

*The Proceedings  
of the  
14th Annual*

# **HISTORY OF MEDICINE DAYS**

**FACULTY OF MEDICINE  
THE UNIVERSITY OF CALGARY**



ΑΝΙΣΤΑΤΕ ΤΑ ΑΡΧΑΙΑ  
ΙΝΑ ΣΠΕΥΔΗΤΕ ΤΑ ΚΑΙΝΑ

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**Edited By  
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## ***Preface & Acknowledgements***

History of Medicine Days, hosted every year by the Faculty of Medicine and co-sponsored by the Alberta Medical Foundation and Associated Medical Services, gathers medical students from across Canada to present papers on topics of their choice in history of medicine. The subjects range from ancient to modern history and touch on personal stories of doctors, attitudes to disease, economics of medicine, politics of health policy and curious anecdotes. They display the enthusiasm, curiosity, and wide knowledge of medical students and the interest they have in broad issues of society and their profession.

This year, 60 students from six medical schools (Memorial, Queen's, Alberta, Calgary, Manitoba and UWO) gave oral presentations during the two-day event held March 18 and 19. Dr. Michael Bliss, University of Toronto, was our keynote speaker this year and presented an inspiring talk on *"From Osler to Insulin: The Coming of Age of Medical Miracles"*.

Scholarship, oratory and competence with PowerPoint were all of high quality and the audience was superbly entertained.

Proceedings would not be possible without substantial financial support the Alberta Medical Foundation, the Hannah Institute, and the Faculty of Medicine at The University of Calgary to whom we are very grateful.

Dr. William A. Whitelaw  
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# *Notes*

# **LITTLE MONSTERS: DECONSTRUCTING THE HISTORY OF CONGENITAL MALFORMATIONS**

By

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Preceptor: None

## **Abstract**

**It is primal nature in human interaction to divert one's gaze toward the skin, the most outwardly visible layer of the physical body. Accordingly, possessing some contemporary sense of "normal" or the ideal, throughout history much attention has been placed on ways in which the body can be seen to express deviance through physical markings. Man has been fascinated by monstrosities of the human form with records of malformations dating to times before humans could read or write.**

**When a baby enters the external world from the womb, any "abnormalities" are identified and critically appraised as the infants' outward appearance speaks to its health and development. Teratology began as a descriptive science, stemming from a variety of mythical and scientific theories explaining the etiology of congenital malformations, such as maternal impression and arrested development. With the human appetite for constant improvement of one's fitness, various historical attempts to correct congenital, developmental, traumatic, and surgical shortcomings and deformities are also notable. Thus it would not be long before technologies and ideologies in obstetrics and gynecology and pediatrics allowed for experimentation and the treatment of congenital deformities.**

**The fascination with "monsters" and development of teratology illustrates how bodily differences have been conceptualized and treated by the medical profession. The history of teratology directly reflects the views, religions, beliefs, and technology of the time. As these subjects have grown and changed, so has the public's interpretation and acceptance of congenital malformations.**

Physical deviance has been socially defined throughout history as a violation of "institutional expectations" or differences from the physical characteristic possessed by the "normals". Our absorption in normal versus abnormal is reflected all around us and terminology such as "monster", which has been used to describe a visually unusual creature from the 1st century B.C. onward, is only one example. "Monstrum" is derived from the root "monere" which means to warn as in a divine warning to show or forecast. Therefore, it was always expected of the superstitious mind that unnatural events would be taken as ominous forebodings. With the Greek cognate of monstrum being "teras", it makes sense how the study of physical abnormalities of newborn (congenital

malformations) came to be known as teratology. Teratology began as a descriptive anatomy of congenital malformations, seen in images, sculptures, paintings and drawings. Today it includes any birth defect either morphological, biochemical, or behavioural.

Ancient Greek and Roman authors developed the scientific, ethnographic, and cosmographic interpretations of the 'monstrous' that were to remain influential until the end of the 17th century. However, Aristotle (ca. 384-322 B.C.) provided one of the most important scientific discussions on the monstrous. His direct observation of nature was impressive, although in several areas his theories, like those of other ancient writers, reflected the social prejudices of his time. He compared the male element, semen, to an artisan shaping the raw material provided by the female into a product. With respect to monstrous births, they were created when there was either abundance or division of the semen. Monstrosity was not against nature per se, but simply against what usually happened in nature. "Nature makes nothing in vain", he would come to say, but sometimes, it did not achieve its intended goal. In that case, the outcome of a natural process was called a monster. Aristotle would establish an enormous conceptual break from the prevailing theories of preformation, which argued that animals are fully formed at conception and merely grow in size not complexity, as in epigenesis. Unfortunately for science, his ideas of epigenesis would be rejected for centuries and embryology would not advance for another two millennia.

With the coming of Christianity, monstrous phenomena were described as having been brought forth by God to communicate divine judgments. Wonders were seen as signs of God's anger, or a sign of the power of nature, inspiring fear or admiration depending on the religious and political context. Monsters were viewed as signs and portents through which God communicated with man. Especially during the religious wars of the 16th century, they were often interpreted as political or religious omens. Often the imagination of societies would give rise to wild concepts of monsters.

But eventually, monsters began to be interpreted less frequently as bad omens and therefore inspired less horror. Curiosity and admiration of Nature's products became predominant. By the end of the Middle Ages, unusual natural occurrences were increasingly perceived as "wonders," or "prodigies", terms that all focused on their strange and exceptional character. Unique and extraordinary creatures, monstrous births were considered prodigies. Renaissance natural philosophy was a broad field by today's standards, combining the empirical study of the natural world - today's biology, zoology, geology, etc. - with more philosophical questions, such as whether Nature was a conscious force acting intentionally, and whether Nature was independent of God. Amid the fascination with prodigies, there was a heightened desire to study nature, which led natural philosophers to pay significantly more attention to wondrous occurrences. At the time medical men, who were also trained in natural philosophy, were the main promoters and chroniclers of wonders. With increasing travel to distant countries and the exploration of other continents, Monstrous beings were increasingly seen as part of the everyday world, rather than on the periphery of the unknown world.

During this time, interest in the wondrous led to a deluge of literature about prodigies. A prodigy was a wondrous event or being which stemmed, in most cases, from a misperception, or creative interpretation of an actually occurring phenomenon. Many chroniclers tried to explain the existence of such departures from 'normal' by juxtaposing both natural causes and the divine.

Tales of the monstrous were also written for the pleasure of wealthy audiences. Published in lavishly produced books, they were a way for medical writers and scholars to try to attract potential patrons who would have been bored with more practical issues. In the mid 1500's Pierre Boaistuau wrote a very successful book combining contemporary accounts of documented monstrous births and fantastic beings, including the monster of Ravenna. It became one of the most symbolic monsters. Although it followed the pattern of extraordinary tales, it was inspired by real events: A child was born with severe birth defects in the Italian city of Ravenna. Shortly thereafter, Italian forces were defeated in the Battle of Ravenna. It was considered an omen of God's anger with the Italian people and, as such, its various disjointed parts could be "read" metaphorically. For instance, scholars claimed that because the Italians had no firm dedication to any cause, their fickle nature was reflected in the Monster's wings; also, the beast was a biological hermaphrodite, illustrating the Italians' sexual immorality.

Ambroise Pare was one famous Renaissance surgeon who took on birth defects late in his life and recorded his understanding of them – a combination of nature and divinity – in an encyclopedia called "Of Monsters and Marvels" (1573). He proposed a list of 13 causes of malformed persons, which include the "wrath of God" and "demons and devils" in addition to "heredity or accidental illnesses" such as "indecent posture of the mother".

Collections of natural curiosities flourished during the 16th and 17th centuries. "Cabinets of curiosities" were, at first, formed by physicians and natural philosophers with a passion for collecting, but also with the desire to have a professional collection useful for research. Such collections also played a social role, enabling collectors to build their reputations and create professional networks through visits and the exchange of objects. During the 17th century, curiosities became increasingly collected by high-ranking personalities, yielding an extravagant turn to natural history collections. Glorifying in superfluity, the professional function of such collections was reduced as they increasingly became mechanisms of entertainment and social promotion for their owners.

Teratology was inevitably not a field limited to the scholarly and wealthy elite. Through "cheap print" such as pamphlets it reached a wide audience. Since Antiquity, visually unusual beings like monsters had been exhibited in public spaces. The same prodigies and monsters were depicted in both scholarly books and cheap print. By the end of the 17th century, however, it was only in pamphlets and broadsides that monsters were still treated as frightening signs of God. The description of the monster was sprinkled with realism, including dates, times, and places where the events occurred. One such late 18th century advertisement reported the birth of female Siamese twins in Barcelona, Spain. To increase the air of authenticity, the role of physicians was reinforced by having the close examination of the twins performed not at the parents' home, but in a highly professional

environment: the Royal College of Surgery of Barcelona. Educated classes were beginning to despise this literature, viewing it as a sign of popular ignorance and superstition. Monsters, nonetheless, flourished in popular literature and freak shows existed into the 19th century.

By the end of the 17th century, scientific societies started to challenge wonders by questioning the truth of strange phenomena: the quest for truth and the norm was incompatible with the love of the marvelous and unique. “Wonders” prodigies” were no longer considered useful by those seeking to understand nature, and what had begun to be seen as imaginary creatures were excluded from scientific study. This led, in the early 19th century, to a narrower definition of the “monstrous” and to the founding of a new field of scientific research. Teratological research also became increasingly specialized, focusing on the medical fields of anatomy and embryology. Throughout the 18th century, both philosophers and scientists worked without recognized anatomical standards to guide them in the classification of monstrous births. Carl Linneaus, notable taxonomist, classified *Homo monstrous* as a species separate from *homo sapiens* to collectively name all natural, humanlike anomalies. This language which stigmatized deviance was not agreed to by all however.

Various theories, many of which had been speculated for centuries earlier, were now seriously being entertained to describe the causes of monsters. That of maternal impressions had existed over many cultures since before the time of Plato, when he recognized that:

“Special watch should be kept over our pregnant women during the year during the year of their pregnancy to guard the expectant mother against the experiences of frequent and violent pleasures – or pains either – and insure her cultivation of a gracious, bright and serene spirit.” (Plato)

Maternal impressions was the theory that a pregnant woman’s imagination, thoughts, emotions, and sights could affect her developing child. It was often an unconscious act on part of the mother, and occurs if she witnesses a traumatic or shocking person or event, or even if she possesses an unfulfilled longing. For example, Spartan law forced pregnant women to look at statues of Caster and Pollux, two royalties of Sparta, to make their children strong and handsome. French Priest Nicolas Malebranche theorized that maternal impression was achieved through communication between the nerves of the mother and the nerves of the fetus. Although this belief remained popular, it was gradually rejected from aesthetics, natural philosophy, and medicine in the eighteenth century.

Aristotle and Hippocrates were only two of the many believers of the theory of mechanical forces. Under this theory, causes of birth defects included narrow or small womb, posture of mother or fall/blow to womb. In the early 1800’s, corsets were at the height of fashion but were blamed by many physicians for induction of malformations. Ironically, corsets were often used to conceal pregnancy. The theory persisted into the 1900s when it was determined that internal pressures alter fetal development, like tumors, small uterus, fibroids, contractions, and twins pressing against one another.



It would not be until the first half of the 19th century that saw the turn of the study of malformations or monsters as anatomical curiosities into the official science of teratology. Teratology became a science free from considerations of God's direct interference in natural processes. It also limited its area of study to birth defects, therefore eliminating imaginary monsters. Anatomists confirmed that monstrosity was a part of the evolution of the fetus. They depicted 'monstrosity' as part of a natural process, rather than as an independently produced phenomenon. This included the promotion of the view that the higher animals were the result of a progressive evolution from lower forms of life. Anatomists, embryologists, and pathologists meticulously described, classified, and categorized congenitally malformed humans and animals. It is interesting to note that modern teratologists retained 'monster' as a scientific term, therefore using a word which, through centuries, had inspired many prejudices.

Teratology grew out of the epigenetic traditions of the later 18<sup>th</sup> century and received its first comprehensive formulation in the biological philosophy of Etienne Geoffroy Saint-Hilaire (1772 – 1844). With the advent of the microscope during the late 17<sup>th</sup> century, scientists had their first look at embryonic development through gametes and fertilization. This would be the time when anomalies like cleft lip and palate were found to be similar to stages the embryo passes through in development. Maybe, thought scientists, these malformations are due to arrested development at an earlier embryonic state? Both an anatomist and embryologist, Geoffroy returned to the ideas of Aristotle to establish the principle of development arrest or delay at a given stage of embryonic life, affirming that the type of anomaly depends on the occurring date. Collecting his own observations and those of his predecessors, he described several clinical characters. Under this Theory of Arrests of Development, abnormalities in higher animals represented states of organization that were permanent in lower ones. The majority of monstrosities were thus to be attributed to an arrest of development so that the organism remained fixed at one of those stages through which it ordinarily passed in the normal course of development. This brought to an end lingering support for the theory that a pregnant woman's imagination could influence the development of monstrosities.

Geoffroy's ideas were in stark contrast to the ideas of a well-know conservative biologist of the time, Georges Cuvier, who determined distinct branches of organisms that were fundamentally different from each other and could not be connected by any evolutionary transformation. Geoffroy went directly against the existing theory that monstrosities were:

"Irregular arrangements, bizarre and disordered formations; vain spectacle by which nature amused itself by making fun of its observers... The theory of philosophical anatomy replaces the idea of bizarre irregular beings with the truer, more philosophical one of beings obstructed in their development...." (Geoffroy)

Cuvier and Geoffroy engaged in a famous public debate over their different philosophies in 1830, at the Académie Royale des Sciences in Paris, debating the responsibility of God in the production of unusual or monstrous births. By the middle of the 18th century,

Enlightenment philosophers shifted the terms of the debate and boldly set forth theories that presented the monstrous as a non-metaphysical phenomenon.

Geoffroy wanted to prove that fetal malformations were the result of chance exogenetic or mechanical circumstances and did not pre-exist in the germ, which was conventional view of development. He attempted this by altering the environment in which chicken eggs were incubated and hoped to hatch a reptile from an avian egg; in doing so, he saw many malformations such as exencephaly, anencephaly and spina bifida. Although he was unable to prove species modifications are a result of environmental alteration, he opened the door for many future experimental teratologists including his son, Isidore, who is considered the founder of teratology.

Isidore (1805 – 1861), a physician, invented the term teratology and declared science of monstrosity an autonomous and even foundational discipline within the larger field of morphological anatomy. He also organised all known human and animal malformations taxonomically by class, order, family, genus, and even species.

From its inception, teratology was associated with a more ambitious project to produce artificial monstrosities by experimenting on animal embryos. At the time, theories of evolution were also a hot topic and scientists were scrambling to experiment with determining mechanisms of evolution of species. The early nineteenth century witnessed the first attempts by men to artificially create new species as well as monstrous deformity in living organisms as a way to better understand the mechanisms that led to monstrosity.

Camille Dareste is credited as the founder of teratogeny, or experimental teratology. His goal was to experimentally transform embryos but he instead produced a variety of malformations. Gradually he determined that different teratogenic agents would result in similar developmental alterations through developmental arrest. Dareste was working in a very exciting time when debated constantly was the question of whether malformations were inherited or acquired exogenously, how to classify them and whether they could be predicted and therefore prevented. It was long believed that many congenital malformations were hereditary and passed on such that "congenital" and "hereditary" were used interchangeably although not at all understood how. Until Dareste, the scientific study of environmental causes was thought to be unpromising; the prevailing belief was that nothing beyond inheritance need be considered so the first experiments in mammalian teratology were done to test these assumptions. Dareste initiated studies with exogenous factors (varnishing eggs, electricity, heat, magnetism, malnutrition of mothers). Finally, by the 1930s experimenting expanded to *mammalian* embryos testing reduced dietary vitamin A, among other agents.

Clinical genetics would enter the teratology picture influenced by the definition of Mendelian genetics in a number of disorders such as brachydactyly, and the development of the concept of eugenics evolved, resulting in a societal attempt to improve the gene pool and prevent dissemination of bad genes into future generations. Even before the use of modern laboratory techniques, pediatrics departments spearheaded the clinical description of simple genetic disorders, syndromes, and major malformations. One of the

most influential individuals in this field was David W. Smith, a pediatrician and clinical geneticist. Smith coined the term “dysmorphology” for the study of genetic and acquired structural malformation syndromes with consideration of their cause and pathogenesis. The growth of medical genetics in pediatrics was stimulated by major technological advances, like the ability to visualize human chromosomes, the development of methods to study biochemical variations in blood and urine, cell culture, and somatic cell hybridization.

It was not until late in the history of teratology that serious attention was given to the *treatment* of congenital malformations by British obstetrician John William Ballantyne. He felt that while much was done for mothers and babies in labour and states such as sterility and miscarriage, little attention was given to the birth of monstrosities and stillbirths, twinning and fetal diseases. In 1901 he published a “Plea for a Pro-maternity Hospital”, triggering the development of the concept of antenatal care. The first antenatal bed in Edinburgh was opened by him that year and the first patient admitted had hydramnios. Ballantyne believed that study of fetal disease would in time reduce stillbirths and congenital abnormalities. His attention was directed to preventing abnormalities of pregnancy and labour rather than the palliative treatment after the birth of a deformed child. Furthermore, the cause of birth defect should be the physician's/scientist's primary focus because this knowledge will aide in prevention not future malformations.

The twentieth century also began the modern era of pediatric surgery, a time of innovation and vastly improved operative survival. Until then, many correctable congenital anomalies had been described in case reports only as medical curiosities, seemingly having no chance for surgical cure, but the challenge was available to those wishing to accept. Sir Denis Browne was the first surgeon in England to confine his practice entirely to children and to tackle pediatric surgery of congenital defects. The methods of treatment devised by him were new and often revolutionary and were frequently attacked and criticized, but they worked. He enlarged his theory of the mechanical origin of congenital deformities such as clubfeet, torticollis, scoliosis, and facial paralysis in a study published in 1936. The mechanical theory led him to search for treatment by use of selectively applied pressures and controlled movements.

A number of clinical geneticists and dysmorphologists became expert in the field of teratology by the mid 1900s and described numerous teratogenic syndromes caused by prenatal exposure to radiation, infections such as rubella, methyl mercury, folate deficiency, alcohol, drugs such as warfarin, and maternal diseases such as diabetes. One of these men was Josef Warkany , a man who has steered us away from views once popular and now largely repudiated. His studies led to the definition of both genetic and environmentally induced structural defects. A humanistic physician, Warkany argued that a child suffering from congenital malformations can no longer be dogmatically held as a sign of parental genetic "faults" nor can a fetus be considered immune from environmental assaults. Warkany foretold the importance of prenatal factors in diseases of children and stated that:

"eugenic measures and advice are not restricted to the genetic aspect of prenatal life ... the fetus should be assured so far as possible by protection of the expectant mother from adverse environmental influences" (Warkany, 1950).

Eugenic activities included The Children's Program of Nuremberg Laws of World War II which authorized pediatricians to kill deformed and retarded infant patients. All defective newborns and infants under the age of three had to be reported to the Ministry of the Interior. Warkany's research included a variety of exogenous agents in rats, but his special clinical interest was in the cause of mental retardation. He published material on anatomic abnormalities and on syndromes caused by cytogenetic abnormalities after techniques were developed for such studies. He wrote overviews for volumes of reports on mental retardation and developmental disabilities, and otherwise sowed seeds for others to cultivate.

Evidently, it was not until the mid 1950s with specialists like Warkany and Ballantyne leading the way that teratology was better defined and pursued and the early care of malformed babies given serious consideration. Abnormalities caused by genetic events such as gene mutations, chromosomal aneuploidies and translocations are now called malformations. Malformations often appear as syndromes (from the Greek, "running together"), where several abnormalities are seen concurrently. Abnormalities due to exogenous agents are called disruptions. The agents responsible for these disruptions are called teratogens.

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# THE HISTORY OF RHINOPLASTY

By

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## Abstract

It may be argued that the nose is our most prominent facial feature. The nose is central to the human face and is important to us, serving both physiological and psychosocial roles. Functionally the nose and nasal cavities serve as a passageway for respiration; cleansing, humidifying and moistening the air we breathe. Everyday the nose also permits olfaction; greatly enriching our perceptual experience as human beings (Dalley and Moore 1999). It is not surprising that many cultures throughout history have granted symbolic significance to the nose. The nose is an integral element of traditional Japanese creation mythology (Seltzer 1949, 1). Ancient Indian cultures associated the nose with personal reputation. In this culture the removal of the nose was a severe form of physical and psychological punishment (Eisenberg 1982). Other cultures display symbolic depictions of the nose in indigenous art forms such as the carved wooden masks of various African and Polynesian tribes (Akpan 1994). Social stigmatization of the nose was repeated with the deformation that was associated with syphilis. Records of this exist in a variety of written forms from various cultures including the Bible, the novel *Little Women* and *The Phantom of The Opera* (Gilman 1999). Evidence of the symbolic importance of the nose persists in modern Western culture. Examples of this can be seen in popular culture's depictions of witches, such as the crooked, warty beak of the evil wicked witch of the west. Other childhood fables such as *Pinocchio* illustrate the punitive result of lying as an ever-growing nose. Resultantly, colloquialisms involving the nose have become a part of our everyday vernacular. Therefore, in many cultures at many points in history the loss of, or damage to a nose has been of physical as well as psychosocial importance. This has mitigated a particular focus on the nose in various medical traditions. Throughout history, rhinoplasty has evolved in many cultures as a surgical technique to modify the nose for reconstructive, restorative and eventually aesthetic purposes (Newman Dorland 2003).

## Ancient Cultures

Mental images of Ancient Egyptian art often evoke facial profiles of the pharaohs. These pieces of artwork clearly display the noses of the rulers. It is within this culture that the first written record of rhinoplasty exists. The oldest medical document to be discovered is the Ebers Papyrus. This scroll is believed to have been written around 3000 BC during the time of the ancient Egyptian physician Imohtep (Lupo 1999). It is now understood that the Ebers Papyrus recorded many procedures, including surgeries that are thought to have predated the writing by as many as 500 years (Hinderer 1979, 6). Translation and analysis of the scroll has been conducted by various historians, such as Edwin Smith and J.H. Breasted. The Ebers Papyrus makes several explicit references to rhinoplasty, describing methods for diagnosis, therapeutic intervention, and surgical procedures (Lupo 1999). At this time damage to the nose was usually the result of trauma. Clinical examination of the nose occurred and methods of diagnosis bore some similarity to modern practices, including careful observation and palpation. With this information Ancient Egyptian physicians would form a treatment plan that may have included rhinoplasty. Surgical interventions at this time were conducted using special tools such as bronze instruments and bandages formulated by highly trained embalmers. It is interesting to note that before the procedure the surgeon would approximate the likelihood of a positive outcome using an established scale (Eisenberg 1982).

Hundreds of years later in India a revolution in the history of rhinoplasty was taking place at the medical school of the University of Benares. Around 500BC the Ancient Indian physician and professor Sushruta was perfecting an operation that is now known as the ancient 'Indian technique' of rhinoplasty. Sushruta, recorded his and previous physician/professors experiences and knowledge in many Sanskrit transcripts such as *The Sushruta Ayurveda* (Eisenberg 1982). These works document a wide breadth of medical knowledge including general information on diagnosis, optimal daily living and therapeutic interventions (Kansupada and Sassani 1997). Specific instructions on rhinoplastic procedures were included in *The Sushruta Ayurveda*. These surgeries were most often of a restorative nature, as total amputation of the nose was a cultural practice, that was most often employed as a punishment for morally reprehensible behavior (Gilman 1999). The technique employed by Sushruta and his pupils is very well documented and still exists in modern medical dictionaries where it is described as, "the restoration of a nose by a flap of skin taken from the forehead, with its pedicle at the root of the nose" (Newman Dorland 2003). The template of the skin to be taken was first traced onto a leaf before being transferred to the forehead (Seltzer 1949, 3). This removal of skin left on obvious scar on the face of the patient, however this was considered to be an acceptable procedural outcome (Eisenberg 1982). The entire operation lasted about 90 minutes, during which Sushruta employed as many as 125 surgical instruments (Seltzer 1949, 3).

As the centuries passed Rome assumed the place of Benares as the center of worldwide medical education. Around 0AD many medical advances were developed and taught in Rome by Greek physician/teachers. Roman medical knowledge was greatly influenced by and reflective of ancient Egyptian traditions (Lupo 1999). Great physician teachers such

as Galen and Celsus imparted knowledge about tissue transplantation and rhinoplastic procedures to medical students. This became part of general medical education and was practiced throughout much of the Roman Empire. This period of surgical advancement was ended in the 13<sup>th</sup> century. During the fourth crusade and collapse of Rome Pope Innocent III outlawed many medical procedures, which halted the refinement of rhinoplasty for much of medieval time (Eisenberg 1982).

### **Renaissance of the Rhinoplasty**

The period of renaissance was a rebirth for many facets of European culture. This includes the art of the rhinoplasty. After a period of rest Italy was again a hub of development. During this time many physicians contributed to the ongoing perfection of the rhinoplasty. Modifications of the Indian method were proposed and practiced by Italian physicians. Resultantly the Italian method of rhinoplasty was developed. This variation transplanted skin from areas other than the patient's forehead (Eisenberg 1982). One such method, invented by Gasparo Tagliacozzi used tissue from the patients arm. The skin was partially sectioned from the arm and attached to the facial deformity. The physician would then carefully align the arm and the nose, matching the skin flap to the desired transplant location. The tissue would remain attached to the limb until the final stages of the procedure when the union of the nose and the new tissue was complete (Newman Dorland 2003). The church continued to condemn Gasparo Tagliacozzi for performing such surgeries, which were deemed to be against the will of God. Eventually the procedure reached neutrality with the church. This was because the rhinoplasties occurred before the use of anesthetic or asepsis and were considerably uncomfortable for the patient to endure. The church therefore deemed the discomfort to be penance to the patient. The attachment of the tissue in the rhinoplasties of the 15<sup>th</sup> and 16<sup>th</sup> centuries was quite crude and was therefore wrought with complications. Poor outcomes were common and included many problems such as tissue rejection, necrosis of tissue due to insufficient blood supply, and eventual loss of the transplanted tissue due to insufficient suturing. While these problems were superficially recognized at the time, they were commonly justified with superstitious explanation (Eisenberg 1982). Eventually, the methods of Gasparo Tagliacozzi fell out of medical vogue and rhinoplasty returned to relative obscurity in the European world. The historical community offers many potential reasons for this, but has not reached consensus. Potential reasons include frequency of complication and poor outcomes, continued underlying disapproval from the church and the general laboriousness of the procedure (Gilman 1999).

