of prudery - a physician operating under a sheet.

In England by the start of the 17th century, attempts were being made to educate and control the practice of midwives but to no avail. Some midwives were educated and exerted pressure in high places but the majority were still the ill-trained, ill-tempered unkempt slovens of the Sairey Gamp variety.

Historically, in almost every country and school of medicine there has been conflict between midwife and doctor. Attempts by doctors to regulate the activities of midwives have always resulted in resentment.

By the middle of the 16th century, surgeons, in contrast to the physicians, began to cooperate with midwives in complicated cases. Ambroise Par who trained at the Htel-Dieu was a pivotal figure in this development. At this time Italy had also become a center of obstetric excellence. Scipione Mercurio in Venice at the end of the 16th century wrote a number of books which dominated European practice for the next one hundred years. Mercurio devoted two chapters to the indications and method of Caesarian section.

The next great teacher, writer and practitioner in Europe was Mauriceau (1637-1709). Mauriceau did much to rid obstetrics of the old wives' tales and superstitions which were inseparable from ignorant uneducated midwives. However, Mauriceau did more than criticise midwives. He offered constructive help by teaching them at the Htel-Dieu and therefore helping this school to maintain its importance.

In England at the middle of the 17th century there was little clinical skill or scientific observation in obstetrics. William Harvey wrote his embryological work *De Generation Animialium* in 1652, and practiced obstetrics although opinions differ as to his clinical ability in that field. Deventer in the Hague influenced the British with his thorough studies of pelvic anatomy which gave to obstetrics a practical scientific basis. Among those so influenced was Richard Manningham who founded his own hospital in 1739. This was the forerunner to what is now Queen Charlotte's Hospital. Manningham is also remembered for his past in the exposure of Mary Tofts, the rabbit lady of Godalming.

Mary Tofts of Godalming giving birth to rabbits. November 1726.

However there was one group of obstetricians in England in the 17th century who had great skill and prominence. This was the Chamberlen family. William Chamberlen, a Huguenot, escaped the St. Bartholomew's massacre and fled to England. Here he commenced medical practice and had four sons two of whom for reasons unknown were called Peter. Both became obstetricians, renowned accoucheurs and both fell foul of the medical authorities. Peter the 3rd, a son of Peter the elder, like his father and uncle, became an obstetrician of equal skill and prominence. Although better qualified than his forebears he had an entrepreneurial side to his nature. In his time he tried to get all midwives to be legally qualified with himself the sole arbiter as to their fitness. He petitioned parliament for an ordinance granting him the sole rights to manufacture all baths and cisterns for 14 years. He petitioned to copyright an invention to make ships steer straight. He produced pamphlets by the dozen in an age when pamphleteering was the method of denouncing one's enemies and praising one's friends and often oneself. He finally reached his pinacle of impossibility by embarking on methods of uniting the Jewish religion with all the Christian sects.

His own son, Hugh, also an obstetrician, was a colleague of Mauriceau and like his father a politician, polemicist, pamphleteer and dabbler in things non-medical. He started a Land Bank which failed and he fled to Holland. The secret of the Chamberlen success with difficult deliveries was then revealed. The family had passed down for four generations the obstetric forceps. Their instrument above all other methods, by extracting the child rapidly in difficult births, saved the life of many mothers and babies. This instrument Hugh Chamberlen sold in Holland to pay his debts. The Dutch, like the Chamberlens, tried to keep it a close secret but failed.

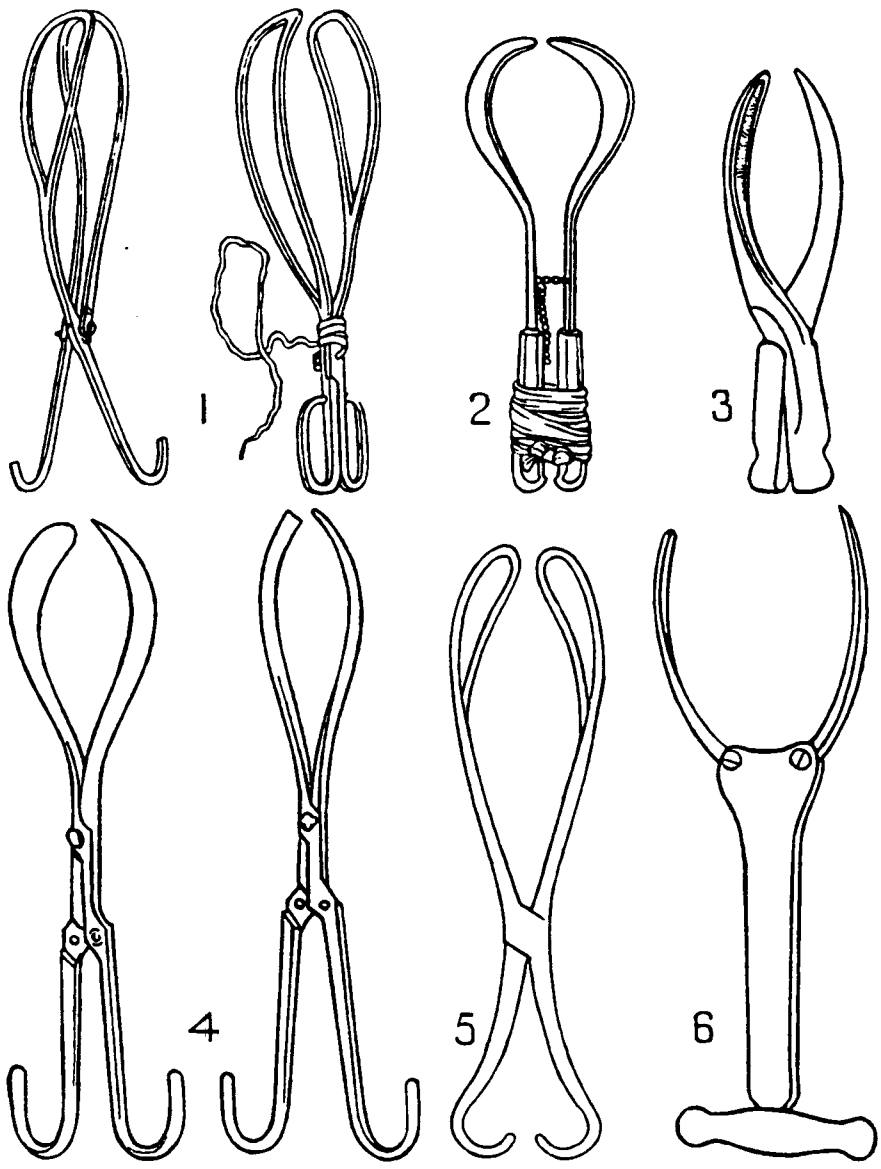
In the 18th century British obstetrics became a profession with a scientific basis and took on an air of respectability due to the influence of two men, William Smellie and William Hunter. Both were Scots, born in the same town of Lanark within 20 years of each other. Smellie is revered as the Father of British obstetrics. He was a teacher and writer of great clarity. Pamphleteering in London was used by midwives angered by Smellie's comfining of poor women in their homes, a midwife's traditional job. A Nr. Nichell was to call him "A great horse godmother of a he midwife." A colleague described him as having huge hands fit only to hold horses by the nose whilst they were being shod. A Doctor John Burton wrote vehemently against his methods. Doctor Burton is famous in literature, caricatued by Sterne as Doctor Slop in *Tristram Shandy*. Smellie was a keen observer and laid down rules on how to conduct a labour and when and how to interfere safely. His whole ethos is summed up in his advice to those who would practice obstetrics.

"He will admit the poor as well as the rich, behaving always with charity and compassion. He ought to act and speak with the utmost delicacy of decorum and never violate the trust imposed in him; so as to harbour the least immoral or indecent design, but demean himself in all respects suitable to the dignity of his profession."

The Hunter brothers, William and the younger John, were to establish the real scientific basis for medicine. William's obstetric work commenced in anatomy and although he was to become a very fashionalbe obstetrician his *Anatomy of the Human Gravid Uterus* exhibited in figures is why he is remembered as the founder of scientific obstetrics.

While obstetrics had been put on a sounder basis and the widespread use of forceps had revolutionised results there was still a measure of terror in childbirth with resultant death to mother and child. Many labours commenced with an obvious disastrous outcome due to a contracted pelvis as a result of ricketts. Caesarian section was occasionally employed to overcome this but

EARLY PATTERNS OF OBSTETRIC FORCEPS



1 Forceps invented by Peter Chamberlen (the elder) about 1630, and retained as a family secret for many years (page 236)

2 Palfyn's forceps (Mains de Palfyn, 1720) ; two spoons, with handles clamped together (page 237)

3 Smellie's short wooden forceps, 1745, with the " English " lock (see page 235 and Plate XLIX)

4 Dusée's forceps, 1733 ; the first attempt to articulate Palfyn's instrument by means of the " French " lock

5 Chapman's forceps, 1733 ; the blades united by a simple groove, easily detachable (page 235)

6 Burton's forceps, 1751 ; slender blades controlled by screw handle. Burton, of York, was the original Dr. Slop of *Tristram Shandy*

was usually employed far too late with resultant disaster. This further frightened obstetricians away from its earlier use. It was not until 1793 that the first mother survived Caesarian section in Britain.

As surgeons grew bolder and intervened more often, the patient's plight hardly diminished. There were no anaesthetics and infection was rife in the numerous lying-in hospitals which had proliferated in the 18th century.

Puerperal fever was feared and much was written on the subject at this time and into the 19th century. Two British obstetricians, Charles White in Manchester and Alexander Gordon in Aberdeen, both observed that cleanliness and ventilation helped prevent this fever. Gordon also observed that women did not have the contagion before confinement and it occured "only in women whose birth attendant had previously attended patients affected with the disease. In short I have proof of its infectious nature" (1795). Oliver Wendell Holmes made similar yet more scientific observations in Boston in 1831. But it was Semmelweis, a Hungarian practising in Vienna, to whom history awards the accolade of discovery in 1860. His success was to be posthumous and needed the advent of Pasteur's germ theory and Lister's antisepsis in 1867 to produce practical results.

