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NARRATIVE REVIEW

The developing understanding of Human Health and Fitness:

4. The Middle Ages.

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Abstract

In Northern Europe, collapse of the Roman civilization was marked initially by a loss of almost all classical learning, with local tribes reverting to a pattern of subsistence hunting and primitive agriculture. However, despite the sacking of some important libraries, many classical texts were conserved in the Byzantine and Arab worlds. Thus, the earlier knowledge of Greece and Rome was progressively recovered; key documents were translated into Arabic and the Anglo-Saxon vernacular, and the spread of monastic Christianity brought clerics who could read Greek and Latin texts to the northern provinces of Europe. Formal medical care was often under the exclusive jurisdiction of the church. Health and disease were viewed in the context of asceticism; illness was to be borne with patience, and healing sought through faith in saints and holy shrines. But the birth and progressive secularization of medical schools in the latter part of the Middle Ages broke the ecclesiastical stranglehold, with a renewal of scientific enquiry. Nevertheless, physicians continued to work largely within the confines of Galen's classic doctrine of restoring health by balancing the body humours. With this objective, they liberally prescribed leeches, emetics and purgatives. Formally trained medical practitioners were few in number, and they were often aided in their task by medical technicians (barber/surgeons) as well as by well-educated lay people. The concept of universal health care dawned in many countries, as cities and states began to appoint physicians and barber/surgeons to treat the poor without charge. However, such personnel were few in number. Thus, much of the responsibility for health care devolved upon female heads of households, wise women and the sick bays of monasteries. In the latter half of the Middle Ages, a rapid growth in commerce and the

development of trades-guilds attracted a growing fraction of the rural population to major cities. Here, a progressive crumbling and loss of Roman infrastructure compromised urban health. Clean drinking water, public baths, and adequate sewage treatment were no longer available to the ordinary city dweller. A flea-borne epidemic of bubonic plague killed perhaps a half of Europe's population during the 14th century, but in the aftermath of this disaster effective quarantine regulations were established at major entry-ports of Europe. Many countries took the first steps towards the development of sheltered housing for the elderly. Frequent church holidays and the development of new forms of recreation encouraged fitness maintenance among those who had migrated to the cities. However, the church often objected to the recreational use of Saints' Days, and the monarch also wished his subjects to substitute military training such as archery practice for more general forms of recreation. Towards the end of the Middle Ages, the trend to replace vigorous sports by ritualized, social pastimes, public spectacles and sedentary games is also likely to have had an adverse effect upon the fitness of urban populations. **Health & Fitness Journal of Canada 2012;5(3):18-46.**

Keywords: Barber/surgeons, Black Death, Health infrastructure, Herbal remedies; Medical schools; Monasteries, Quarantine, Sheltered housing; State medical services; Tournaments; Wise women.

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Background

Previous articles in this series (Shephard, 2011; Shephard, 2012a, 2012b) have explored growth in our understanding of human health and fitness from the dawn of history to the collapse of the Roman Civilization. In this article, we follow developments into the Middle Ages (from 476 CE, when Romulus Augustus was deposed by the German chieftain Odoacer, to around 1400 CE).

The conquest of the Roman Empire by the “Barbarians” from Northern Europe marked the beginning of a millennium characterized by intellectual stagnation and economic decline. Often, the accumulated classical knowledge of Greece and Rome was rejected and proscribed because the church regarded it as essentially heretic or pagan learning. Thus, in 391 CE, the Coptic pope Theophilus himself led an angry mob of zealots who destroyed much of Alexandria’s extensive library. However, the successor to Theophilus in the Alexandrian papacy (St. Cyril, c376-444 CE) saw fit to revive a modified form of the “incubation” rituals of Pergamon, where the sick had slept in a pagan shrine. The healing temple now conserved the relics of two Christian well-respected martyrs, John of Edessa and Cyrus of Alexandria, and as in the time of Galen, patients were often “cured” by eating the asps that roamed around the shrine (McGuckin, 2004). The Nestorians, a heretical sect of the Orthodox Church, established an early school of medicine at Edessa in northern Mesopotamia, and for a time the Byzantine court accepted treatment from Nestorian physicians. However, in 489 CE the bishop of Edessa (Cyrus II) prevailed upon Emperor Zeno to destroy the medical school (which he viewed as a heretical institution) and the physicians accredited to this institution

were summarily expelled to Persia. Here, they were welcomed by a liberal-minded Shah, and thus contributed substantially to an eastward shift in centres of learning (Segal, 1970).

Much of the mediaeval world was highly suspicious of any knowledge that was not formally endorsed by the established church. In consequence, scientific enquiry was stifled, and (until around 1000 CE) there was even a lack of good historical records. This period of history was thus termed the “Dark Ages” (Mommsen, 1942). However, historians now prefer to use the term “Middle Ages.” The new terminology recognizes that despite the repression of enquiry in many parts of Europe, the era was not devoid of intellectual accomplishment in other areas of the world. The Byzantine Empire, centred on Constantinople, conserved many of the Roman traditions (Kazhdan and Constable, 1982), albeit with a greatly diminished interest in reading the classical texts (Oman, 1914). Many scholars sought recognition by focussing on the minutiae of theology, rather than on the human sciences of healing and fitness. Gregory of Nyssa (c335-395 CE) complained about the religious preoccupations of his fellow-citizens (Gibbon, 1781):

“This city is full of mechanics and slaves, who are all of them profound theologians; and preach in the shops, and in the streets. If you desire a man to change a piece of silver, he informs you, wherein the Son differs from the Father; if you ask the price of a loaf, you are told by way of reply, that the Son is inferior to the Father; and if you inquire, whether the bath is ready, the answer is, that the Son was made out of nothing.”

During mediaeval times, civilization flourished mainly in the east. In the century that followed the death of Mohammed (570-630 CE), Arabic countries united under the *Rashidun* ("Rightly guided Caliphs") and Muslim forces gained sufficient military strength to sweep across the southern half of the ancient world. They established a powerful and prosperous empire, stretching from China to the Iberian Peninsula (Gibbon and Bury, 1900; Sicker, 2000). Their dominion persisted until the the Crusades and the Mongol invasion, at the end of the 12th century. Thus, for several centuries, the focus of formal knowledge and enquiry shifted from Athens and Rome to cities such as Baghdad, where there was a blossoming of new scientific and intellectual achievements, and at least a few important medical discoveries were made (Campbell, 2000; Huff, 2003).

Much of accumulated Byzantine learning, and many of the compendia of classical writings that had been collated by Arab scholars were unfortunately destroyed by various warring groups, including the Berber invasion of 711-718 CE, the sacking of Constantinople during the fourth Crusade (1204 CE) and the Mongol invasion of 1222-1242 CE.

In Britain and much of northern Europe, the well-ordered cities, lavish lifestyle and indolence of colonial Rome were quickly replaced by disorganized chaos. The local infra-structure crumbled quickly as the Roman legions withdrew, and survival of the indigenous tribes depended on a return to the primitive hunting and agricultural existence of an earlier era (Gibbon and Bury, 1900). The British cleric Gildas (c 500-570 CE) gave a graphic description of the new, post-Roman reality (Laycock, 2006):

"For they took to looting from each other, since there was only a very small stock of food to give nourishment to the desperate people; and the calamities from abroad were made worse by internal conflict, and consequently, the whole area became almost devoid of food, except for what hunters could find."

The gradual spread of monasteries and associated academic institutions brought a modicum of classical learning back to northern Europe. In Britain, Theodore of Tarsus, who was appointed Archbishop of Canterbury in 690 CE, brought with him an entire Greek library. Large cathedrals, abbeys and monasteries were constructed from the 12th century onwards, and these establishments were staffed by scholars who could read and understand the classics. Medical schools began to be established around some of these religious institutions, and occasional brave teachers undertook anatomical dissections. This in turn led to a first questioning of the dogmas that had been established by Galen. The discipline of medicine progressively became divorced from the church and its rigid theology, and a variety of paramedical workers emerged to supplement the efforts of a limited cadre of formally trained physicians. Tentative efforts were made to extend treatment and institutional care to even the poorest of citizens. However, with the exception of certain herbs, most of the treatments offered by mediaeval practitioners had little practical value, and unfortunately many were quite harmful to health.