The invention of the printing press and subsequent proliferation of mass media facilitated the growth of all scientific pursuits. As time passed the media penetrated further into society, sparking interest in previously unheard of knowledge. In 1794 the first widely published account of a rhinoplasty appeared in the London edition of Gentleman's Magazine. The article was a clear and detailed description of a traditional Indian rhinoplasty, which included diagrams. This anonymous account is believed to have been written by Lyon Lucas who was a British military surgeon during the English colonization of India (Gilman 1999). His article reignited an interest in the procedure throughout Europe. Joseph Constantine Carpue was an English physician and professor of medicine



who experimented with various surgical techniques at the beginning of the 19<sup>th</sup> century. These included both the Italian and the English methods of the rhinoplasty (Seltzer 1949, Gilman 1999). In a published work Joseph Carpue expresses a preference for the Indian method, which he continued to practice and teach. His work brought much attention and mixed opinion from the English monarchy, the general population, and his colleagues (Eisenberg 1982). King George IV the reigning English monarch of the day condoned Carpue's work, indirectly encouraging other surgeons to follow suit (Seltzer 1949). The general population became increasingly interested in rhinoplasty and popular opinion supported the development of plastic and reconstructive surgeries. Carpue's colleagues in the medical profession did not react as favorably, as is reflected in a particularly negative letter submitted to the *Lancet* in 1864 (Eisenberg 1982). One reason offered for the rejection of rhinoplasty by the medical establishment is the assumed connection many physicians made between the loss of a nose and syphilis resulting from perceived sexual indiscretion. Joseph Constantine Carpue went to great lengths to disassociate reconstructive surgeries from morally stigmatized diseases. This is exemplified in published case studies in which Carpue clearly identifies his patients as soldiers who had been mutilated in battle. Regardless of publicly distancing reconstructive surgery from venereal diseases, evidence exists that in practice Carpue used his techniques to restore deformities resulting of syphilitic pathologies (Gilman 1999).

Renewed interest in rhinoplasty led to major developments occurring early in the 19<sup>th</sup> century. In particular Carl Ferdinand Von Graef, a renowned German surgeon and professor made great contributions. Through his teaching and publishing of numerous books, which compiled descriptions, and illustrations of rhinoplasty Von Graef earned the reputation of being the father of modern plastic surgeon. Von Graef championed the term 'rhinoplasty' and also invented a new technique known as the 'German method' (Eisenberg 1982). This method used free grafts to obtain tissue for transplantation to the nose (Newman Dorland 2003). One of Von Graef's students, Johann Friedrich Dieffenbach continued the tradition of plastic surgery excellence. Dieffenbach published many texts describing his procedures in great detail, including extensive illustration. Many of his surgical procedures were reflective of earlier methods, including the use of leather templates in reconstructive surgeries (Eisenberg 1982). However, it was Dieffenbach's tremendous technical skill as a surgeon that earned his masterful reputation. His successful completion of many complex restorative operations elevated medical opinion of rhinoplasty (Millard 1976). The rise in popularity of rhinoplasty during the late 19<sup>th</sup> century led many other physicians to experiment and develop techniques. It is believed that Dieffenbach was the first person to consider completely endonasal rhinoplasty, however he was never documented having completed one (Eisenberg 1982).

### **The Advance of Aesthetic Rhinoplasty**

Advances made toward the end of the 19<sup>th</sup> century revolutionized surgery forever. With the onset of asepsis and anesthetic surgery became more successful for both physicians and patients. Early anesthetics had to be continuously inhaled, limiting their use in rhinoplasty. The onset of the use of cocaine as an anesthetic changed plastic surgery forever (Lupo 1999). Procedures could now be carried out in a far more comfortable

manner. In 1891, surgeon John Roe published two truly groundbreaking papers. In the first he documents the first aesthetic rhinoplasty. In this surgery Roe corrected a nasal hump on a patient. The idea of rhinoplasty as an aesthetic procedure was supported by other physicians of the time such as Vincent Czerny, a professor of surgery at Friburg University (Eisenberg 1982). In his second paper of 1891, Roe performs the first ever intranasal rhinoplasty. He suggested the use of this technique, which approaches from tiny incisions hidden inside the nostrils diminishing facial scarring (Millard 1976).

While Roe was the first physician to use this technique, the further development of the intranasal approach is largely attributed to Jacques Joseph. Joseph was a German orthopedic surgeon who was known for bad temper and eccentricity as well as surgical genius. He refused to acknowledge previous physicians contributions to the development of rhinoplasty and often operated without a hat, mask or gloves (Lupo 1999). Joseph published his accounts of numerous external and intranasal aesthetic plastic surgeries. His intranasal techniques are now commonly referred to as the 'Joseph method' (Goodman and Smith 1993). Numerous other historical milestones in the development of rhinoplasty can be attributed to Joseph, who also was a major developer of many surgical tools (Eisenberg 1982). As a professor of medicine throughout the bulk of his career Joseph taught many students went on to further advance rhinoplasty.

Joseph Safian was a student of Jacques Joseph, who in the early 20<sup>th</sup> century immigrated to the United States. Upon arrival to the North America Safian wrote an English book called *Corrective Rhinoplastic Surgery*. His text outlined the ideas and surgical methods of Jacques Joseph and facilitated the adoption of many of Joseph's methods into the American medical mainstream. Fellow student Gustave Aufricht also contributed to this phenomenon, writing his own book in the United States (Millard 1976). Once adopted by the United States development of aesthetic cosmetic surgery continued exponentially. Many physicians and surgeons offered variations of the rhinoplasty, which were met with mixed opinion by the medical community. Similarly to the reaction of English physicians during the mid to late 19<sup>th</sup> century, many American physician's and surgeons joined a public backlash toward plastic surgery, rejecting the basic philosophy of rhinoplasty. However, as injured soldiers returned from World War I, World War II, and subsequent armed conflicts, the reparative outcomes of plastic surgeries were put widely on display. The public gained an appreciation for such skillful techniques. Plastic and reconstructive surgeries were used in what was recognized as morally dignified procedures, and were finally positively received (Millard 1976, 23). In this atmosphere of renewed recognition plastic surgery has continued to thrive and develop extensively throughout the last sixty years.

From reconstructive, restorative and eventually aesthetic beginnings rhinoplasty has evolved throughout history to become a comprehensive surgical technique to modify the nose. Beginning thousands of years ago Ancient cultures in Egypt, India and Rome developed medical techniques to treat damage to the nose. Such damage was due to a variety of causes, including trauma from labor and war, punitive infliction after infidelity and pathology of diseases like syphilis. Rhinoplasty was largely terminated after the crusades, when surgical procedures were condemned by the church after being banned by

Pope Innocent III. With the Renaissance came a general increase in various cultural and intellectual pursuits including rhinoplasty, leading to the further development of reconstructive surgery. Throughout the 15<sup>th</sup> and 16<sup>th</sup> centuries surgeons experimented with new techniques such as tissue transplantation in the absence of asepsis or anesthesia. The resulting poor outcomes and continuing disapproval of the church contributed to decreasing medical interest in rhinoplasty. Public interest was again sparked in 1794 when an account of a rhinoplasty was published in the English mass media. Neutrality from the monarchy further encouraged development, although association of the procedure with syphilitic disease created negative stigmatization of rhinoplasty within the medical profession. The onset of asepsis and anesthesia marked another new phase in plastic surgery when procedures were first conducted for aesthetic reasons. Less invasive techniques were developed and published throughout the medical world. These novel approaches to rhinoplasty were eventually incorporated into American medical practice in response to injuries incurred by soldiers in the first and second world wars. Rhinoplasty has continued to proliferate and advance exponentially throughout the late 20<sup>th</sup> and early 21<sup>st</sup> centuries.

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# **PIRATES & PEG LEGS: A HISTORICAL LOOK AT AMPUTATION AND PROSTHETICS**

By

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## **Abstract**

Pirates may be the perfect poster boys for prosthetics – the primitive ones at least – with the peg leg, the hand hook and the glass eye under the skull and crossbones eye patch. Captain Hook is one of the most famous, albeit fictitious, amputees. The traumatic amputation of his hand by a crocodile isn't the most common method for losing a limb but still scientifically possible.

Amputation and the use of prosthetics are not limited to literary characters. The practice of amputation has occurred since ancient times. Various reasons from congenital defects, judicial punishment and religious rites have been documented. Evidence of amputees has been found on cave walls and ancient scriptures. The Rig-Veda, a sacred Indian poem written in Sanskrit between 3500 and 1800 BCE, tells of Queen Vishpla who lost her leg in battle. She was fitted with an iron prosthesis and returned to battle. The oldest known prosthesis, which was discovered in a tomb in Capua, Italy, was an artificial leg made out of copper and wood dating back to 300 BCE.

Early prosthetic principles that were developed exist to this day and are amazingly efficient in function. However the main impetus for the advancement of prosthetics and amputation surgery has been warfare. The wounded from battle required on-site surgery without the benefit of analgesics or sterile technique. One of the most important contributions to surgical amputation and prosthetic development was by Andre Pare (1510-1590), a French army barber-surgeon who introduced amputation as a life-saving procedure and designed prosthetics in a scientific manner. Following the American Civil War, amputees received government funding for prostheses. This increasing interest along with technology developed in the two World Wars, has advanced amputation and prosthetics into modern day miracles.

When thinking of prosthetic devices, one cannot help but conjure up the appearance of a pirate. With the peg leg, the hook hand and the glass eye – pirates may be the perfect posterboys for prosthetics. Although there is no documented use of prosthetics, it is conceivable that a pirate could lose a limb in battle and find a suitable alternative among the ship's materials. It was uncommon for there to be a doctor on board, so the ship's cook would be called upon to conduct the crude amputation (Wilczynski, 2001). Most of the accounts of pirates with prosthetics come from the literary world – Captain Ahab with his peg leg in “Moby Dick” and Captain Hook with his prosthetic hook in place of a hand in “Peter Pan”. Each pirate parting with his extremity as a result of an animal encounter – Captain Ahab losing his leg to the white whale while a crocodile claimed the hand of Captain Hook. Although traumatic accidents can cause the loss of limbs, amputation itself is an ancient practice that has been found in many different cultures and whose principles are still practiced today in the context of modern medicine.

Anthropological evidence uncovers the beginnings of amputation practice. Cave paintings in various ancient cultures, estimated to be 36,000 years old from Spain and France and later in New Mexico, show imprints of mutilated hands and suggest the practice of self-mutilation to appease gods in religious ceremonies (Friedmann, 1978). The Rig-Veda, an ancient Indian sacred poem written in Sanskrit between 3500 and 1800 BCE, tells of Queen Vishpla who lost her leg in combat and was fitted with an iron prosthesis before returning to battle (Sanders, 1986). Amputee gods were worshiped in ancient cultures. Tezcatlitoca, the Aztec god of creation and vengeance was a right foot amputee while the Celtic Irish god, New Hah, was a left arm amputee with a four-fingered silver prostheses (Padula and Friedmann, 1987). In looking at ancient cultures, amputation and the use of prosthetics in myths and legends was a vision of the principles that still exist to this day. Amputation occurred quickly and without complication. Prostheses seemed to fit perfectly and function as well as the former limb. The concepts of good surgical techniques and effective prostheses were there but the actual practice was very different from what was said in stories.

The reasons for amputation in ancient times varied from wanting to conceal congenital deformities to traumatic amputation from war. Religious rites were performed in which worshippers disfigured themselves in order to appease the gods or show their faith. The act of circumcision is a remnant of these rites still practiced today (Padula and Friedmann, 1987). Judicial punishment was another common reason for amputation with the offending part taken as retribution for the crime committed. A foot was removed for laziness, both arms for rebellion and a hand was taken for theft. In Arabic countries, the right hand – used for eating from a common bowl – was removed as punishment for theft. This resulted not only in excluding the thief from social activities such as eating, but also humiliating the thief by forcing him to feed from his left hand which was considered unclean (Vitali, 1978). Ancient cultures also had knowledge of treating diseases such as gangrene, tuberculosis and leprosy with amputation above the affected area. After amputation for whatever reason and by whatever method, prosthetics were employed not only for function but also for cosmetic appearance and a psycho-spiritual sense of wholeness.

From the primitive amputation procedures and prostheses of the ancient cultures, the civilizations of Egypt, Greece and Rome applied a scientific approach to make amputation and prosthetics more practical. The use of ligatures to tie off bleeders was first described by Hippocrates in 5 BCE, who also advocated amputation as a treatment for gangrene (Wilson, 1978). Celsus (0 AD) re-emphasised Hippocrates' principles. He further described closing soft tissues over exposed bone and putting cotton dressings over the area (Sanders, 1986). Archigenes, a Roman surgeon, advocated amputation not only for gangrene but tumour, injuries and other deformities (Sanders, 1986). The medieval ages reverted back to the primitive methods for amputation – crushing the limb, dipping in hot oil or searing with irons (Oracle Think Quest, 2001). The feudal system of the time effectively divided Europe into isolated kingdoms where there was no development or dissemination of scientific knowledge. There were limited prosthetic options available at this time – basic peg legs and hand hooks – which only the rich could afford. Knights wounded in battle wore prosthetics that appeared as extensions of their armour. These prosthetics were meant to hide disfigurement and the disgrace of defeat rather than provide function (Friedmann, 1978) which points to the psycho-spiritual need to feel whole.

After the invention of gunpowder in 1340, the use of firearms and cannons greatly increased and led to the development of battlefield surgery and barber surgeons (Ham and Cotton, 1991). Gunpowder brought an increase in the wounding potential of war. Not only was there more bodily harm done but also the gunpowder was considered to be poisonous and the wound needed to be “sterilized” by boiling oil. The standard of care at the time for gunshot wounds was immediate amputation, cautery of bleeding vessels and application of boiling oil to the stump. The greatest contribution to amputation surgery and prosthetics sciences of this time was by Ambroise Pare (1510-1590), a French army barber-surgeon. During the battle of Turin (1556), Pare ran out of boiling oil and concocted a balm of eggs, roses and turpentine to dress the wounded. The next day, Pare saw that those who received the balm did much better than those whose wounds were scaled with oil. Pare also described many procedures of amputation surgery, the most noticeable being the reintroduction of the ligature rather than “hot irons” to control hemorrhage (Ham and Cotton, 1991). Time was still a limiting factor. A surgeon working with no anesthesia, tourniquet, or skilled aid hand was limited to about 30 seconds to amputate and 3 minutes to complete the operation (Vitali, 1978). This was a very small amount of time for a surgeon to ligate major arteries. It wasn't until the introduction of the tourniquet in 1674 by Etienne J. Morel, also a French Army surgeon, that ligation would have more widespread use (Ham and Cotton, 1991). Hence, amputation became more of a lifesaving technique. Pare also invented upper and lower extremity prostheses that show knowledge of basic prosthetic function. "Le Petit Lorrain" was a hand operated by springs and catches made for a French Army Captain, which he then used in battle. He also invented an above knee prosthesis that was a kneeling peg leg and foot prosthesis (Vitali, 1978).

The dawning of the modern medicine era brought many advancements to amputation surgery: sterile surgical techniques, uses of tourniquets and other blood reducing strategies, anesthesia and disease-fighting drugs. With amputation now accepted as a

curative measure instead of a desperate attempt at saving lives, the focus was on optimizing functionality. Thus amputation resulted in better residual limbs for better prosthetics. One example of prosthetic development was the Anglesey leg which was designed by James Potts in 1800. It was a wooden leg with a synchronous motion of the prosthetic steel knee and a wooden ankle that was controlled by catgut tendons from the knee joint above. It became known as the “Anglesey leg” as it was worn by the Marquis of Anglesey in 1816 after he lost a leg at the Battle of Waterloo (1815). It was also nicknamed the “clapper leg” because during locomotion it made a clapping noise (Sanders, 1986). In 1839, the Potts/Anglesey leg was taken to the USA by William Selpho (an apprentice of Potts) and modified by the addition of a rubber sole. Palmer again modified the design and patented it in 1846 when it became known as the “American leg” (Ham and Cotton, 1991).

Each major war has served as the stimulus for improvement of amputation techniques and for the development of improved prostheses. After the American Civil War (1861-1865), the U.S. government made its first commitment to supply prostheses to war veterans known as the “Great Civil War Benefaction” (Wilson, 1978). This government funding fueled competition that developed new designs of prosthetics. However, the promise of prosthetics was not without its problems. There were no standards set in place to govern prosthetic production. Many claims of success were made but few prostheses actually delivered. It was a time of shysters preying on the ignorant amputee. It was not until the twentieth century when the most significant contributions to prosthetic sciences were made, stimulated by the aftermath of the first and second world wars and the polio epidemics of the late 1940’s and early 1950s (Ham and Cotton, 1991). Injured veterans who acquired musculoskeletal and neuromuscular impairments or traumatic amputation and polio survivors with diminished neuromuscular function increased the demand for prosthetic services. Recognizing the lagging of care for amputees in America, the Surgeon General of the Army invited the U.S. prosthetists to Washington, D.C. in 1946, to discuss prosthetic technology and its development in this country. From this meeting arose of the present day American Orthotics and Prosthetics Association. This event was thought to have contributed more to the development of the science of prosthetics than any other occurrence in its history (Thomas and Hadden, 1945). Through this forum prosthetists could develop ethical standards, scientific programs, and educational programs, and build foster a multidisciplinary approach with other health professionals.

The sheer quantity and complexity of medical implants and prosthetic devices have increased dramatically in recent years. From joints to breast implants, heart valves to artificial eyes, prostheses are available for many different parts of the body. Technological innovations allow construction of artificial limbs that are increasingly comfortable, versatile, and lifelike. Carbon fibre composites, "on board" computers, direct skeletal attachments, and other advances allow prostheses to resemble the missing limb more closely (Marks and Michael, 2001). Fundamental proven prosthetic principles are never outdated; only the methods to accomplish them are refined. Ideas are endlessly being recycled from the past. Concepts that may have been impractical at the time of their inception become possible with developments in materials and technology. Advances in

technology and use of cost-effective materials has made amputation a life-saving and limb-sparing procedure with prosthetics that won't end up costing an arm and a leg.

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# **BLOOD IN THE BOTTLE AT BATTLE – A DRIVE TO SAVE LIVES**

By

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## **Abstract**

**Medical discoveries and advancements occur as a result of an external impetus to aid in human survival. War is one such “impetus”, where the thought of losing thousands upon thousands of lives provides the stimulus to develop and improve life-saving methodologies.**

**The era, from 1900 to 1945, encompassed two of the largest wars: WWI and WWII. This era also saw the development of Blood Banking and Transfusion, especially *at the front lines*. With the large mobilization and atrocious bloodshed during these wars, a large wounded population existed to apply the latest transfusion techniques; the battlefield became a laboratory where life-saving techniques could be employed, modified, re-employed, and re-modified.**

**This era can be divided into three periods in regards to blood banking and transfusion progress. The first period, 1900-1918, saw a revolution in blood withdrawal and injection techniques; WWI created an environment to apply these novel techniques rapidly. The second period, 1918-mid 1930s, was a time of peace and information flow across countries, of public education, and of civilian application of transfusion strategies. Finally, the third period, from the mid 1930s-1945, saw resolution of contamination and evolved techniques for separating and storing plasma. These discoveries were accelerated in-part due to the Spanish Civil War, causing European division once again and foreshadowing the devastation from air-bombardment that would occur in the looming WWII. The transfusion techniques used during WWII were borrowed and improved from those developed in Spain. Without a doubt, Dr. Norman Bethune, while in Spain, had the vision of bringing ‘blood in a bottle to battle’ and, shortly after, Dr. Janet Vaughan had the insight and ambition to develop a life-saving blood transfusion service in London. Hence, the Spanish Civil War and the physicians mentioned above were instrumental in the development of front-line, life-saving, transfusion services used in WWII.**

The epic age of blood transfusion and storage occurred during the first half of the 20<sup>th</sup> century. The number of lives this medical advancement has saved is remarkable, and for this reason it has been said that blood transfusion, along with anaesthesia and germ infection, is one of the most important developments in modern medicine.

In its broadest definition, transfusion involves the transfer of blood or blood components from one individual to another. This process, although intuitively seems obvious, took considerable time to develop and to standardize. At the beginning of the 20<sup>th</sup> century, the blood groups were defined and single, random transfusion events had been recorded from human to human and animal to human. It was not until one of the most tumultuous eras in history, the World Wars, that blood transfusion advanced rapidly and its ability to save lives became recognized.

The time period, from 1900 to 1950, can be divided into three periods, in regards to the transfusion developments that occurred during this time. However, it is during the late 1930's that blood banking developed and revolutionized medical care on the battlefield. It is this time frame, the mid 1930's to WWII, that is focused on in this essay.

### **First Period: 1900 to 1918**

This was the pre-WWI and WWI time period, where transfusion medicine's potential became realized. The major outcomes of this time were:

- Revolution in withdrawal techniques and safe practices;
- Opportunity to apply the new techniques on a wide scale due to a large wounded population in WWI;
- Experimentation of the techniques allowing employment, modification, re-employment and re-modification. This allowed for rapid improvements to be made in the transfusion methods.

One of the main advances that resulted from this time period was the development of an indirect transfusion protocol, where both donor and recipient were separated in time and space. Before this time, transfusions needed to be made with the donor connected directly to the recipient, giving blood as they sat next to the ill recipient. The new "indirect" system helped remove inconsistencies in blood amounts given, was less labour-intensive, was more efficient, and did not put the donor at risk. Blood was now able to be stored in bottles for utilization in life-saving procedures.

### **Second Period: 1918 to mid-1930s**

A time of peace, reform and renewal, Europe was recovering from the war it had survived and was looking to maintain stability. Blood transfusion advances were mainly geared towards refinement of technique and in adapting the knowledge gained from blood transfusion on the field to transfusion in daily civilian care. For instance, transfusions, which were used on wounded soldiers during war, were thought to be useful during childbirth, as a large volume of blood could be lost during the delivery process. Nations began meeting to exchange ideas and experiences, as cultural differences existed among

transfusion practices. The issue of coagulation was also addressed, with sodium citrate being refined and used to prevent the coagulation of blood exposed to air during transfer. The issue of blood-type compatibility was brought forth, as this important classification had been largely ignored while transfusing blood in WWI. During the First World War, blood-typing was more of a luxury that helped to predict the likelihood of hemolysis. It was expedited and refined to be more reliable and more practical as a blood matching tool.

While many problems were being solved during this time period, one major problem arose after the war. This was the problem of donor recruitment and retention. Without a war, donors, such as soldiers and medical field personnel, were no longer mobilized or prepared to donate blood. Also, the devastation and “catastrophic” nature during the war often motivated healthy individuals to donate their blood; this motivation was no longer present. This created a dilemma, a dilemma that we still are trying to address even today. To deal with this, entire new organizations were developed to focus on blood acquisition. These organizations were now educating the public about transfusion in their campaigns – advances in blood transfusion were no longer kept solely within the scientific community in medical reports. This put more trust in the public to donate blood based on the understanding that by doing so, lives could be saved. Options of how to compensate donations were also pondered; this is a serious problem that is argued even today. Would free-market payment schemes be effective, would government regulation of price be fair, or would people simply donate on the basis of “altruism” and “giving the gift of life”? These are all problems that donor organizations continue to deal with today!

### **Third Period: mid-1930s to 1945**

While the problem of donor acquisition began post-WWI, the fear of a diminished blood supply became shockingly evident during the period from the mid 1930s to 1945. Advances in blood transfusion continued, as transfusion became an increasingly important tool in resuscitation. The resolution of contamination, plasma separation and storage techniques all contributed to a more effective blood transfusion, as well as created a potential alternative to whole blood transfusion. While the world was giving great interest into the revised blood transfusion methodologies, such as through global meetings like the International Blood Transfusion Congress of 1937, the peace in Europe was once again being disrupted in, first, the Spanish Civil War (1936 – 1939) and, second, the Munich Crisis (1938). These two conflicts were paramount in that they created a foundation and foreshadowed what was to come in the Second World War. The Spanish Civil War was especially significant in that it shocked Europeans about the need for the wider use of transfusions by the civilian population and the benefit of a mobile blood bank at the front lines.

Spain was undergoing a civil conflict, with Fascist rebels attempting to overthrow the existing Communist Republican government. Franco was the Fascist leader at the time and was allied with axis powers such as Italy and Germany. It was during this war that air bombardment of innocent civilians occurred, in addition to bombardment of soldiers at the front-lines. With more casualties, there was an increased need for blood and blood products, and, hence, an immediate strain on the blood supply resulted.

With such large numbers of people requiring transfusion, the post-WWI idea that pre-tested individual donors be called upon for each transfusion was impractical and truly impossible. This pressure to have blood during times of need led to the development of stored blood for longer periods of time. Since WWI, The International Transfusion Congress in Paris was already attracted to this thought of stored blood; however, the source of blood had not been determined yet. A wide variety of solutions were brainstormed including the Soviet idea of using blood from cadavers. This was not favourable, for technical and psychological reasons, and was useless when large amounts of blood were needed. Instead, the consensus was reached that refrigerated, citrated human blood from live donors would be used. Sterile technique would be crucial to a safe transfusion. The culmination of all these advances was the appearance of the first mobile blood banks in 1937.