It was not without reason that the mid 18th to 19th century was called the Age of Agony. Anaesthesia, as we know it today, was first used in the 1840's by American dentists. James Young Simpson first used it in childbirth in 1847. Queen Victoria was given chloroform in 1853 during the birth of her 8th child, Prince Leopold. She expressed herself well pleased. Far less pleased were a number of medical experts and religious authorities. Simpson's Scottish education, which included a formidable knowledge of the Bible and an ability to express himself forcefully, removed these barriers.

Now that pain and infection were more controlled, surgical methods to overcome obstructed labour were more frequently employed by using forceps whose design and skilled usage had improved markedly. Also Caesarian section was beginning to be an acceptably safe method. Caesarian section had been the centre of bitter controversy in the 17th and 18th centuries. In Britain the results were bad for it was used as a last resort. Fleetwood Churchill reported the 90 cases performed in Britain to that time. Fifty-seven mothers had died and an even lower percentage of babies survived. On the Continent Caesarian intervention was earlier and the results much better with more than half the mothers surviving and 75% of the children. The origin of the term Caesarian is obscure. Popular belief favours its derivation from the method of Julius Caesar's birth. Another view is that it derives from the Latin word *caedare*: to cut. The most likely explanation is the law *lex regia* of 715 B.C. which forbade the burial of a pregnant woman without first removing the child from the abdomen for separate burial; *lex regia* became *lex Cesare*.

In India (Susruta) when a mother died in labour a post mortem Caesarian was performed with an occasional live birth. This also occured sporadically in Muslim and European medicine down the centuries. In many primitive societies Caesarian sections were known to have been done. The first recorded Caesarian with survival of both mother and child in Europe occured in Switzerland in 1500 when Jacob Nufer, a swine gelder, so delivered his wife using a razor.

The Australian colonies experienced many of the same problems and poor outcomes as did the British. In the early years of New South Wales, there were very few midwives of any degree of training or experience. The few doctors present were all Naval surgeons, none had had any formal obstetric training and little practice.

Midwife going to a labour, by Rowlandson 1811.

Any perceived advantage of childbirth in the colony was that the living conditions may have been marginally better than the squalid London tenements and Irish cottages from where the convicts came. There was no lying-in hospital of comparable depression to those in the cities of the British Isles. Sunlight and enforced activity possibly made the mothers fitter. Again in the early years the birth rate was low. Nearly all the mothers were convicts of low socio-economic status.

Medical care was minimal. By 1796 the colony had expanded from central Sydney to Parramatta and the Hawkesbury River yet, in the whole colony, there were only four doctors one of whom was on Norfolk Island.

It is interesting that two of the earliest cases of medical negligence recorded in the colony involved obstetrics. The assistant surgeon James Mileham was tried by court martial and severely reprimanded for not attending a woman in labour at the Sydney Hospital in 1806. Shortly after Doctor Savage was similarly court-martialled for "Callously failing to attend a woman in labour." The woman died. Savage was cashiered and left the colony in disgrace.

Doctor William Redfern, convicted for his past in the Mutiny of the Nore in 1797, was sent to New South Wales and emancipated. He rapidly built a reputation as the best obstetrician in the Colony. He attended Mrs Macquarie at her confinement. That a doctor with absolutely no obstetric training could so rapidly assume this position speaks volumes about the abilities of his colleagues and midwives. The lying-in section of the Sydney Hospital was at Dawes Point in 1805. The nurses were all convicts inept, slovenly, drunk and dirty. The patients were, as surgeon John White wrote: "More pitiable objects were never seen."

The Benevolent Society of NSW was founded in 1814 and by the 1820's it was taking an interest in pregnant women. A lying-in hospital under its auspices, separate from Sydney Hospital, was commenced near to where Central Railway is today - the old colonial cemetery. From these beginnings evolved the Royal Hospital for Women, Paddington; Australia's oldest obstetric hospital.

The proliferation of lying-in hospitals which had occured in Britain did not occur in Australia. Home births or Cottage Hospital births were the normal occurrence until the Second World War. The Women's Hospital Crown Street opened in 1890 with many of the same objectives as the Royal Hospital. Both these hospitals were amongst the first in the world to run Prenatal clinics. Antenatal care did not exist before the start of the present century.

St. Margaret's Hospital commenced in a small way in 1911 and King George V Hospital opened in 1941.

With the advent of so much scientific knowledge skills and equipment, 20th century obstetrics has left behind its dark past and is no longer the Cinderella of medical science.

Blood transfusion, antibiotics, regional anaesthesia, the care of the premature newborn, ultrasonic imaging and prenatal determination of genetic faults has created a very changed world into which to be born. The quality and quantity of life has improved allowing reflection on the past epic story of agony, folly, ignorance and courage involving the obstetrician, the midwife and, most of all, the mother.

BIBLIOGRAPHY

A Short History Of Medicine Ackerknecht E

A Short History Of Medicine Singer C

Milestones In Midwifery
History Of Obstetrics Thoms H

Hindu Medicine Wise Thomas, 1867

The Great Pulse, Potter E

Pregnancy Teoh E.S. Times Publishing Singapore, 1987.

Medieval Hebrew Treatise On Obstetrics Barkai R. Annls. History of Medicine, 1988.

English Midwives In 3 Centuries Aveling J.h., London 1872.

Man Midwife
Anatomical Tables Smellie W

History Of Sydney Hospital Watson J.F.

Life & Work Of Wm Redfern Ford E., Sydney University monograph.

History Of Obstetrics In Australia Forster & Cope

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS-

Chapter 12 THE HISTORICAL DEVELOPMENT OF HOSPITALS TO THE TWENTIETH CENTURY

L. D. Channon-Little

NOTES

THE HISTORICAL DEVELOPMENT OF HOSPITALS TO THE TWENTIETH CENTURY

L. D. Channon-Little

We can often gain a better perspective on modern practices by going back in time and seeing how they developed. This is particularly true with regard to the hospital.

Our ways of caring for the sick always reflect the Zeitgeist, or prevailing thoughts and beliefs of the time. Historically, hospitals came into their own in the middle ages, when a very restrictive prevailing world view focussed on religious principles. We can see the influence of the decline of importance of religious and superstitious values in medicine and the complementary rise of a rational view of bodily dysfunction based on scientific principles. In parallel, the religious administration of hospitals gradually changed to a secular bureaucracy.

Early civilisation

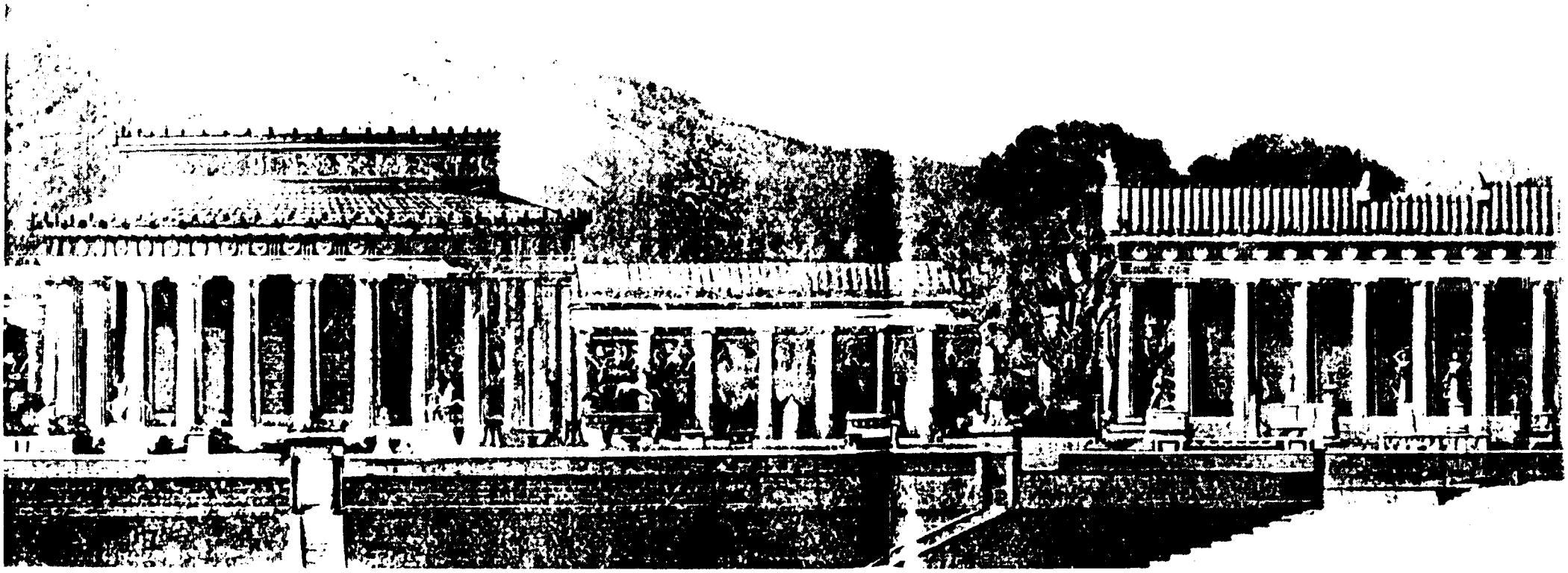
The Ancient Egyptians believed that diseases had supernatural causes. The remedy was to perform a religious act and the physicians of the day were also priests. The healing temples of this civilisation were possibly the first hospitals though we know little about their operations and whether or not they provided inpatient facilities.

It seems probable that one theme running right through the development of modern medicine and salient to an understanding of hospitals arose in Ancient Egypt: Pliny reported that as early as the eleventh century B.C. some physicians were paid by the state to treat the poor without a fee (Roemer & Friedman, 1971).

There were two major approaches to medicine in Ancient Greece. On the one hand there was a belief that illness resulted from supernatural causes and that the appropriate remedy was to make a votive offering to Aesculapius, god of healing. It is possible that the hostels for the poor attached to the Aesculapian temples were the prototype of the modern hospital (Sigerist, 1961). The other approach to medicine was a more rational and scientific view, based on careful observation and unifying theories of bodily dysfunction such as that of a disturbance to the equilibrium of the four humours of the body postulated by Hippocrates. Practitioners who based their treatment on such views possibly took in patients to the guest rooms of their houses where they could receive care and continuing treatment for a period. These systems were not separate and distinct: the Hippocratic Oath is sworn by "Apollo the healer, by Aesculpaius, by Health and all the powers of healing" and witnessed by "all the gods and goddesses" (Sigerist, 1961).