From the 14th century onwards, the growth of trade led to a considerable expansion of European cities. Wealth was progressively transferred from the manor houses and monasteries to a new merchant class, but squalid poverty

remained among the illiterate serfs who also were seeking a new life in the cities. Effective measures to prevent the spread of disease were limited not only by a lack of understanding of the nature of infections, but also by a lack of health infra-structure in most of the newly constructed urban areas. In consequence, there were frequent major epidemics of diseases such as cholera and bubonic plague. Efforts to maintain the personal fitness of city-dwellers were curtailed by religious edicts requiring church attendance on Holy Days and royal commands to devote any other free time to military training. Although a wide variety of new sports and pastimes made their appearance, opportunities for participation thus depended strongly on an individual's social class. For the aristocracy, formerly vigorous events such as tournaments became progressively more stylized, and other games such as croquet and bowls offered an opportunity for social interaction rather than vigorous physical activity. The common people also seem to have devoted a growing proportion of their leisure time to the watching of tournaments and pageants, and the playing of sedentary board and dice games.

Health

State of knowledge. During the early part of the Middle Ages, the lack of Latin and Greek scholarship was a major barrier to understanding any existing knowledge of health in Britain and other Northern European countries. Few of the population had the ability to read in any language, and disease, starvation and violence were all too common features of their daily life. However, works such as the *De Materia Medica* of the Greek pharmacologist Dioscorides (c.40-90 CE)

(Beck, 2005) began to be translated into the Anglo-Saxon vernacular during the tenth century CE (Rusche, 2003), and an ability to read Latin and Greek manuscripts was slowly regained in the abbeys and monasteries, through the combined missionary and educational efforts of Augustine (who took office as the first Archbishop of Canterbury in 597 CE) (Blair, 2005; Mayr-Harting, 1991) and of Charlemagne in 8th Century Europe (Einhard, 1880).

The revival of medicine as a profession distinct from the church hierarchy began with an edict of Charlemagne (805 CE) allowing some promising young scholars to be sent to learn medicine. Subsequently, the healing arts became progressively divorced from clerical practice. The Council of Clermont (1130 CE) decreed that monks and canons were not to learn law or medicine for the sake of material gain, and the Council of Tours (1163 CE) was even more specific: it specified that clerics must avoid all secular studies (Pioreschi, 2003). Thus in 1214, Master Gilbert Eagle (who was serving as a physician to the Archbishop of Canterbury) was summoned to Rome to explain why he was still combining medical practice with his priestly duties (Getz, 1998).

Attitudes of the mediaeval church.

Church fathers such as Augustine of Hippo (354-430 CE) (Lawless, 1990) and Benedict had systematically placed an understanding of religion above other areas of knowledge. Although their educational programme included the teaching of some aspects of medicine, any study of the human body was seen as a means of discovering the wisdom of God, rather than as a tool that might help in the healing process. Thus, in *De opificio Dei* (the Works of God) Lactantius (c 250-317

CE) discusses the human body as a manifestation of Divine providence (Roots, 1987).

Basil of Caesarea (330-379 CE) declared that physicians had the noblest of professions, and he was himself active in offering medical care to the poor, building a large hospice and hospital before the gates of Caesarea. But at the same time he argued that not all diseases were produced by nature, or even by our bad habits and vices; some illnesses were sent directly from God as a trial of personal faith or as a punishment for a long forgotten sin. He is said to have followed a rigid pattern of personal asceticism, and this may have hastened his own death from hepatic disease. His views undoubtedly set the stage for a strong reliance on healing by faith, at the expense of the sounder components of classical medical knowledge. Faith in divine mercy soon made scientific enquiry into the origins of disease highly suspect. Gregory of Tours (c538-590 CE), for example, had a strong belief in the efficacy of saints and their relics, particularly the miraculous cloak of St. Martin of Tours (Stancliffe, 1983). Gregory himself had suffered a bad case of toothache, and he believed that he had been able to cure this by applying to his teeth dust from the tomb of St. Martin (Krey, 1955). Subsequently, Gregory threatened to class as a heretic anyone seen seeking help from a physician, such as his archdeacon Leonastes; even worse, in the case of Leonastes, the physician offering treatment was a Jew! Bernard of Clairvaux (1090-1153 CE) also commented:

“The occasional use of herbs from the monastery garden may, indeed, be tolerated; but to buy drugs, to consult physicians, to take medicines, befits not

religion and is... contrary to the purity and honour of our order.”

Many of the mediaeval sick made long and arduous journeys to shrines or even humble churchyards in their quest for the miracle of healing. Specific saints were thought to cure particular diseases. Thus, St. Erasmus (who had suffered evisceration) could help patients with problems of the gastro-intestinal tract, a prayer to St. Just was efficacious for those with headaches, St. Lawrence was competent to deal with back pain, St. Agatha offered healing for nursing mothers, and St. Anthony could counter ergotism (Bettman, 1956).

In essence, the mediaeval church replaced pagan rites with its own superstitions. In some parts of the world, such beliefs persist. The supposed bones of St. Mark are still venerated in the cathedral of San Marcos, in Venice, and in Québec, 500,000 faithful Catholics continue to make pilgrimages each year to the crutch-filled shrine of St. Anne de Beaupré on the north shore of the St. Lawrence estuary.

Nevertheless, a few church scholars sought to conserve Greek and Roman learning, particularly Aëtius of Amida (mid 5th- mid 6th century CE) and Isidore of Seville (560-636 CE). Aëtius came from the region of the Tigris, but served as physician in the Byzantine court. He compiled a 16 volume compendium of medical knowledge, the *Medicinae Tetrabiblos*; he is remembered particularly for the introduction of cloves and camphor into western ointments (Cornarius, 1549). Isidore's *Etymologia* (Barney et al., 2010) was also an encyclopaedic compilation of pre-existing knowledge; a huge text in 20 volumes, its 448 chapters offered a terse but comprehensive digest of classical

handbooks, miscellanies and previous compendia. Sections of specific interest in the context of health and fitness include volume IV (*De medicina*) and volume XVIII (*De bello et ludis, On war and games*). In *De Medicina*, Isidore embraced the Galenic concept of effecting a cure by balancing the body's "four humours," yet he recognized that health also required attention to the laws of daily living:

"matters of food and drink, clothing and shelter. Ultimately, it consists of every means and fortification by which our body is preserved..."

Isidore supported the earlier view of Ambrose (c 337-397 CE) that the quality of the pulse was a good indicator of a person's overall health (Secundus, 1829).

Under the influence of Thomas Aquinas (1225-1274 CE) and Albertus Magnus (c1193-1280 CE), the Roman church also began to accept reincorporation of certain facets of Greek and Arabic knowledge into western thinking (Hinson, 1995).

Development of schools of health science. The region around Salerno, in southern Italy, was long renowned for its pleasant climate and it also offered the purported remains of St. Matthew and other sacred relics to those who were sick. Scholars from the region undertook a systematic translation of classical and Arabic texts into a canon of knowledge that included the *Ars Medica*, published by the Benedictine *Monte Cassino* monastery. The *Regimen sanitatis Salernitanum* is one of the most famous writings that is attributed to the Salerno school (although some scholars believe it is derived from an Arabic source, unacknowledged for clerical reasons). It takes the form of a long-revered poem, and it was probably

written in the 12th or 13th centuries; it is dedicated to Robert, the son of William the Conqueror. It offers 362 pieces of cogent lifestyle advice, and it was widely respected in many parts of the world until at least the 18th century:

"Si tibi deficient medici, medici tibi fiant Haec tria, mens hilaris, requies, moderata diaeta" (Joy, temperance, and repose, slam the door on the doctor's nose).

"... medici tibi fiant, Haec tria: mens laeta, requies, moderata diaeta. (Use three physicians still; first Doctor Quiet, Next Doctor Merry-man and Doctor Dyet" [as translated by Sir John Harrington (Harrington et al., 1922)].

The *Regimen* does not seem to have been universally approved by the Roman church. A commentary prepared by Arnald of Villa Nova (1230-1300 CE) (a physician who had sought the elixir of life and had discovered that *aqua vitae* restored youth to the aged) was publicly burned and the title was placed on the *codex* of "forbidden books".