The mobile blood banks were carefully planned out and required a great deal of care in their organization. The inspiration behind these mobile transfusion units was from the very noble Dr. Norman Bethune (1890 – 1939), a Canadian physician who was dedicated to the service of humanity. He was in his fifties when he left for Spain. Dr. Bethune had traveled to Spain during the war without a prearranged role, visiting hospitals throughout the nation to assess the situation. He was in search of a vision. After returning from his visionary excursion, Dr. Bethune made plans to develop a mobile blood transfusion service. This inspiration was the product of insight triggered by passion. He wanted to find a system where blood could be brought to the wounded; he had stated that “doctors must go to the wounded, and the earlier, the better.” This idea was not a new concept, but it had not been attempted – it was Dr. Bethune who put it to practice. Therefore, he started the Canadian Blood Transfusion Service in Madrid.

With help from fellow Canadians, the British, Americans, the French and the Spanish, Dr. Bethune began to collect parts of his mobile transportation vehicle. The final result was a Ford station car (obtained from England) with refrigerators, an auto clave, incubators, distilled water, and hurricane lamps, all of which could run on gasoline or kerosene (independent of electrical power). Also, glassware, transfusion sets, and 2000 sets of type 2 and 3 blood serum for typing (bloods were not types A, B, AB, O but were designated as types I, II, III, IV) were placed in the vehicle. They used sterile milk and wine bottles to store blood in the refrigerator. The vehicle had the title: “Servicio Canadiense de Transfusion de Sangre” (Canadian Blood Transfusion Service).

To obtain donors, Dr. Bethune’s team would advertise through the press and local radio. They utilized an entirely novel concept of free civilian donations on a large scale, giving medals with stars placed on them for each donation. This was highly successful! Perhaps it was the war-time mentality that motivated people to donate blood, as they had done during WWI. Regardless, donations were pouring in. Blood could be stored for up to two weeks. To administer the blood to those in need, Dr. Bethune’s team would go to the wounded and decide what was needed. If it was blood, then they would blood type by pricking a finger and dripping some of the blood onto a glass stick that had type II or III serum. If his blood cells agglutinated with II and not with III, he was type III. If they

agglutinated with II only, he was type III. If both caused agglutination, he was type I, and if neither caused clumping, he was type IV. When typing gave equivocal results, type IV blood was given as this was called the “Universal Donor”. On average, three transfusions were done per day at the front lines utilizing the mobile blood transfusion unit. In essence, this classification is highly reminiscent of the indirect Coombs test that is frequently used today.

Dr. Bethune was successful in establishing the mobile blood bank and saving lives on the field. While in Madrid, the capital of Spain and a prime area of attack by Franco, Dr. Bethune was emotionally affected by the devastation he witnessed in Cuatro Caminos, a working-class residential area of Madrid. There, he observed savage aerial attacks by the Fascist rebels on civilian targets. Air Bombardment of civilians was blatantly evident during this war and Bethune was shocked that an enemy would consider unarmed civilians as fit targets. He was so emotionally affected by the bombing of a hospital in Cuatro Caminos that he wrote a poem titled “I come from Cuatro Caminos.”

I come from Cuatro Caminos,  
From Cuatro Caminos I come,  
My eyes are overflowing,  
And clouded with blood.  
The blood of a little fair one,  
Whom I saw destroyed on the ground;  
The blood of a young woman,  
The blood of an old man, a very old man,  
The blood of many people, of many  
Trusting, helpless,  
Fallen under the bombs  
Of the pirates of the air.  
I come from Cuatro Caminos,  
From Cuatro Caminos I come,  
My ears are deaf  
With blasphemies and wailings,  
Ay Little One, Little One;  
What hast thou done to these dogs  
That they have dashed thee in pieces  
On the stones of the grounds?  
Ay, ay, ay, Mother, my Mother;  
Why have they killed the old grandfather?  
Because they are wolf's cubs,  
Cubs of a man-eating wolf.  
Because the blood that runs in their veins  
Is blood of brothel and mud  
Because in their regiment  
They were born fatherless  
A “curse on God” rends the air  
Towards the infamy of Heaven.

In the Barcelona Blood-Transfusion Service, developed by F. Duran Jorda, almost 30,000 donors were used over a 30-month period to furnish 9,000 litres of blood in 27,000 transfusions. This demonstrates the extent of blood banking during the late 1930's. It was during this time, originating in the United States of America, that the term "blood bank" was coined. Previously terms such as "blood depot" were being used. Overall, this service was a very important development, as one of the ominous new developments of war-time strategies was the air bombardment of civilian populations in large numbers. This would be a powerful tool during WWII.

The threat of a Second World War was looming, as indicated by the Spanish Civil War and the Munich Crisis in Sept 1938. These events led to near panic among the inhabitants of Europe's large cities as the spectre of war loomed overhead. Governments began preparations. One of the most critical lessons learned from the recent events and the previous World War was the importance of a blood supply. In Britain, this fear led to the organization of wartime transfusion services even before the opening of hostilities in September 1939.

In Britain, Dr. Janet Vaughan (1899 – 1993), a physician and experimental physiologist, was vigilant and quick to discover how London could very easily become an air raid target, just as Madrid was during the Spanish Civil War. She was promoted as the leader of a group of pathologists under the Medical Research Council, who were to anticipate conditions in which a vast number of emergency blood transfusions might be necessary. Only in her thirties, Dr. Vaughan approached the MRC with a plan for blood acquisition and storage. This was approved. It seems very probable that Dr. Bethune had influenced Dr. Vaughan in the development of a Transfusion Service in London. Dr. Vaughan was known to look to the Spanish Civil War's efforts to manage wounds, especially during the inhumane air bombardments which had not been dealt with previously in war. It is not known if Dr. Bethune and Dr. Vaughan had ever formally or informally met. But it can be hypothesised that Dr. Vaughan was greatly influenced by the work that was occurring in Spain during its Civil War, which involved individuals such as Dr. Bethune and Duran Jorda.

In Britain, a mobilization was planned within the constraints of a two-week expiration of stored blood as well as with the knowledge of the London population centre size. For instance, the British Red Cross Society set up an ambulance station in London during October 1938 which was designated to be a temporary blood storage depot. This used refrigeration units and a large stock of obsolete milk bottles, with a rubber cap designed for storage (the system was very similar to the milk bottle design created by Bethune in Spain). She focused on the storage and use in resuscitation to develop transfusion depots in the London area in anticipation of the casualties that were expected to result from air raids. The thought of London undergoing the devastation seen in Madrid's Cuatro Caminos drove Dr. Vaughan to take a proactive role in developing the London Transfusion Service. It was so honourable that Dr. Vaughan was recognized by the BBC as one of six Women of the Century.

In preparation, the 200 hospitals in London were notified to prepare for blood storage and to expand their lists of possible donors. Press releases and BBC broadcasts for appeals were prepared, but were held up awaiting the announcement of conflict (they did not want to instigate a premature panic). Once hostilities began in September 1939, donations poured in. London had a twenty-fold increase in donations over the highest annual total donations ever received by the London Red Cross.

Just as in Britain, France also made preparations in the fear of an upcoming war. The French abandoned their old donor-list system in favour of a blood-banking scheme, basing their new system on the Spanish example. The new plan for the second war was very different from WWI because blood would be drawn, not from combatants or medical personnel who were themselves overwhelmed during military action, but rather from non-combatants from the interior. Germany on the other hand was lagging in its transfusion efforts compared to the British and French. US army reports during and after the war ridiculed the German efforts to obtain only “Aryan” blood. It was also thought that the Nazi xenophobia blinded the Germans to the utility of transfusion. Post WWII, among the many charges at the Nuremburg medical war crimes tribunal were allegations of experiments on concentration camp inmates with a blood anti-coagulant, old plasma, and blood serum.

In contrast to those unethical experiments performed in Germany during WWII, scientific progress was taking place in Britain and the US. The discoveries of the time included the serendipitous finding of the Rh blood group and the use of plasma and other blood fractionation products (which would allow supply over long distances). In the United States, plasma was favoured over whole blood (which was favoured by the British). Plasma’s advantages had been suggested in the past as far back as WWI; however, it wasn’t until now that it was scientifically shown that plasma pooled from sufficient sources would neutralize antibodies, thereby preventing the need to type for compatibility. This was a continuation of the actions in the Spanish Civil War in which the Barcelona service routinely mixed whole blood from at least six donors of the same type to cancel out variations in titre. However, based on overall patient success rates, the Americans were losing more patients compared to the British, and hence, during this time period, whole blood appeared superior to plasma and albumins in resuscitation.

During the first half of the 20<sup>th</sup> century, many discoveries came about, with some being immediately adopted, while others remaining unused for years. Never the less, a quick, safe, effective transfusion protocol was developed by mid century that can be credited with saving hundreds of thousands of lives during war and peacetime. During WWI, about 9 in 100 soldiers wounded who arrived alive at the forward hospitals ended up dieing (due to inability to resuscitate effectively). During WWII, the number of soldiers who died upon reaching the hospital was halved. This decrease in mortality indicates success in treating the wounded between WWI and WWII.

The majority of developments in transfusion btw the wars were not the result of new discoveries, but rather were a consequence of the spread of ideas, such as the case of the Barcelona Blood Bank influencing the development of the London Blood Transfusion

Service, and the experimentation of new ideas on the field, such as the development of an indirect transfusion protocol. The discovery of techniques for the transfer of blood had been made in the first dozen years of the century, and the world wars permitted a demonstration of their effectiveness on a large scale. Widespread adoption in normal civilian settings required very different organization, motivation, and safeguards than were required under wartime conditions. This is an issue that donor organizations are trying to resolve even today. In essence, much of the advancements in blood transfusion and blood banking occurred within and between the two World Wars, where a major demand existed for blood (increased casualties, more brutal war-fare) and a supply was needed to keep up with the demand to save lives. The developments in blood transfusion paralleled the developments of the World Wars in a myriad of ways, with the ultimate goal of resuscitating the ever-increasing wounded population.

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# **TRADITIONAL ABORIGINAL MEDICINE: FROM ILLICIT TO IN VOGUE**

By

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## **Abstract**

**Imagine for a moment you are a 15-year-old Cree boy living on the North Battleford Indian Reserve in Saskatchewan circa 1880. Your centuries old tradition of hunting and trapping are but a fading memory as you attempt to adjust to a new and unfamiliar life of agriculture. Just be sure not to leave the reserve without permission. You wouldn't want the government appointed Indian agent to withhold your federally promised food rations as he did to your mother in spite of her racking TB cough.**

**Using food as a tool for social control was typical of the Canadian government's systematic approach to colonization, subjugation and assimilation of the First Nations peoples. More than a century later, Aboriginal people still suffer the consequences of a legacy of systematic de-culturalization and de-spiritualization. For almost any imaginable indicator of health, be it infant mortality, life expectancy, diabetes or cardiovascular disease one finds a shamefully glaring disparity between the Aboriginal and Non-Aboriginal community. So dismal were the health, education, employment and housing conditions on the Peguis Indian Reserve in 1987 that it prompted the South African ambassador, Glenn Babb, to accuse Canada of perpetrating its own form of apartheid right here at home.**

**In the late 1980s and 1990s however, a resurgence of interest in traditional aboriginal healing methods fueled government funding for healers, sweat lodges and spirit dancing ceremonies – practices that had once been suppressed and in some cases even outlawed. This paper seeks to explore how this striking change came about. It posits two hypotheses for the shift in attitude: one exploring agency of the Aboriginal people; and the other examining mounting international pressure on the government to remedy the situation. The more contentious question remains unanswered: are these changes genuine, or just fragile tokens, products of politically motivated gestures?**

The Canadian government's attitude towards delivery of health care services to First Nations peoples can be classified as abysmal at the worst of times and ineffective at the best of times. A history of colonialist and paternalistic wardship including the creation of the reserve system, forced relocation of communities to new and unfamiliar lands, the forced removal of children into institutions, inadequate services to those living on

reserves, and inherently racist attitudes towards Aboriginal peoples has resulted in glaring health disparities (Adelson 2003, 5). In 2000, the gap between life expectancy of registered First Nations people and other Canadians was estimated at 7.4 years for men and 5.2 years for women (INAC 2002). The incidence of diabetes in registered First Nations peoples is close to quadruple that of the general Canadian population across every age group (Romanow 2002, 220). In fact, Aboriginal peoples generally suffer poorer health outcomes for almost any imaginable disease marker, including but not limited to mental health, family violence, cardiovascular disease and infant mortality. Aboriginal people be they on or off reserve, in rural or urban settings, also tend to fare more poorly when evaluating determinants of health such as employment rates, housing condition, and level of education. Young Aboriginals are more often exposed to problems such as alcohol abuse and drug addiction than other Canadians of the same age. Combined with pervasive poverty, persistent racism, and a legacy of colonialism, Aboriginal peoples have been caught in a cycle that has been perpetuated across generations (Ibid. 218).

### **History of Repression**

Historically Aboriginal peoples have suffered a poisonous relationship with the Canadian government. Post-confederation, circa 1880, it was common practice for the federal government working through Indian agents to use food as a form of social control. The penalty for such minor transgressions as leaving the reserve without permission was often denial of food rations (Waldram et al. 2000, 155). In residential schools the situation was so dismal that Dr. Peter Bryce, the federally appointed general medical superintendent responsible for aboriginal health, suggested the schools be converted to sanatoria. He found the schools rife with disease and lacking proper medical facilities. According to his data, 25-35% of all children who had been pupils had died, primarily from tuberculosis but also from other diseases such as measles (Ibid., 156). Our first Prime Minister, Sir John A. MacDonald's response to fulfilling treaty obligations provides insight into his Indian policy and poignantly encapsulates the government's attitude towards Aboriginal peoples, "Of course the system is expensive, especially in feeding destitute Indians, but it is cheaper to feed them than to fight them, and humanity will not allow us to let them starve for the sake of economy" (Ray 1990, 41).

In some cases Aboriginal practices were not just ignored but fully outlawed. Traditional healing methods were decried as witchcraft and idolatry by Christian missionaries and ridiculed by most others. Ceremonial activity was banned in an effort to turn hunters and trappers into agricultural labourers. Eventually, the *Indian Act* prohibited those ceremonies that had survived most defiantly, the potlatch and the sun dance (Titley, 1989). Many elders and healers were prosecuted. In these ways, Aboriginal people were stripped of self-respect and respect for one another (RCAP 1993).

In 1927 parliament passed the Indian Act which proved particularly damaging to Government-Aboriginal relations. Among other things, this act forbade First Nations people from forming political organizations. Hence, it was common for a First Nations leader to be imprisoned by the RCMP for trying to organize any form of political group. The law prohibited traditional First Nation government systems from existing in native

communities and in its place established the present day "band council" system. In addition to suppressing the political activity of First Nations, the 1927 Indian Act also denied the Aboriginal people of Canada from speaking their native language, or practicing their traditional religion. Aboriginal children attending residential schools were often severely punished for uttering even a single word of their native language ([www.afn.ca](http://www.afn.ca)).

### **Shift Towards Self-Determination**

Up until the last 15 years, the Canadian government held a very paternalistic attitude towards the delivery and administration of healthcare to Aboriginal Peoples. In the 1960s the burgeoning health care crisis among Aboriginal peoples finally forced the government to sit up and take notice. Native health care spending ballooned from 4 million in the fifties to 28 million in the sixties in an attempt to provide equal health care on par with the non-Aboriginal population (Waldram et al. 2000, 190). Although federal funding increased, the government retained tight control over the administration of health services. Medical Services Branches (MSBs) were established across wide geographic zones. This consisted of eight base hospitals and hundreds of peripheral health centres, nursing stations and clinics. In 1987 the auditor general reported that four of the eight hospitals were in an advanced state of deterioration and seven of the eight had such low occupancy rates that they were half empty most of the time (Canada, Auditor General 1987: Section 12.79). Ultimately the federal government proved woefully ineffective and inefficient in its foray into the health care arena, a fact not surprising considering that in Canada healthcare is constitutionally delegated as a primary responsibility of the provincial government.

The late 1980s and early 1990s saw a dramatic shift towards more funding and greater aboriginal self-determination. In October 1994 the federal government announced \$243 million for a five-year funding plan of Aboriginal healthcare, \$87 million of which was earmarked for Aboriginal controlled community based health programs (Waldram et al. 2000, 256). There was also a shift towards greater acceptance of traditional Aboriginal healing methods such as sweat lodges and drumming ceremonies. It became more common for people to solicit the services of elders and healers.

The 1990 New Aboriginal Healing and Wellness initiative in Ontario was specifically aimed at helping Aboriginal peoples reclaim and revive their ancient traditions. It aims at fostering and promoting the integration of traditional and culturally appropriate approaches to healing and wellness in Aboriginal communities, while supporting better access to the type of care and services for Aboriginal People that most other Ontarians take for granted ([www.ahwsontario.ca](http://www.ahwsontario.ca)). There was also a transfer of administrative responsibility for certain existing health-related programs, starting with the National Native Alcohol and Drug Abuse Program and the Community Health Representative program in 1980-1981 (RCAP 1993).

In 1988 the Anishnawbe Health Clinic in Toronto first opened its doors. It was first funded by the provincial government as a multi-service urban community health centre. It

is grounded in the principles of the Medicine Wheel and has a mandate to provide services to off-reserve, non-status, and Métis people living in Toronto ([www.naho.ca](http://www.naho.ca)).

Under the auspices of the Aboriginal Healing and Wellness Strategy community based health centres similar to the Anishnawbe clinic began to surface throughout Ontario in Ottawa, Sudbury, Thunderbay and London as well as smaller townships such as Cutler, Fort Frances and Keewatin (*ibid.*).

### **Impetus for Change**

Despite decades of socioeconomic inequality and a long history of poor health status among Aboriginal peoples, the late 1980s and early 90s saw a swift recognition of the problem and acknowledgement of responsibility by the Canadian government. The trend towards increased funding and transfer of control over healthcare had begun.

It is curious that the change in attitude came as suddenly as it did. The new pro-active, reformist attitude seemed to coincide with a few key changes in the political climate and the restructuring of powerful aboriginal lobby groups.

### **Aboriginal Agency**

The term Aboriginal peoples is indeed a very broad term encompassing many diverse communities that inhabit a large geographical area. It includes but is not limited to treaty and status Indians, non-status Indians, the Métis, and the Inuit (though historically the Inuit were excluded from this definition). Uniting and organizing such a varied population often with competing interests was and remains an onerous task. The decades post world war I have witnessed the formation and dissolution of many First Nations lobby groups beginning with the League of Indian nations in the 1920s to the North American Indian Brotherhood in the late 1940s to the National Indian Council in 1961. Lack of nationwide support and internal administrative problems caused the organizations to break into regional factions. Chiefs wanted to develop an organization which was truly representative and accountable to their community members, thus the NIB made the transition to becoming the Assembly of First Nations (AFN) in 1982 ([www.afn.ca](http://www.afn.ca)).

The Assembly of First Nations represents the latest and arguably the most powerful and cohesive incarnation of Aboriginal lobby groups. As an organization they have maintained solidarity among the aboriginal groups in expressing their concerns for self-determination, land claims, natural resource and education rights. In fact they have been the driving force behind many landmark successes for the Aboriginal community, leading the way for constitutional reform. Dr. Ahenakew, leader of the AFN, along with the leaders of three aboriginal groups in Canada, attended three First Ministers Conferences (FMC) on Aboriginal rights in Ottawa in 1983, 1984, and 1985. These FMCs, were historic developments in themselves, because they marked the first time that Aboriginal Leaders were represented in Constitutional talks that directly affected them ([www.afn.ca](http://www.afn.ca)). The AFN has been vocal in their opposition to federal attempts to reduce its financial responsibility for First Nations health care. They vehemently fought against a federal proposal to reduce non-insured health benefits (that is, benefits such as prescription drugs

and eye glasses not universally available through medicare) to registered Indian people and Inuit. Their opposition sparked widespread debate that eventually came to include all aspects of federal policy on health care for Aboriginal people. Ultimately, it led to a new federal policy statement on Aboriginal health as reflected in the *Report of the Advisory Commission on Indian and Inuit Health Consultation*, written by Justice Thomas Berger. The language was conservative, but the report was radical, giving support to the concept of community control by Aboriginal people. Thus, it gave credence to the then-startling idea that Aboriginal people could manage their own affairs. In fact, Berger imagined a complete end to the institutional dependency long fostered by the Canadian state (RCAP 1993).

### **External Government Pressure**

In March of 1987 on invitation of Chief Louis Stevenson, South African ambassador Glenn Babb visited the Peguis Indian Reserve in Manitoba. At a time when the world was pointing fingers at South Africa, condemning them for their policy of apartheid and atrocious violation of human rights, it was controversial to say the least that Chief Stevenson would extend such an invitation. Chief Stevenson embarrassed and inflamed the federal government by pointing out the hypocrisy of Canada, a nation which prides itself on being a champion of human rights and social justice, treating its native peoples as second class citizens. Ambassador Babb fanned the flames of discontent by accusing Canada of perpetrating its own form of racial apartheid and compared the plight of Native Canadians to that of South African blacks. Besides drawing attention to the deplorable conditions of the Peguis Reserve, Chief Stevenson effectively shamed the Canadian government before the international community.

Another public embarrassment not soon to be erased from Canadian memory occurred in March of 1990. Mohawks at Kanesatake, west of Montreal, set up a blockade to prevent bulldozers from breaking ground for a golf course that would be built on a native burial ground. The Mohawks disputed the land with the nearby municipality of Oka. On August 14, after a series of almost daily violent incidents, Premier Robert Bourassa called upon the army for support. Horrified Canadians watched as soldiers faced off with armed Mohawks from the militant Warrior society. "The Warriors wanted the army," said John Ciaccia, Quebec's minister of Indian Affairs, "because then they could say they were fighting nation against nation, the Mohawk army against the Canadian army ...They played it for all it was worth around the world." On September 26, after a tense 78 day standoff, the Warriors surrendered, and most of the leaders were arrested ([www.cbc.ca](http://www.cbc.ca)).

As a direct result of the Oka standoff the Mulroney government ordered the Report of the Royal Commission on Aboriginal Peoples. A landmark government inquiry that commented on every aspect of the Aboriginal condition from residential schools to forced relocation, economic development to education, health to housing. A number of recommendations from the report sparked the trend towards transfer of health services to Aboriginal peoples in the late 1980s and early 1990s.

Perhaps the most contentious question remains unanswered: are the changes of the last two decades genuine, or just fragile tokens, products of politically motivated gestures?

When judging the Canadian government and its conciliatory efforts, history tells us to pay attention to what it does not what it says. The AFN, along with several communities and tribal councils continue to argue that self-determination in health should be part of comprehensive self-government and that the federal government has a hidden agenda of divesting itself of responsibility for Aboriginal health and welfare long before Aboriginal people have achieved good health (RCAP 1993). Certainly there were yawning gaps in the scope of transfer. For example, major components of care, notably the services covered under the non-insured health benefits program, were excluded from transfer agreements. Budgets transferred to First Nations' control took no account of members living off-reserve, many of whom come home for health care or need culturally appropriate programs wherever they are. It also appeared that transferred funds were to be frozen at pre-transfer levels, thus preventing the development of new programs except at the expense of old ones (Speck 1989, 187).

Thus, the sum of Aboriginal experience, population health research and World Health Organization analysis adds up to the same conclusion: health, like every facet of human experience, is the handmaiden of power. What happens to ill health conditions depends as much on the allocation of power in Canada as on the reorganization of health and healing systems (Adelson 2003, 35).

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# **ACHIEVING EDUCATIONAL EQUITY: THE HISTORY OF AFFIRMATIVE ACTION POLICIES FOR ABORIGINAL STUDENTS IN CANADIAN MEDICAL SCHOOLS**

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## **Abstract**

**The purpose of this project is to investigate the historical development of educational equity programs for Aboriginal students in medical schools across Canada. Each of the Canadian medical schools, where English is the primary language of instruction, was surveyed between May and August 2004, regarding the existence and characteristics of their respective educational equity programs.**

**Geographical location in western Canada, comprehensive program initiatives at every level of education, and age were the features of programs strongly related to the successful recruitment and graduation of Aboriginal medical students. An admission policy involving targets or quotas was a feature that showed a lesser relationship. Influences on the evolution of such programs include principles of social equality, public support and criticism, endorsement by professional organizations, and governmental policies at the federal, provincial, and university levels.**

## **INTRODUCTION**

In Canada, the health disparities between Aboriginal populations and the general population are disturbing, particularly in remote and rural Aboriginal communities. Aboriginal people suffer more from diabetes, cancer, and cardiovascular disease. The life span of an Aboriginal person is about ten years shorter on average. Aboriginal youth commit suicide at a rate six times the national average (Aubry 1994).

It is generally agreed that the demands of Canada's Aboriginal population are not being met by Western medicine (Kennedy 1984). Many Aboriginal communities are located in remote or rural regions of the country where access to health care is limited. Another significant barrier to the use of medical services is language, as individuals who speak an Aboriginal language are more likely to seek out traditional healers and to invest significant belief in the equality or superiority of these treatments (Waldrum et al 2000). Illness, from an Aboriginal perspective, is not necessarily predicated on physiology—certain symptoms may be interpreted as a message or opportunity for an individual to reflect upon, and make changes, in his or her life (Kennedy 1984). Western explanatory

models are unlike Aboriginal conceptualizations of wellness and illness and can be antipathic, serving to "...neither allay the anxiety of Aboriginal [patients], nor satisfy their quest for meaning" (Weeramanthri 1997). How well patients follow treatment programs, how positively they view the physician-patient interactions, and how likely they are to seek out treatment in the future is directly related to how well the physician's explanatory model complements their own. Patients are more likely to visit a physician and be compliant with care when the physician provides culturally competent health care (Delroy 2005, Wilson 2001).