It seems likely that several contemporary Eastern religions similarly had temples of healing with residential facilities.

The very word "hospital" derives from a Latin word "hospes" meaning a host or guest, and it is in the civilisation of Ancient Rome, with its talent for organisation, that we find clear evidence of the existence of hospitals. The troops who marched long distances to do battle were accompanied by medical personnel. When they pitched camp a valetudinarium or hospital was set up to treat the sick and wounded. Withington (1964) notes that while the first account of such a hospital dates from the second century A.D., they had probably existed for some time. The military hospital was soon translated into civilian life and by about A.D. 200 nearly every city had a hospital, providing medical and residential care (Coe, 1970).



Artist's reconstruction of Temple of Aesclepios at Epidauros; this and the Asclepician at Pergamon were the most opulent of the healing temples. Between Tholos, on left, and temple, on right, was Abaton, where patients slept and dreamed during cure.

The God of Healing, Asclepios and his daughter Hygeia, Goddess of health.

The Christian ethic of charity and care for one's fellows provided a rationale for the development of further civilian hospitals. The church council at Nicaea in A.D. 325 ruled that the bishops should set up hospitals in every cathedral city (Knowles, 1973). These hospitals were staffed by religious persons who knew a little about medicine and catered for travellers as well as for the sick. The linkage between Christianity and the practice of medicine was further strengthened by the first Christian Roman emperor Constantine I, a Christian, who ordered the closing of all pagan healing temples, in A.D. 335 (Knowles, 1965). These moves put hospitals firmly under the authority of the church and led to the ignoring medical advances made by the Greeks and Romans.

THE MIDDLE AGES 1000 - 1600

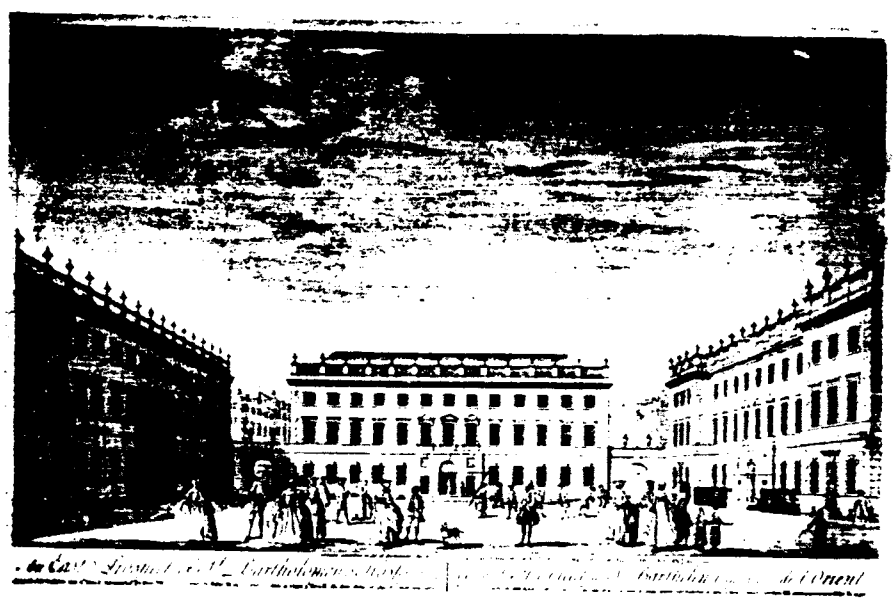
Between 1096 and 1291 there were repeated religious Crusades from European countries to the Holy Land. The journey was long and difficult and, not surprisingly, crusaders became ill or had to travel home wounded. Many hostels for their treatment were established along the crusade routes, again with a religious orientation.

The linkage between religion and medicine continued. Most monasteries had a hospital where the sick could be treated and where travellers could rest. Many major hospitals were founded by religious personnel, such as the London Hospitals of St. Thomas in 1215 and St. Bartholemew in 1123 both of which were set up by orders of monks (Knowles, 1973; Medvei & Thornton, 1974) and the Magdalen Hospital at Exeter founded in 1170, by Bishop Bartholomew's charter. (Russell, 1976). Like many hospitals of the day, incidentally, the Magdalen was a specialist hospital for lepers.

The medieval hospital was a religious institution influenced by religious factors in its every characteristic. The majority of hospitals even looked like churches. St. John's Hospital in Bruges, founded in the fourteenth century, is an outstanding example here.

The hospital staff were similarly largely of the church. Rahere, founder and head of St. Bartholomew's Hospital, London was the Prior of the Priory of Austin canons, for example (Medvei & Thornton, 1974). (He had fallen ill on a pilgrimage to Rome and had vowed to God that if he were to get well and return to London he would build a hospital for the sick and poor. A vision of Saint Bartholomew told him where to build the hospital and to whom it should be dedicated.) (The hospitaller, head of the hospital, was almost always a church person. His duties emphasised the importance of proper religious observances for everyone connected with the hospital rather than any medical concerns. The view of disease as a punishment for sin provided a rationale in part.

Patient care was largely in the hands of nuns. (This is the origin of the word "sister", still in use in our hospitals.) The motivation of the religious personnel working at the hospital was to carry out the Christian ethic of charity and thereby gain salvation. Laywomen carried out the domestic tasks of cooking, cleaning and so on.



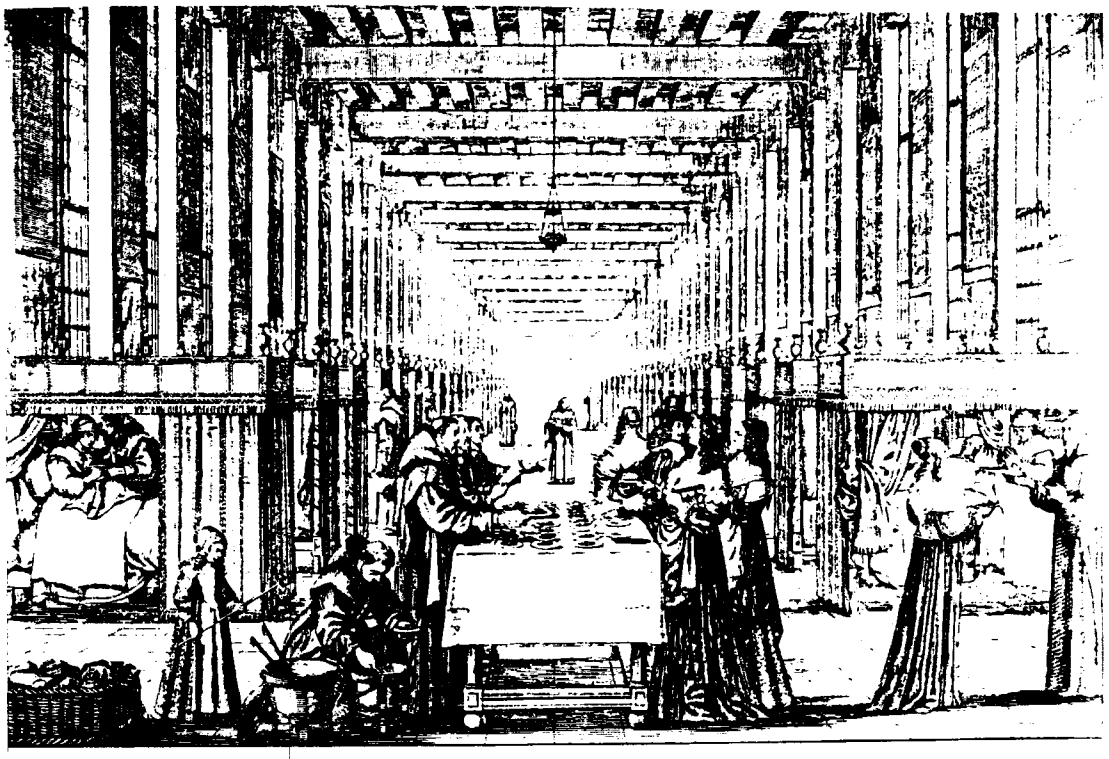
St. Bartholomew's Hospital, London.

Any medical treatments required were prescribed by the religious persons or more commonly, by a physician who visited the hospital from outside. Mostly physicians maintained an office in town and treated private patients there and in the patient's own homes. Gradually physicians came to be called on more and more to treat the poor in the hospitals without payment as part of their Christian duty. Members of the clergy were allowed to practice medicine but not to draw blood. Because of this, physicians were forbidden to practice surgery which was relegated to barber-surgeons. The historical split between medicine and surgery mentioned in the Hippocratic path was thus maintained with surgery having a much lower status.

Both medicine and surgery were very rudimentary at this time. From the twelfth century onwards, medicine had been taught at the universities, with the courses based very much on the teaching of the Ancient Greeks. The graduate would then usually apprentice himself to a practising physician. In the fifteenth century, for example, most medical courses at the high prestige urban universities took four or five years. After 2 years' study the student gained the bachelor's degree and after a further 2 years obtained the licence to practice.

About the beginning of the fourteenth century physicians began to band together to protect their rights to practise. They began to form guilds, which admitted only properly qualified persons and claimed a monopoly on the practice of medicine (Khumbhaar, 1940), thereby largely ousting the clergy.

During this era, three guilds of practitioners worked in the hospitals, the physicians, barber-surgeons and apothecaries. A major enhancement of the status of physicians came in 1518 when the physicians in England organised themselves into a profession and were granted a charter as the Royal College of Physicians.



Infirmary of The charity Hospital, Paris (Abraham Bosse).

The patients at the hospital comprised the indigent sick and travellers needing shelter. The only illness commonly treated in specialist hospitals, was leprosy, although orphans, the aged infirm and the blind might be treated in other specialised institutions, such as St. John's Hospital in Northampton, founded in 1138 to give lodging and a little money to seven aged poor women (Waddy, 1974).

Conditions on the wards were unsanitary and often overcrowded. Patients were frequently accommodated two to a bed with no regard for the diseases of the bed fellows. A woman about to come into labour might share a bed with someone having an infectious disease such as influenza. It is hardly surprising that cross infections often occurred. With the unsanitary conditions and the lack of effective medical treatment, the death rate of those who entered hospital was very high indeed.