The medical school at Salerno taught anatomy. Its instruction was based on both the dissection of pigs (as described by Platearius in the *De Anatome Porci*) and a study of the writings of Galen (Shephard, 2012b) and Haly Abbas (930-994 CE), an Arabic surgeon who had described the action of the heart (Moir, 1831). Remarkably for this era, the school boasted at least one female faculty member (Magistra Trotula) ((Green, 2001)). Many of the professors were either married or of Jewish extraction, suggesting that the church and the Monte Cassino abbey were able to exert only a limited influence on the policies of this university. The school was severely damaged when Salerno was sacked by the

Holy Roman Emperor (in 1194 CE) and in this upheaval many of the families of faculty members faced public auction. But the school survived, and later recovered. A further female physician (Constanza Calenda) was appointed to the Faculty in 1430 CE, and teaching operations continued for many years, until the school was closed definitively by an edict of Napoleon in 1811 CE.

Salerno scholars expanded the ideas of Hippocrates and Galen concerning the need to balance the four body humours (Grant, 1974). Thus, the sanguine fellow, surcharged with hot moist blood, was inclined to be fat, and he loved *"mirth, musick, wine and women."* The phlegmatic person, dulled by an excess of cold phlegm, was *"squarish and given to rest and sloth."* The choleric patient, dominated by a plethora of hot and yellow bile was *"all violent, fierce and full of fire,"* and the melancholy man, with a surplus of cold black bile had *"a heavy looke, a spirit little daring."* Imbalance between the four body humours was routinely detected by appraisal of the urine and the pulse. Thus de Corbeil, 12th century physician to Philip II of France and a product of the Salerno school described 18 gradations of colour, plus odours and sediments in the urine (*De urinis*), and characteristics of the pulse, including its resting speed (quick or slow), pressure (hard or soft), interval (rare or frequent), and increasing or decreasing pulse rhythm (*De pulsibus*) (Wallis, 2005).

Abbot Rabanus Maurus (775-856 CE) of the Benedictine Abbey of Fulda, Germany, compiled an encyclopedic *De rerum naturis* (On the nature of things). Book 18 of this work contains a chapter entitled *De medicina et morbis*. However, it seems not to have been published until 1025 CE, and then by the Monte Cassino

monastery rather than by the Fulda abbey (Iorio et al.)

By the 12th century, other medical schools were flourishing in cities such as Montpellier, Paris, Bologna and Padua. In general, they still reiterated the ideas of Hippocrates and Galen (Getz, 1998). A typical recommendation was:

"Several kinds of medicine may be good, such as diet, drink, hot bath (whence sweat is growing), with purging, vomiting and letting blood."

The Bologna School was noteworthy in that it was a secular institution, established with a guild-like structure and falling under the aegis of the Faculty of Law rather than the local theologians. Although an Edict of the Council of Tours (1163 CE) and a Bull of Pope Boniface VIII (1300 CE) had been interpreted or misinterpreted as proscribing the dissection of dead human bodies (Pioreschi, 2001), during the 14th century, the Bologna school began to undertake such dissections, challenging many of the classical concepts of anatomy and physiology (Shephard, 2012b). Leaders in the Department of Anatomy were Taddeo Alderotti (1210-1295 CE), who seems to have combined the roles of Professor of Medicine and State Medical Examiner for deaths and injuries (Dall'Osso, 1956; Siraisi, 1981). and Mondino di Liuzzi (c1270-1326 CE), who wrote the first modern textbook of anatomy (Infusino et al., 1995).

The Medical School in Paris remained under strict control of the church, and it chose to spurn the services of an outstanding Milanese surgeon-exile (Lanfranc, c1250- 1306 CE) because he was married. Lanfranc promoted the novel concept of cleanliness in surgery, as opposed to encouraging an accumulation

of “healing” pus (Walsh, 1911). Guy de Chauliac (1300-1368 CE) brought the new anatomical knowledge from Bologna to Paris, and later he moved to Avignon to serve as personal physician to the Papal Court established in that city. He survived the Black Death, distinguished Bubonic and Pneumonic forms of the Plague, and successfully fought the rumour that Jews had caused the epidemic by poisoning the local wells (McVaugh, 1997; Thevenet, 1993).

In mediaeval times, problems in gynaecology and obstetrics received short shrift from most health care workers other than the local wise woman (below). In the *Breviarum Practicae*, Arnaldus of Villa Nova, a physician and alchemist from Montpellier University (c1235-1311 CE) was able to dispose of gynaecology in three short paragraphs, linking the topic to a discussion on the natural history of vipers (Bettman, 1956), on the basis that:

“women are for the most part poisonous creatures”

One important development during this era was the devolution of drug preparation from the doctor to a separate class of paramedical professional, the apothecary. A 12th century document discovered at Arles, in Southern France, specifies that apothecaries were to keep out of medical affairs, while doctors were forbidden to own or hold interest in pharmacies (Chief., 2005). This is a lesson that still has to be learned in the United States, where even today editors and other contributors to a number of apparently independent medical journals are heavily financed by the makers of specific and sometimes unproven medications.

Islamic, Jewish and Byzantine influences. In the Arab world, Muslims considered illness as an atonement for sin, and death as a part of the journey to meet God. But nevertheless, medical practice was encouraged, and for many centuries Arabic knowledge of health exceeded that in the Christian world.

During the “Golden Age” (c. 750-1258 CE), the Islamic community accumulated considerable wealth, because of its location astride important trade routes. A defeated Byzantine emperor was surprised to learn that one of the terms of the peace treaty exacted by the conquering Muslim “barbarians” was the right to collect and purchase Greek manuscripts. The consolidation of classical learning was facilitated through insistence on use of a precise and universal form of written Arabic, and libraries were enriched as scholars such as Jurjus Bakhtischû (8th century CE), Ibn Ishaq al-Kindi (801–873 CE) and Hunayn ibn Ishâq (809–873 CE) translated many of the classical Greek and Roman texts into Arabic (d'Alverny, 1991). Hunayn ibn Ishâq not only coordinated the translations, but also served as physician to the Caliph. In an early discussion of weapons of mass destruction, he refused the Potentate's request to formulate poisons to use against his enemies, even in return for enormous riches; he argued that such action would run counter to his medical oath (Tschanz, 2003). The scholars were said to be paid by the kilo for their translations, and thus sought heavy paper for their translations! A defeated Byzantine emperor was also surprised to learn that one of the terms of the peace treaty exacted by the conquering eastern “barbarians” was the right to collect and purchase Greek manuscripts. The Arabs were particularly impressed by the texts of Nestorian

Christians, who had been exiled in turn from Constantinople and Edessa, Syria, and were living at Gondeshapur, Persia. The Persian King Khosrau II also sent his personal physician to India to glean new medical knowledge. The medical school at Gondeshapur, thus did much to conserve and combine the best of the Greek, Persian and Indian medical heritage (Azizi, 2008), as shaped by Thomist and Zoroastrian influences. One measure of the liberal environment was that physicians and jurists had an equal vote with bishops and presbyters in choosing the next Patriarch.

Eastern countries contributed many important scientific discoveries during the Middle Ages, and their empirical, experimental and quantitative approach to scientific inquiry added substantially to medical knowledge. However, it remains unclear whether these investigations included anatomical dissections, or whether Shariah law prohibited such studies. Dissection could have facilitated such discoveries as the true nature of the pulmonary circulation (Savage-Smith, 1995). Names of outstanding Arabic physicians from this era include al-Razi, Symeon Seth, Ibn Sina (Avicenna), Abu al-Qasim al-Zahrawi, Nicholas Myrepsos, Ibn-Nafis, and Maimohides.

Abu Bakr Zakariya al-Razi. Abu Bakr Zakariya al-Razi (ca. 864–930 CE) was born in the city of Ray, Iran, but practiced in Baghdad. He wrote on many topics, including medicine. By careful clinical observation, he was able to distinguish smallpox from measles (Ligon, 2009), and he recognized that fever was an important component of the body's defense against infection. He also was the first person to describe allergic asthma, and like many of his contemporaries, he compiled a 23-volume compendium that

summarized Chinese, Indian, Persian, Syriac and Greek Medicine. With some reluctance, he criticized common aspects of classical Greek treatment, such as the practice of blood-letting to regulate the sanguine humour:

"It grieves me to oppose and criticize the man Galen from whose sea of knowledge I have drawn much."

He also described an early controlled study on the treatment of heat stress:

"A man travelling on a hot day fell into an acute fever; his face was red, his breath hot like fire, and his heart beat violently. I waited an hour or two expecting to see some flow of blood, but nothing happened; so I ordered his nose to be rubbed vigorously. Still there was no bleeding, and the fever and pain increased. Then I gave him ten pounds of cold water to drink, and this was soon followed by copious diuresis and decrease of the fever. But his servant, who got no water because all were busy with his master, died before evening."