The health of Canada's Aboriginal people will improve only when access to appropriate and effective health care is improved. Sending physicians from urban centres to remote and rural Aboriginal communities for short periods of time is an expensive and ineffective solution (CTV.ca News Staff 2005). A better and more permanent solution involves training more Aboriginal health care providers, including physicians (Gilmore 1990, Delroy 2005, Branswell 2002, *Times-Colonist* 2002). Past research has shown that medical students of ethnic minority groups are more likely than nonminority students to practice in underserved areas and treat disadvantaged patients (Komaromy et al. 1996, May and Beruman 1995, Davidson and Lewis 1997, Rabinowitz et al. 2000). Similarly, Canadian medical students from rural backgrounds are more likely than students from urban backgrounds to practice in rural areas (Woloschuk and Tarrant 2004, Wright et al. 2004, Easterbrook et al. 1999). Many Aboriginal physicians work in underserved areas and within Aboriginal communities after graduation (Stephens 1991, Nairne 1994). With the current shortage of rural physicians, and because Aboriginal peoples live mainly in these rural and remote areas, preparing physicians to deal with this population is critical. The ideal is to have Aboriginal physicians working in these communities (*Medical Post* 2003).

Canadian medical students come from a variety of academic, geographical, and social backgrounds. However, it has been recognized that the ethnic diversity of the student population does not represent the ethnic diversity of the Canadian population (Beyerstein 2001, Branswell 2002, Delroy 2005, Dhalla et al. 2002, *Times-Colonist* 2002). A survey initiated by the Canadian Federation of Medical Students (CFMS) in 2001 reported that although there are more people from visible minorities in medical school than in the Canadian population, Black and Aboriginal populations are underrepresented (Dhalla et al. 2002). Of the 981 first-year medical students who responded to the survey, fewer than 1% identified themselves as having an Aboriginal ethnic background, compared to 3.5% of the general Canadian population aged 20 to 24 years old (Government of Canada 2001). The lack of diversity in medical school is an ominous sign for the medical community and for Canada, which badly needs a physician work force that is both diverse and reflective of society as a whole (*Star-Phoenix* 1997).

Each of Canada's medical schools sets its own admissions targets and criteria that can change from year to year (Association of Canadian Medical Colleges 1984-2004). Historically, some Canadian medical schools have imposed formal or informal quotas on their applicant pools, restricting access to applicants based on religion, gender, and race (Delroy 2005, Beyerstein 2001). Such quotas are prohibited today (Association of



Canadian Medical Colleges 1984-2004). Generally, the students admitted to medical school are representative of those who apply; however, students of certain ethnic minorities apply in lower numbers (Delroy 2005, Dhalla et al. 2002). Recently, universities have taken steps to examine why this is so. Taking into consideration these findings, several universities have implemented educational equity programs in order to increase student diversity.

This paper investigates the historical development of educational equity programs for Aboriginal students in medical schools across Canada. Each of the thirteen Canadian medical schools, where English is the primary language of instruction, was surveyed regarding the existence and characteristics of their respective educational equity programs. This project attempts to identify the features of such programs that correlate with the successful recruitment and graduation of Aboriginal students. The project also examines the influences that have helped such programs to evolve, including public opinion and government policy.

## **METHODS**

### **Literature Search**

The literature was reviewed using various search strategies. Ovid MEDLINE and HealthStar were searched from 1966 to 2005. MeSH terms included Indians, North American and Education, Medical. The CBCA and Canadian Newsstand databases were also searched using the search string Aboriginal or Native; and Medical or Medicine; and University. For each university surveyed, a similar search was performed of the university website.

The literature was examined for historical and current references to educational equity programs in Canadian medical schools, characteristics of such programs, and numbers of Aboriginal students admitted, enrolled, or graduated from Canadian medical schools. The literature search did not reveal any similar research in Canada.

### **Survey**

A survey was developed based on the literature review. Ethics approval was sought and received from Health Sciences Research Ethics Board at Queen's University. Five questions were asked regarding the existence and characteristics of educational equity programs:

- Does the medical school have an educational equity program intended to increase the number of Aboriginal students enrolled in medicine?
- Does the program include high school recruitment programs (e.g. career fairs, summer workshops, etc.)?
- Does the program include undergraduate student preparation programs (e.g. pre-medical programs, MCAT preparation sessions, etc.)?
- Does the program include affirmative action policies for medical school applicants (e.g. quotas, invitations to self-identify as an Aboriginal student)?

- Does the program include medical student retention programs (e.g. peer-support groups, mentorship programs, special bursaries, etc.)?

Respondents were invited to supply details of their programs, as well as the year that each specific initiative was introduced.

Due to the author's limited proficiency in the French language, only universities where English is the primary language of instruction were surveyed. A one-page questionnaire was sent via e-mail to the Assistant Dean of Admissions of the Faculty of Medicine at each of the universities surveyed. The e-mail was also copied to the respective Admissions Coordinators. E-mail addresses were obtained from the respective university's website. Only one response per program was accepted. It was assumed that the Assistant Dean of Admissions would have the most knowledge of the admissions policies of their Faculty and could provide the most accurate information.

An e-mail questionnaire survey method was chosen because it was a relatively quick way to obtain data. Because the population surveyed was small, a reasonable response rate was expected. With follow up reminders, 69% of the schools responded, and 54% completed the survey.

## RESULTS

The Universities of Alberta, Calgary, Saskatchewan, Manitoba, and Queen's, McGill, and Dalhousie Universities completed the survey. The University of British Columbia and Memorial University responded to the survey, but responses were incomplete. The Universities of Ottawa, Toronto, Western Ontario, and McMaster University failed to respond.

Responses to the five areas of inquiry are shown in Table 1. Supplemental information has been provided using information obtained from the literature search (Haley 2001, *Vancouver Sun* 2001, Borsellino 2002, University of British Columbia 2002, University of Alberta 2002, University of Calgary 2004, Miller 2003, University of Saskatchewan 2003, Krause and Stephens 1992, University of Western Ontario 2005, McMaster University 2002, *Medical Post* 2003, Underwood 2003, Etowa 2003.)

Table 1: Characteristics of Educational Equity Programs for Aboriginal Students at Canadian Medical Schools.

University	Educational Equity Program	High school Recruitment Program	Undergraduate Preparation Program	Admission Policy	Medical Student Retention Program
University of British Columbia	2001			Target of 5% for Aboriginal students (2004)	
University of Alberta	Aboriginal Health Careers Program (1988)	National and regional career fairs; recruitment posters; Summer Science Program (1999)	No	3 additional seats available for qualified Aboriginal students (2003); 2 additional seats available for qualified Aboriginal students (1987-2002)	Academic, personal, financial counselling and referral (1988); financial awards (1989); Aboriginal Health Lectures (1990); workshops on Aboriginal Health and Leadership Issues (1995)
University of Calgary	In progress; Faculty of Medicine has expressed interest in the mandate and implementation of a university-wide Aboriginal Student Policy (2004)	No	In progress—a subcommittee is working on this.	Aboriginal applicants who meet the minimum GPA are interviewed (2003); Aboriginal applicants will be considered under the same criteria pertaining to GPA as residents of Alberta (1997-2002)	In progress—not a formal program yet, but a strong initiative is present.
University of Saskatchewan	Aboriginal Equity Access Program (1992)	Provincial career fairs (1994); MCAT preparation program	Summer Mentorship Program (1994); course-based Master's degree in Medical Science intended for Aboriginal students to enhance readiness to enter Medicine proposed (2003)	3 seats reserved for qualified Aboriginal applicants (1992)	Aboriginal Equity Access Program (1993)

University of Manitoba	Special Pre-Medical Studies Program (1982)	University-wide initiative through the ACCESS Program; includes presentations in northern communities and schools; distribution of pamphlets and posters; newspaper, radio, and television advertisements	Special Pre-Medical Studies Program (1982); includes science courses, reading and writing skills, summer practicums, MCAT preparation	Special consideration applies to Aboriginal applicants (1982)	Professional Health Program (1982); includes individual and family counselling; housing, childcare, and relocation assistance; personal development workshops
University of Western Ontario	2003			Up to 3 positions available for Aboriginal applicants (2003)	
McMaster University	Faculty of Health Sciences Policy for the admission of Aboriginal students (2002; policy expires 2007)	No; a student-run initiative involves presentations at high schools and a poster campaign (2003)		Applications from Aboriginal students are reviewed by a special committee (2003); Aboriginal students may be considered as Special Applicants (1991)	Faculty of Health Sciences is examining financial support via a bursary system (2002); funding is available for a health sciences coordinator (2002)
University of Toronto	Aboriginal Health Professions Program (1995-1999); Indian Health Careers Program (1986-1995)	Summer mentorship program (1994)		Aboriginal applicants are encouraged to contact the Admissions Officer and the Office for Aboriginal Student Services and Programs (1999); Aboriginal students may be considered under AHPP or IHCP (1986-1999); 2 seats designated for Aboriginal applicants (1987-1990); 5 seats designated (1990-?)	Visiting Lectureship on Native Health (1990)

Queen's University	Alternate Process of Assessment of Aboriginal Canadians for Admission to the School of Medicine (2000)	No	No	4/100 positions designated for qualified Aboriginal applicants (2000)	Scholarships designated for Aboriginal students (2000)
University of Ottawa				Aboriginal students "particularly invited to apply" (1999)	
McGill University	No	2002	No	No	No
Dalhousie University	No	No	Transition Year Program for entry into medicine for post-baccalaureate Aboriginal students proposed (2003)	Aboriginal applicants invited to self-identify; Faculty of Health Sciences Policy Statement on Affirmative Action commits to develop and implement affirmative action policies for Aboriginal students	No
Memorial University	No	No	No	No	No

## DISCUSSION

### Factors Influencing the Development of Educational Equity Programs

Educational equity programs have evolved partly to rectify historical social inequalities. The Special Premedical Studies Program (SPSP) at the University of Manitoba was established in 1979 in recognition of the inequality in the health professional representation (Stephens et al. 1996) and in recognition of the fact that no candidate of Aboriginal ancestry had been sufficiently prepared for admission to medicine (Krause and Stephens 1992). The chairman of the College of Medicine Admissions Committee at the University of Saskatchewan stated that “this group of students has not had the opportunities in the past we feel should have been extended to them, and we’re trying to catch up to where we should have been years ago” (Driver 2004).

These educational equity programs have been both lauded and criticized by the general public. Educational equity programs do have negative connotations. In the past, American affirmative action programs have used quota systems to admit students from ethnic minorities into various university programs with lower academic standards (Andrew 2004). An editorial criticizing the admission policy at the University of British Columbia stated that “a new form of discrimination is spreading through Canadian campuses—one that, while somewhat more subtle, is just as offensive to those who believe post-secondary institutions should be blind to racial or ethnic background. Called ‘affirmative action,’ the new discriminatory policies manifest themselves in ‘admission targets’ or quotas to help students from ‘disadvantaged’ groups” (Hiebert 2001). The Society for Academic Freedom and Scholarship filed a complaint against the University (*Vancouver Sun* 2001), stating that universities, as academic institutions, must uphold merit principles on the basis of scholarship (Fong 2001). “There is no reason to admit students into medical school on the basis of race. Indeed, there are very strong reasons to ignore race as an admission criterion: fairness to all applicants, competence of future doctors, and respect for aboriginal people who deserve to be held to the same standards of performance as others and who deserve the same high standards of competence in their physicians as do other Canadians” (Ferry 2001). In order to minimize criticism and retribution, these educational equity policies are carefully designed and worded under legal guidance (McMaster 2002).

In addition to the question of fairness, educational equity programs for Aboriginal students in medical schools have developed for more pragmatic reasons. Medical schools have a duty to produce physicians who will meet the health care needs of the nation (Aubry 1994, Delroy 2005). The health indicators of Aboriginal Canadians lag behind those of non-Aboriginal Canadians in almost every way. Many Aboriginal communities get infrequent service from physicians, and sending physicians from urban centres to remote and rural communities is expensive and ineffective (CTV.ca News Staff 2005). The SPSP at the University of Manitoba was developed in the hope that Aboriginal health professionals would be able to better serve Aboriginal populations (Stephens et al. 1996).

The development of educational equity initiatives at certain universities has spurred the development of similar programs at others. While developing their program in 2002, McMaster University noted that the majority of universities have also developed programs to encourage Aboriginal applicants (McMaster University 2002). The University of British Columbia described its policy as “in step with other Canadian universities that have taken this step” (Haley 2001). In particular, Aboriginal admission policies at the Universities of Alberta, Manitoba, Saskatchewan, and Ottawa were cited (Fong 2001, Hiebert 2001).

University policies are also influenced by governmental policies, both at the federal and provincial levels. The Royal Commission on Aboriginal Peoples identified a need for more Aboriginal health professionals in Canada (1996). More recently, both the Governments of Alberta and Canada have been re-examining their policies pertaining to Aboriginal peoples. Two seminal reports, *Strengthening Relationships: The Government of Alberta's Aboriginal Policy* (September 2000) and *Gathering Strength—Canada's Aboriginal Action Plan* (1997), identify the improvement of educational opportunities for Aboriginal people as a crucial objective. The goal is to reduce the discrepancy in level of education attainment between Aboriginal and Non-Aboriginal populations. The University of Alberta has identified the significance of both reports to the development of their educational equity programs: “The Aboriginal strategies developed by the University will directly correspond to current governmental priorities, and if designed well, our programs should be eligible for funding partnerships” (University of Alberta 2002). The McMaster Faculty of Health Sciences policy for the admission of Aboriginal students reflects the desire at the national, provincial, and local university levels to increase aboriginal enrolment in Health Sciences professional programs (McMaster University 2002).

Universities are also listening to the recommendations of key professional organizations. The College of Medicine at the University of Saskatchewan was placed on probation in November 2002 by the Liaison Committee on Medical Education (LCME) and the Committee on Accreditation of Canadian Medical Schools (CACMS). The College was found to be in non-compliance with LCME Standard MS-8: Each medical school should have policies and practices ensuring the gender, racial, cultural, and economic diversity of its students. The LCME found that “although an Aboriginal Equity Access Program was initiated in 1993 and enjoyed modest early successes, the school admitted no Aboriginal students between 1999 and 2001. These data indicate that existing policies are insufficient to address the college's implied social contract and expectations of the rapidly growing Aboriginal population of the province,” and the CACMS found that “the College's current admission policies and practices do not appear to foster diversity of the student body in congruence with the school's implied social contract and expectations of the community. This is particularly significant as it applies to Aboriginal students” (University of Saskatchewan 2003). Since 2002, two universities have introduced new educational equity policies of their own, two have made significant adjustments to previously existing admissions policies, and two others have increased admission targets (Table 1).

## **Measuring the Success of Educational Equity Programs**

Ten years ago, there were 51 practicing Aboriginal physicians in Canada (Thorne 1993, Aubry 1994). Today, the number has doubled to about 100 (Delroy 2005). In 2003, approximately 75% of Aboriginal medical students are enrolled in western universities. This discrepancy could reflect the larger Aboriginal populations in western Canada (*Medical Post* 2003), or it could be a result of the comprehensive recruitment and retention programs offered by the Universities of Alberta and Manitoba (Table 1). As of 2003, the University of Manitoba has graduated 30 physicians of Aboriginal ancestry, the most of any Canadian medical school (University of Manitoba 2003). The University of Alberta has the distinction of graduating the greatest number of Aboriginal physicians in the shortest period of time (King 2000).

The age of the program is also related to the number of Aboriginal graduates. The SPSP at the University of Manitoba is the longest running program in Canada and has subsequently graduated the most Aboriginal physicians. The University of Alberta has also graduated a significant number of Aboriginal physicians in its seven-year history. However, the relationship is not absolute. The University of Saskatchewan established its Aboriginal Equity Access Program in 1992, and while it experienced early success, the school admitted no Aboriginal students between 1999 and 2001 (University of Saskatchewan 2003). The program at the University of British Columbia is relatively new, but it has enrolled 16 medical students thus far (Delroy 2005).

Educational equity programs that have focused on admission policies using targets or quotas have been largely unsuccessful in their attempts to recruit Aboriginal medical students. The University of Toronto was the first in Canada to set aside designated positions for qualified Aboriginal applicants (Gilmore 1990). This policy apparently has since been revoked (Association of Canadian Medical Colleges 1984-2004). At McMaster University, there were 24 Aboriginal applicants to the Faculty of Health Sciences in 2001. None were asked to interview. When the policy was revised in 2002, enlisting a “culturally aware” group of people to review the applicants’ submissions, the university was able to make two offers of admission to Aboriginal students (McMaster University 2002). The University of Manitoba provides special consideration to Aboriginal applicants, but has not set a target or quota. This approach has been successful.

## **Barriers to Success for Aboriginal Students**

The most successful educational equity programs meet the needs of Aboriginal students.

For many Aboriginal students, gaining admission into university is difficult. The greatest barrier is academic. According to Statistics Canada (2001), 48% of Aboriginal youth aged 20 to 24 have not completed high school. The number of Aboriginal students completing their high school education is rising, but the graduation rate still lags behind that of their non-Aboriginal classmates (Petten 2003). Aboriginal students who do finish high school often lack the necessary language, math, and science skills needed to proceed to



university. Half of Aboriginal university students do not complete their first year, and only one-third ever complete a degree (Bergman 2002).

The quality of education that Aboriginal youths receive, especially in remote communities, is frequently substandard. The concept of university education is often not addressed in the North, and career counseling can be inadequate or absent (Krause and Stephens 1992). Many rural high schools cannot provide the academic programs and enrichment activities available to urban high school students. This is not only an educational disadvantage, but it can be a disadvantage when rural students' curricula vitae are assessed against those of urban counterparts (Rourke 2005).

Once admitted to university, many Aboriginal students must face other personal challenges. A high percentage of Aboriginal students enter university as mature students. Many have children of their own and many are single parents (Bergman 2002). Rural students by necessity must travel away from home to attend university (Rourke 2005). Aboriginal students are often called back home to deal with sickness or death in their families and communities (Bergman 2002).

The medical school admission process may be unintentionally biased and difficult for Aboriginal students. Admission policies rarely take Aboriginal issues and experiences into account if there is no Aboriginal representation on the admission committees (Rourke 2005).

Although Aboriginal students graduate from medical school at the same rates as their classmates (Krause and Stephens 1992, Stephens et al. 1996), minority students do tend to have higher attrition rates, take longer to complete undergraduate training, and are more likely to switch specialties or drop out of residency programs (Lee 1992, McManus et al. 1996). Reviews of Canadian university programs have revealed a lack of Aboriginal curriculum content and a lack of Aboriginal role models (Shaw et al. 1996, Petten 2003, Krause and Stephens 1992). Furthermore, Aboriginal students accepted into medical school via educational equity programs may face discrimination on a personal level. According to three graduates of the University of Manitoba's SPSP, medical classmates, at least in the beginning, either resented the attention given to the Aboriginal students or treated these students in a patronizing manner. This attitude has been decreasing as the years go by (Krause and Stephens 1992).

Adequate high school preparation and career counseling; mentorship and support for premedical and medical students; and provision of academic, financial, and counseling resources that are culturally appropriate, are all of paramount importance to the continued success of these programs (Pinette et al. 2000).

### **Future Directions for Educational Equity Programs**

Through the initiatives of educational equity programs in Canadian medical schools, the number of Aboriginal physicians in Canada has increased. Several universities that do not have formal educational equity programs are considering their implementation (Etowa

2003). Many universities that do have established programs are reviewing their initiatives and curricula (University of Saskatchewan 2003, University of Manitoba 2003, University of Alberta 2002). The universities that have graduated the most Aboriginal medical students tend to have more structured curriculum initiatives. A concerted effort from all Canadian medical schools, possibly coordinated through the Association of Canadian Medical Colleges and the Canadian Association for Medical Education, will increase the numbers of Aboriginal medical graduates even more (King 2000).

Until enough Aboriginal physicians are available to meet the needs of Canada's population, Aboriginal communities will continue to be served by non-Aboriginal physicians. While medical schools must be more sensitive to the needs of Aboriginal students, they also must provide non-Aboriginal students with a better understanding of native culture (*Medical Post* 2003, Chowdhury 2004). Almost 75% of Canada's medical school programs offer a some lectures or clinical placements in Aboriginal health education, but none have a formal Aboriginal health elective that uses all of the tools of learning to instruct their medical students (Chowdhury 2004).

Greater input from Aboriginal communities will be beneficial in the development of educational equity and medical education programs (Krause and Stephens 1992). The risk inherent in not firmly establishing such initiatives is that at a future point, the initiative could potentially dissolve, and relationships that have been established within the Aboriginal communities will erode to be replaced by the disenfranchisement of the Aboriginal community (University of Saskatchewan 2003). By building upon existing programs, Aboriginal people themselves identify the strategies that will work best (Government of Canada 1997).

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# **COMPARISONS OF THERAPEUTIC FOODS IN ANCIENT EGYPT, IMPERIAL ROME, AND MODERN TIMES**

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## **Abstract**

**Before the era of designer drugs, naturally occurring substances such as foods were widely used as pharmaceuticals. Records of such usage are found in the medical papyri of ancient Egypt, especially the Ebers papyrus, and the treatise On the Properties of Foodstuffs, by the physician Galen of Pergamum, who practiced in the Imperial era of ancient Rome. Comparison of the foods recognized in both sources to have therapeutic properties provides evidence for the degree of transmission of medical knowledge from ancient Egypt to Imperial Rome.**

**Some of the foods mentioned in both the papyri and Galen's treatise are common fruits and vegetables, certain preparations of meat, and plant extracts. Although some foods are identified as providing the same therapeutic benefit in both sources, different therapeutic properties are attributed to most of the foods mentioned in both sources. As a result, it can be concluded that there was little if any transmission of the knowledge of the therapeutic properties of food between the time of the Ebers papyrus and that of Galen.**

**Current therapeutic agents are designed to have maximum effect. It is thus to be expected that less effective drugs such as the foods described in these ancient sources are obsolete as therapeutic agents. Modern research into the efficacy of some of these foods as pharmaceuticals has revealed that many of the foods described by Galen and in the Ebers papyrus have no therapeutic properties. However, some of these foods do have a small but demonstrable therapeutic effect, suggesting that their ancient use as therapeutics was not entirely without benefit.**

## **Introduction**

Many naturally occurring substances are known to be pharmacologically active. Foods and herbs have, over the course of history, been used as therapeutic agents, admittedly with varying degrees of efficacy. In the ancient world, foods were well-recognized and extensively used as pharmacotherapeutic agents. Some of the earliest recorded examples of such uses are found in the medical papyri of ancient Egypt, foremost among which is the Ebers papyrus, dated to approximately 1550 B.C. (Manniche, 1989). Another ancient source, the treatise "De Alimentorum Facultatibus" ("On the Properties of Foodstuffs") by Galen of Pergamum, also records the use of foods to ameliorate a wide range of medical

conditions. Galen practiced medicine in the imperial period of ancient Rome and lived from approximately 130 to 200 A.D. (Powell, 2003). As the pre-eminent physician of his time and whose recommendations were standard medical practice for centuries, his work can be considered representative of the medicine practiced in the imperial Roman period and his recommendations for therapeutics the standard of the time. The properties ascribed to various foods in both the ancient Egyptian and imperial Roman sources can be assessed to determine the degree to which knowledge of therapeutic agents was transmitted during the approximately 1800 years that separated the compilation of the Ebers papyrus from the writing of Galen's treatise.

The explosion of medical knowledge within the last century has encompassed the area of therapeutics. In the present era, sophisticated, highly effective designed or refined drugs have relegated all other therapeutic agents, including foods, to the status of fringe treatments. Indeed, foods are identified as agents of harm perhaps more than they are considered beneficial, at least in the popular press. Scientific research into the properties of foods is ongoing, and recent investigations have revealed therapeutic benefits of some foods. Therefore, it is possible to use current research on foods for comparison to foods identified as having therapeutic properties in the ancient world to determine whether there is any consensus on the properties of those foods considered beneficial in all three eras and to evaluate the efficacy of foods used as pharmaceuticals in ancient Egypt and Imperial Rome. A careful surveillance of Galen's treatise and various ancient Egyptian medical texts reveal some similarities but many disparities in the recorded properties of those foods used as pharmaceuticals in both ages. The same relationship is true for the degree of concord between the modern identification of therapeutic benefits from foods and that of the ancient world. This discontinuity of medical thought over time is evidence both of ever-accelerating medical progress and of communication deficits over time.

## **Part I: Foods in the Ancient World**

The medical texts of ancient Egypt known today are papyrus scrolls preserved in desert tombs and only relatively recently re-acquired (Ghalioungui, 1963). The most comprehensive among these are the Ebers and Edwin Smith papyri, both of which identify certain foods as therapeutics for a variety of conditions. Both of these papyri are most likely copies of earlier texts, compiled together by an industrious scribe for a rich patron who wanted his own medical "textbook". The earlier texts have been lost, and only the fragments copied into the retrieved scrolls remain. Both the earlier texts and the remaining compilations are probably unable to describe Egyptian medicine in its totality, though, because medical training in ancient Egypt was completely oral once above a certain level of training (Ghalioungui, 1963). However, the papyri recovered in the modern era, namely the Ebers papyrus, provide the best available evidence of ancient Egyptian medicine, and their prescriptions of foods for therapeutic use should be considered an accurate reflection of the pharmaceutical compendium in that era. The treatise "On the Nature of Foodstuffs" by Galen of Pergamum is, in contrast, an original work based on *de novo* scientific research (or what passed for research in imperial Rome). This treatise is the first to deal with foods that were found throughout the entire Roman Empire (Powell, 2005). Earlier Hippocratic treatises provided guidance for the use of

therapeutic foods but mentioned foods only from limited geographic areas, and so had limited applicability for people from outside that region. Galen's broader outlook encompasses the whole of a "civilized" diet for a citizen anywhere in the Empire. This more global approach lends support for the use of this treatise as a representation of foods used as medical therapies in imperial Rome. Finally, it must be remembered that Galen's concept of medicine was that expressed in the Hippocratic treatise "On the Nature of Man"; that the body was composed of four humours (blood, phlegm, yellow bile, and black bile) which were each some combination of two of the four qualities (hot, cold, wet, and dry), and that health was achieved by balancing these humours and maintaining their respective qualities (Powell, 2003). Consequently, many of the therapeutic properties ascribed to foods by Galen are associated with rectification of the balance between the humours or their qualities. In subsequent discussion of the foods recommended in both the papyri and in Galen's treatise, it is to be assumed that these foods were ingested to achieve therapeutic benefits unless another delivery vehicle, such as topical application, is specified.