Secularisation of the hospitals - 1536-1700

Kind Henry VIII of England brought about the dissolution of the monasteries between 1536 and 1539. As part of his campaign against the Catholic church, the church run hospitals were largely closed down and the sick poor who had been their inmates were forced on to the streets. Petitions to the King got up by the more fortunate inhabitants of London were successful in stimulating the re-opening of hospitals such as St. Bartholemew's (1546) and St. Thomas's (1552) by Royal Charter as secular hospitals.

In 1601 the Poor Law was enacted in England. This Act enabled parish officials to raise taxes to fund institutions to take care of the sick poor. This was not the first time that some financial responsibility for the upkeep of the inmates of hospitals had been placed on the community. A charter of Bishop Bartholemew of Exeter lists various tolls to be paid by the citizens to the leper hospital, including "a toll on all corn sold in Exeter on the fourth and sixth day of the week, of all bread on the sixty day, besides all bread and corn that owes toll at Exeter fair" (Russell, 1974 p 3), for examples. Nonetheless, the 1601 Poor Law formally assigned financial responsibility for the poor (and hence for their hospitals) to the parish communities throughout England.

This change resulted in a very different ethos in the hospital system. Instead of being run by people inspired by a sense of Christian charity, the community now had a bleak sense of legal duty to care for the poor by means of taxes and donations.

Rather than souls to be saved, hospital patients were viewed as a burden on the public purse. As well as receiving finance from public monies, hospitals began to charge their patients. No one was turned away because of inability to pay, but patients were encouraged to pay for themselves or to find a relative, employer a benefactor who would foot the bill.

Around this time, the influence of the church was waning in many spheres. Human dissection was no longer forbidden and researchers obtained an increase in knowledge about the structure and function of the human body. The prevailing view of disease was becoming naturalistic rather than supernatural. Treatments, however, remained largely ineffective and non-specific. Surgery, especially re-mained a very dangerous undertaking for the patient and this factor contributed to its continuing lower status in comparison with medicine.

The nursing staff of hospitals after secularisation was no longer composed largely of dedicated women from an order of nuns, but consisted in the main of employed lay persons. The hours were long and the pay low - about that of a domestic servant. Add to this the high mortality rate among attendants - Knowles (1974) reports that as late as 1788 attendants living in the Hotel-Dieu hospital in Paris had a death rate of between six and twelve percent per annum - and one can guess that the quality of job incumbents would not be high.

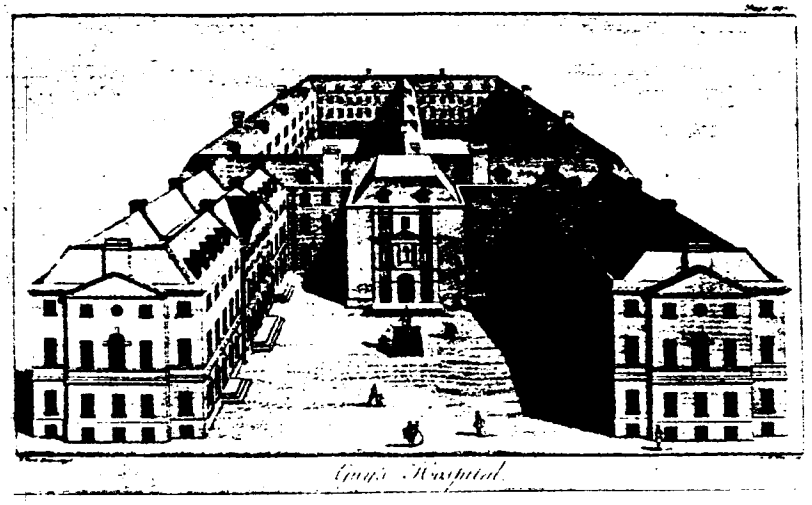
Reports of vioence, drunkenness and immorality amongst the nursing staff of hospitals of the period abound.

With secularisation, the hospitals ceased to open their doors to anyone in need of treatment or shelter. They became places of treatment for diseases which could be cured by the expertise available. At St. Thomas's in the late sixteenth century for example, the mad were sent to Bethlem lunatic asylum, plague victims were removed to one of the Lock hospitals and incurables were sent home to die. (McInnes, 1963).

The eighteenth century

Following the Industrial Revolution many people made immense fortunes. In an age of developing social conscience and philanthropy, the endowment of secular hospitals as a charitable gesture by private individuals began. A wealthy London merchant, Sir Thomas Guy, founded Guy's Hospital in 1722, for example. A group of prominent local citizens might pledge an annual sum, as in the case of Northampton General Hospital, where the 1743 subscription list was headed: "We whose names are underwritten, desiring, as far as in us lies, to find some remedy for this great misery of our poor neighbours, do subscribe the following sums of money to be by us yearly paid (during our pleasure) for the procuring, furnishing and defraying the necessary expense of an INFIRMARY AT NORTHAMPTON for the benefit of the poor sick of the county of Northampton who shall be recommended by any of the subscribers or benefactors contributing one guinea or upwards in such manner as the majority of them shall direct" (Waddy, 1974, p. 4-5). Thus, once again, charitable acts endowed hospitals for the sick poor, who formed the vast majority of the patients.

As well as being an age of philanthropy, this was an age of science and medicine reflected it. The eighteenth century saw the beginning of the rapid development of scientific theory, knowledge and technology as applied to medicine, which development carried through into the nineteenth century.

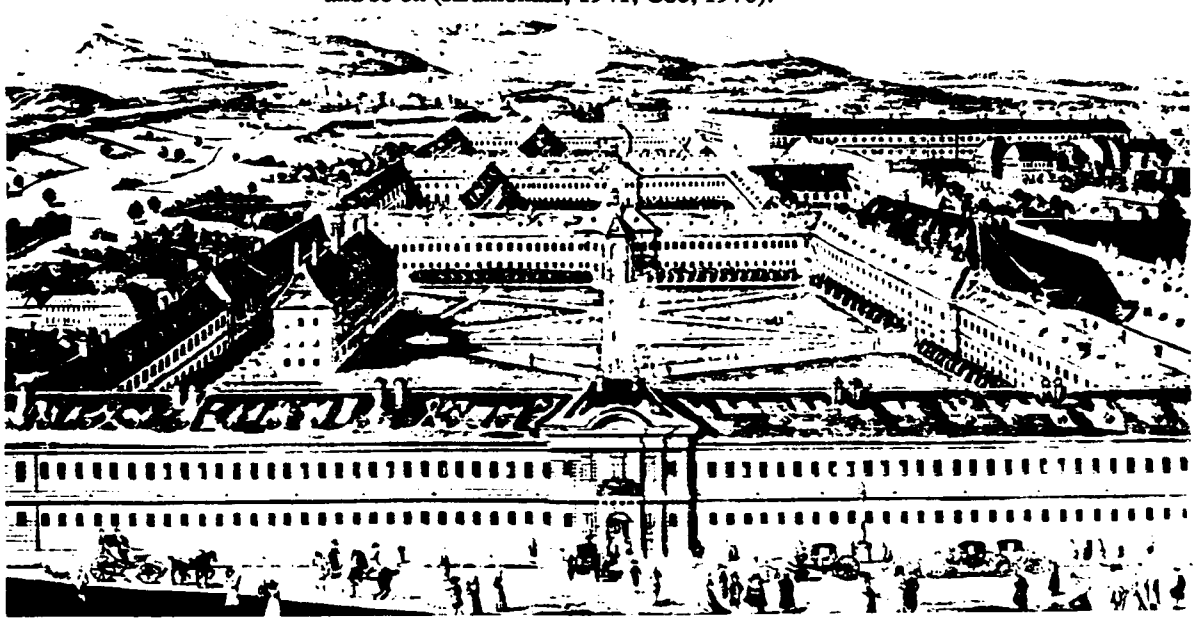


Guy's Hospital, England.

With the Industrial Revolution came the centralisation of much of the means of production into factories. Many of these were run on bureaucratic lines with division of labour, standardisation of procedures, the presence of hierarchies of control and authority invested in a position, rather than the individual occupying that position (Weber, 1947; Etzioni, 1964). This administration can be highly efficient (Weber, 1964) and many characteristics of bureaucratic organisation were rapidly incorporated into running hospitals.

The French Resolution with its emphasis on the rights of the individual also had its impact on hospitals. As well as the general impact, there were specific rulings such as those of the National Convention of the French Revolution in 1793 that only one patient per bed should be allowed and that beds must be placed at least a metre apart (Knowles, 1974).

Santorio, professor at the medical school of Padua in Italy was probably the first physician to use diagnostic instruments as a routine procedure. In the 17th century he used a thermometer (possibly the first person to do so) and invented other instruments (Krumbhaar,1941). Leeuwenhoek developed a functioning microscope in that century too. The nineteenth century, though, was an era of rapid development of new diagnostic instruments including the stethoscope (by Laennec in 1816), ophthalmoscope (by Riva Rococi in 1986) and so on (Krumbhaar, 1941; Coe, 1970).



Vienna General Hospital - 1784.
A splendid example of monastic influence on hospital architecture.

Before the nineteenth century, surgery was a painful and risky business. While soporifics had been used during surgery from earliest recorded history, the practice died out in the Middle Ages. In the nineteenth century adequate anaesthetic procedures for use in surgery were developed. Sir Humphrey Davy discovered that nitrous oxide had anaesthetic properties in 1860 and even suggested that it might possibly be used in surgery (Khumbaar, 1940). In 1842 Long carried out the first surgical operation under ether in the United States and in 1846 Lister carried out a better-publicised operation with ether in England, as did Morton in United States. In 1866 Lister used the work of Pasteur on micro-organisms as a rationale for the use of carbolic acid on wounds during surgery and convalescence (Shryock, 1947). This antiseptic procedure radically reduced the risks of cross-infection. With these developments in

anaesthesia, antisepsis and eventually asepsis, surgery became less unpleasant vastly safer and much more successful. The rise in status of surgeons relative to physicians began at this time.