Much of al-Razi's therapy was based on an appropriate choice of diet. Where herb remedies were recommended, he checked their side-effects by prior animal experimentation, a policy also advocated by the Persian physician Ali ben al Abbas in his 10th century *Kitab al-Maliki* (Complete Book of the Medical Art).

Symeon Seth. Symeon Seth of Antioch was an 11th century Jewish Byzantine doctor. His *Syntagma de alimentorum facultatibus* (On the properties of foods) also criticized some of the concepts of Galen and he sought to combine the best of Greek knowledge with Eastern traditions (Brunet, 1939).

Ibn Sina. Ibn Sina (980-1037 CE) was a Persian physician whose Canon of Medicine (Gruner, 1930) became the leading medical text during the Middle Ages. He recommended a moderate amount of sleep as a means of balancing the four humours of the body, and he surrounded practices such as cupping for the person who is “over full of blood” with a mysterious ritual (Clendening, 1960):

“Let is be (done) during the wane of the moon, on a day without cloud or rain and on the seventeenth of the month...”

Although his text contained much superstition of this ilk, he also had a broad knowledge of both symptoms and pharmacology, and his Canon was respected by both Arabs and Europeans for the next six centuries. Even today, some physicians regard Ibn Sina more highly than Sir William Osler, because Ibn Sina offered a more integrated view of medicine and surgery (Majeed, 2005).

Abu al-Qasim al-Zahrawi. Surgery was rigidly precluded in the Arab world by an edict of Allah against the cutting of human flesh (*Muthla*, the mutilation and deformation of a divinely created body) (Motzki et al., 2010). However, in Cordoba, Spain, an Arabic physician named Abu al-Qasim al-Zahrawi (936-1013 CE) circumvented Shariah law by using a white-hot cautery to carry out many minor operations [see his encyclopedic text *El Tasreef*, (Ahmad, 2007; Nabri, 1983)].

Nicholas Myrepsos. Nicholas Myrepsos was a Byzantine physician who lived in Nicaea during the late 13th century. He is remembered particularly for his compendium of medical knowledge, the *Dynameron*. This

remained the chief text of the Faculty of Pharmacy in Paris until 1651 (Geanakoplos, 1966). He probably could have helped some modern U.S. penitentiaries:

“we give criminals deadly poison, and then this medicine, and they suffer no hurt”

Ibn al-Nafis. Ibn al-Nafis (1213–1288) was a Damascus-born physician who practiced in Cairo. He wrote important commentaries on the concepts of both Galen and ibn-Sina (Campbell, 2000). In one of his works (*Sharh al-Tashrih, Commentary on Anatomy*) he gave the first clear description of pulmonary transit, the circulation of blood from the right to left ventricles of the heart through the lungs rather than the ventricular septum (Huff, 2003; Paaviläinen, 2009).

Maimonides. Moses ben Maimon (Maimonides, 1135-1204 CE) was a Jewish physician who found greater respect among the Arabs than in the Christian world. He made an earnest attempt to reconcile the teachings of Aristotle and Galen with Mosaic law, and he urged a matching of concern for the well-being of the body with care for the well being of the psyche (Rosner, 2002). He had studied in Cordoba, but when an edict was passed that all Jews and Christians in that city must accept the teachings of Islam, he moved to Egypt, where he became court physician to Saladin. He recognized that Saladin’s lifestyle was far from ideal, and he wrote a dietetic rule book for him (the *Regimen of Health*). He advised (Kraemer, 2010):

“Care of self in the widest sense includes diet, physical exercise, training in the virtues and rational enlightenment.”

Sources of health information and medical care. In the mediaeval world of Western Europe, health information and immediate medical care were provided by the female heads of households, wise women, and the sick dispensaries of monasteries. Other sources of medical advice included a limited number of trained physicians, their technical assistants or barber/surgeons, and well-educated lay-people and clerics. At least in the early part of this era, health-care facilities seem to have been much better developed by the Arabs than by the Christian world.

Female head of the household. The female head of the household was an important first-line source of health care information for the ordinary person in mediaeval times. In recent years, this concept seems to have been rediscovered by Health-Link BC (with its widely distributed *Household Guide to Health*, and associated telephone and internet consultation services) (Macleod, 2009).

The physicians of the Salerno medical school (above) frequently referred to treatments administered by the ladies of their city (*mulieres Salernitanæ*). Their healing efforts were probably led by Dame Trotula (above). For example, one record speaks of the *mulieres* treating dropsy by the administration of herbal diuretics. However, the sources of guidance available to the mediaeval chatelaine were themselves often suspect, and sometimes the treatments administered were much less appropriate than the herbal diuretics. Occasionally, the chatelaine's knowledge was used deliberately to kill her patient (as, for example, Stephania (Brewer, 1881) who used her understanding of herbs to poison the Emperor Otto III in 1002 CE). Chaucer (1343-1400 CE) was quite

cynical about the wifely advice likely to be received in mediaeval England. In the *Nun's Priest's Tale* he had Chanticleer nearly poisoned by drastic domestic remedies such as an extract of black hellebore (Chaucer, c1390; Creekmore, 1966). Nevertheless, the mediaeval lady of the manor was expected to provide health advice not only for her own family, but also for her less well-educated tenants. Thus, *Le Ménagier de Paris* (c1393 CE) provided necessary guidance to his fifteen-year old bride on ways to prepare soups and beverages for the sick (Power, 2006). Tudor authors such as Thomas Tusser (1524-1580 CE), a Suffolk farmer (Tusser, 1812), and Gervase Markham, a 16th Century member of the Queen's cavalry, (Markham, 1986)) also commended the womanly role of tending the sick.

Wise Women. "Wise Women" or "White Witches." provided the second tier of medical care for the common people of Mediaeval Europe. The Wise Woman had an extensive practical knowledge of both midwifery and herbal folk remedies, and was able to provide effective pain-killers, digestive aids and anti-inflammatory agents. In an attempt to guard against the intrusion of witchcraft and pagan practices, the Mediaeval Church required midwives to be licensed by a bishop and to swear an oath not to use any form of magic when assisting women through labour (Herberman, 1913).

Mirroring current controversies over the place for exercise specialists, nurse practitioners and registered midwives in the health-care continuum, Wise Women were ill-regarded by many medical practitioners in Mediaeval society (Blais, 2002; Warburton et al., 2011; Worster et al., 2005). For example, in 1322 the Faculty of Medicine in Paris forced Jacoba

Felicie to face trial on charges of illegal medical practice (Minkowski, 1992; Null, and Seaman, 1999). English physicians, likewise, sent a petition to Parliament bewailing the "*worthless and presumptuous women who usurped the profession;*" they urged the imposition of fines and "*long imprisonment*" on any woman who attempted to "*use the practyse of Fisyk*" (Null and Seaman, 1999).

Sometimes, the Wise Women did indeed introduce pre-Christian rituals into their ministrations, and this is one reason that they sometimes incurred the wrath of the church. Formal witch-hunts began in Germany during the 14th century, and at the urging of monks such as Kramer and Sprenger (*Malleus Malificarum*, Hammer of the witches) (Institoris et al., 2007; Minkowski, 1992), persecution swept progressively across Europe, so that by the 17th century even the Protestant James I was subjecting supposed witches to the death penalty in the newly formed United Kingdom of England and Scotland. One witch-hunter wrote (Elias and Ketcham, 1995):

"all good Witches, which do no hurt but good, which do not spoil and destroy, but save and deliver...It were a thousand times better for the land if all Witches, but especially the blessing Witch, might suffer death."

Monasteries. The monasteries offered a third recourse for the sick in all ranks of society. Early during the Mediaeval era, Benedict of Nursia (c 480-547 CE) had ordered that monasteries should make arrangements to tend the sick. Many such institutions developed extensive herb gardens. In 820 CE, the Abbott Rabanus Maurus also included in the design for an abbey to be constructed

at Fulda, Germany, a special wing for sick and elderly Brothers, a lazaretto for those with contagious diseases, and an apartment for a monastic medical specialist (Bettman, 1956). By the end of the 13th century, monasteries across Europe offered as many as 19,000 *leprosaria* in (Hays, 2009). Misdiagnosis of leprosy was frequent, but nevertheless isolation of patients with skin conditions contributed to the progressive control and elimination of this disease from Europe.