There are some foods mentioned in various ancient Egyptian papyri and "On the Properties of Foodstuffs" that are ascribed the same or at least similar therapeutic properties in each source. Lettuce is discussed in Galen's treatise and the Ebers papyrus as an agent to relieve indigestion (Manniche, 1989). Galen recommends celery as a diuretic, and celery is prescribed to decrease swelling in the limbs in the Hearst papyrus (Manniche, 1989). However, the Hearst papyrus recommends rubbing celery on the limbs, while Galen recommends ingestion, so while there may have been consensus on the diuretic properties of celery in these ancient sources, the delivery system was apparently controversial. A closer consensus is found on the properties of juniper berries, which were widely used as flavouring agents in the ancient world. In the Ebers papyrus, juniper berries are identified as being anti-flatulent and capable of inducing menstruation (Manniche, 1989). Galen relates that juniper berries cut through thick humours, the result of which would be to reduce flatulence and increase bleeding. Honey is prescribed as an agent to improve wound healing and as a diuretic by Galen and in the papyri. Eggs are recommended in the papyri as soothing agents for the skin (Darby, 1977) and by Galen as soothing agents for the throat. Figs are mentioned in both sources as laxatives and "internal cleansers"- Galen records that figs remove sandy residues from the kidney. One of the few drugs relevant today used in the ancient world is opium, which is present (in very low concentrations) in the poppy seeds omnipresent in ancient cooking. Galen recognizes the opiate properties of poppy seeds when he suggests using poppy seeds as a sedative, a use referred to in the Ebers papyrus, where mashed poppy seeds are prescribed to stop babies from crying (Manniche, 1989). Both the writers of the ancient Egyptian papyri and Galen attribute similar therapeutic properties to some of the foods that contributed to the diet of Mediterranean peoples in the ancient world.

While there is a consensus on the therapeutic properties of certain foods recorded in the ancient Egyptian papyri and Galen's treatise "On the Properties of Foodstuffs", these same foods are ascribed other, differing properties in each source. Lettuce, for example, has a much wider spectrum of activity described in the Ebers papyrus than in Galen's treatise. In the Egyptian papyri, there is a mention of lettuce used as an aphrodisiac



(Darby, 1977), and is prescribed as an anti-tussive agent, an analgesic, a laxative, an agent to improve hair growth, and a medication to get rid of intestinal worms. In contrast, Galen recognizes only one additional therapeutic property of lettuce, sedation. The suggested therapeutic benefits of celery are also more numerous in the ancient Egyptian texts. Celery is recommended in various papyri for contraception, burn relief, headache and toothache relief, and as an agent to stimulate appetite (Darby, 1977). Honey is an important component of many ancient Egyptian remedies recorded in the papyri, where honey (applied topically) is described as an anti-tussive and anti-septic agent. Galen does not recognize these effects of honey and claims instead that honey is a laxative and an emetic. Galen, however, recognizes more properties of opium than are recorded in the Egyptian papyri, as he recommends poppy seeds for their hypnotic and anti-tussive effects, properties that might be attributed to the opium in poppy seeds. Juniper berries are described as having totally opposite additional therapeutic benefits in each of these ancient sources. Juniper berries are labeled as laxatives (Manniche, 1989) and anti-diuretics (Nunn, 1996) in the Hearst and Ebers papyrus respectively, but Galen claims that they are anti-laxatives and weak diuretics. The variation in the properties ascribed to foods used as therapeutic agents by Galen and prescribed in the ancient Egyptian papyri suggests that the effects of therapeutic foods in the ancient world were based upon individual observations of a few cases rather than evidence from controlled clinical research.

Most of the foods identified as therapeutic agents in the representative sources of ancient world medicine discussed here are recorded as having completely different therapeutic properties in each source. A survey of some of the foods acknowledged as therapeutic agents in both Galen's treatise and the ancient Egyptian papyri reveals how disparate the alleged activities of these foods are. Fenugreek is mentioned in the Ebers papyrus as an agent to induce labour and in the Edwin Smith papyrus as an agent to improve the appearance of skin (Manniche, 1989), but Galen wrote that this herb should be used as a laxative. Galen instead identified bean flour as a treatment to improve the appearance of skin, while the Egyptian papyri recommend that beans should be ground into a paste for topical administration to relax arthritic joints and to heal a prolapsed rectum (Darby, 1977). Galen recorded that the seeds of the chaste tree reduce libido while the Ebers papyrus recommends chaste tree seeds to relieve constipation, reduce swelling, and strengthen teeth. Pomegranates are recommended in the papyri to kill intestinal worms (Nunn, 1996), but Galen prescribes these fruits for heartburn relief. The Ebers papyrus suggests the use of barley dough to soothe burns (Nunn, 1996) while Galen commends this dough as an extremely effective emetic. Galen also prescribes pig brain for emesis, but pig brains are mentioned in the medical papyri as anti-cancer agents (Darby, 1977). The Brooklyn papyrus reveals that onion was a key ingredient in a remedy to cure snakebite (Nunn, 1996), but Galen argues that the pungency of onions renders them capable of cutting through thick humours and thereby reducing flatulence. Some foods are recognized as having completely opposite effects in the papyri and in Galen's treatise. Dates, one of the few sweetening agents available around the ancient Mediterranean, are a case in point. Galen credits dates as effective agents to stop diarrhea, whereas dates are described as laxatives in the ancient Egyptian medical papyri (Nunn, 1996). Grapes are recognized in the papyri as being capable of reducing urine output (Nunn, 1996), but

Galen recommends grapes as diuretics. From this survey of therapeutic foods in the ancient world, it is apparent that there was more disparity than consensus regarding the medicinal properties of foods used as pharmaceutical agents before effective drugs were created.

Foods were commonly used as drugs in antiquity. Similar foods can be found recommended as therapeutic agents in the medical papyri of ancient Egypt and Galen's treatise "On the Properties of Foodstuffs", attesting to the similarity of agriculture and horticulture around the Mediterranean Sea over the almost two thousand years separating the ancient Egyptian from the imperial Roman era. However, these foods are most often ascribed different therapeutic properties in the ancient Egyptian records and in Galen's treatise, suggesting that there was little, if any, continuity of medical information between these ancient eras. It is extremely unlikely that Egyptians and Romans in the ancient world were so different that the same "drugs" would have different effects on each population. The different properties ascribed to these drugs in each era suggests that scientific research, at least in the modern sense, was not applied to studies of the foods used as drugs in the ancient world. Controlled studies would reveal the same results in different people taking the same drug. The absence of such results is a strong indication that conclusions about drug properties were drawn in the ancient world without evidence from controlled trials. The method used in the ancient world to draw conclusions about drug effects was most likely observation of isolated, uncontrolled cases, due to its simplicity. Modern studies involving controlled trials are more likely to accurately determine the therapeutic properties, if any, of foods.

## **Part II: Foods in the Current Age and their Relationships to Therapeutic Foods of the Past**

The development of scientific pharmacology has led to the creation of agents to treat a huge range of medical conditions. Modern therapeutic agents undergo strenuous laboratory and clinical testing to determine, first, whether they are more effective than nothing at all or a placebo, and then, their safety for human consumption. In the modern era, scientific knowledge has expanded exponentially, and drug research is no exception. Therapeutic agents available today have been specifically designed for action at a particular site in the body, refined from earlier, less efficacious drugs to achieve maximal therapeutic effect, or even found by serendipity as one of the unexpected benefits of scientific research (Katzung, 2001). The widespread availability of relatively safe, effective drugs has rendered older therapeutic agents obsolete. Foods are no exception. While the concept of healthy eating is a much-publicized one, and the adage "an apple a day keeps the doctor away" is well known, foods are acknowledged now as part of a balanced lifestyle rather than as therapeutic agents with specific health benefits. Yet there is currently an expanding market for alternative medicine, which promotes the therapeutic potential of natural products found in foods. This departure from standard medical care has sparked numerous investigations into the validity of naturopathic agents. Foods with alleged therapeutic properties have been subjected to the rigorous controlled tests demanded by the modern scientific method. The resulting data has been published and can be analyzed to reveal the therapeutic properties of various foods. This information

can be compared to the ancient use of foods as therapeutics to determine whether the foods prescribed in the ancient texts would be effective for the conditions indicated or indeed if they had any therapeutic benefit at all.

Modern investigations have showed that some foods have therapeutic properties consistent with those described by Galen and in the ancient Egyptian papyri. Some of the most striking verifications of ancient world medical therapy come from recent investigations into the properties of honey. These investigations have confirmed the anti-septic properties of honey when applied to wounds (Al-Waili, 2004) as described in the papyri and the laxative effect of honey (Ladas et al., 1995) reported by Galen. New studies have also reported that honey has a demonstrable anti-fungal effect and improves lipid profiles and plasma glucose levels relative to sucrose (Al-Waili, 2004). The use of figs as “internal cleansers” recommended in both sources is supported by the anti-helminthic effect of figs reported in a recent study (Stepek et al., 2004). Figs also have been shown to have a pro-coagulant activity via Factor X stimulation (Richter et al., 2002) and high levels of carotenoids, which protect against colon cancer (Su et al., 2002). Modern research into barley has provided further possible confirmation of therapeutic properties identified in the ancient world. Galen reports that raw barley dough can be used as an emetic; a 2003 study reports that food-induced enterocolitis in children can be caused by barley (Nowak-Wegrzyn, 2003). It is tantalizing to speculate that Galen observed this effect and extrapolated his observations to healthy adults. Barley is also a well-known agent to reduce plasma cholesterol levels (Behall et al., 2004), but without blood tests, the hypocholesterolemic property of barley could not be known in the ancient world. Dates are high in fibre (Al-Shakib et al., 2003) and as such can be used as a laxative (Burnett et al., 2000), consistent with the laxative property of dates reported in the Egyptian papyri. The medicinal properties of poppy seeds have also been confirmed by recent investigations. Poppy seeds contain morphine at levels up to 294 mg morphine / kg of poppy seeds. A minimal adult oral dose of morphine is 10 mg / kg (Katzung, 2001). Morphine does have sedative properties, so a poppy seed extract to stop babies from crying as prescribed in ancient Egypt may well have been effective. Galen credits poppy seeds with sedative and anti-tussive effects, both of which are recognized clinical effects of morphine and could have been achieved after ingestion of a great many poppy seeds (Katzung, 2001). Therefore, recent scientific research has revealed that some of the foods used as medicines in the ancient world have the properties attributed to them in ancient sources and would thus have been effective therapeutic agents.

Despite the modern confirmation of the efficacy of some foods used as drugs in the ancient world, new scientific research has also revealed that many of the therapeutic foods used in ancient Egypt and imperial Rome would have been useless in the treatment of the conditions for which they were prescribed. Many of these foods have, however, recently-discovered benefits, suggesting that their use in ancient times might have been beneficial for general health, though without effect on the condition indicated. Lettuce is a case in point. There is no evidence to suggest that lettuce has any of the effects attributed to it by Galen or in the papyri. However, lettuce has high levels of lutein and carotenoids, both of which reduce the risk of colon cancer (Slattery et al., 2000) and high levels of vitamin K, which is associated with reduced risk of hip fracture (Feskanich et al., 1999). Celery also

has high levels of lutein (Slattery et al., 2000), and the ethanol extract of celery has shown some potential as a mosquito repellent (Choochote et al., 2004). In spite of these beneficial effects, there is no evidence to suggest that celery has any of the therapeutic properties recorded in the Egyptian papyri or by Galen. High levels of fibre present in beans might also reduce the risk of colon cancer (Nakaji et al., 2001), but there is no evidence that beans have the more extensive therapeutic properties attributed to them in the ancient sources. Similarly, modern studies have revealed that juniper berry oil has significant anti-bacterial and anti-fungal effects, but none of the properties attributed to juniper berries in the papyri or Galen's treatise (Filipowicz et al., 2003). The therapeutic benefits of chaste tree seeds also varies between the ancient and modern eras. Linoleic acid, an estrogenic compound, has been isolated from these seeds (Liu et al., 2004). Estrogen improves libido in post-menopausal women (Burger, 2001), implying an effect of chaste tree seeds opposite to Galen's claim that they reduce libido.

One of the most common properties of food unrecognized in the ancient world but confirmed by modern investigations is the presence of antioxidants and the resulting cardiovascular protective effect. There are a great many different antioxidant compounds in foods. These include flavonoids and polyphenols. Pomegranates contain flavonoids, which block LDL oxidation and foam cell formation and so help protect against atherosclerosis (Dornfeld et al., 2002). Pomegranates are also effective anti-fungal agents (Vasconcelos et al., 2002), but are not anti-helminthic as reported in the papyri. Onions are also rich in flavonoids and have a protective effect on the cardiovascular system (Mennen et al., 2003). Onions also protect against cancer, asthma, and infection (Griffiths et al., 2002), but there is no evidence that they help to cure snakebite or reduce flatulence as claimed in the papyri and by Galen respectively. Methanol extract of fenugreek seeds also contain antioxidant compounds which are protective for erythrocytes (Kaviarasan et al., 2004). Fenugreek seed powder consumed daily also has significant anti-diabetic effects (Cicero et al., 2004). There is no evidence that fenugreek has any effect on parturition, skin care, or defecation as suggested in the ancient sources. Similarly, modern studies have not shown that grapes can affect urine output as claimed by Galen and in ancient Egyptian papyri, but have revealed that both water and ethanol extracts of grape seeds have a high concentration of antioxidants (Bagchi et al., 2000). Grape seed extracts have a wide range of benefits including vasodilatory, anti-inflammatory, anti-microbial, and estrogenic effects (Bagchi et al., 2000). It should be concluded from the above survey of therapeutic foods that while many of the foods used as drugs in the ancient world were ineffective as therapeutics for some conditions, they did have other beneficial health effects.

Some of the foods prescribed as therapies in the Egyptian papyri or in Galen's treatise, however, had potentially harmful effects on general health. The ingestion of pig brain for emesis, as proposed by Galen, or for cancer protection, as recorded in the papyri, would have exposed the eater to cysticercosis, a potentially fatal tapeworm infection (Flisser, 1991). As well, topical application of eggs has been associated with contact dermatitis (Tam et al., 2001), an unwanted complication when the point of the therapy is to soothe the skin!

Therapeutic foods have been investigated in recent years to determine the therapeutic benefits that might be derived from them. These investigations have revealed numerous beneficial properties of various foods for overall health, but these are mostly inconsistent with the therapeutic properties recorded in the papyri of ancient Egypt and in Galen's treatise "On the Properties of Foodstuffs". This difference reflects the progress of science from the ancient world to the present time. In ancient Egypt and imperial Rome, there were no research institutions and minimal means of communication. As a result, the results of therapeutic interventions were determined by observation of the effects these therapies had on patients that a single doctor might observe. Without controlled experimentation, confounding variables could seriously affect the conclusions drawn from observation of the effects of various therapeutic interventions. Without mass communication, the observations made by one physician could not be tested by another physician to verify the results obtained. Given these limitations, it is not surprising that modern studies reveal a lack of appropriate applications of foods to medical conditions in the ancient world.

## **Discussion**

Food is necessary for survival. In the ancient world, foods were far more; they were almost the sole therapeutic agents available. Rigorous modern scientific testing has confirmed that many foods do have demonstrable therapeutic properties. While usually not as effective as modern pharmaceuticals, which are specially designed *de novo* or refined from an earlier compound for maximum effect, the medicinal properties of foods do exist and are not merely unfounded claims of alternative medicine practitioners. The use of foods as therapeutic agents has been recorded in the medical papyri of ancient Egypt and extensively discussed in the treatise "On the Nature of Foodstuffs" by Galen. Recent investigations into the therapeutic properties of foods using systematic scientific experimentation complete the survey of therapeutic foods over time. Foods discussed in the medical literature of all three eras (ancient Egyptian, imperial Roman, and modern) can be compared to gain an appreciation for the role that foods have played in medical practice from the earliest days of rational medicine in ancient Egypt.

A comparison of the ancient sources reveals discontinuity between the therapeutic properties of foods identified in the ancient Egyptian papyri and in Galen's treatise. The disparity between many of the therapeutic properties attributed to the same foods in the two eras suggests that there was a lack of communication of medical information from ancient Egypt to imperial Rome. It is not unexpected that the written records of Egyptian medicine were not known to the Romans; they were not mass-produced and were often buried with their owners (Nunn, 1996). The obvious lack of any other sort of communication is also not surprising when reflecting upon the changes in medical theory that occurred between the two ages. When medical theory developed from the ancient Egyptian concept of medicine to the four humours model followed by Galen, medical practice likewise changed. With the new concepts of medicine, therapeutic principles had to be re-evaluated, and Galen and his contemporaries may well have considered the therapies of the ancient Egyptians as ineffective and quaint as Galen's therapies appear to us. The lack of scientific method in the ancient world made randomized, controlled trials

impossible; the resulting observational studies might also explain a great deal of the disparity between therapeutic recommendations in ancient Egypt and imperial Rome. Modern applications of randomized, controlled trials have revealed the true properties of foods described in the ancient sources. These results indicate that the actual therapeutic properties of foods are different from those proposed by Galen or recorded in the Egyptian papyri, with a few exceptions. These differences reveal that foods prescribed as drugs in ancient Egypt or imperial Rome were usually ineffective for treatment of the presenting condition. However, these foods provide a number of other health benefits. As well, the well-documented placebo effect may have rendered useless therapies effective for some patients with certain conditions. In today's world, while foods are still generally considered therapeutically useless, it is important to remember that foods do have a variety of health benefits. Foods should be used to the same effect now as in the ancient world: to maintain general health.

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# **TRIUMPH OVER PAIN: THE CURIOUSLY CONTENTIOUS HISTORY OF ETHER**

By

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## **Abstract**

**Surgery in the early nineteenth century posed serious challenges to both the surgeon and the patient, notably due to the unbearable pain induced by the application of the scalpel. However surgical textbooks of the day scarcely mentioned this pain. Amusingly the accompanying illustrations of operations actually showed patients lying quietly and apparently unconcerned in the midst of gruesome and painful procedures.**

**All this changed on October 16, 1846. William T.G. Morton, a Boston area dentist, administered ether to a patient with a large vascular malformation in his neck. John Collins Warren, a senior surgeon at the Massachusetts General Hospital, painlessly excised the tumor in an operating theater filled with hospital staff. Morton's demonstration revolutionized the way surgery was practiced, but the credit for the discovery of surgical anesthesia is certainly not his alone. Several individuals challenged Morton's attempts to claim sole credit, including Horace Wells, Charles T. Jackson, and Crawford W. Long.**

**Wells, a former dental partner of Morton's, noticed the analgesic qualities of nitrous oxide at a public lecture in 1844. While he successfully applied the gas to his practice, his public demonstration failed miserably. Incidentally this is where Morton learned of the idea of inhalation anesthesia. Jackson, a former mentor to Morton, supplied Morton with the critically important advice of using pure sulfuric ether, rather than impure commercial concoctions. Further complicating matters was the fact that Long, a physician from Georgia, was actually the first to perform an anesthetized operation using ether in March 1842. However he failed to publish his results until several years after Morton's demonstration. Acrimonious legal battles erupted between Morton, Wells, and Jackson in the hopes that official recognition might lead to monetary profit. Ironically none of these three received any financial reward, and all met untimely and tragic deaths.**

## Introduction

Surgery in the early nineteenth century is difficult to comprehend today. In the pre-anesthesia era, the surgeon's application of the scalpel induced unbearable pain to the patient, and the only real prophylactic was the speed of the surgeon's hands. Although surgical operations were performed very speedily, they still required anywhere from five to thirty minutes to complete (Moore, 1999). Although the necessity of an insensibility-inducing agent was not lost upon surgeons, there was a distinct lack of systematic and methodical research in the area. Opiates were administered gratuitously, alcoholic intoxication was applied, hypnotism was tried, and sometimes even a smart blow to the chin was used (Key, 1963). Unfortunately none of these techniques worked reliably, and the field of surgery failed to acknowledge this lack of dependable pain alleviation. Surgical textbooks of the day scarcely mentioned pain. Amusingly the accompanying illustrations of operations actually showed patients lying quietly and apparently unconcerned in the midst of gruesome and painful procedures (Moore, 1999). All this changed on October 16, 1846 thanks to a resourceful but profiteering dentist.

## Discovery

William T.G. Morton began his dental career at the newly founded Baltimore College of Dental Surgery. However, he did not finish his degree but instead, started to take instruction in 1841 from Horace Wells, a dentist based in Hartford. The two became partners for a short time during 1842 and 1843, but the partnership proved unsuccessful and Morton set up his own practice in Boston. In 1844 he attended several classes at Harvard Medical School in an ultimately unsuccessful attempt to complete a medical degree. At the same time, to expand his limited knowledge of chemistry, he lived briefly with Charles T. Jackson, an internationally famous physician, chemist, and geologist. However Morton's dental practice started to flourish, and he dropped his extracurricular academic interests to focus on his business (Duncum, 1947).

His practice specialized in prosthetic dentistry, but in contrast to his colleagues, Morton considered it essential to completely extract all tooth material from the jaw before fitting any dental prosthesis. Although he was quite skilled in dental reconstruction, his technique was both laborious and painful, discouraging many potential clients. He realized that this was preventing him from maximizing profits, and so his business interests inspired him to look for a way to make extractions painless (Snell, 1894). At this time, dentistry was a trade, not a profession, so dentists regularly kept their special techniques secret. It is therefore no surprise that Morton was so cautious in his search for a pain-relieving agent (Rutledge, 1996). He originally took interest in ether because his former mentor Charles Jackson had suggested its local application might deaden the pain of extractions. His results proved inconsistent, but this aroused his interest in ether vapor. Because he was so worried about others stealing his ideas, he took great pains to keep his experiments secret. His original experiments in the summer of 1846 were on his household pets and subsequently, on himself and his dental assistants. However, his results were unreliable, and Morton sought Jackson's help. Ironically he underestimated Jackson's interest in his work and overestimated his own concealment of his experiments.

During this meeting, Jackson suggested that Morton could improve his results if he used chemically purified sulfuric ether rather than less pure commercial products (Duncum, 1947). After additional tests on himself and his assistants, he felt confident enough of his knowledge and control over ether vapor to administer it to a patient. On the evening of September 30, 1846, Eben Frost came to him with an intensely painful tooth. He begged Morton to hypnotize him, a standard but ineffective attempt at pain relief. Morton assured him that he could offer him something far more effective, and Frost agreed to be treated with ether. After inhaling the ether through a handkerchief, Morton painlessly extracted the tooth with Frost having no recollection of the extraction (Rutledge, 1996).

After this first practical success, Morton took two important steps: he proceeded to apply for a patent, and he looked for the opportunity to apply his preparation to a surgical patient. Morton called upon a patent commissioning office to inquire about the possibility of patenting a new process using sulfuric ether. He received an uncertain response but was assured that a definitive answer could be provided upon consulting the law (Duncum, 1947). Morton subsequently consulted John Collins Warren, the head of the surgical staff at the Massachusetts General Hospital (MGH), about publicly demonstrating his preparation. Due to his hopes of patenting his discovery and fears of piracy, he refused to disclose the exact nature of his preparation. Warren had ethical problems concerning Morton's request, most notably because the preparation's identity and safety were unknown. Despite his misgivings, Warren instructed that an invitation be sent to Morton. It was written by one of the junior house officers, perhaps reflecting Warren's skepticism and reservations about this secret preparation (Moore, 1999).

Morton's demonstration was scheduled for October 16, 1846. Being a Friday morning, the operating theater was substantially filled because it was the student's clinical day. A general air of skepticism pervaded the vast majority of the audience. Morton was late because he had made several last minute changes to the inhaler (Rutledge, 1996). Warren was impatient and decided to proceed with the operation. "As Dr. Morton has not arrived, I presume he is otherwise engaged," he remarked to the audience; the crowd replied with a great laugh. This underhanded joke was meant to imply that Morton was too fearful of failure to show up (Rice, 1859). As Warren was about to start, Morton rushed in with his newly configured inhaler. He applied the ether vapor to the patient, and the patient was soon asleep. The theater watched on in silent anticipation as Warren started his incision in the direction of the vascular tumor in the patient's neck. To everyone's surprise, the patient didn't startle, scream, or give any other indication of pain. As the operation progressed and Warren ligated the deep vessels, the patient started moving his limbs and uttering nonsensical expressions. Warren doubted the success of the operation until he had full confirmation from the patient afterwards that no pain had been experienced. He then turned towards the amazed audience and famously remarked, "Gentlemen, this is no humbug" (Duncum, 1947). Morton had certainly taken full advantage of his first public opportunity to showcase ether.

## Origins

Although Morton was instrumental in revealing ether anesthesia to the world, the origins of inhalation anesthesia actually predate his interest in the subject. In the early nineteenth century, after nitrous oxide had been shown to be relatively safe, traveling professors of chemistry journeyed through towns of the United States, lecturing on gases and demonstrating their exhilarating effects. Nitrous oxide was quite popular because intoxicated individuals spoke foolishly and would sometimes laugh uncontrollably. It soon became fashionable to inhale nitrous oxide at lectures and social gatherings (Duncum, 1947). In 1818, Michael Faraday suggested that ether vapor might produce similar effects to nitrous oxide gas. In many social circles, ether replaced nitrous oxide largely because of the greater simplicity of obtaining, storing, and administering ether. Ether frolics, social parties where participants would become drunk from ether vapor, became remarkably popular, particularly among students (Bergman, 1992).