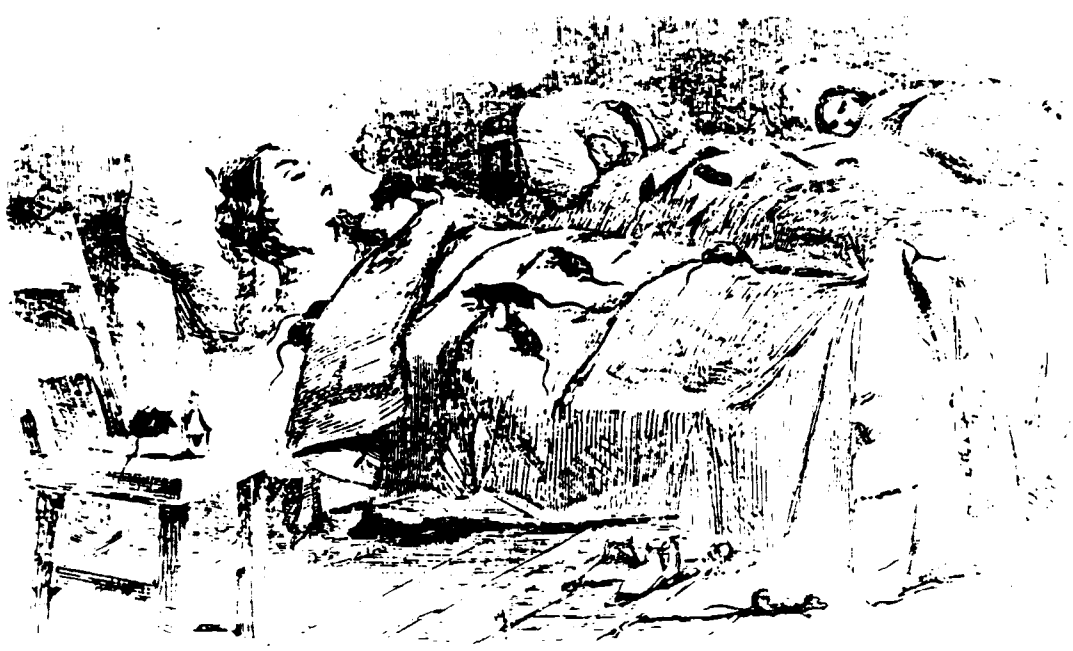
The advances in surgical techniques had two effects: the need for specialist equipment made the hospital the location of choice for surgical procedures and the success rate of surgical interventions dramatically improved. One result of these changes was that the middle and upper classes began to use hospital services in greater numbers. These people were expected to pay for the services they received. Thus there developed a two tier system with free services for public patients and the possibility of private services for those who were able to pay. The medical profession similarly became more dependent on hospitals or the location of equipment and services needed to carry out their specialised procedures.

The nineteenth century saw a major improvement in the skills and status of the nursing profession. Two major factors influenced this development. The first was the development of the diagnostic and observational instruments described above and the advances in surgery. This meant that there was a new role for the nurse in monitoring patient progress and in assisting medical personnel. These tasks needed more training than the traditional nursing tasks, which were more similar to those of a domestic servant.

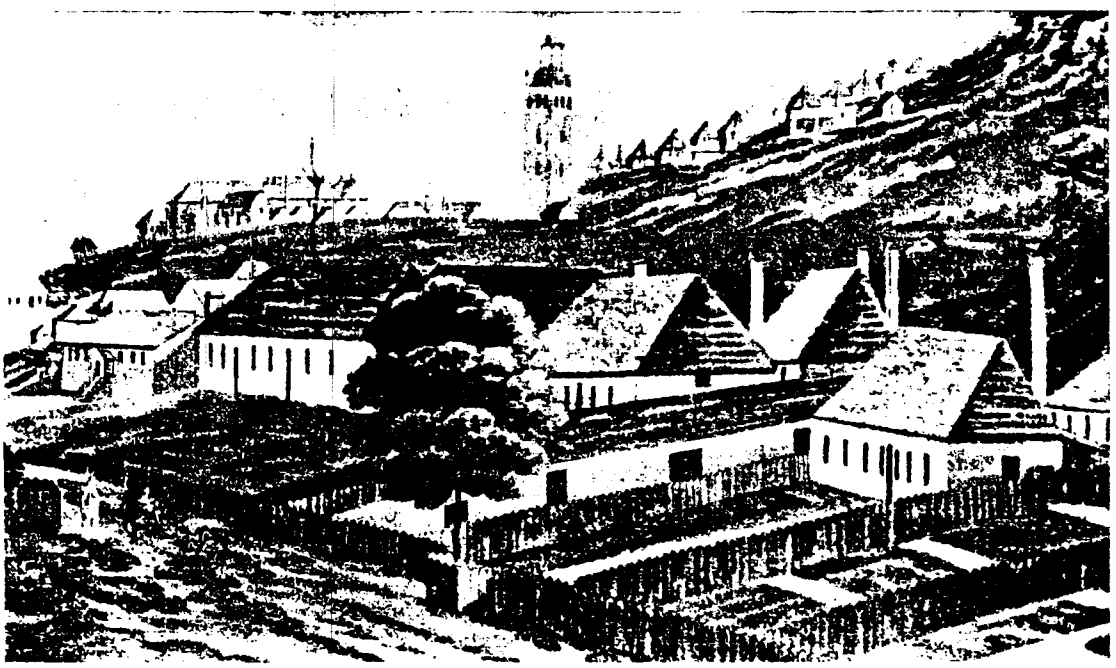
Florence Nightingale (1820 - 1910).

The second factor to influence nursing was the work of a single person - Florence Nightingale. We saw earlier that because of the poor pay and conditions and the nature of the patients in hospitals, nursing was not considered to be a respectable occupation. It must have come as a considerable shock to Florence Nightingale's upper middle class English family when she decided to go to Germany to learn nursing from a minister who worked with his sick parishioners (Woodham-Smith, 1951). When she returned to England in 1853 she set up a hospital for "sick gentlewomen" and began to develop training programmes for women of middle and upper class origins. Her real triumph came in 1854 when she went to the Crimean war and was able to convince the army surgeons, who were most sceptical about the possible contribution to medical services of a group of middle class lady do-gooders, of the efficiency and skill of her group of nurses. In 1860 the first nursing school was set up in her honour at St. Thomas's hospital (Woodham - Smith, 1951).

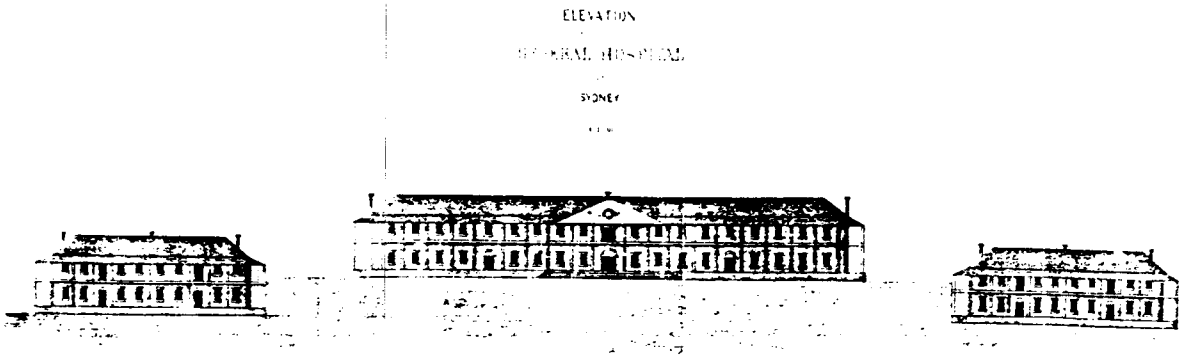
On the positive side, Florence Nightingale virtually single-handedly changed nursing from an unskilled occupation taken up by many women as a last resort to a highly professional one requiring proper training and offering an efficient service. On the negative side, she believed that the nurse should be an unquestioning and subservient assistant, aiding the medical staff in their work and that the nurse should cheerfully accept low pay, restrictions to lifestyle and long hours. These beliefs have provided the profession with a difficult legacy in modern times. Similarly, the setting up of her nursing school in a hospital rather than an educational institution has had implications for the status of nurses for many years. Only in 1985 did the state of New South Wales formally transfer all nursing training programmes to tertiary education institutions.



Conditions in a New York hospital - 1860.



First General Hospital at Dawes Point. 1796 - 1816.



Colonial hospitals in the nineteenth century.

For physicians of the nineteenth century, the time was one of enhanced status and professionalism. The Royal Colleges in England expanded their influence on the profession. Professional societies such as the American Medical Association, founded in 1847, were set up (American Medical Association, 1951) and medical journals such as the Lancet, founded 1823 (Lancet, cover) were developed to promulgate medical knowledge.

Hospitals continued to increase their influence as centres of specialist treatment for rich and poor. They were also firmly established as the major centres for medical education. In many of the major hospitals, a rather rigid system of patronage controlled appointments, including medical staff appointments. This made it difficult for many fully-qualified people to enter hospital practice. Several of these decided to set up their own specialist hospitals and small

hospitals such as St. Mark's Hospital for diseases of the rectum and colon with only 7 beds proliferated (Granshaw, 1985).

The early twentieth century

The major changes in hospitals in the early part of this century was an increase in size, number and the services offered. With greater size came the necessity of more complex administrative procedures. No longer could the government of a hospital remain the business of a few local worthies whose own occupational sphere was elsewhere. For most hospitals there is a Board of Governors (or Directors) made up of prominent members of the community and of the hospital staff. This board decides long term policy. The implementation of that policy in terms of the day to day running of the hospital is done by professional administrators.

With technological advances, the need arose for ancillary services in specialist areas such as x-rays and haematology. Hospitals began to employ trained technicians to perform these services. Locating such laboratory and technical services within the hospitals further increased the dependence of the medical profession on the hospitals.

Within the medical profession itself, there had been increased specialisation. At the end of the nineteenth century many specialist areas such as paediatrics, obstetrics and gynaecology, cardiology and so on had developed. These specialities became represented within the hospital.

We have noted that during the past four hundred years there had been an increasing tendency for medical practitioners to receive at least a part of their training in hospitals. In the 20th century the hospitals became the central location for nurse education as well. A similar development was seen in research. Over the time period more and more medical research has become hospital-based.

The use of antibiotics in the health care system generally resulted in fewer deaths from acute infection and more chronic degenerative conditions being treated in hospitals. There was less need for long stay hospitals for illnesses such as tuberculosis. (A parallel change was seen in psychiatric hospitals with the introduction of psychotropic drugs of specific action from the 1950's onwards.) There are now fewer specialist hospitals overall. In the hospitals, the main increase in activity has been intensive care units and in specialist surgery. There has been an increase in teamwork, especially in the use of social workers and liaison psychiatry services for treatment of psychiatric problems in those admitted for physical illnesses.