At any given monastery, one or more monks commonly assumed the role of herbalist. In Germany, the Abbess Hildegarde of Bingen (1098-1179 CE) (Throop, 2006) wrote extensively on the value of herbs and holistic therapy when deployed within the Hippocratic tradition. For example:

"Every plant is either hot or cold, and grows thus, since the heat of the herbs signifies the spirit, and the cold, the body."

Some monasteries also had resident or visiting lay doctors (*medici laici*, or *idioti*). An appropriate stipend for a *medici laici* comprised (Hartley and Elliot, 1929):

"one loaf of bread, one gyst of best beer, 40 shillings per annum, and on fish or flesh days to be served as one of our monks."

The Alexian brothers (*Lollebroeders*, or *soft-singers*) were a lay order originating in Mechelen, Flanders. They were initially recruited to provide terminal nursing care for victims of the Black Death. During the 15th century, the Order spread rapidly throughout Germany and the Low Countries, despite some repression from the Vatican. It still operates a number of hospitals in the U.S.

Trained physicians. Charlemagne (c742-814 CE) ordered his Minister of Education to teach children medicine, although it is unclear whether those selected for such instruction were intended to serve as professional physicians or simply as well-educated lay people.

In 10th century Anglo-Saxon England, some vernacular medical texts such as the "*Leech Book of Bald*" became available, probably at the urging of Alfred the Great (848-899 CE). These books offered primarily herbal remedies (Nokes, 2004; Rubin, 1970). However, early physicians became known as leeches, by virtue of their main alternative to herbal treatment.

Following the Norman invasion, an elite group of master physicians and teachers emerged within the Catholic church. They came to regard healing as an important part of their religious duties, and if they were successful in their medical practice, they were often appointed to prestigious and well-endowed livings. Over the 11th century, this group became progressively divorced from the church and established itself as a separate professional entity. Thus, Pope Boniface VIII (c1235-1303 CE) advised Magister Arnald of Villa Nova (de Villanova et al., 1975) to set aside his interests in theology and stick to his medical last "*Intromitte te de medicina, et non de theologia*").

Treatment by this small coterie of trained physicians was largely the preserve of the rich. During the 13th century, the city of Worcester (with a population of some 10,000) boasted only three "physicians" (Getz, 1998). This medical complement may be compared with the current 37/10,000 physician/patient ratio in Vancouver (Thommasen et al., 1998); nevertheless,

even lower ratios persist in some third world countries such as Mali and the Central African Republic where current figures are still only 0.8 physicians per 10,000 population.

King Magnus of Norway and Denmark (1024-1047 CE) was particularly concerned about the small number of trained surgeons available to accompany his armies. He thus supplemented their numbers with those of his soldiers who had "*the softest hands.*" These medical orderlies began their task knowing nothing about the healing arts. However, some were quick learners, and it was reported that in time they became "*perfect leeches.*"

Professional fees were often high. In his prologue to the *Canterbury Tales*, Chaucer warns of the "*silken-clad Doctor of Physic who 'loved gold,'*" and an addition to the *Regimen Sanitatis Salernitanum* advises:

"Let doctors call in clothing fine arrayed, with sparkling jewels on their hands displayed, for when well-dressed and looking over-nice, they may presume to charge a higher price."

Nevertheless, the professional competence of the typical trained physician remained pitiful. A renowned Royal Physician of the 14th Century (John Arderne, died c 1377 CE) suggested treating kidney stones with:

"a plaister of pigeon's dung and honey applied hot!" [The Art of Medicine (Arderne and Millar, 1922)]

Arderne's fee for the surgical treatment of an anal fistula was the immediate payment of 40 marks, a gift of clothing, and continuing annual payments of 100 shillings for the remainder of the

patient's life (Cosman and Jones, 2008); in 1956, The total fee was estimated as the equivalent of \$48,000 in 1956 U.S. dollars (Bettman, 1956). Nevertheless, this patient was wealthy, and Arderne is said to have treated the poor without charge.

In Europe, various governments began to contemplate a State Health Service, able to provide medical care to the poorest members of society. In 1214 CE, Hugh of Lucca was appointed State Surgeon in Bologna at an annual salary of 600 *Bologni*. In return for this stipend, he was expected to spend at least a half of the year practising in the city of Lucca, and to attend the poor gratis. Likewise, Council reports for the city of Nuremberg record that in 1377 CE Magister Petrus was appointed *medicus noster*, the city physician to the poor (Borkowsky, 1935). Wismar, Strasburg, Cologne and Frankfurt also established the post of *Stadtärzte* (City Physician), and in 1426 CE the Holy Roman Emperor Sigismund decreed that every city within the Holy Roman Empire must hire a town *physicus*, at an annual salary of at least 100 guilders (Lindemann, 1999).

Dealings of the physicians with wealthy patients were sometimes fraught with danger. When Queen Austragild of Burgundy died in 580 CE, her final wish was that her physician be executed on the following day. King Guntram gladly met this request (Dana, 1926):

"the spirits of the angelic queen and the inefficient physician took a synchronous...and peaceful flight into the unknown"

In the days before the advent of Medical Malpractice insurance, one tactic of the wily physician was to refuse treatment unless the patient signed

documents indicating that he considered himself already dead.

Barber/surgeons. The mediaeval period saw the emergence of a substantial company of medical technicians and barber/surgeons, individuals who had usually gained a modicum of professional knowledge through apprenticeship to a formally trained physician. The doctors commonly relegated such mundane tasks as the annual spring and fall blood-letting to the barber/surgeons. Such "cupping":

"soothes rage, bringing joy to the sad, and saves all lovesick swains from going mad."
[Regimen Sanitatis Salernitanum]

But, medical technician beware, such benefits are seen only if the cupping applied to the appropriate side of the body in an appropriate phase of the moon! Sometimes, barber/surgeons not only assisted local physicians, but also solicited patients on the street or set up a booth at the local market. Many of the group plied other trades in their free time, and often their medical services were reimbursed in-kind. One such individual, John of Essex, combined the duties of phlebotomist, medic, and tooth-drawer from 1156 to 1171 CE. Foreshadowing the introduction of universal health care, the Royal Exchequer offered him a grant of one penny per day, so that he could treat the poor and indigent in his area. The cost of medical services underwent a rapid escalation even during the Middle Ages, and by 1400 CE, Mathew Flynt of London was receiving sixpence per day for this same responsibility (Getz, 1998).

Well-educated lay-people. Well-educated laymen and clerics often learned

a little medicine as a part of their general education. They thus provided a further health-care resource for both rich and poor (Getz, 1998). Isodore's *De Medicina* (Barney et al., 2010; Sharpe, 1964) offered brief didactic instruction, and it seems to have been written mainly for this third category of lay practitioner, sometimes known (perhaps justly!) as the *idiotae*.

Henry of Mondeville (1260-1316 CE) (Clarke, 1931) distinguished two classes of "idiot": the proud and stupid who boasted of their hereditary knowledge and opposed orthodox medical practitioners and those whose circumstances had prevented their acquiring a regular education, but who respected qualified surgeons, and were ready to learn from them.

Arabic patterns of health-care. In many respects, medical services in the Arab world were further advanced than in Western Europe during the Middle Ages. The Nestorian hospital at Gondisapor dates back to the 5th century, and as early as 707 CE, Caliph Welid founded a similar institution in Baghdad. The latter facility not only provided treatment for the sick, but also accommodated the blind and lepers. By 977 CE, the largest of Baghdad's many hospitals boasted a staff of 24 physicians, and in 1160 CE an itinerant Jewish Rabbi commented that there were also 60 "medical warehouses" within the city (Zunz and Lebrecht, 1840). Moreover, service was provided without regard to wealth:

"every patient who claims assistance is fed at the king's expense until his cure is completed"

And on discharge from hospital,

"each patient received five pieces of gold, so that he might not be obliged to return to work immediately."

Other large and well-appointed hospitals were constructed in Damascus and in Cairo. The Cairo House of Wisdom (Withington, 1964) boasted an extensive library that employed six librarians, and scholars were

"admitted without distinction. Some came to read, others to copy the books, others to attend the lectures of the different professors. They found there all the pens, ink, and paper they could require."