Incredibly Morton wasn't the first to demonstrate ether as a surgical anesthetic. That honor belongs to Crawford Williamson Long, a well-trained physician practicing in the small town of Jefferson, Georgia. His offices became a clubroom for the town's intellectual youths where regular meetings often turned into ether frolics. Long enjoyed inhaling ether for its exhilarating properties. Amusingly he often discovered new bruises on himself and his friends following a session of ether inhalation. They had no recollection of pain or the causes of these bruises, so Long concluded that ether could eliminate pain and be used for surgical operations. He put his observations into practical use on March 30, 1842, when a boy named James Venable approached him requesting for two small tumors to be removed from the back of his neck. Long explained his observations to Venable as he knew that Venable enjoyed inhaling ether (Duncum, 1947). Upon getting consent, Long painlessly removed one of the sebaceous cysts. Although thrilled with his achievement, he only gave ether for seven minor operations over the next four years. Curiously he didn't publish the report of his cases until 1849, three years after Morton's demonstration. To this day no one fully understands Long's reasons behind not reporting his discovery promptly or attempting to persuade others of its importance. His rural location may have prevented him from having the necessary influence in scientific society at the time. Perhaps he was overly conscientious and was waiting to try ether for a major operation. He might have been intimidated by the professors of the nearby Medical College of Georgia who endorsed hypnotism. Regardless of the reason, Long had the innovation and courage to experiment with ether as a surgical anesthetic, but his work did not influence the practice of surgery (Rutledge, 1996).

Morton's former teacher and partner, Horace Wells, also had an important impact on the development of anesthesia. On December 10, 1844, he and his wife attended a lecture in Hartford, Connecticut by Gardner Colton, one of many traveling professors that were quite popular in the United States at the time. Colton conducted a demonstration with laughing gas, but Wells noticed that one of the participants suffered a severe gash to his knees without reacting to the pain. He immediately reasoned that nitrous oxide might be able to alleviate the pain associated with dental procedures. After asking Colton to produce some nitrous oxide for him, Wells inhaled it and had one of his own wisdom teeth

extracted (Rutledge, 1996). Upon waking he exclaimed, “I felt it no more than the prick of a pin. This is the most wonderful discovery of our time” (Keys, 1963). In the following month, Wells performed about fifteen painless dental procedures with nitrous oxide and felt confident enough to demonstrate it publicly. John Warren invited Wells to demonstrate a dental extraction on one of the students in January 1845. Unfortunately for Wells, the gasbag was withdrawn too soon, the anesthesia was incomplete, and the student screamed in pain. This result proved disastrous, as the surgeons at the hospital took no further interest in Wells or his methods. However this demonstration left a strong and lasting impression on Morton, setting the stage for his clandestine quest for an effective and reliable anesthetic agent (Rutledge, 1996).

## **Fallout**

Thomas Morton’s success with ether continued after his original demonstration on October 16, 1846. The following day he aided in the removal of an adipose tumor from a woman’s arm by administering ether throughout the operation. He also received news from the patent commissioning office, and to his delight, it was confirmed that etherization could be patented. Unhappily for Morton, the patent commissioner was a friend of Thomas Jackson’s, and he had been persuaded by Jackson to recommend that the discovery be considered a joint one. Although Jackson was a distinguished academic, especially in the field of geology, he had an unsavory tendency to take credit for other people’s inventions, especially when they had financial promise. For example in 1840, when Samuel Morse patented the electric telegraph, Jackson publicly claimed that he was the true originator of the idea and had outlined its underlying principles to Morse in 1836. Jackson’s friend at the patent office persuaded Morton to include Jackson’s name on the patent, and the patent was finally issued on November 12 (Duncum, 1946).

During this time Morton had been prohibited from using ether at MGH because he had kept the identity of his preparation a secret. He was so concerned about his discovery being pirated that he disguised the color and odor of his ether preparation and called it *Letheon*, Greek for forgetfulness. John Warren and other senior surgeons at MGH were concerned about the ethical problems of using a preparation whose composition and safety were unknown. They prevented Morton from using it at the hospital unless he revealed its exact nature. He finally capitulated on November 6, revealing that the preparation was nothing more than sulfuric ether. The next day Morton administered ether in two major operations, an amputation of a leg and a resection of a mandible in the presence of a packed operating amphitheater. Both operations were complete successes, and the MGH surgeons were fully persuaded of the importance and effectiveness of this discovery. Morton subsequently enjoyed the endorsement of the MGH staff in his mission to collect fees and regulate the use of ether anesthesia (Rutledge, 1996).

As ether anesthesia became more popular and more accepted, Jackson decided to take matters into his own hands and wrote two separate letters to a friend in Paris. Jackson claimed that the discovery of the anesthetic application of ether and its introduction into surgery were his achievements. He also described how ether vapor had been thoroughly tested and accepted at MGH. His Parisian friend was influential in presenting his letters to

the Académie des Sciences, and soon the European scientific community was acknowledging Jackson's claims. Morton quickly learned of Jackson's letters and collected evidence to refute his claims, but Jackson's connections and friendships in Europe had more influence. He continued to enjoy the support of his international friends from Paris and London (Duncum, 1947).

Horace Wells also challenged Morton's claims. After Wells' failure with nitrous oxide at MGH, he returned to Hartford and became seriously ill. His sickness was so severe that he was forced to neglect his dental practice, and upon his recovery, his practice had become ruined. Wells' interest in nitrous oxide dwindled, and he was forced to drift between various jobs to earn money. In December 1846, he was about to sail to France to pursue an art-dealing venture, but his friends advised him to publish a statement in the *Hartford Courant*. He claimed that he should have rights to the discovery based on the fact that his nitrous oxide experiments used the same principles as Morton's ether discovery (Duncum, 1947).

Morton's patent was soon ignored all over America and Europe, as surgeons were able to apply ether more simply by using a sponge instead of Morton's specialized inhaler. Furthermore the United States Army and Navy broke his patent with their widespread use of ether during the Mexican War in 1847. Instead of making a fortune, Morton's efforts to collect fees and regulate anesthesia were a failure. By this time his dental business had been neglected so long that it had become unsalvageable (Duncum, 1947). In 1849, Morton, with his supporters, petitioned Congress to recognize him as the discoverer of anesthesia and to compensate him monetarily. In total three appeals were made, and Congress finally agreed in 1852 to reward Morton with a \$100,000 award. This decision was greeted with objections from Jackson's and Wells' supporters, and Crawford Long was persuaded to also submit a claim in 1854. All of the proposed bills were eventually rejected due to the excessive number of claimants, and ironically no one received any financial reward (Rutledge, 1996).

## **Afterward**

Of the four major personalities involved in the ether controversy, only Crawford Long's life wasn't destroyed by the desire to gain prestige and monetary reward from ether. After the Congressional debates of 1854, he gave up his quest to become recognized as the discoverer of anesthesia. Instead he continued his practice and lived a pleasant life in Georgia until his death. He remains a hero of the South, and his successful use of ether has been memorialized by the celebration of Doctor's Day every March 30 (Rutledge, 1996).

Horace Wells' efforts to gain recognition for the discovery of anesthesia proved fruitless, and eventually he left his wife and son, unsupported in Hartford, to go to New York City to resume his experiments. He soon became addicted to chloroform and was incarcerated on his 33rd birthday for throwing sulfuric acid on prostitutes. In prison he committed suicide. Twelve days later, his family received news from the Paris Medical Society that he merited the honor of the discovery of the first use of vapors or gases to make surgery painless (Rutledge, 1996).

Charles Jackson transformed into an uncontrollable megalomaniac. In 1873, when he came across Morton's grave in the Mount Auburn Cemetery in Cambridge, Massachusetts, Jackson developed a severe psychotic mental illness. He was placed in an institution for the insane outside of Boston and remained there until his death in 1880. Amusingly he was buried just a short distance from Morton at Mount Auburn (Rutledge, 1996).

Thomas Morton's life became an obsessive struggle to gain financial reward and recognition for his contribution to anesthesia. However, none of his financial schemes were successful, and he ruined himself by putting all his time, energy, and money into these schemes. His creditors soon ignored him, he lost his home, and he was censured by the American Medical Association. In the summer of 1868, Morton journeyed to New York City to defend himself against a new publication by Thomas Jackson claiming credit for ether anesthesia. However, the city was in the midst of a heat wave, and Morton suffered a heat stroke in a carriage going through Central Park (Rutledge, 1996).

The discovery of ether anesthesia revolutionized surgery and paved the way for the discovery of the concept of asepsis, one of the pillars of modern surgical practice. Dentists, and not physicians, had the most important influence on the discovery of anesthesia. Although their motives, especially Morton's, may have been suspect, it was their aggressiveness, courage, and innovation that led to one of the most important medical discoveries of the nineteenth century. Great discoveries are usually credited to one individual although several investigators may be involved, and Sir William Osler pointed out that, "...in science, the credit goes to the man who convinces the world, not the man to whom the idea first occurs" (Keys, 1963). However the bitterness and peculiarities of the ether controversy suggest that it is fitting if no single individual receives credit. The Boston Public Garden is home to the Ether Monument, a structure that commemorates the discovery of ether anesthesia. No names are given, and instead of being a monument to commemorate an individual, it commemorates a medical treatment (Bigelow, 1900). It is to that medical procedure of anesthesia that humanity can be grateful in the realization that pain free operations, many of which are life-saving and dramatically improve quality of life, are only readily accessible because of ether and the individuals that helped to discover and popularize its pain alleviating properties: Long, Wells, Jackson, and Morton.

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# **WISE WOMEN AND MEDICAL MEN: OBSTETRICS AND GYNECOLOGY IN THE MIDDLE AGES**

By  
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## **Abstract**

**During the middle ages, simply being female was a very hazardous proposition. Propriety prevented most male doctors from treating women for any conditions related to sexuality or reproduction. This may have been just as well, since the treatments offered by the medieval physician were marginally effective at best, and were often spectacularly harmful. Instead, medical care of women was largely provided by midwives and 'wise women' (lay healers). Many of their methods were no better than those of the doctors, and some are quite shocking by today's standards. Others are merely odd or amusing. However, a few have stood the test of time and are still in use, in various forms, by modern midwives and physicians.**

**At various times, the wise women and midwives of the middle ages were persecuted for their methods, ostracized for performing abortions, and hung or burned as witches. Ultimately, they were marginalized by the medical establishment when physicians realized that obstetrics and gynecology could increase their own profits. Through it all, however, these wise women and midwives provided an essential service to their communities, and left behind a legacy that endures to this day: that of women responding to a need and providing care for one another.**

The Medieval period, or Middle Ages (approximately 476-1440 AD), began with the demise of classical civilization and ended around the time the printing press was invented. This period was characterized by the domination of all aspects of life by the Church, and among scholars, by a great respect for the teachings of the ancient Greek and Roman philosophers. In medicine, the study of the writings of great physicians, such as Hippocrates, took precedence over the study of diseases and living patients (Major 1954, 223-224).

Most medieval doctors still followed the methods outlined by Hippocrates a thousand years earlier. Hippocrates wrote on a number of women's health topics, and it is clear that he did not share our modern concepts of evidence-based medicine and patient-centered care. In one book, he made the following recommendation for inducing an abortion: "on the 6<sup>th</sup> day of her pregnancy, the woman should perform a number of mighty leaps, making her heels touch her buttocks. After the 7<sup>th</sup> leap, the seed will fall out of her with a clatter." (Rowland 1981, xv). (Hippocrates made no mention of how a woman might know that she was exactly 6 days pregnant.) His recommendations for expediting labour

were equally strenuous. The woman was advised to run up and down steps, to fasten herself to a ladder and have someone else shake it violently, or to lie in bed and have someone repeatedly raise and drop the foot of the bed (Rowland 1981, xv). It is little wonder that women of the time may have preferred the care of midwives over doctors!

In medieval times, both European and Arabic doctors were expected to have a theoretical knowledge of obstetrical and gynecological matters. However, their sense of propriety prevented them from actually inspecting a woman's "vital parts" or delivering an infant. They might be present at a delivery if the woman was noble or wealthy, but usually waited outside the chamber while the midwife attended to the patient. The few who did do deliveries handled only the most standard presentations; anything more complicated than a footling breech was deferred to a midwife (Rowland 1981, xv). (This is an interesting contrast to the modern situation, in which midwives usually handle only uncomplicated deliveries, and breech presentations not responsive to version are generally referred to an obstetrician.)

Like today, however, many rural areas and smaller towns didn't have a doctor at all. As a result, midwives and wise women (lay healers) provided not just obstetrical care, but nearly all primary care in these areas (Achterberg 1990, 42).

Medical and surgical textbooks of the period are reflective of this approach: if instructions for childbirth are given at all, they are in terms of what "the midwife should do" in a given situation. A Latin treatise by Guy de Chauliac illustrates this attitude, in a passage on multiple births: "Childbirth is also made difficult because of many children; sometimes there are two, and according to Avicenna five or more, and according to Albucasis more than seven, even ten, so he says. And because the matter requires the attention of women, there is no point in giving much consideration to it." (Rowland 1981, xv). Thus the avid student of medical history, who yearns to discover how de Chauliac's contemporaries would have handled a birth of decuplets, is left unsatisfied in the end.

Fortunately, during the middle ages, literacy became more common among ordinary people. As a result, there were a number of practical handbooks published in English on the subject of women's health, aimed at midwives and nuns (who between them did most obstetric and gynecological care) and at women patients themselves (Rowland 1981, 18). Such books often contained a very odd assortment of information: the best-known, believed to be written by a woman nicknamed Trotula, was a comprehensive gynecological text that included such tidbits as "the manner of tightening the vulva so that even a woman who has been seduced may appear a virgin" and, at the end, a section on cosmetics, including make-up tips and instructions on how to reduce wrinkles (Rowland 1981, 4-6). However, this was no stranger than similar books written for the male physician of the day: one of these, amid a section on recipes for various tonics, included instructions for making gunpowder (Rowland 1981, 14). The introduction of the third volume of another medieval medical text was as follows: "In this book I intend, God being my helper, to treat of those sicknesses which particularly concern women, and as women are in general venomous [sic] animals I shall follow it up with a treatise on the bite of venomous animals" (Rowland 1981, 13-14).

Works written during the medieval period betrayed an assumption that all women, and particularly wealthy ladies and nuns, were delicate creatures who required special medical care. One author wrote that women who “are nourished with hot food and drink and live in much ease” (i.e., the privileged upper class) would menstruate more often and for a longer time than other women, and would be weakened by the resulting loss of blood (Rowland 1981, xiii).

A fetus was considered to be in an especially vulnerable state, which is not surprising considering the Middle Ages’ high incidence of miscarriage, stillbirth, and neonatal death. However, while modern prenatal care is concerned with matters such as nutrition and avoidance of teratogenic chemicals, these were of little concern to medieval women. Their lack of knowledge about what caused miscarriages and birth defects meant that their fears were focused on much less tangible dangers. For instance, it was thought that if a pregnant woman “curses, blasphemes, or swears at someone”, her child would be deformed. People also believed that anything that startled the mother during pregnancy would affect the unborn child. So, for example, seeing a deformed person would cause a similar birth defect, and if a dog jumped up and startled a pregnant woman, her child would be born with “dog feet”. For this reason, pregnant women were advised to stay indoors as much as possible. This was especially true after dark, for there were other dangers then: if a woman looked at the moon, her baby would become a lunatic or a sleepwalker. Other beliefs concerned miscarriage and neonatal death: for example, expectant mothers were warned never to agree to be the godmother of a newborn, because then one of the children- the born or the unborn- would die (Shorter 1982, 49). In Norway and Germany, it was also a common belief that every child cost the mother a tooth (Shorter 1982, 51).

Medieval childbirth was, of course, a low-tech affair by modern standards. However, there were a few simple devices used by midwives to facilitate a birth. One such tool is the birthing stool: a chair or stool with a large hole cut out of the centre of the seat. Birthing stools have been part of midwifery for millennia; their first recorded use was in ancient Egypt. They had remained popular in Italy since that time, and midwives in many European countries adopted their use in the early 15<sup>th</sup> century (Shorter 1982, 56). The birthing stool allowed a woman to give birth in an upright position, with the aid of gravity. The baby pressed down directly on the cervix, which sped up the delivery process, and the mother was more comfortable than she would have been laying in a bed (Wertz and Wertz 1977, 13-14). Often, one of the midwife’s assistants would wrap her arms around the mother from behind, and would press down on the abdomen in the area of the uterine fundus during contractions, thereby helping to expel the baby (Shorter 1982, 56).

Interestingly, use of the birthing stool has experienced a revival in popularity among modern-day midwives, and in today’s hospitals, an upright birthing chair is usually available.

Throughout history and until quite recently, midwifery was closely associated with magic and sorcery. Both midwifery and the allopathic medicine of the middle ages made

extensive use of astrology to determine whether, how, and when to treat ailments. The use of amulets, incantations, and snakeskin girdles considered to have supernatural powers had been part of standard birthing practice for many centuries, and was not considered at all sacrilegious. It is said that even the Virgin Mary wore an enchanted girdle during her confinement, and that this girdle was then kept at the Cathedral of St Peter in Westminster until at least the 13<sup>th</sup> century (Rowland 1981, 31-32).

Precious stones, particularly eaglestone (any small rock found inside the nest of an eagle), were widely recommended for use during childbirth, by sources as diverse as Plutarch, Trotula, and the Talmud. Placed near the vaginal opening during labour, the eaglestone was believed to draw out the baby and placenta, thus shortening the duration of the birth process. (Most texts warned that the stone must then be immediately removed, or it would also draw out the womb: fatal uterine inversions were often ascribed to a stone left in place too long.) The eaglestone could also be used earlier in the pregnancy, to prevent abortion. Worn around the neck, it exerted its magnetic properties upwards, and therefore served to hold the fetus up inside the body (Rowland 1981, 33).

Jasper was another stone considered to be helpful in pregnancy, childbirth, and lactation, and one 11<sup>th</sup>-century author advised that the woman should hold a piece of jasper in her hand for the full nine months of her pregnancy. This advice was clearly intended for the high-class lady with household servants, for it would certainly have interfered with the daily chores of most other women! More reasonable authors simply suggested that a jasper amulet be worn during pregnancy (Rowland 1981, 34).

Reformation-era proscriptions against sorcery turned all of these practices- amulets, astrology, incantations and magic girdles- into religious issues. Laws were passed that specifically condemned their use during childbirth, and a great many midwives were among those tried and executed as witches. The earliest known midwives' oath, from 1567, includes a promise to refrain from using enchantments or sorcery during a woman's labour. Only one ritual was permitted: that of baptizing the child (often the moment it began to crown) if for any reason its death seemed imminent (Rowland 1981, 12, 30-32).

There are a number of remedies that are common to most medieval obstetrical texts. Making the woman sneeze is recommended by many authors to induce labour, while making her sneeze and then causing her to become angry, is suggested before inserting any sort of vaginal suppository, in order to increase its effectiveness (Rowland 1981, 28-29).

Most of the problems encountered by medieval healers were similar to those that concern doctors and midwives today although their interpretation and management were often quite different. For instance, there were numerous reasons given in medieval texts to explain why menstruation might stop, aside from pregnancy and menopause. These included hard work, "because of the heat or the cold of the wombe or the heat or cold of the humours that be enclosed in the wombe, or excessive dryness of their complexion, or being awake too much, thinking too much, being too angry or too sad, or eating too little." This retention of the blood was considered to be unhealthy; women who became pregnant

during such a time were thought likely to have a child with leprosy or some other ‘evil’ disease, and even those that did not become pregnant were considered to be at high risk of developing problems such as heart disease or hemorrhoids. Fortunately, there were remedies: bathing in boiled herbs, cupping (affixing a small earthenware cup to the skin using suction produced by a burning candle: a practice still common among practitioners of traditional Chinese medicine) under the nipples and kidneys, eating spicy foods, and bloodletting from the big toe were standard treatments. Failing these, those treating the woman were advised to give her herbal medicines and try to make her by turns “very angry, very sad, and very merry” (Rowland 1981, 59-77), in an effort to stimulate the flow of menses. Curiously, the treatment for a woman who bleeds too *much* was very similar: cupping under the nipples and kidneys, and bloodletting on the legs to draw the blood away from the womb. Only the herbs given were different (Rowland 1981, 59-77).

In the middle ages, it was widely believed by both doctors and lay healers that hysteria stemmed from the uterus being too high up in the body. Since the uterus was believed to be sensitive to smell, it could be enticed back down into its normal position by either placing a pleasant-smelling substance near the vagina (toward which the uterus would then migrate) or by placing an unpleasant-smelling substance, such as burnt hair, near the nostrils (thereby causing the uterus to withdraw downward). This belief appears to be the basis of smelling salts used for fainting or hysterical ladies, a practice which persisted until quite recently (Rowland 1981, 28-29).

The cure for some conditions was sexual intercourse, a remedy which posed a particular problem for unmarried women and nuns. Most texts advised that for these women, it was better to live with an unpleasant condition during the present, in order to avoid eternal damnation by seeking a sexual cure (Rowland 1981, xiii). However, this was only the ‘official line’, and it is unknown what advice was actually given to unmarried women behind closed doors.

For couples unable to conceive, midwives suggested a number of fertility tests. One involved planting bran seeds in two pots, and then having the woman urinate in one pot, and the man in the other. If the seeds in both pots sprouted, then both were fertile, and could be helped to conceive by potions from the midwife. If the seeds in one of the pots failed to grow, that person was infertile and even the strongest medicine could offer no help. In that case, only a miracle could give them a child (Rowland 1981, 34-35).

Compared with modern parents, medieval couples also had much more control over the gender of their children. If a couple desired a son, they had only to dry the vulva and uterus of a female hare or pig, grind the dried organs into a powder, and drink the powder mixed in wine prior to intercourse. Couples hoping for a daughter were advised to do the same with the testicles of the male animal (Rowland 1981, 35).

Medieval texts cited many possible causes for a uterine prolapse. These included retention of blood (i.e., failure to menstruate), evil humours, paralysis caused by cold, (from sitting too long on cold stones, taking cold baths, or drinking too much cold water), and of course, forgetting to remove the eaglestone after a delivery. Fortunately, the uterus

could usually be put back in place manually, and could be coaxed to stay there by a similar principle to that used in hysteria. To coax the womb to stay up where it belonged, evil-smelling things (ox feces thrown on hot coals was recommended) were placed near the genitals, and sweet-smelling things near the nose. The uterus would tend to migrate away from the nasty smell and toward the pleasant one, and so stay up in its natural position (Rowland 1981, 100-101).

Thanks to the midwives' handbooks, we have a great deal of information about medieval childbirth. One author described a normal birth as a child who presents with the head down, and who arrives in "twenty pangs or less" (Rowland 1981, 41-42). Presentations other than headling or footling required that the child be pushed back into the womb and manually rearranged into the correct position. This was apparently effective often, but certainly not always. Sometimes, if the baby was badly stuck, the midwife would have to dislocate or amputate one of his limbs to get him out. It was not uncommon for people to go through life with major disabilities because such a procedure had been necessary during their birth (Achterberg 1990, 46). That was preferable to the alternative, however: when dislocation or amputation was unsuccessful, the baby would be forcibly extracted using hooks, either whole if possible, or in pieces if necessary. The exception was a situation in which the mother was already dead, in which case a Caesarean section would be performed in a final attempt to save the infant (Rowland 1981, 44-45). Caesareans were never performed on living women, because they were almost invariably fatal for the mother (Shorter 1982, 160-164; Wertz and Wertz 1977, 139).

Failure to expel the placenta following the birth of a child was considered to be the result of a weak womb, caused by fasting, great anger, wrath, or being beaten. In such cases a midwife could often pry the placenta free using her fingernails. Failing that, fumigation might be effective. The woman was to sit on a birthing stool, above a small pot. In the pot, the midwife would place powdered goats' horns and goats' feet, and these were set alight so that they created a great deal of smoke. The smoke was directed upward toward the woman's vagina, and this would help the placenta to come free (Rowland 1981, 146-147).

Both in childbirth and in the treatment of everyday maladies, herbs were used a great deal by midwives and lay healers. Herbs were available for nearly every malady, from fibroids to erectile dysfunction. Midwives and wise women were often sought out for these remedies, which were probably as effective as those offered by the medical doctors of the time.

As a result of their knowledge of herbs, wise women also knew what plants could be used to cause an abortion, or to poison someone. Of course not all of them did these things, but probably some did. A lot of people visited wise women late at night, in secret, either because of their sinister reputation or because they were seeking these services (Achterberg 1990, 42). It is likely that the women of a community advised each other about which midwives were willing to provide abortions or other illegal services.

So it was that, while medical doctors treated many men and a few of the wealthier women, nearly all obstetric and gynecological care in the middle ages was done by lay healers and midwives. This tradition of women caring for women was the norm not only during this period, but throughout recorded history. All of this changed in the 1600s, thanks to a British physician with the unfortunate name of William Smellie.

Unlike other doctors of the time, Smellie was interested in obstetrics. He attended many deliveries using the recently invented obstetrical forceps. Compared with midwives' hooks, the forceps had the notable advantage of freeing an infant from its mother without killing it in the process (Wertz and Wertz 1977, 34). Smellie had great success with this new instrument, and he saw in obstetrics the potential to ease women's suffering, while also making himself a considerable amount of money. He soon put out an advertisement to other doctors: "Midwifery Taught for Five Shillings".

Prudery was still a problem, and obstetrics was practiced under the bedclothes. But students came, and so did patients, attracted by Smellie's offer of free care for poor women. Physicians were looking for ways to increase their knowledge and earn more money, and Smellie's timing couldn't have been better. The school flourished. The first obstetric wards in Britain opened in 1739, and in 1752 Smellie's school became the General Lying In Hospital (Carr).