CONCLUSION

The hospital has changed from a religious institution dedicated to the charitable ethic of custodial care of the indigent sick to a secular bureaucracy where all walks of life can receive specialist medical treatment founded on a basis of rational, scientific medical knowledge.

REFERENCES

American Medical Association (1951) *Guide to Services*. AMA : Chicago.

Coe, R.M. (1970) *Sociology of Medicine*. McGraw-Hill: N.Y. Chapters 6 and 9.

Etzinio, A. (1964) *Modern Organisations*. Prentice Hall: N.Y.

Granshaw, L. (1985) *The history of a specialist hospital*. Lancet, l, 1265 - 1266.

Knowles, J.K. (1973) *The Hospital. In Life and Death and Medicine*. Scientific American. W.H. Freeman: San Francisco.

McInnes, E.M. (1963) *St Thomas' Hospital*. Allen & Unwin: London.

Krumbhaar, E.B. (1941) *A History of Medicine*. Alfred A. Knopf: N.Y.

edvei, V.C. & Thornton, J.L. (1974) *The Royal Hospital of Saint Bartholemew, 1123 - 1973*. St Bartholemew's Hospital: London.

Roemer, M.I. & Friedman, J.W. (1971) *Doctors in hospitals, Medical Staff - Organisation and Hospital Performance*. Johns Hopkins Press: Baltimore.

Russell, P.M.G. (1976) *A History of the Exeter Hospitals 1170 - 1948*. James Townsend: Exeter.

Shryock, R.H. (1947) *The Development of Modern Medicine*. Alfred A. Knopf: N.Y.

Sigerist, H.E. (1961) *A History of Medicine Volume ll*. Oxford University Press: N.Y.

Waddy, F.F. (1974) *A History of Northampton General Hospital 1743 - 1948* Guildhall Press: Northampton.

Weber, M. (1947) *The Theory of Social and Economic Organisation*. Oxford University Press: N.Y.

Woodham-Smith C. (1951) *Florence Nightingale*. McGraw-Hill: N.Y.

NOTES

HISTORY AND PHILOSOPHY OF MEDICINE FOR MEDICAL STUDENTS -

Chapter 13 MEDICAL STUDENTS

A. Sefton

NOTES

MEDICAL STUDENTS

A. Sefton

INTRODUCTION

In many societies, written records and notes from oral traditions describing the practice of medicine or healing clearly define the roles of the practitioners. By studying these, together with reports of the ways in which members of various societies view or have viewed their healers, we can understand something of patterns of work, knowledge and status. Unfortunately, much less is known about the process of becoming a doctor.

Who have been the medical students throughout the ages and in different societies? How were they chosen or elected to learn the practice of medicine or acquire the powers of healing? What have the aspiring practitioners had to learn? How have they been taught? How do they demonstrate their proficiency for certification? How did the students view their own training? How are or were the aspiring doctors viewed by others?

Answers to these questions are difficult to obtain. When considering historical evidence, there seem to be few contemporary accounts of the methods of educating doctors or healers. Even when reports are available, there will be biases depending on the perspective of the writer; for example, a diary or record written by a student, a teacher, a public health official and a patient written over the same period will differ considerably in emphasis and detail. Later accounts represent interpretations firmly rooted in the perspectives of medical knowledge current at the time of writers. Further, in order to put original writings for the direct translation into any sort of historical perspective, it is necessary to know something of the way in which the practice of medicine and the delivery of all health care was organized - In addition, the social structure, educational systems and the interplay between medicine and other cultural features such as religion must be considered.

Who have been the students of medicine?

Medical knowledge and healing powers have always been prized and often guarded in secrecy; the handling on of such expertise becomes a valued process and the recipients are usually carefully selected. The first sentence of the Hippocratic Oath illustrates this well: I swear by Apollo the physician, and Aescupalius, and Hygieia, and Panacea, and all the gods and godesses, that, according to my ability and judgement, I will keep this Oath and this stipulation - to reckon him who taught me this Art equally dear to me as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others.

(From Works, Vol. 1, translated by Francis Adams, pp. 278-280, London, 1849.)

For this fragment of the oath we can draw a number of inferences. First, the gratitude of the student to the teacher is clear, underlining the value of the training received. Secondly, the knowledge is to be imparted only to those "disciples" prepared to be bound on oath to the "law of medicine". Thirdly, students seem to have had a free choice of entering training and taking the oath. Fourthly, there seems to be a tendency for family members to enter the profession of physician. Fifthly, at least some students appear to have paid fees

which were, however waived for family members and for the offspring of the teacher. Lastly, the practitioners or students referred to in this version were clearly male; to be certain that women were actually excluded it would be necessary to ensure that the pronouns were not translated in terms of the expectations of 1849.

There are echoes of these points in many other historical and contemporary societies. Healers are still in most societies accorded high status, and are usually regarded as possessing special knowledge or powers. Because they are privy to secrets and personal disclosures, they may be held in awe and reverence even when their craft is not regarded as of divine origin. Various techniques and practices have been used to enhance the mystique of the profession - for example, the exclusive use of Latin in medical writings and discussions in 17th century England, and the use of magic and charms in contemporary traditional societies. As a result, a certain ambivalence in community attitudes to doctors is common.

The Smith surgical payrus fromEgypt c.1700 BC.

Anatomy of the intestines, Chinese.

In many societies,students could make a free personal choice of studying for a career in medicine. Access however could be limited for instance by academic tests on entry. In other countries and situations, access may be regulated by lottery or chance (as in Holland for example) by excluding certain groups, or by admitting only members of a particular ethnic background, social group or class. (The example of the use of Latin mentioned above was a similar device, limiting access to those who attended schools teaching Latin. Many contemporary medical schools which teach in English apply tests of English competence for entry). Even when restrictions are not explicit, interview or other selection procedures may be used to manipulate the social, ethnic or intellectual composition of the entering class. Within the Western medical tradition as well as in many other societies, one means of regulation has been the imposition of religious tests. Before this century, the only two Universities in England offering medical degrees (Oxford and Cambridge) were not only the preserves of the upper classes, but in order to graduate students had to be

communicant members of the Church of England. (The exclusion of Roman Catholics, Jews, Nonconformists and those without religious affiliations ultimately led to the establishment of the University College, London in the nineteenth century and to other Universities and medical schools in England.) On the other hand, in Scotland which boasted four universities from the 17th century, despite a smaller population and greater poverty, religious tests were not applied and students from a wider social background entered. In Padua, all degree candidates became bound by Pope Pius IV in 1564 to make a public profession of the Catholic faith. Before this, Padua was regarded as the best European medical school and was favoured by students from England and Germany because of its religious tolerance. Despite repeated petitions, it was not until 1616 that degrees were awarded on the authority of the Venetian republic, thus avoiding the profession of faith.

Financial constraints have clearly operated from the time of Hippocrates, even when the medical tuition itself is free. A much greater barrier to entry is obviously created when high fees are charged, as is the case in many preliterate or contemporary traditional societies - the Azanda in the Sudan, for example, where the shaman or witch doctor requires students to stay for long periods of training and to make expensive gifts. Similar constraints operate in the U.S.A. where medical students, already college graduates, are charged high fees, not only for tuition, but even for lodging an application to enter a medical school.

Now, as in Hippocratic times, children may follow their parents in the role of healer or doctor, but in some societies such as ancient China,outsiders were specifically excluded. By contrast, in other societies, natural or supernatural events may determine that an individual is destined for the healer's role - a form of "election" often associated with a belief in the magical powers of the healer. Some individuals are marked out because of particular circumstances (twins, or seventh sons, for example), supernatural events occurring at the time of their birth, or survival after a normally fatal illness. Whatever the process of election, a long period of study and preparation almost always ensues.

In traditional societies and in historical times doctors were usually male, but in the Han dynasty (206-220 AD), there is reference to women physicians and in ancient Rome there is evidence that women practiced medicine and in Salerno (Italy) from at least the twelfth century, women are recorded as having been enrolled as medical students. During the modern rise of feminism and amidst strong opposition, Elizabeth Blackwell (1849) and Elizabeth Garrett (1861) trained in the U.S.A. and England respectively; see Figure 4. The first female medical student in Australia, Dagmar Berne, enrolled in Medicine at this University in 1885, only two years after its establishment. (She later graduated in England, and her name is remembered in a clinical prize.)

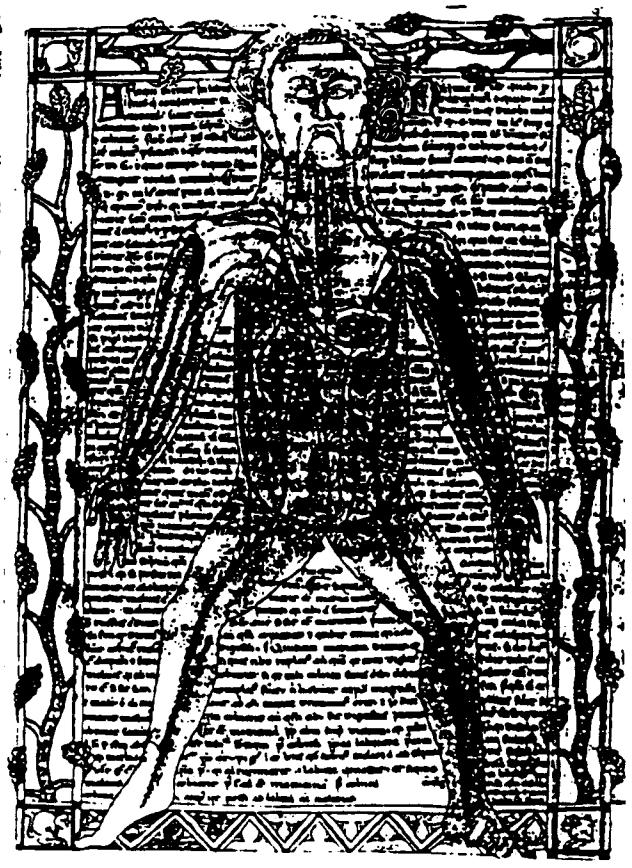
Although women have been and indeed are still excluded from becoming physicians, surgeons or witch doctors in many societies, they often act or have acted as healers, herbalists and as midwives - of lower status, but nevertheless highly skilled professions. In many cases, these arts and knowledge were passed down within families. Amongst some tribal American Indians, the shamans or those with healing powers are all women.