Public health, preventive medicine and fitness

Public health. The Western Caliphates seem to have developed a good system of Public Health during the period of Muslim rule. During the 10th century, the city of Cordoba boasted 900 public baths, 17 universities and 70 public libraries. The library of Al Hakem II (985-1021 CE) had some 225,000 volumes in its stacks (Reilly, 2005; Taylor, 1845). However, in Northern Europe, the infrastructure of an earlier era- aqueducts, public baths and sewers- had quickly fallen into disrepair following the departure of the Roman garrisons, and the Mediaeval population had little concept of either Public Health or Preventive Medicine. Infrequent bathing and unwashed woolen clothing led to a proliferation of fleas and other insect vectors, uncontaminated water was a rarity, and a lack of refuse disposal encouraged rat infestations of most towns. In 1349, King Edward III (Child et al., 1991) complained to the Mayor of London about:

“human faeces and other filth lying in the streets and lanes in the city”

In many cities, substantial populations of hogs and cattle added to the odour and stench. For example, Philip I of France (1116-1131 CE) was killed when his horse shied because a hog had darted out from a dung heap along the banks of the Seine. During the mid 14th century, two thirds of the European population was killed by a flea-borne outbreak of bubonic plague (the “Black Death”, 1340-1348 CE) (Ziegler, 1998). The French physician Guy de Chauliac (above) wrote (Krey, 1955):

“so contagious was the disease that no one could see or approach the patient without taking the disease”

Many of the doctors deserted their patients, fleeing to what they perceived as safe havens. Others proposed preposterous remedies for the disease. However, effective quarantine measures were developed in Venice, Ragusa and Marseilles over the decades that followed the Black Death. Reminiscent of Ellis Island in the US, or the Ile d’Orléans in Québec, incoming travelers were required to spend forty days of isolation on an island before being admitted to the city (Fрати, 2000; Tran et al., 2011).

In Northern Europe, most of the Roman *balnae* (Shephard, 2012b) had been abandoned, in part because of the high cost of heating the water, and in part because the church considered public bathing a prelude to venal sins (Jackson, 1990). However, John of Villula, Bishop of Bath and Wells, had a strong interest in medicine, and under his direction the local “*King’s Bath*” was rebuilt over the ruins of the *Sulis Minerva* temple during the 12th century. The local spring

delivered around a million litres of water per day at a temperature of 46.5°C, avoiding any problems with heating bills or pollution! (Jackson, 1990). The bath served mainly for medicinal purposes rather than for personal cleansing, since the water contained a malodorous mixture of at least 30 minerals. It reputedly cured Prince Bladud of leprosy in 863 BCE. The healing powers of the Bath became sufficiently famous that:

“From all over England sick people come to wash away their infirmities in the healing waters, and the healthy gaze at the remarkable bubbling up of the hot springs.”

Saint John’s Hospital was founded in 1174 to accommodate those who were receiving extended treatment at the King’s Bath. Many doctors settled in the surrounding streets, and by 1609 Bellot’s Hospital was offering spa treatment not only to the rich, but also to poor people (Bath, 2012). However, the spa was not immune to religious controversy and criticism. In 1449 CE the Bishop of Bath proclaimed mixed nude bathing a profaning of God’s holy gift of water, and in 1536-1430 CE Henry VIII closed the baths because they implied acceptance of the Catholic superstition of “holy” springs (Crebbin-Bailey et al., 2005).

In Germany, a tradition of river bathing persisted, and a growing number of public bath houses were constructed during the 14th century. Attendance was expensive and poorer Germans considered *badgeld* (bath money) a great blessing. Unfortunately, the hot tubs progressively became the scene of debauchery, prostitution and infection rather than healing. By the 16th century, the City Fathers were closing them for

fears of spreading syphilis, leprosy and plague.

Another aspect of the Social Safety Net (the Seniors' housing complex) made its first tentative appearance during the Middle Ages. In 1388 CE, a Nürnberg brewer (Konrad Mendel) founded the "*Guild of the 12 Brothers*" to care for middle-class artisans after they had retired (Treue, 1966):

"12 alte, kranke, aber nicht bettlägerige Männer, welche das Nürnberger Bürgerrecht besaßen und sich mit eigener Arbeit nicht mehr ernähren konnten." (12 old, sick, but not bedridden men of Nuremberg citizenship who could no longer feed themselves with their own work."

His seniors' complex included sheltered workshops, so that the artisans could continue to pursue their trades at a speed commensurate with their abilities. In England, almshouses performed a similar role in caring for elderly people during the Middle Ages (Clay, 1909). Many almshouses were associated with monasteries or included a chapel or chantry, and because of their association with the Catholic Church, they were unfortunately stripped of their support during the turmoil of the Reformation.

Fitness. As Roman forces withdrew from Britain and much of Northern Europe, the civil order, lavish lifestyle, and indolence of the Roman Empire was quickly replaced by the primitive and chaotic existence of an earlier era (Gibbon and Bury, 1900). Most of the "Barbarian" population devoted their days to hunting, gathering food, and tending cattle (Randers-Pehrson, 1993). The tasks of daily living once again provided most

people with more than an adequate dose of physical activity.

Much energy was expended in defending castles, abbeys and small city-states. The Mediaeval knights were eager to maintain their physical condition. During battle, their armour imposed a heavy metabolic and thermal load, and between military campaigns they thus maintained a high level of physical condition by jousting, tournaments and hunting. Surrey, Henry VIII's courtier poet (Weir, 2001) wrote of:

"The gravel ground, with sleeves tied on the helm, On foaming horse, with swords and friendly hearts."

The recommendation of most physicians to fairly healthy patients was to engage in moderate exercise. Thus Arnald of Villa Nova (above) advised patients with palpitations of the heart (Withington, 1964):

"take moderate exercise before eating, and rest entirely after it, till the food has left the stomach, and then ride horses or gently trotting mules, avoiding rapid ascents or descents."

Attitude of the church. Many ordinary townspeople showed a poor level of fitness during the Middle Ages. Blame should probably be placed on the asceticism of the Mediaeval church. Earlier, the Church Fathers had certainly shown opposition to both the worship of Zeus that was associated with the classical Olympic Games and the brutality of Roman spectator sport (Shephard, 2012b). Thus, in a treatise for young catechumens (*De spectaculis*) written around 197 CE, Tertullian had condemned Christian attendance at circuses, stadiums and amphitheatre

spectacles. Likewise, In his "*Homily against spectacles*," John Chrysostom (347-407 CE) railed against Christians who preferred horse races "*willingly*" and disliked "*angrily*" his "*sermons and instructions*" where such functions were vigorously denounced (de Mariana, 1854; Mercado, 2007).

It is less clear established how far the early church despised personal fitness. Indeed, the words "ascetic" and "athletic" were initially almost interchangeable, and the athlete was used as a symbol in much early Christian teaching (Koch, 1971). In his Epistle to Polycarp, Ignatius of Antioch (c35-117 CE) (Mercado, 2007) wrote:

"Be sober, as an athlete of God. The prize is incorruptibleness and eternal life, whereof you also are convinced... athletes are wont to be skinned and yet to be victorious... fight together, run you all at the same pace."

Similarly, Tertullian compared the martyr's training to that of the athlete (O'Malley, 1967):

"the agonothete,...who presided over Greek games and bestowed the prize "is God Himself"; the Xystarch, who played the role of judge, is the Holy Spirit; the spectators are the angels and the trainer Jesus Christ."

Tertullian also wrote favourably about military training (Dodgson, 1842 ; Mercado, 2007), where soldiers:

"are already learning by labour and distresses to endure war, by marching under arms, running over the plain, working at the fosse" All their doings are made up of toil, lest their bodies and their minds should be terrified in passing from the shade to the sun, from the sun to the open air, from the vest to the coat of mail,

from silence to clamour, from rest to tumult."

Other early church leaders advocated regular physical effort. In his work *Paidagogus*, Clemens of Alexandria (150-215 CE) (Ferguson, 1974; Ferguson, 1976) commended athletics for boys and men, although not for women. Potential activities of the Christian convert could include moderate (non-competitive and amateur) wrestling, ball play and fishing), although Clemens personally preferred an emphasis upon the physical tasks of daily living (handling a hoe, working the mill, chopping wood and walking for transportation) rather than sport. Likewise, although Isidore of Seville considered the Olympic Games as idolatrous [*De bella et ludis*, (Barney et al., 2010)], he also recommended (Mercado, 2007) that youngsters acquire:

"a more vigorous and stronger spirit than body itself... To exercise yourselves at full through mountains, through sea and you shall see with wonder how good and healthy the body feels with the work and development that the limbs acquire with exercise." [Historia de los godos]

Attitudes in the Middle East. Several Middle Eastern scholars made positive comments on the value of moderate physical activity, notably Avicenna and the Jewish physician Rabbi Moses ben Maimon (Maimonides, 1135-1204 CE).