Midwives continued to practice, and of course they are practicing still. But over the years, male doctors increasingly became the main providers of obstetric and gynecological care. Today, of course, we are seeing increasing numbers of women in medicine, and many of those are choosing to work in areas of women's health. All of this may seem like a new trend, but in fact it is a shift back to what may be the most ancient tradition in the history of health care: that of women caring for women.

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# FROG PRACTICE: MEDICINE, MIDWIFERY AND THE EXCLUSION OF WOMEN

By

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## Abstract

**Although childbirth historically has been the sole domain of midwives, between the 17<sup>th</sup> and 19<sup>th</sup> centuries a dramatic shift occurred which resulted in the attendance of physicians and obstetricians at the majority of births. Greater obstetrical intervention and a change in birthing location from home to hospital accompanied this shift in power.**

**The displacement and elimination of the midwife was brought about as a result of the professionalisation of medicine and specifically by the development of the obstetric profession. Physicians and professional societies consistently cast midwives as ignorant, amoral and unsafe, despite statistical evidence that suggests otherwise. Midwives were further challenged by their own inability to effectively challenge the parallel professionalisation of medicine by organising and educating themselves. The simultaneous restrictions upon women from entering medical educational institutions ensured that women were effectively eliminated from the health care professions for many years.**

Dr. James Gregory . . . compared men-midwives to that species of frog, in which according to the allegation of Reaumur, the male draws out the ova from the female, or, to use the naturalist's own words, 'accouche la femelle.' If this is a fact in natural history, this frog practice is doubtless the only precedent, in the whole animal kingdom, in favor of *accoucheurs* and man-midwifery.

Samuel Gregory, 1848

## Introduction

Between the seventeenth and nineteenth centuries, a dramatic shift in childbirth practices occurred. While midwifery had once been the sole domain of females, male-midwives and later general physicians and obstetricians began attending at greater numbers of births. Concurrent with this shift in gender roles was a parallel shift towards greater obstetrical intervention and the transfer of the majority of births from the home to the hospital. In part, some of these developments can be traced to wider trends simultaneously occurring, such as the industrial revolution's impact on the development of medical technology and



the Cartesian philosophy of body-mind dualism which facilitated the study anatomy and physiology. However, it is the contention of this paper that the professionalisation of medicine, and specifically the professionalisation of obstetrics, actively sought to displace and eliminate midwives. In so doing, women were effectively excluded from both their traditional professional domain and from entering the new professions of medicine and obstetrics. This paper broadly traces the historical context of childbirth in Western Society and then explores the framing of arguments against women and how professional organisation of both physicians and midwives reinforced these arguments.

## **History of Childbirth**

Throughout the history of Western Culture, childbirth has traditionally been the domain of women. In the first century C.E., Soranus identifies the ideal qualities of a midwife in his treatise *Gynaecology* and although he does not specifically indicate that birth attendants must be females, he directs his instructions for childbirth to a female audience (Soranus, 1<sup>st</sup> century C.E., 1.67-9, exc. L). Samuel Gregory, a nineteenth century lecturer of physiology, further establishes that the Romans employed only women as midwives and that these women were recognised as legally having a “distinct class in society and [enjoying] certain rights and immunities in common with the medical profession” (Gregory 1848, 8). Likewise, female midwives were common in early Greece and are referred to by Socrates (whose mother was a midwife), Plato and Hippocrates (Gregory 1848). Gregory cites an interesting instance in which the Athenian physicians attempted to legally restrict the management of childbirth to themselves but that the government repealed the law after women collectively protested the notion of male attendants at births. With the exception of medical emergencies during which a male surgeon might be consulted, childbirth almost always was the uncontested domain of women.

In 1663, one of Louis XIV of France’s mistresses, the Duchess of Villiers, chose to have a professor of surgery direct her birth despite the lack of medical indication for surgical intervention. Gregory asserts that this event was the first instance of exclusive obstetrical care and dryly alludes to the subsequent desire to have male surgeons or physicians attend births follows “a fashion first set by a court prostitute of Paris” (1848, 9). More important, however, is his observation that the surgeon was soon appointed to a lucrative office as the official court midwife and his argument that the “fruits” of this office were an important, but immoral, motivation for men-midwives.

The ability of male-midwives and physicians to establish themselves thereafter as socially acceptable birth attendants occurred at different rates in different countries. Gregory asserts that the medical profession most thoroughly monopolised childbirth in England and the United States in 1848, while conversely, in France where obstetrics originally developed, female midwives retained control of childbirth by and large. Despite the increased numbers of physicians attending births in the United States, 50 percent of all births were managed by midwives in 1900 with the remaining being managed by general physicians (Dawley 2001) with strong class and racial factors determining who used midwives or physicians. This situation would soon change. In 1930, the first obstetric specialty board was established in the United States which enabled medical education to

be more strictly controlled, including entrance standards. By the 1950s that the majority of all babies (80-90%) were born in the hospital with obstetricians primarily supervising the births (Dawley 2001).

### **The Exclusion of Women**

Although Gregory observes the lucrative nature of childbirth as a motivation for physicians increasingly being involved in deliveries, his argument does not encompass the entire story. Although there was little empirical evidence that medicine offered any advantages over midwifery, high morbidity and mortality rates allowed physicians to pathologise childbirth from a normal, domestic activity to an illness requiring medical intervention. By exaggerating the dangers of childbirth, women were frightened into fearing for their safety (Cahill 2001). At the same time, midwives were victim to a general systematic devaluation of female roles and traits by both medicine and religion (Cahill 2001). Numerous historical documents support the interactions between these two claims.

In 1724, a physician by the name of John Maubray attempts to assert that MEN... being better versed in *Anatomy*, better acquainted with *Physical Helps*, and commonly endued with greater *Presence of Mind*, have always been found readier or discreeter, to devise of something more *new*, and to give quicker *Relief* in Cases of *difficult* or *preternatural BIRTHS*, than common *MIDWIVES* generally understand (1724, 186, emphases in original).

Not only does he assert that men are better educated and able, but he then attributes these advantages to the use of mathematical foundations and “the Glory of *GOD* Almighty’s good *Providence*” (1724, 187, emphases in original). By firmly situating his argument in both religious and scientific contexts, Maubray appeals to the generally held medical and religious conviction that women are of lower intellectual status than men. Close to three decades later, William Smellie argues that female midwives should have a certain set of skills and knowledge but which are of much lower level than those required of physicians or male-midwives (1752). Smellie takes an interesting approach to female midwifery; although he obviously does not support it, he recognises that women do work as midwives. He puts forth that men practitioners should encourage the confidence of female midwives rather than openly condemning her practice in order “to make allowance for the weakness of the sex” (1752, 447). In defining separate and unequal spheres practice, Smellie undermines the knowledge and skills of female practitioners. Both Maubray and Smellie’s arguments are part of a general belief in the intellectual inferiority of women and they both question the ability of the midwife to manage safe deliveries given this inferiority. In effect, they draw a connection between the lesser intellect of women and their ability to provide appropriate care.

In the early nineteenth century, Walter Channing takes a different approach to undermine the ability of female midwives to provide safe and reliable care during childbirth. Rather than appeal to the belief of intellectual inferiority, Channing constructs a moral argument

which jives well with the Victorian times. An individual needs to thoroughly understand the profession of medicine as a whole to be able to understand the nature and safe treatment of labour. Many today would agree to some extent with Channing on this point but he continues on to argue that women, although intelligent, are emotional and therefore could not be instructed in the science of medicine as are men (1820). In fact, Channing argues, women need to be protected from the study of medicine and therefore by excluding women from midwifery, physicians are really doing women a favour. He concludes his treatise by stating

It was one of the first and happiest fruits of improved medical education in America, that [women] were excluded from the practice; and it was only by the united and persevering exertions of some of the most distinguished individuals our profession has been able to boast, that this was effected. There is in the profession no wish to persecute or oppress an individual; but the interest of an individual is not to be put in competition with the interest of the profession, or of society at large. (1820, 21-22)

In contrast to his earlier claims of protecting women from medical education, this last statement reveals the true intent of Channing's argument against midwifery. Midwifery represents a challenge to medicine's desired monopoly of clients and knowledge; by aligning the interests of society with the medical profession, he can use a moral argument as leverage against midwives who are now not only unsafe, but even amoral.

In 1911, when the Instructive District Nurses Association of Boston suggested educating women as obstetricians, male obstetricians framed the "woman as inferior" argument differently yet again. Rather than relying solely on intellectual or moral grounds, J.W. Williams and J. B. de Lee structured their argument around gender, class and race. They argued that if poor African American or immigrant midwives could practice obstetrics, upper class, white male physicians would not choose a career with obvious low levels of skill and knowledge (Dawley 2001). Capitalising on racism and stereotypes, medicine and public health sought to emphasise incompetence among midwives. Dawley notes that a series of articles in a public health nursing journal juxtaposed photos of "unkempt dark skinned women who were a danger to those they served" (2001, 116). An early example identity construction, pictures showed the midwives in dark, baggy and sinister clothing while after being taught asepsis, midwives were clothed in starched white dresses and uniforms (Dawley 2001). More shocking still were the accusations of spreading venereal disease, death and blindness that were directed at African American and immigrant women (Dawley 2001).

### **Professional Organisation**

The ability of medicine to displace midwifery depended not only on its ability to systemically denigrate women and their potential role as midwives, but also on its ability to institutionalise. In England this process was carried out by the organisation of physicians, surgeons and apothecaries into one occupational group under the 1858 Medical Registration Act. One of the effects of the development of professional societies

was the ability to label everything outside of the accepted professions, including midwifery, as “quackery.” The Medical Registration Act also had the ability to discriminate against those who were not deemed fit to enter the profession. Although the Act uses the terminology of *persons* rather than just man, the exclusion of women from educational institutions prevented their entry into the professional society (Cahill 2001). Likewise, in the United States, the American Medical Association helped institutionalise the medical profession by developing stricter regulations of practitioners and setting higher educational standards (Dawley 2001). While these activities are not problematic in and of themselves, the ability of the American Medical Association to exclude women from becoming physicians while simultaneously positioning midwives as inferior alternatives effectively excluded women from both realms of professional activity.

At the same time, it would be erroneous to place all the blame for the elimination of midwives on the medical profession. While the medical profession was busy institutionalising itself in the United States, midwifery continued to suffer from a lack of organisation and regulation. Little support was available for training and development and midwives continued to rely on experiential knowledge learned from other midwives (Dawley 2001). This disorganisation, however, was not uniform across all countries. Although the 1858 Medical Registration Act did initially exclude midwives, the 1902 Midwives Act provided educational standards and licencing for British midwives (Stevens 2002). The Central Midwives Board was not self-regulated and was under the influence of physicians and nurses (Stevens 2002) but the Act paved the way for increased status. With this status came national professional societies, academic journals and education which emphasised clinical skills as well as the basic sciences. In contrast, American midwives were organised into clubs lead by nurse-midwives which served to further devalue the role of midwives. The clubs served as forums for cleanliness checks, case discussions and lessons of the month which were decidedly non-academic in nature (Dawley 2001). The differential ability to self-organise is a major factor in the different success rates of midwives in the United States and in England.

## **The Evidence**

While maternal and infant mortality rates did decline during the late nineteenth and twentieth centuries, it is not clear that these changes were at all connected with increased physician or obstetrician presence at childbirth. As was the case with infectious disease when changes in social infrastructure such as water and housing lead to declines of morbidity and mortality well in advance of the development of vaccines and antibiotics, so did a decline in maternal and infant mortality rates. Cahill (2001) cites a study which found that mortality rates decreased the most dramatically during the First World War when 60 percent of medical practitioners had been drafted and were not practising medicine. It is postulated that concurrent changes in the standard of living among poor sectors of society during the war years had an important and often overlooked impact on mortality rates. However, with both infectious disease and mortality due to childbirth, physicians were at the time able to assert improved medical care and increased scientific knowledge. Due to the increased status of physicians, these claims remained unchallenged for many years.

In fact, midwives actually had outcomes that were as good as or even better than those of physicians with respect to pregnancy-related mortality rates. In 1913, a study found very different rates of puerperal sepsis between physician attended births and midwife attended births. Although midwives attended 40% of all births in New York City, they only had 22% of maternal deaths from sepsis while physicians attended 60% of births and had 69% of maternal deaths from sepsis (in Devitt 1979). Data from other studies which were re-evaluated in the 1970s (Devitt 1979) found that physicians had significantly poorer outcomes in terms of maternal and neonatal mortality rates (evaluating neonatal mortality rates rather than infant mortality rates reduces the influence of poverty and other social characteristics on the different populations served by midwives and physicians). Table 1 summarises neonatal mortality findings which show significant differences and Table 2 summarises maternal mortality rates by attendant. It should be noted that although physicians likely attended more complicated cases, deaths were ascribed to the midwife category if a midwife was at all present.

**Table 1. Neonatal Mortality Rates by Attendant**

Study	Attendant	Live Births	Deaths under 30 Days	Neonatal Mortality Rate (per 1000)
Newark, 1915-1916*	Physician	11 400	487	42.7
	Midwife	10 996	276	25.1
	Total	22 396	763	34.1
Newark, 1921*; home births only	Physician	3523	143	40.6
	Midwife	4470	144	32.3
	Total	7993	287	

\*  $\chi^2$ : significant at  $p < 0.05$

**Table 2. Maternal Mortality Rates by Attendant**

Study	Attendant	Live Births	Maternal Deaths	Maternal Mortality Rates (per 1000)
Newark, 1921*; home births only	Physician	3523	25	71
	Midwife	4470	10	22
	Total	7993	35	
Newark, 1916-1921*	Physician	38 706	267	69
	Midwife	30 945	47	15
	Total	69 651	314	45
Philadelphia, 1914-1930*	Physician	593 861	4428	74.6
	Midwife	90 923	77	8.5
	Total	684 787	4505	65.8
New York City, 1930-1932* (all births, home and hospital)	Physician	318 701	1406	44
	Midwife	29 519	85	29
	Total	348 220	1491	43

\*  $\chi^2$ : significant at  $p < 0.05$

The poorer outcomes achieved by the physicians are generally attributed to “meddlesome obstetrics” such as stretching of the cervix, bleeding patients and using forceps. It is important to recall that the increased status and income derived from professional organisation does not necessarily translate into an increased ability to effect changes in morbidity or mortality. To this end, an important distinction is that “Expertise is something to work for and to share; professionalism is - by definition - elitist and exclusive, sexist, racist and classist (Ehrenreich and English, in Cahill 2001, 339).

## Conclusion

By the mid-twentieth century, almost all births in the United States were performed by physicians or obstetricians in hospitals. This change was relatively abrupt after the millennia during which women provided almost all assistance during childbirth. Midwives were edged out of their professional sphere by physicians who consistently cast them as ignorant, amoral and unsafe, despite statistical evidence that suggests otherwise. Midwives were further challenged by their own inability to effectively challenge the parallel professionalisation of medicine by organising and educating themselves. At the same time, restrictions upon women entering medication education institutions ensured that women were effectively eliminated from the health care professions for many years except in the capacity of a nurse.

The intertwined history of medicine and midwifery provides insight on the different attitudes to obstetrics around the world. While midwives are very accepted in societies where they have a history of professional organisation, such as Sweden and England, in other countries obstetric interventions are overused because of the associated status. In Chile, for example, caesarean sections are performed at more than 80% of births. Understanding the history of the two professions is a potentially important step in understanding the roles of each profession in contemporary society.

The historical influence of medicine on midwifery also provides important lessons for physicians today. Clearly physicians have had and continue to have a determinant role in the health care system and are able to influence health care trends and the roles of other allied health care professions. Yet the medical profession has at times acted out of greed and a desire for power and status in order to further itself. Although there is a clear conflict of interest, the medical profession can learn from the example of midwifery to prevent unfairly biasing the public against other professions and the associated potential abuse of power. Had physicians influenced the health care system based on available evidence rather than moral arguments or stereotypes, the realm of childbirth in North America likely would have a very different picture than it currently does.

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# **ACCULTURATION, BREASTFEEDING AND SOCIAL CHANGE: CHANGING PATTERNS OF BREASTFEEDING IN CANADIAN ABORIGINAL WOMEN**

By

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## **Abstract**

**Despite worldwide efforts to promote breastfeeding, Canadian Aboriginal women have lower breastfeeding rates than the general population. Health Canada's 1988 National Database on Breastfeeding among Indian and Inuit Women showed declining rates of breastfeeding. The encroachment of Western civilization into previously remote areas of Canada contributed to a gradual shift from breastfeeding to bottle-feeding among Aboriginals, influenced by the transitional nature of Aboriginal societies over the last half century. With the decline in traditional hunting, fishing, and gathering lifestyles came a move to permanent settlements. Milk products, formulas and other foodstuffs became more readily available to Aboriginals. More Aboriginal infants were born in hospitals, and breastfeeding was discouraged by health care personnel, either intentionally or unintentionally. In the 1960s, some physicians saw formulas and breastmilk as equivalent; as well, supplementation with glucose water or formula was common. During the 1970s, more women began using oral contraception postpartum, suppressing lactation. Increasing employment among women also affected breastfeeding.**

**Lower breastfeeding rates in this population are worrisome. Aboriginal birth and mortality rates exceed those of the general population. Common causes of Aboriginal morbidity and mortality—SIDS, type II diabetes, respiratory and gastrointestinal infections—are conditions for which breastfed infants may be at lower risk. Exacerbating these health inequalities, Aboriginals struggle with unemployment, homelessness, and poverty. Living in geographically or socially isolated communities, they have decreased access to health care and social services.**

**Despite breastfeeding promotion efforts, some Aboriginal women are reluctant to breastfeed. Emphasis on culturally appropriate breastfeeding promotion methods has led to the successful use of peer counseling and community support strategies. Although breastfeeding may not be suitable for everyone, it is inexpensive, and provides emotional and health benefits. The effects of modernization on Aboriginal life have been profound, and encouraging breastfeeding in this marginalized group remains a challenge.**



## **Case**

A 21-year-old Aboriginal G2P1 woman from an isolated Northern Ontario Cree community delivered a term baby boy requiring significant care in the KGH NICU. He improved with resuscitation efforts, and after a few weeks in the NICU, he eventually stabilized. Mom decided to breastfeed once the baby was able to tolerate oral feeds, and the baby appeared to have a good latch and suck. However, some of the NICU nursing staff soon became concerned that Mom did not seem fully committed to breastfeeding. She often asked the nursing staff to bottle-feed the baby instead of coming down to nurse. Many of the nursing chart reports commented on Mom's apparent disinterest in breastfeeding, stating that she would miss feeds because she was reportedly "too tired" or because she was doing other errands. At times, the nursing staff would be unable to reach Mom in her hospital room to come down for feeds. Because of Mom's sporadic willingness to breastfeed, some of the staff began making seemingly judgmental inferences about Mom's desire and ability to care for her baby. Is this mother's attitude towards breastfeeding typical for women from aboriginal communities?

## **Deciding to Breastfeed**

A new mother's decision whether or not to breastfeed is often made under a great deal of scrutiny from medical personnel, friends and family. Both folk wisdom and the current scientific body of knowledge support the medical and emotional benefits of breast-feeding for mothers and their babies (Leary 2004, Young et al. 2002). However, for various reasons, a significant proportion of new mothers elect to bottle feed instead of breastfeed. Women who bottle feed may feel pressure to justify their decision; in an anecdote recounted by a member of the NICU nursing staff, a stranger once approached her in a shopping centre to ask her why she was not breastfeeding her baby. Although we are taught that breastfeeding is an individual choice, there exists a pervasive notion that since "breast is best," bottle-feeding an infant is wrong.

## **Benefits of Breastfeeding**

At first glance, the health benefits of breastfeeding appear incontrovertible: some studies have shown that breastfed babies may have lower rates of respiratory disease, otitis media, gastroenteritis, SIDS, allergies, childhood cancers, type I and type II diabetes, and inflammatory bowel disease (Leary 2004). Yet other studies show that breastfed babies have higher rates of allergies-the protective effects of breastfeeding remain controversial. Some studies report that breastfed infants score higher on IQ tests later on in childhood; however, the effects of breastfeeding on cognitive development have not yet been clearly defined (Drane & Logemann 2000). It is postulated that breastmilk's protective health effects stem from the presence of maternal factors such as IgA, lysozymes, macrophages, growth factors, and long chain fatty acids (Leary 2004). The emotional benefits of breastfeeding for mother-child bonding are also compelling.

Globally, there are a number of groups and initiatives promoting breastfeeding. The La Leche League, founded in 1956, was one of the first groups to actively encourage

breastfeeding over bottle-feeding. More recently, the World Health Organization (WHO), the American Academy of Pediatrics (AAP), the Canadian Pediatric Society (CPS), UNICEF and other groups have all made statements in support of breastfeeding over formula feeding (Kramer & Kakuma 2002, AAP Work Group 1997, Leary 2004). The WHO's 2002 report, "The Optimal Duration of Exclusive Breastfeeding: a systematic review", advocates that infants be exclusively breastfed for the first six months of life (Kramer & Kakuma 2002). Breastfeeding is a significant public health priority among groups of lower socioeconomic status, especially in developing countries and resource-limited settings. Unlike expensive formulas, breastmilk is a free, natural source of infant nutrition. It contains more bioavailable iron than formulas, and does not require access to potable water or a heat source for sterilizing bottles. It also generates less disposable waste than bottle feeding (Leary 2004). From a public health perspective, breastfeeding has a number of advantages over bottle feeding.

### **Breastfeeding Trends in Canada**

The literature describes a gradual shift from breastfeeding to bottle-feeding around the middle of the 20<sup>th</sup> century. At the time, many physicians and laypeople alike were convinced that infant formulas were equivalent to breastmilk in nutritional value. Even Dr. Benjamin Spock, the guru of infant care, was equivocal about the advantages of breastfeeding over bottle-feeding. In his 1946 book, Dr. Spock stated that there was no harm or physical/emotional loss from not breastfeeding. He also minimized the advantages of breastfeeding, and warned about potential "harm to mother" from increased weight loss, because "breastfeeding is exhausting" (cited in Ward 2000, 38). People also worried that breastfeeding might not provide sufficient calories to support healthy infant growth and development. Other contributing factors included the growing number of women in the workforce, which affected both breastfeeding initiation and duration (Ward 2000). Advertisements for formulas during this time reflected this by emphasizing the convenience of bottle feeding over breastfeeding (Greiner 1975). This downwards trend away from breastfeeding continued throughout the 1950s, and breastfeeding rates reached its nadir in the mid-1960s (Langner 1990).

However, in the middle part of the 20<sup>th</sup> century, there was a sharp increase in breastfeeding over the subsequent 10-15 years. Two peaks have been described: between 1970-1973 (increased by 69%) and between 1981-1982 (increased by 15%) (McNally, Hendricks & Horowitz 1985, cited in "Breastfeeding in Canada" 1999, 7). Some reasons given to explain the resurgence in popularity of breastfeeding were the concerns of "overmedicalization" of infant feeding. Prior to this, it was felt that the doctor knew best, not the mother (Ward 2000). Mothers felt disillusioned with the overmechanization of modern lifestyles, and the need for special supplies for sterilizing and preparing bottles of formula. Proponents of breastfeeding sought to regain the natural connection between mother and child. Over the latter part of the century, there was increasing knowledge about the properties of breastmilk and its advantages over substitutes. As well, there was growing criticism of the infant formula industry for its questionably unethical marketing practices both abroad and at home (Greiner 1975). As a result came increased breastfeeding advocacy by health professionals & lay community (Jelliffe and Jelliffe

1978, 1981 cited in “Breastfeeding in Canada: a review and update” 1999, 7); the pendulum swung the other way, and some mothers feel that it has now become socially unacceptable to not breastfeed.

### **Aboriginals and Breastfeeding**

Despite breastfeeding promotion efforts worldwide, some groups have lower rates of breast feeding than the general population. In Canada, Aboriginal women are one of these groups—an observation that has been described both anecdotally as well as in the literature (Jenkins et al. 2003, MacMillan et al. 1999, Martens & Young 1997, among others). In a 1988 Health Canada study, Langner et al. compiled information on breastfeeding practices among Canadian Aboriginal women in the National Database on Breastfeeding among Indian and Inuit Women. This report describes a shift from breastfeeding to bottle feeding in the 1950s among Aboriginal women. Other subsequent studies support the finding that in general, Aboriginal women tend to have lower rates of breast feeding than the Canadian population as a whole (Martens & Young 1997, MacMillan et al. 1999). Langner et al. found in 1988 that while 60.7% of Aboriginal mothers initiated breastfeeding, only about 42% were still breastfeeding at 3 months, and 30.6% at 6 months. Subsequent studies showed that by 1996, the breastfeeding initiation rate among Aboriginals had dropped to 54%. However, although fewer Aboriginal mothers initiated breastfeeding than the general Canadian population, (54% compared to 75%), they were slightly more likely to continue breastfeeding at six months (39% compared to 24%) (Macmillan1999). The downward trend in breastfeeding in Aboriginals in the 1950s-60s mirrored that in the general population, but unlike breastfeeding rates in the general population, it hasn’t trended upwards as expected (Langner 1990). Efforts are being made to increase breastfeeding in the Aboriginal population.

### **Aboriginal Societies in Transition**

Much of the shift away from breastfeeding to bottle-feeding in the Aboriginal population can be attributed to the changing nature of Aboriginal societies. With acculturation, as Aboriginal peoples grew to adopt lifestyles closer to that of Western peoples, so too did their breastfeeding trends approach those in the general population.