What did students have to learn?

The existence of written records of medical practice makes it possible to determine what information students of medicine might have had to learn. Thus, for example, in ancient Egypt or Greece, it can be assumed that the body of knowledge to be acquired by a physician is included in the medica papyri and the Hippocratic writings (although what surgeons would have needed to learn is more obscure); from Roman times it is evident that a full command of

Galen's writings was required, together with mastery in the use of his recommended treatments (galenicals). In more recent times, notes made by teachers or students, clinical records and examination papers may be available. Where only an oral tradition exists, much greater difficulties are experienced in discovering the sort and extent of the knowledge required. Obviously in different societies it included (and may still include) a thorough knowledge of herbal remedies, astrology, magic or mystical numbers. The limits on learning also depend crucially on the degree of specialization prevailing - for example, whether surgical skills are excluded (see the Hippocratic Oath) or included, and whether the same practitioners prescribe herbal remedies and apply physical therapies. The extreme of specialization in former times was in China, with 9, then 13, then a myriad of defined specialties (teeth, smallpox, large vessels etc).

An edition of Galen's works 1565. The teachings of Galen.



The circulation; 13th. century.

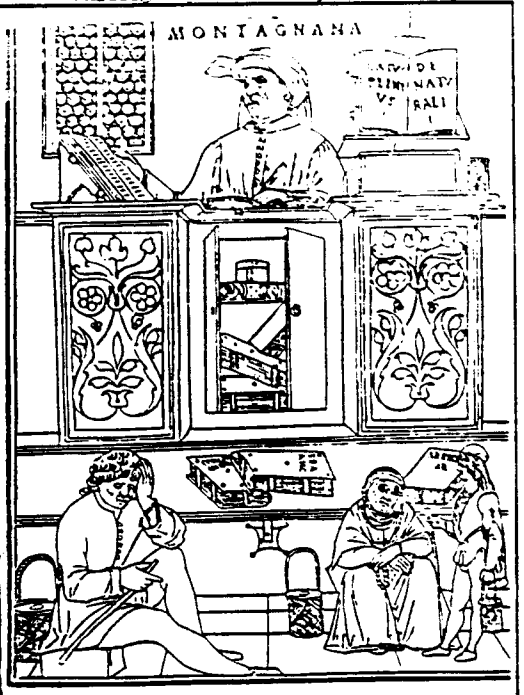
On the other hand, it is harder to determine what behaviours and attitudes were taught: the essential interactions with patients, other practitioners and society at large cannot often be inferred from records. Contemporary accounts of patients and working literature may provide clues.

Dissection.

How have students been trained and licensed?

The fragment quoted above from Hippocrates strongly suggests that an apprenticeship system was in use in ancient Greece, with the knowledge being imparted to one or more disciples (by "precept"). The use of the word "lecture", however, suggests that some didactic, formal teaching may have also been included. An apprenticeship system has been widespread. In early Rome, every self-proclaimed practitioner had the right to be a teacher, and one entrepreneur claimed to complete the training of a doctor in six months!

Lecture: The teacher (Mondino de Luzzi, 1493) lectures while his assistant dissects for the students.



Teacher of Arabic medicine, Petreus de Monagnana.

EXAMPLE OF TEACHING METHODS

From Ambroise Pare (c. 1517-1590), method for reducing a dislocated shoulder.

Galen himself (c129-200) was trained in the apprenticeship system but his education lasted 12 years, as he moved to study with various highly regarded teachers. Although Roman medical practitioners had many privileges - for example, exemptions from taxes (10 AD) and military service (118 AD) - their training and practice was unregulated until the time of Severus Alexander (222-235AD). A form of apprenticeship, initially restricted to family members, existed in China about two millennia ago before the rise of medical schools, but the notable feature of Chinese training was a rigid examination system which regulated not only the right to practice and the specialty to be undertaken, but also the level of service permitted - chief, assistant, teacher and so on.

More recently, apprenticeship was the major method of training physicians in England until the widespread development of medical schools from the late nineteenth century; the Colleges of Physicians, Surgeons and Apothecaries examined and certified the competence of the successful students. When the first medical schools started in Australia, the majority of practising physicians in Sydney and Melbourne were licentiates from one or more of these Colleges. Before the medical schools were established, students in Sydney who wanted to study medicine could do so by becoming apprenticed locally, but then they had to travel to England or Scotland to complete their studies and for examination. (It is interesting in the context of certification that not until after the Civil War in the U.S.A. was there any regulation of medical practitioners.) Clinical clerkships, as practised in many modern medical schools, have their roots in the apprenticeship system, and a form of apprenticeship is still common in the training of healers in many traditional societies - from, for example, the Yoruba of Ibadan and the Iban of Sarawak to the Alaskan Eskimos.

Schools of medicine (and sometimes magic) also have a long history, having apparently existed in ancient Egypt based on large hospitals like those at Memphis and Thebes. When Alexandria became a great cosmopolitan city, from about 300 BC, not only was the library famous, but there was also a highly regarded University, staffed by salaried professors, which included medical studies. Another great medical school associated with a hospital later developed at Jundeshapur (in South West Persia, now Iran) where Greek, Persian and Indian influences blended. By the tenth century there were medical schools established in China under imperial control; if their students did poorly in the state examination, teachers were fined! In Italy by the tenth century, Salerno was also a meeting place of various cultures (Greek, Jewish, Latin and Saracen), the site both of a health resort and a medical school which admitted both men and women as students. It was there in 1140 that medical practice in Europe was first regulated (by King Roger). By widespread custom, teachers depended on students' fees for their livelihood, but in Padua (founded in 1250), the students actually elected their professors and teachers. The requirement for certification became 3 years training in logic, 5 years in medicine, and one year as an assistant to an older colleague. An intermediate examination after 2 or 3 years qualified the candidate as a Bachelor; after the full course the Master's degree was awarded. The title Doctor, a term originally referring to teachers of Law, was conferred only on those who became teachers of Medicine. This has an interesting modern counterpart: in England and Australia medical graduates hold only Bachelor's degrees; a doctorate is earned only after further study and research. In the U.S.A. medical graduates receive a doctorate on graduation and the students enter medical school only as graduates.

Interior of Hospital in which students would be trained; from Paracelsus, Opus Chirurgicum (1565).

The dream that came true, a cartoon of Anderson Stuart
by Lionel Lindsay; original in the Dean's office.

WHERE WERE STUDENTS TAUGHT.

How did students themselves view their training?

The most valuable resources available to answer this question are the writings of the students themselves while undergoing their training or of their teachers. In our own medical school, we have access to student newspapers and journals, as well as private diaries and more formal records of Senate, the Faculty and student societies. Obviously the extent to which such records are available influences our confidence in assessing the experiences of students. Other sources include memoirs written many years after the experience - likely to be coloured by hindsight and nostalgia - and fictional works which may nevertheless provide some insights.

How are or were students viewed by members of society?

This question cannot easily be answered without enlarging the scope of the enquiry to include a wide general reading of literature including biographies, diaries, descriptive accounts, and even novels, plays and poems. While these provide a wealth of information about community attitudes to medical practitioners, they are less revealing of views on students. Without being too specific, it seems that medical students have been variously regarded as drunken louts, industries swots, ignorant and incompetent, intelligent and hardworking, insensitive and arrogant, good at Rugby and rowing, lazy charges on the public purse, privileged but despised. A short verse from Martial indicates one view from Roman times:

"I was getting sick and you came at once,
Together with a hundred students, O Symmachus,
A hundred frosty fingers probed me;
I had no fever, Symmachus; now I have."

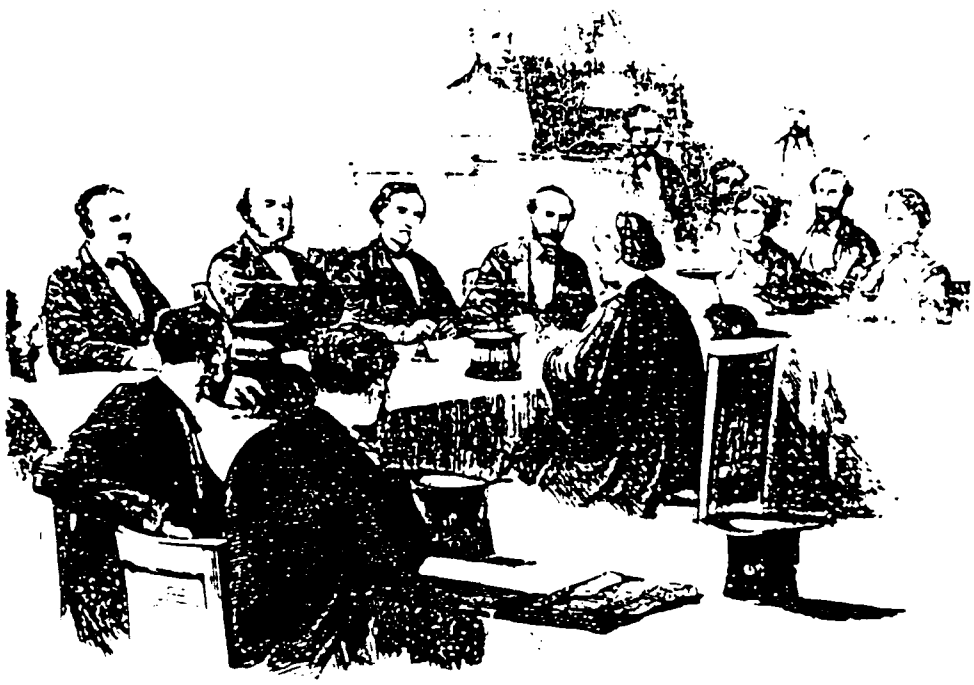
The Medical School of the University of Sydney

Apart from inferences drawn from a standard translation of Hippocrates and observations of illustrations, most of the information discussed above was derived second-hand from commentaries (many of recent origin) written about past events, or summaries of contemporary anthropological findings. By narrowing the scope of the enquiry, however, it is possible to obtain information from first-hand sources about the predecessors of current medical students at the University of Sydney. The two centenary volumes - that of the Faculty and of the Medical Society - provide interesting sources of information.