In the *Canon of Medicine*, written in 1025, Avicenna argued that walking was the best medicine. In the chapter "*The Regimen of old age*," he wrote (Kruger, 1962):

"Among physical exercises, there are some moderate ones; it is to them that one should devote himself. They... are factors

of good nutrition for adults and happy growth for the young. Unmoderated exercise is an overload...and causes the body to age before its time...preserve a happy medium... exercise your limbs... until you succeed in panting."

Maimonides practiced in a suburb of Cairo, and eventually became physician of Saladin, the first Sultan of Egypt and Syria. He, also, was a strong advocate of a healthy personal lifestyle (Leviant, 2008 ; Ryan, 1974):

"A person should...walk prior to the meal until his body begins to be warmed...Strenuous exercise should be taken every day in the morning till the body is in a glow. There should be an interval of rest till one has recovered composure...Anyone who lives a sedentary life and does not exercise...even if he eats good foods and takes care of himself according to proper medical principles- all his days will be painful ones, and his strength shall wane... The most beneficial of all types of exercise is physical gymnastics to the point that the soul rejoices."

However, Muslim insistence on wearing the Burjka and Hajib certainly did little for the fitness of women.

Sport and recreation. Fathers of the Greek Church had condemned many aspects of spectator sports, but chariot racing in the Hippodrome continued to flourish into the Sixth Century (Kazhdan and Constable, 1982). As the Middle Ages developed, the aristocracy engaged in equestrian sports, tennis, bowling, kolf, cricket and pall mall. In his younger days, Henry VIII was quite athletic, building a tennis court and a bowling alley, and wrestling with the King of France.

The common people engaged in a wide variety of active pursuits on Sundays and Saint's Days (of which there were at least 20 per year), despite occasional prohibitions from clergy (who wished to boost church attendance) and kings (who sought military training during any free time). Popular options included football, archery, water races, foot races, shinty, stoolball, rounders, wrestling, leaping, casting the bar and various energetic forms of dancing.

By the late Middle Ages, some forms of work (for example, tailoring) were becoming sedentary, and society was devoting a growing part of its leisure time to passive pursuits, including a range of pageants, spectacles, Mumming plays, cock and bear-fights and sedentary games. Moreover, a number of the common sports and pastimes had become more ritualized, and no longer required great physical effort.

Equestrian sports. Hunting.

Hunting and polo were both popular sports among Byzantine aristocrats (Kazhdan and Constable, 1982). In Northern Europe, all classes engaged in hunting as a source of food, but for the aristocracy it was progressively transformed into a stylized pastime, with much of the countryside set aside as Royal Forests, "chases" and *Tiergarten* where game were preserved (Griffin, 2007). As the church became more secular, many of the clergy enjoyed their share of hunting, and sometimes they devoted more time to such pursuits than to their spiritual responsibilities:

"An avid horseman was this monk, alright: His greyhounds were as swift as birds in flight. Tracking and hunting hare - he loved to do it" [Prologue to Chaucer's *Canterbury Tales*, (Brodie, 2005)]

Henry II (1133-1189 CE) brought before the secular courts those clergy whom he thought were devoting too much of their time to hunting and hawking. But this did not deter Thomas à Becket, Archbishop of Canterbury, who took various hunting dogs and hawks to France when he became ambassador to that country. In Clause 42 of the *Magna Carta*, John (1166-1216 CE) gave specific rights to senior clergy that soon became embodied in the Forest Charter of Henry III (1217)(Thomson, 1829):

"Whatever Archbishop, Bishop, Earl, or Baron, shall be passing through our forest, it shall be lawful for them to take one or two Deer by the view of the Forester."

Tournaments. Tournaments were common pastimes for Mediaeval knights. The concept of the tournament had been introduced to England by the Norman nobility during the 11th and 12th centuries CE. It was essentially a mock battle, involving large cavalry forces (McIntosh, 1971; Riley, 1853), and was perhaps intended initially as a form of military training. But by the 13th century, tournaments were carried out without overt hostility (*nullo interveniente odio*), solely for practice of horsemanship and a display of military prowess (*pro solo exercitio, atque ostentatione virium*)."

Tournaments were at first condemned by the church because of their violence, and like many other sports, they continued to be prohibited during Lent. The bohort, or play tournament, was a related event for aristocratic youth that placed more emphasis on horsemanship than on combat. It was described by William Fitzstephen, around 1183 CE, in his preface to a biography of Thomas Beckett [*Descriptio Nobilissimi Civitatis Londoniae*] (An, 1772)].

Jousting and tilting. Those who were not knights, but at least held the social rank of esquire, were entitled to engage in cruder forms of jousting and tilting (Strutt, 1968). Jousting initially mimicked the tactics of the heavy cavalry, with contestants using a lance, axe or dagger and wearing armour that weighed as much as 50 kg. The Roman practice of water jousting was also revived in both England and France. By the 14th century, gunpowder had made use of the lance obsolete, and a surfeit of real conflict in "hot wars" reduced interest in mock battles (Strutt, 1968). Nevertheless, jousting with blunted spears continued into the 16th century as the sport of "haslitude,"

In England, jousting sessions were the high point of Elizabethan Accession Day tilts (Barber and Barber, 1989). The joust was normally stopped if the life of one of the contestants seemed in danger. In France, the jousting death of Henry II from an orbital infection (1559 CE) led to the substitution of horse ballets, including ring tilts (Martin, 2001). However, water jousting persists to this day in some areas of France, such as the Rhone valley, and it may have spurred development of the Canadian sport of burling.

Tennis. The game of tennis probably originated in France during the 12th century (Crego, 2003). The ball was originally struck with the palm of the hand (from the French "*jeu de paume*"), but in the 16th century, rackets came into use. The name tennis (from the French "*tenez*") was then adopted, and the game was usually played indoors. Henry VIII was a big fan of the new sport, and in 1530 he constructed a luxurious tennis court at his Hampton Court palace.

Bowling. The sport of bowling (from the French *boule*) probably originated during the reign of Henry II of England (1133-1189 CE). It was initially played in alleys, such as in the one built for Henry VIII in his Whitehall Palace (Walford et al., 1886). The local taverns also arranged bowling matches. These were criticized by Edward III and Richard II because they took the common people away from archery practice and encouraging gambling. By 1511, an edict of Henry VIII made bowling an illegal pastime for the common people, with a fine of 6s 8d for those disregarding this law. However, those owning property valued at more than £100 could obtain a "bowling licence," An amendment enacted in 1545 allowed commoners to join in the sport at Christmas, although only under the direct supervision of the Master of the house.

The Wilts Magazine of 1648 tells us that Sir Edgar Hungerford lost his entire estate on the outcome of a game of bowls. Lawn bowling was also prevalent by the time of the Armada, with Sir Francis Drake busily engaged in such a game at Plymouth Hoe while he awaited the arrival of the Spanish fleet. King Charles was allowed to enjoy the occasional game of bowls while held captive in Carisbrooke Castle.

Kolf. The sport of Kolven, or Kolf, originated in the Netherlands during the 12th Century. It seems to have been an antecedent of golf, although it evolved into an indoor sport, played in large private houses and in rooms adjacent to taverns. The word golf was first used in 1453 CE (Strutt, 1968). The sport shared in the blue laws of the period, and during the 16th and 17th centuries Scottish authorities frequently prosecuted people who had the temerity to play on the "Sabbath" (Strutt, 1968).

Cricket. The origins of cricket are unclear. However, there was a game where a small ball was hit by a cryc, or curved stick as early as the 13th Century CE (Strutt, 1968), and in 1300, Edward I invested 100 shillings to provide his son instruction in the game of Creag (Strutt, 1968). in 1420, a cricket match in the village of Bemerton, near Salisbury, witnessed an unpleasant brawl where an intervening spectator was hit with a bat. The spectator apparently remained unconscious for some 3 months, until a miraculous healing was effected at the tomb of Bishop Osmund.

Pall Mall. Pall Mall is an ancestor of croquet, and it appears to have been derived from the Italian game of *pallamaglio*, or ball mallet. It was played extensively by the nobility during the 16th and 17th centuries. Joseph Strutt described the 1611 version of the game as follows:

"Pale-maille is a game wherein a round box ball is struck with a mallet through a high arch of iron, which he that can do at the fewest blows, or at the number agreed upon, wins" (Strutt, 1968).

The main walk of St. James Park was set aside for Pall Mall, and King Charles and his courtiers often engaged in this activity. As Samuel Pepys wrote in 1661 (Wheatley et al., 2006):

"To St. James's Park, where I saw the Duke of York playing at Pelemele, the first time that I ever saw the sport"

Football (soccer). The origins of soccer are obscure. Some authors trace it to the Roman game of *harpastum* (although this used a small and rather hard ball), to the Greek *episkyros*, or even

to China. As early as the ninth century CE, the Welsh monk Nennius reported that a group of boys were playing at ball (*pilae ludus*)(*Historia Britonum*) (Giles, 2006).

In mediaeval England, soccer sometimes retained its pagan origins; for example, the Good Friday game at Wreyland, Devon, was supposed to ensure a bumper potato crop. In this era, soccer often became a brutal mob game between rival villages. A team of unlimited size tried to force an inflated pig's bladder onto the steps or even the balcony of the opponents' parish church. The contest often ended with broken limbs and internal injuries, and there were occasional deaths, as in Ulgham, Northumberland (1286 CE), when a player became impaled on an opponent's dagger (Lennox, 2009).

Despite the protests of the church, soccer games often occupied the leisure time of religious festivals. Thus Fitzstephen described the mediaeval Shrovetide in London (An, 1772):

"all the youth of the city go into the field of the suburbs and address themselves to the famous game of foot-ball."

In 1313 CE, King Edward II banned mob football because of the chaotic impact of "hustling over large balls," and in 1331 CE Edward III renewed this ban because it distracted able-bodied men from archery practice. Occasionally, even the clergy ventured onto the soccer field. In 1584, the Diocese of Oxford ruled that any minister or deacon found guilty of participating in this sport was to be reported to the bishop and banned from office.

Archery. During the period 1272-1483 CE, archery was strongly encouraged by several English monarchs

(Edward I, Edward III, Richard II and Edward IV) (Bradbury, 1985; Trevelyan, 1944) as a means of increasing military preparedness. The Assize of Arms of 1252 had already stipulated that all "*citizens, burgesses, free tenants, villeins and others from 5 to 60 years of age*" should provide themselves with arms. Even the poorest male citizen was expected to seek out a long-bow matching his height, and butts were set up in every town. Edward I banned all sports except archery on Sundays, and under Edward III, a halfpenny penalty was imposed on all who failed to participate in the weekly archery practice. Thus, in 1363 he declared:

"every man... in the same country, if he be able-bodied, shall, upon holidays, make use, in his games, of bows and arrows... and so learn and practise archery"

The skills honed at the archery butts earned the British victory in several battles during the Hundred Years War, including Crécy (1346 CE) and Agincourt (1415 CE).

Water races. Wealthy livery companies and private householders sponsored contests between the watermen who provided barge transportation on the River Thames. These races covered distances of several km (Burnell and Page, 1997).

Foot races. One well-documented footrace with Mediaeval roots is the Olney Pancake race. This has been held each Shrove Tuesday since 1445 CE, when a housewife, reputedly late for the Shroving service, ran from her kitchen to the parish church, still clutching her frying pan. Contestants were subsequently required to run from the Bull Inn to the church (a

distance of about 380 m), tossing their pancakes en-route.

Shinty. Shinty is a predecessor of field hockey, and it probably dates back as long as two millennia. The Gaels brought it to Britain from Ireland (McLennan, 1999).

Stool ball. Stool ball may have begun as an ancestor of cricket. It was originally played by milkmaids, who used their milking stools as wickets.

Rounders. Rounders, an ancestor of baseball, seems to have been played in England at least since Tudor times.

Dancing. Dancing was popular on Mediaeval feast days. Maypole dances possibly had some connection with ancient fertility rites, and many towns and villages set up a permanent Maypole. The church of St. Andrew Undershaft, in the city of London, erected a Maypole each spring, until student riots in 1517 and the wrath of a Puritan mob in 1547 put an end to the ceremony (Cobb, 1977).

Morris dancing (*Moriskentantz, morisques, moresca*), was originally inspired by the Moors. It became widely popular as an energetic recreational pursuit across Europe during the 15th century, with sticks replacing the Moorish swords (Forrest, 1999). Originally seen as a court entertainment, it was quickly adopted by the working peasantry as a part of their Whitsuntide celebrations.

In 1600, a Shakespearean actor, William Kempe, is said to have Morris-danced the entire distance from London to Norwich (a distance of some 170 km). When he reached his destination, he received a substantial purse from the Norwich City Corporation (Kempe, 1600). Related forms of popular dance included the Molly Dance (this was a begging form

of the Morris dance, performed on Plough Monday, immediately following Epiphany, with the ploughboys wearing clogs and some clad as women), a Horn Dance originating in Abbots Bromley (where participants wore reindeer horns and carried hobby horses) (Plot, 1686), and Hoodening (a Kentish begging dance performed at the winter solstice where participants carried a "hooden horse").

Other forms of physical activity. Fitzstephen describes the many other physical activities that vigorous young men (probably drawn from the guilds of apprentices) performed in London on public holidays:

"Leaping, Shooting, Wrestling, Casting of Stones [in jactu lapidum], and Throwing of Javelins fitted with Loops.... they also use Bucklers, like fighting Men."

To this list may be added hammer-and horse-shoe throwing, quarter-staff contests, quoits, skittles. For the children, there were also games of hopscotch, blind man's buff, and the many other games recorded by Pieter Bruegel the elder in his painting *Kinderspiele*, (Children's Games, 1560 CE).

During the winter months, Fitzstephen describes the youth of London amusing themselves on the frozen marshes, wearing shin-bone skates, and dragging their friends along on sleds. Pieter Bruegel also recorded the ice sports of the Dutch peasantry (see, for example, his *Winterlandschaft mit Vogelfalle* (Winter landscape with a bird trap, 1565 CE).

Sedentary pursuits. Sedentary pursuits for all classes of society included games of chess, alquerque (an Arabic forerunner of checkers), back-gammon,

nine men's Morris (a strategy board game with Roman origins), fox and geese (a board game from Scandinavia), shove ha'penny, shovelboard, hazard (an ancestor of craps, possibly devised during the siege of Hazarth (1125 CE), or named after the Arabic for dice, *Al Zar*), and various types of card game (Bell, 1979; Mohr, 1997; Murray, 1952).

Conclusions

Given that the Middle Ages began with the almost total collapse of learning in Northern Europe, it is remarkable that any of the knowledge gleaned during the Classical Era was conserved for subsequent generations. Society owes a considerable debt to the Muslim world for its efforts in preserving, translating and compiling the master works of an earlier age. However, in medicine, Eastern scholars opened up relatively few new lines of enquiry.

The Mediaeval Church supported scholars who could read Greek and Latin literature, but in many respects the ecclesiastical authorities had a negative influence upon learning, proscribing classical medical documents through fear of promoting pagan superstitions. The emphasis of the Mediaeval Church upon personal asceticism, stoic acceptance of illness, the expectation of a miraculous cure through faith in a saint or his venerated relics, and the interdiction of anatomical dissection did little to encourage health or a greater understanding of bodily function. Moreover, throughout much of the Mediaeval period, theological controversies occupied the brightest minds, at the expense of more profitable lines of enquiry.

Nevertheless, the monasteries did provide passive care for the elderly and those with chronic disease, and

pharmacological knowledge was conserved and developed through their herbalists. The gradual emergence of independent medical schools and the divorce of physicians from church authority seem to have been essential steps in paving the way for the Renaissance, with its plethora of new discoveries in health and science.

Mediaeval cities were marred by filth and squalor, leading to fearsome epidemics such as the Black Death. Nevertheless, there were a few advances in Public Health, including the development of quarantine measures, the segregation of lepers, State provision of health care for the poor, and the development of sheltered housing for the elderly. Further, an ever-growing range of active sports and pastimes offered interested city dwellers a means of conserving their physical fitness in a world where sedentary occupations were becoming more common.

Author's Qualifications

The author's qualifications are: Roy J. Shephard M.D., Ph.D., LL.D., D.P.E., F.A.C.S.M.

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