The University of Sydney was the first in Australia, founded in 1850. Although a Faculty of Medicine was first established in 1856 to award degrees a medical school to train students was not established until 1883. The first medical school was that of Melbourne, beginning in 1861 and taking students in 1863; the third, Adelaide, started in 1885.) At the time, medical studies at Oxford and Cambridge were weak, so the Senate of the University of Sydney, along with many other colonial universities, turned to the University of Edinburgh with its strong tradition in the medical sciences to appoint the foundation Dean and Professor of Anatomy and Physiology. It seems astonishing today, but the appointee, Thomas Anderson Stuart (later Sir Thomas) was only 26 years old, faced with the prospect of travelling 12,000 miles to an unknown continent. He gathered around him other Scots, including the first Professor of Anatomy, J.T. Wilson, and built a medical school of high repute. He dominated the early years both of the school and Prince Alfred Hospital until his death in 1920. He founded the Medical Society in 1886 and built the "Old" Medical School (now appropriately named the Anderson Stuart Building) which was completed in stages between 1889 and 1922. Thought to be too large for the future, it was dubbed "Stuart's Folly". It bears a strong

resemblance to the preclinical school at Edinburgh; even its original facade faces south (towards the present School of Chemistry) - in appropriately for the southern hemisphere.

It is not possible in this short account to enumerate all the interesting and colourful characters connected with the medical school, but it is possible to provide some answers to the general questions originally posed in terms of our own school. Entry was open to all matriculants until the 1960s when quotas were first introduced to limit the intake. Fees were charged until all tertiary fees were abolished in 1972, but for twenty years before that the majority of students were fully supported by Commonwealth Scholarships. Despite the barriers erected by the fees, it is interesting that one of the first intake of six students (W.G. Armstrong) worked as a teacher to put himself through, and another (D.D. Rutledge) was a practising clergyman who also worked during his medical studies. Although the first woman entered in 1885, few at first followed her example, in part due to the narrow education and inadequate academic preparation provided in the girls' schools of the time; those who did succeed her initially faced a great deal of difficulty in obtaining training positions in the hospitals after graduation. Despite the great increase in the numbers of women entering the school in the last 30 years, a brief inspection of the composition of the professional specialties and the medical hierarchies suggests that difficulties and barriers have not entirely been removed.



Examination in Paris of Elizabeth Garrett in 1870.
She was the first woman to train successfully as a physician in England.

In terms of "what" students learned, we have several sources of information - not only Faculty records, examination papers, laboratory books, diaries, but also Anderson Stuart's own lecture notes and even some apparatus. In terms of "how" students were taught, such records, including early photographs and plans of the medical school building itself strongly reinforce the idea that lectures, practical classes and dissection dominated the early years. Clinical training has always been carried out in the affiliated hospitals, including the specialist institutions, and bears some resemblance to the apprenticeship system. The first of the teaching hospitals for the University of Sydney was Royal Prince Alfred, then Sydney Hospital. Later, St. Vincent's (1923) and St George Hospital (1963) were added, but both of these later passed to the University of New South Wales. Royal North Shore was affiliated in 1926, and more recently, Concord, Lidcombe and Westmead have been included as teaching hospitals for the University of Sydney. Final certification by the N.S.W. Medical Board has never been more than a formality for medical graduates of the University of Sydney, although the new legislation requiring the registration of students has yet to be put into effect.

At the time of its inception, the medical curriculum at the University of Sydney was seen as innovative and amongst the most advanced in the world at the time. This largely resulted from the strengths of the Scottish medical schools from which Anderson Stuart and other early Deans of Australian schools came. They were beginning to adopt scientific principles as the basis for medical teaching, well ahead of almost all of those in England and in the USA. It was not until the early years of the twentieth century that the Flexner report ensured that a similar scientific approach to medical education was adopted in the USA. The basic structure of the present curriculum was established in the 1920s when the first full-time Professors of Medicine and Surgery (C.G. Lambie and H.R. Dew respectively). Since that time it has since undergone successive modifications - including length - without major change in sequence or departmental emphasis.

In 1992 Faculty took the momentous decision to change its entry from 1997 to accept only graduates from any first degree and to adopt a four-year curriculum based on principles of integration, adult learning, problem-based activities and early clinical contact. Similar decisions were taken at the medical schools of Flinders University and the University of Queensland. The move is seen as a major innovation, opening up access to a more diverse group of more mature students. Once again, the Sydney Medical School plans to regain leadership in medical education and, as the new strategies are developed for the four-year degree, will apply them progressively to the existing six-year curriculum.

CONCLUSIONS

By providing details of the pattern of medical practice in historical times or in different societies, many sources can indicate what information students may have had to learn, but fewer delineate the more subtle aspects of the behaviours and relationships deemed necessary. It is harder to obtain insights into the life of medical students, particularly in earlier times. Although the selection or election of healers or doctors may vary, explicit and implicit barriers may restrict entry. Training may resemble an apprenticeship system, be carried out in organized schools or colleges, or contain elements of both systems. Final certification may be regulated by law, or may simply depend on the acceptance of the community.

BIBLIOGRAPHY

Abse, D. (1978) *My medical school.* Robson Books, London.

Ackerknecht, E.H. (1984). *A short history of medicine.* Johns Hopkins University Press Paperback, Baltimore.

Axtell, J.L. (1979). Education and status in Stuart England: the London physician. In: C. Webster, ed: *Health, medicine and mortality in the sixteenth century.* Cambridge.

Foster, G. and Anderson, B.G. (1978). *Medical Anthropology.* Wile and Sons, New York.

Lyons, A.S. and Petiucelli, R.J. (1978). *Medicine an illustrated history.* Harry N. Abrams Inc., New York.

Rosetti, L. (1983). *The University of Padua: an outline of its history.* Edizioni Lint, Trieste.

Sinclair, H.M. (1974). Oxford medicine. In: *Medicine in seventeenth century England.* Berkley.

Sutton, Harvey. (dates unknown) *The medical student in ancient Egypt. The medical student in ancient Greece* (i) *The Hippocratic period* (ii) *The Alexandrian period The medical student in Roman times The medical student in the thirteenth century.* Sydney University Medical Journal.

Young, J.A., Sefton, A.J. and Webb, N. (1984) *The centenary book of the Faculty of Medicine,* University of Sydney. University of Sydney Press, Sydney.

Sefton, A.J., Cheng, N. and Thong, I.G. (1992). *The centenary book of the Sydney University Medical Society, Hale and Iremonger, Sydney.*

ACKNOWLEDGEMENTS

Illustrations and Source Material

ALEXANDER, P., "William Shakespeare The Complete Works", Collins, London, 1965.

ARONSON, J.K. "An Account of the Foxglove and its Medical Uses", 1785-1985, Oxford University Press, London, 1985.

BAILEY, H. and BISHOP, W.J. "Notable Names in Medicine and Surgery", H.K. Lewis & Co. Ltd., London, 1959.

BENTLEY, R. and TRIMEN, H., "Medicinal Plants", Vols. 2 and 4, J. & A. Churchill, London, 1880.

CLENDENING, L., "Source Book of Medical History", Dover Publications, New York, 1942.

COGHILL, N., "Geoffrey Chaucer The Canterbury Tales", Penguin Books, 1951.

COTTINGHAM, J., STOOTHOFF, R. and MURDOCH. D., "The Philosophical Writings of Descartes", Vol. 1., Cambridge University Press, Cambridge, 1985.

CUMPSTON, J.H.L. and McCALLUM, F., "The History of the Intestinal Infections (and Typhus Fever) in Australia 1788-1923, Service Publication No. 36, Government Printer, Melbourne, 1927.

CUMPSTON, J.H.L., "The History of Small-Pox in Australia, 1788-1908", Service Publication No. 3, Government Printer, Melbourne, 1914.

FLEMING, A., "Penicillin its Practical Application", Butterworth & Co. Ltd., London, 1946.

GORDON, R., "Doctor in the House", Michael Joseph, London, 1955.

HANDLER, C.E., "Guy's Hospital 250 Years", Guy's Hospital Gazette, London, 1976.

HARVEY SOCIETY of NEW YORK 1910-1911, "The Harvey Lectures", J.B. Lippincott Company, Philadelphia.

HARVEY SOCIETY of NEW YORK 1936-1937, "The Harvey Lectures", The Williams & Wilkins Company, Baltimore, 1937.

HOLMES, S.J., "Louis Pasteur", Dover, New York, 1961.

KEYNES, G., "The Apologie and Treatise of Ambroise Pare", Univ. Chicago Press, Chicago Illinois, 1952.

LEYEL, C.F., "Culpepper's English Physician and Complete Herbal", Wilshire Book Company, California, 1971.

LONGMATE. N.. "Alive and Well Medicine and Public Health 1830 to the Present Day", Penguin Books. London. 1970.

LYONS. A.S. and PETRUCELLI. R.J.. "Medicine an Illustrated History", Harry N. Abrams. Inc.. New York, 1978.

MAJOR. R.H.. "Classic Descriptions of Disease", Third Ed.. Blackwell Scientific, Oxford. 1932.

MEDICAL RESEARCH COUNCIL, "A System of Bacteriology in Relation to Medicine", Vol. 1., H.M.'s Stationery Office, London. 1930.

MEDVEI. V.C. and THORNTON. J.L.. "The Royal Hospital of Saint Bartholomew 1123-1973", London. 1974.

ROHDE. E.S., "The Old English Herbals", The Minerva Press. London, 1972.

SARGANT. W., SLATER. E. and HILL. D., "An Introduction to Physical Methods of Treatment in Psychiatry", 3rd Ed. E. &. S. Livingstone Ltd., Edinburgh, 1956.

THOMSON. W.A.R., "Healing Plants".

THOMSON. W.A.R., "Herbs that Heal", Adam and Charles Black, London, 1976.

WATSON, J.F., "The History of the Sydney Hospital from 1811 to 1911", Government Printer, Sydney, 1911.

ZIGROSSER, Carl, "Medicine and the Artist", 3rd Ed. Dover Publications, Inc., New York, 1955.

Medical Society Printing Service
BLACKBURN BUILDING, D06
UNIVERSITY OF SYDNEY 2006
Phone: X 2482 (or) 552 4541

"Printing by the students, for the students"


Gavarni