The process of acculturation has affected Aboriginal societies in countless ways. With further settlement and urbanization of previously rural and remote areas, First Nations and Inuit peoples began to gradually give up their traditional ways of life. Hunting, fishing and gathering were no longer as important when stores and trading posts offered food, including formulas and milk products, to be purchased. The number of health care facilities in the Canadian North also grew, and it became more common to deliver babies in a hospital setting rather than at home. This affected breastfeeding rates because physicians and other health care personnel in the mid-1950s were still encouraging the use of formulas. It was also common practice of supplementing breastfed babies with formula or glucose water, and of sending new mothers home with a supply of formula (Langner

2000). Physicians also began encouraging the use of oral contraceptives postpartum, which suppresses lactation (Langer 2000, Hankins 2000).

### **Factors Affecting the Decision to Breastfeed**

A number of studies have examined factors which influence breastfeeding rates in the general population; these factors include maternal age, ethnicity/religion, socioeconomic status, level of maternal education, attendance at prenatal classes, whether mom is planning on returning to work or school, family/community support for breastfeeding, and maternal perceptions of a community's preferred form of infant feeding (Kong & Lee 2004, Dodgson et al. 2002, AAP Work Group 1997, Agnew et al. 1997, among others). Aboriginal women tend to be younger in age at first pregnancy, and have less access to education, stable employment, and prenatal care and counseling; it is therefore not surprising that this group has a lower breastfeeding rate than the Canadian population (Martens 1997, MacMillan 1996). In studies which survey Aboriginal women about breastfeeding, reasons given for not breastfeeding or for early weaning include: not having enough milk, breast soreness/infections, infant illness, poor initial success at breastfeeding, and the perception of having "bad milk" due to smoking, drinking or poor diet (Martens 2002, Young 2002, Martens 1997). As well, some mothers were unable to articulate why they were not breastfeeding.

In my brief review of the literature, there did not seem to be a significant discussion of whether Aboriginal cultural or religious beliefs specifically address the issue of breastfeeding. Surprisingly, in one study comparing infant feeding practices among different multicultural Canadian groups, Aboriginals were not mentioned at all (Agnew et al. 1997). The reason why fewer aboriginal moms are breastfeeding may not be directly related to Aboriginal culture itself per se; as demonstrated by many other studies described above, other factors related to socioeconomic status and geographic isolation seem to play key roles, and being of Aboriginal descent may just be a surrogate marker for these other social factors.

### **Conclusion**

One may wonder why breastfeeding rates among Aboriginals may be important—why should we be concerned? Firstly, the Canadian Aboriginal population is young, and has a crude birth rate almost twice that of the Canadian birth rate (Young 1994, cited in Martens 1997). From a health perspective, Aboriginals are a high-risk population for a number of conditions, such as malnutrition, obesity, type II diabetes, teenage pregnancy, alcoholism, mental illness, and suicide (MacMillan et al. 1999, MacMillan 1996). As such, both their total and infant mortality rates are greater than those of the general Canadian population. Further compounding their health inequalities, they struggle with difficult social issues stemming from their past history of oppression, and ineffectual government attempts to improve their socioeconomic status (MacMillan 1996); unemployment, homelessness, undereducation and poverty are major issues affecting both urban and rural Aboriginals today. It is well known that poverty is associated with ill health—unfortunately, those that need the most medical attention are often the least able to access it. Because Aboriginals

either live in geographically and/or socially isolated communities, Aboriginals have decreased access to health care (including prenatal classes and lactation consultants), despite their apparent increased need for such services. Many of the common causes of Aboriginal morbidity and mortality—SIDS, type II diabetes, meningitis, respiratory conditions, gastrointestinal infections—are conditions for which breastfed infants may be at lower risk (Leary 2004, Cunningham et al. 1991 cited in Martens 1997, MacMillan 1996).

Some studies have compared various methods of breast feeding promotion among different cultural groups. The most success is achieved using methods appropriate to the cultural group. "Culturally appropriate" ways may incorporate certain beliefs or techniques; it also may take the form of counseling/encouragement from a member of the same community. The most successful interventions have used peer counseling over other means, such as instruction by community health nurses. This has been attempted with success in Aboriginal communities in Manitoba (Martens 2002).

Canadian Aboriginal women have been found to breastfeed less than the general population. The shift towards bottle-feeding in the early part of the 20<sup>th</sup> century that was seen in both Aboriginal and non-aboriginal mothers was followed by a reversal of this trend only in the general population, but not in Aboriginal women. More research needs to be done to examine why breastfeeding patterns diverged for these previously concordant groups. Although breastfeeding may not be the answer for every new mother, it is an inexpensive and effective intervention that may offer some health benefits to those who choose it. Marginalized or otherwise vulnerable groups, such as Canadian Aboriginal women, may not be receiving sufficient information or support for their decision to breastfeed. Every effort should be made to eliminate the socioeconomic barriers which may hamper any woman's ability to make an informed choice about feeding her infant.

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# THE DIFFICULTIES ENCOUNTERED BY WOMEN IN MEDICINE

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## Abstract

**This year, approximately half of students new to the study of medicine are women. Of what relevance is gender to us as students and future practitioners in the notoriously rigorous discipline we have embarked upon? Placed in a historical context, what have been the barriers encountered specifically by women studying and practicing medicine in North America and in Canada? Presumably there have been barriers encountered particularly by women, as the first woman thought to have practiced Western medicine in Canada did so disguised as a man.**

**Situations such as the aforementioned result from a history of barriers facing women. Today, as throughout recent history, women have responded to an inner calling to pursue medical studies and careers despite such barriers to acceptance, and have a history of valuable contribution to the medical profession. The stories of groundbreaking women in medicine are colorful ones, and surprisingly near to us in space and time. The stories of Charlotte Ross, the first female physician in Manitoba, Jennie Trout, the first licensed female physician in Canada, the indomitable, internationally recognized Maude Abbott, and Amelia and Lilian Yeomans, Winnipeg's first female physicians, serve to illustrate the astonishing array of barriers ranging from minor annoyances to the impediment of career progress by gender bias to open ridicule and even absolute barriers facing the early women doctors. Visiting these stories, of particular relevance to Canadian students, is useful in developing an appreciation of the historical context in which the contribution of women was made. Such an appreciation can only help the medical profession to develop tolerance and an understanding of the value of our female colleagues, and in this way change the way women are perceived and treated.**

Throughout ancient history, there is evidence of skilled and educated female physicians (Kane-Berman 1997, Rothhammer 2001, 500). By the 12<sup>th</sup> century however, governments in Western Europe had begun regulating the practice of medicine, and women began losing opportunities for education (Rothhammer 2001, 500). By the 15<sup>th</sup> century in England for example, women were granted licenses to practice, but were not allowed to study at universities (Kane-Berman 1997, 1495). The situation worsened for female physicians until by the middle of the 19<sup>th</sup> century, medicine became an exclusively male domain in the western world (Kane-Berman 1997, 1495). Women have begun reentering the medical profession since the late 19<sup>th</sup> and early 20<sup>th</sup> century (Mason 1989, 23), but

have encountered in their pursuits a variety of obstacles to their full acceptance and integration into the profession. These obstacles range in magnitude from minor annoyances to open ridicule and gender bias impeding the progress of their careers to their being barred from entry to schools and medical societies.

At the present time, women are not encountering absolute barriers to their acceptance to medicine. It is perhaps surprising however, how recently and close to home such barriers have been encountered. The first female medical school graduate in North America was Dr. Elizabeth Blackwell from Cincinnati, who graduated at the head of her class in 1849 (Rothhammer 2001, 501). Well into the first half of the 20<sup>th</sup> century, established medical schools simply did not accept women (Rothhammer 2001, 501), and schools that did accept women had informal quota systems barring entry to women (Mangan 1998, 226). The number of female medical students reflected this absolute barrier to acceptance. Female medical students actually declined in number from 6% to 4% of medical school classes between 1900 and 1930 (Mangan 1998, 226)!

Despite this sorry state of affairs for aspiring female physicians, in 1875, Dr. Jennie Kidd Trout became the first female physician to be licensed in Canada. Because no medical school in Canada accepted women, Dr. Trout entered Women's Medical College in Philadelphia, Pennsylvania (Rayson et al. 1993, 189). The determination of pioneering Canadian physicians in overcoming barriers to acceptance eased the way for future generations. Dr. Trout and other female physicians of the time such as Dr. Emily Stowe worked long and hard to facilitate the opening of medical education to women in Canada (Rayson et al. 1993, 189). These two women were likely motivated by their own experiences of exclusion to help others. Required to take courses at the Toronto School of medicine in order to be granted Canadian medical licenses, they were initially denied admission. Three years after their graduation in Pennsylvania, the two women managed to gain acceptance to the required courses, but suffered hostile and rude harassment from lecturers and their fellow students (Hacker 1974, 22).

Even once admitted to medical schools, concrete barriers continued to stand in the way of full acceptance into the profession throughout North America and Europe. Post graduate studies often remained closed to women. The majority of internal medicine courses in Europe were restricted to male applicants (Smith 2000, 929). Until 1881 in France, postgraduate medical studies were restricted to men (Goetz 1999, 1679) and in North America, few hospitals accepted women as interns until the 1930s (Mangan 1998, 226).

Barriers continued to exist for women in Canada, even as women in medicine excelled. Dr. Maude Abbott graduated in 1894 from Bishop's College, Montreal. Although she had won the Stanley Medal for Academic excellence and was the valedictorian for her class in McGill, the university did not accept women into medicine at the time (Smith 2000, 929), and she attended Bishop's Medical College, where hospital practicums were taught by McGill staff. Although she was first to pay her fees, she was initially refused admission, and, much to her embarrassment, the issue of her admission as a female doctor was publicly debated in the newspapers (Kelen 2000, 895). Although by 1905, she became a "worldwide expert" (Kelen 2000, 896), she continued to endure indignities and barriers to



her work. Her energy for work was incredible, and although she contributed and was a member of at least 18 organizations, she was oftentimes admitted only as a guest member, full membership being denied to women (Kelen 2000, 895). Dr Abbott contributed to McGill University for years as a lecturer and museum curator without being appointed as a professor, and Dr. William Osler wrote to the Dean of Medicine of McGill, describing her work as “the best that McGill had done to date” (Kelen 2000, 896). Her position there was not permanent, and it was only much later that she became Assistant Professor of Medical Research (Kelen 2000, 896). This might be described as shameful treatment of a woman described as a “Canadian medical hero” (Smith 2000, 929), whose work in pathology provided a foundation of the classification of heart disease and medical-surgical interventions (Kelen 2000, 893).

Absolute barriers to practice resulted in some unusual situations. Dr. James Miranda Stuart Barry, arguably the first woman to practice western medicine in Canada (Hacker 1972, 3), realized her aspirations and lived the life of an accomplished physician and surgeon as a man. Dr. Barry graduated from the University of Edinburgh in 1812, and served in the British army as a hospital mate, and eventually as Inspector General of Hospitals (Rothhammer 2001, 501). It was only upon her death that she was discovered to be a woman. The idea of a female doctor seemed to be so unacceptable to some that a Dr. Edward Bradford publicly surmised that Dr. Barry was “a male in whom sexual development had been arrested about the sixth month of foetal life” (McSherry 1992, 291)! Although she had been able to overcome career obstacles by posing as a man, she was denied the dignity of acknowledgement, and was buried as a man in order to save the war department and medical association embarrassment (Nitychoruk and Nicolle 1994, 6)

Towards the end of the 1800’s, as medicine became more sophisticated and more remunerative, men often fought to keep medicine under their exclusive domain, and the atmosphere has been described as one in which women “were actively discouraged or prevented from entering the profession” (Smith 2000, 929). As a result, when the barriers to acceptance into undergraduate and postgraduate medical studies were overcome, women faced more the subtle obstacles of open ridicule and gender bias in their careers. Examples of this shameful behavior abound, and it was not always discreetly expressed. The views of an American pathologist with respect to feminism were recorded in the transactions of the American Medical Association in 1871:

Another disease had become epidemic. ‘The woman in question’ in Relation to medicine is only one of the forms in which the pest vexes the world. It attacks the BAR, wriggles into the jury box and clearly means to mount the bench. It strives, thus far, in vain to serve at the altar or thunder from the pulpit. It raves at political meetings, harangues in the lecture room and infects the masses with its poisons (as per Rothhammer 2001, 504).

Astonishingly as late as 1961, the dean of a medical school in the United States publicly stated “Hell, yes, we have a quota; yes, it’s a small one. We do keep women out when we can. We don’t want them here – and [other medical schools] don’t want them either,

whether or not they'll admit it" (as per Mangan 1998, 226). Society deemed it socially unacceptable for women to learn anatomy and surgery (Rothhammer 2001, 502), and it was sometimes thought that women were frail, encountered limitations during certain times of the month, and would be subject to the destruction of their health (Rothhammer 2001, 229). It was also argued that medical training would be wasted, when women abandoned the profession in order to raise families (Mangan 1998, 226). Gender discrimination hindered the pursuit of careers. Financial barriers were a deterrent for women. Bankers were reluctant to loan money to women for a medical education, and families often invested in the education of their sons before the education of their daughters (Rothhammer 2001, 506). Maternity leaves were forbidden, and women were often dismissed if a pregnancy occurred (Rothhammer 2001, 506). As a result of these and other difficulties, as late as 1998, women doctors numbered only 21% of all doctors in the United States, and typically earn about two-thirds of what male doctors earn (Mangan 1998, 227).

Charlotte Ross was a woman who faced the difficulties of gender bias without letting them impede her remarkable career. The daughter of a well to do Canadian businessman and Member of Parliament, she was a medical school graduate of the same class as Jennie Kidd Trout. She, however, refused the requirement of completing classes in a Canadian medical school as a condition of licensing on principle, as she had legitimately graduated as a medical doctor in Philadelphia. Instead, she became invaluable as a practicing physician in Whitemouth Manitoba, where she moved with her family in 1881. While raising her eight children, she tended to the surrounding communities with dedication and skill, garnering much respect. Her request to the Manitoba Legislative Assembly to have her right to practice legislated was denied. She practiced, however, for twenty-five years in Whitemouth without being either prosecuted or recognized by the government (Edge 1992, 283). She retired following the death of her husband, at nearly seventy years of age (Hacker 1974, 86). Her granddaughter Dr Edith Ross became the first woman anesthetist to practice at the Winnipeg General Hospital. Manitoba's fourth female medical school graduate, she was the only woman in her class (Nitychoruk & Nicolle 1994, 8).

Amelia and Lilian Yeomans became contemporaries of Dr. Ross, and were the first licensed female physicians in Winnipeg. A widowed mother and daughter team, they focused their efforts on public health and issues of women's rights more so than clinical medicine. Also graduates of an American medical school, Amelia waited for two years before applying for licensing, feeling as Dr. Ross did that her doctorate was her license to practice (Edge 1992, 265).

Dr. Mary Percy Jackson is an example of how remarkably well some women were able to overcome minor hurdles attributable to gender bias. An Englishwoman by birth, Dr. Jackson began practice in Canada in 1929, during a time when recruitment of female physicians was at times favorable, as reduced pay was acceptable on the grounds that they did not have to support a wife (McGinnis 1995, 19). Dr. Percy Jackson chose an adventurous career on the Canadian frontier, and her remarkable letters home to England carry a tone of infectious excitement. Faced with discriminatory practices during her medical training, in which women students were assigned the most difficult tasks on the

grounds that “if women wanted medical degrees, they should be forced to earn them”, she responded with confidence that such practices afforded her excellent training, and the ability to practice in isolation in Northern Alberta (McGinnis 1995, 11). Upon marriage and relocation in 1931, the Canadian government refused the community of Keg Rivers’ petition for a district medical officer, and Dr. Percy Jackson worked largely without pay until health insurance was introduced in 1969 (McGinnis 1995, 31).

In recent years, men are not accepted to medical schools in North America preferentially over women. Women made up 50.4 % of medical school applicants in the United States in 2004, and accounted for 49.6 % of acceptees (Association of American Medical Colleges, 2004). These figures reflect the acceptance that women have gradually been gaining in Manitoba. In 1940, as members of the “non-preferred lists”, it was decided that a quota of one woman per year was to be admitted to the University of Manitoba (Carr & Beamish 1999, 154). In 1944, when it was decided by the University that “...Selection shall be made without regard to the racial origin or religion of the applicant”, no criticism of gender bias was acknowledged (Kinnear 1993, 136). As a result, relatively few women had graduated by 1970. By 1990, however, as gender bias gradually lifted, classes contained as many women as men (Carr & Beamish 1999, 156). It is not known by the author whether or not the gender discrepancy in the present first year class at the University of Manitoba is merely a reflection of the number of qualified female applicants.

In the face of these promising statistics, however, suspicion remains in the mind of the author as to the presence of barriers to women, remnants of the historical context in which we live. The fact that as recently as 1998, almost 50 percent of female American medical students reported gender-based harassment (Mangan 1998, 225), indicates that to this day, minor annoyances may exist for women pursuing a career in medicine. In Canada, surprisingly enough, a recent study from McMaster University provides convincing evidence that discrimination on the basis of gender and sexual harassment are commonly experienced by residents in clinical training (Boynton et al 1997, 272). The late Dr. Christina Hill, the first woman urologist in Canada, recalled very little or no overt harassment, but complained of the undercurrent of mild prejudices suggesting that women in medicine were “not accepting our destined role in life” (Hill 1980, 356). A similar sentiment had been expressed earlier by Kay Thomson, (1970, 31), at the time a third year medical student, who remarked that the presence of women in medicine was welcomed with “... a faint suspicion that she is doing something somehow unnatural.”.

Kane-Berman (1997, 1495), describes how although in recent years the number of women in medical schools equal or exceed the number of men, there remains a sexual division of labour in medicine, with women doing the work male doctors do not wish to do. This sort of assertion, at a time when women do not seem to be at a disadvantage due to gender is contentious. Dr. Wendy Tink (Wigston 2002) for example, describes the barriers facing women as such; “With the exception of higher politics and surgery, a lot of barriers are in women’s heads.”. Ignoring concerns, however, may fly in the face of evidence that completes the present picture of women in medicine a little further. Compared with men, women are currently underrepresented in leadership roles in

faculties of medicine in Canada (Canadian Medical Association 1996), and in many institutions in North America, women of equal academic standing and achievement are likely to be promoted at a slower rate than men in academic medical careers (as per Boynton et al 1997, 268). Furthermore, a department head at the University of Toronto recently examined pay equity for biomedical scientists at the University expecting to find no difference. Instead he found significant discrepancies in favour of men (as per Boynton et al 1997, 270). Complicating the picture of equity in medicine is the confounding factor of gender differences inherent in the parenting roles of men and women. How might these role differences impede career development for women in medicine? A 1996 survey conducted by the Canadian Medical Association showed female physicians spending more time than their male counterparts on housework, and four times as much time on child care (Canadian Medical Association 1998). Evidence suggests that addressing these more subtle barriers to women can be effective in promoting the accessibility of career options for them. Obstacles to career success preferentially affecting women were identified and addressed over five years at Johns Hopkins University. As a result, there was a 550% increase in the number of women at the associate professor level in this short five year time period (as per Boynton et al 1997, 269). Clearly there are some elusive pieces of the puzzle with regard to barriers presently affecting women not apparent when examining only numbers of applicants accepted to medical school. How does Canada fare in beginning to address some of these subtle barriers? Maternity leaves, or the absence of them are one of the beginning steps on the road to parenthood for many physicians. With the overhead costs involved in medical practices, Canadian Employment insurance benefits alone may not allow physicians to consider maternity leaves. Dr Elizabeth Hall-Findlay, with a clinic in Banff Alberta, described the difficulties inherent in a parental leave with monthly overhead costs of \$7000 a month (Nicholls 2003). Physicians in Manitoba, Ontario, Nova Scotia, British Columbia, Alberta, Saskatchewan, New Brunswick and Quebec have access to maternity leaves, although Québec's program is only for general practitioners. These benefit programs are new developments in Canadian medicine, and exclude a lot of Canadian physicians. (Benady 2005). Dr. Sajni Thomas, president of the Federation of Women in Medicine in Canada notes that "We all promote maternity health for everyone else, but unfortunately we're behind for ourselves." (as per Nicholls 2003). Is it possible that weakness in societies and the medical establishments' support systems for mothers results in a selective strain of its female physicians? Is it possible that by expanding the acceptability and availability of work life options would result in enhanced quality of life for women who have chosen medicine as a profession?

It seems that throughout recent history, women have responded to an inner calling to pursue medical studies and careers despite barriers to acceptance, and have a history of valuable contribution to the medical profession. Considering the recentness of opening opportunities for women in medicine, it is not inconceivable that gains are somewhat tenuous, or even resented by some. As long as women continue to contribute in their capacity as physicians, the public and the medical profession have the ability to demonstrate tolerance and understanding of their value, and in this way change the way these women are perceived and treated.

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# HISTORY OF WOMEN IN MEDICINE: STRATEGIES TO OVERCOME BARRIERS

By

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## Abstract

**Our pioneer women physicians were plagued by informal and formal mechanisms of discrimination that barred them from pursuing a career in medicine. This project examines the strategies women used to infiltrate the profession, focusing on the career of renowned French neurologist Dr. Augusta Dejerine-Klumpke (1859-1927). Recognized for her influence on the development of the specialty of neurology and the foundation neuroanatomical theory, Dr. Dejerine-Klumpke led a highly accomplished career, yet still maintained the ideals of Victorian womanhood as a wife and mother. Dejerine-Klumpke was the first woman in France to enter academic medicine as the first female extern and intern to practice in the hospitals of Paris. She challenged a profession with standards and practices intended to bar the progress of women; and a society bound by 'scientific fact' that deemed women intellectually and physiologically incapable of such a career. The strategies used by Dr. Dejerine-Klumpke to advance and succeed in the medical community are compared to methods of other female physicians of her time. Strategies discussed include: public persona (comparison of conservative and confrontational approaches to invoke change in the medical profession); collaboration with a spouse (the benefits and drawbacks of sharing research and practice with one's husband); the influence of female role models (the impact of one's upbringing on career choice and success) and choice of medical specialty (the effect of infiltrating a new or developing field). Barriers faced during Dejerine-Klumpke's time are further compared to current struggles faced by female physicians. The strength and strategies of our sisters of the past are used to gain perspective on current problems within our professional system and offer solutions.**

This manuscript is an excerpt from an essay I completed during my research work in the Department of History at the U of A. The initial subject of my research was Dr. Augusta Dejerine-Klumpke (1859-1927), a French neurologist. I delved into the recorded history of her career through scientific publications, obituaries, and articles on her struggles and achievements published worldwide.

Her accomplishments are many, and she continues to be recognized for her influence on the development of the specialty of neurology and the foundation of neuroanatomical theory. Following a bitter struggle with the medical community, Mme Dejerine became

the first female extern (1882) and then intern (1885) ever permitted to practice in the hospitals of France. Entrance into the prestigious academic realm of medicine required completion of externship and internship programs. These ranks were traditionally restricted to a select group of “the most successful men destined to become the academic elite of the next generation”.

She published a total of 56 scientific articles between 1885 and 1926. She received her first publication during her externship (*La Revue de Médecine*, 1885), for her research on the effects of injury to the inferior branches of the brachial plexus. This syndrome would later become known as Klumpke’s paralysis. She received the Prix Godard from the Académie de Médecine for this research.

During her internship she worked under Vulpian, the Dean of the Faculty of Medicine. Her inaugural thesis, defended in 1889, discussed her further research on peripheral nerves, specific to polyneuritis, lead palsies (a common affliction at the time) and neuromuscular atrophies. For this work she received the Médaille d’Argent des Thèses by the Faculty of Paris and the Prix Lallemand by the Académie des Sciences of l’Institut de France.

She married a colleague and fellow neurologist, Dr. Jules Dejerine, and the two collaborated on a multitude of important neurological articles throughout their careers. Some of their most notable work was on secondary degenerations following lesions of the cortex; the course and connections of the Reil’s ribbon (lemnisci), the red nucleus, aberrant fibres of the pyramidal tract and the course of the cuneus fibres of the corpus callosum.

One of the great accomplishments of the Dejerine couple’s collaboration was two volumes of the acclaimed text, *Anatomie des Centres Nerveux* (1895, 1901), considered to be a ‘great classic of neurology’ and a ‘considerable achievement in human neuroanatomy’. Augusta made important contributions to the text, particularly to the technical elements. The development and application of the technique of microtome serial section of the entire brain was Augusta’s work. The technique had never been used with such perfection. According to Roussy, the text stands as a monument to Madame Dejerine’s affinity for anatomical science, and illustrates the ‘organizing genius of her mind’, that is, ‘its capacity for detail and ingenuity in presentation’. At this time in the history of neurology, the anatomy of the nervous system was in a chaotic state. Research developments by Golgi, Cajal, Forel and His had resulted in an entire reformulation of anatomical theory, and the establishment of the neuron theory. This new approach required a more rigid elaboration of neural topography. ‘The master who understood best in the world the anatomy of nervous centers’, Madame Dejerine contributed extensively to this objective. The Dejerines also collaborated on another important text, the *Sémiologie des Affections de Système Nerveux*. Augusta had an extraordinary talent for drawing and diagrammatic representation of the complexities of neuroanatomy and drew the sketches herself for the anatomical charts and diagrams.

During World War I, Dr. Dejerine-Klumpke put aside her academic research to dedicate herself to the treatment of war-injured patients. She made major advancements in the



treatment and rehabilitation of patients with traumatic paraplegia and hemiplegia, at a time when little was known about the subject. Augusta contributed to the formation of standards of assessment and treatment of these patients and also established a specialized medical and vocational rehabilitation program. She was chief of France's first paraplegic department.

Madame Dejerine-Klumpke also made significant contributions to aphasiology, specific theses were Mirallié's (1896) on Wernicke's aphasia, Bernheim's (1900) on Broca's aphasia, and Pélissier's (1912) on pure motor aphasia. Her contributions were mainly in the area of neuroanatomy.

Madame Dejerine-Klumpke was a founding member of the French Neurological Society and President of the organization in 1914-15. Probably among her most outstanding honours, especially exceptional for a woman, was the Legion of Honour, bestowed to her first in 1913 for her scientific research, and again in 1921, with the grade of Officer and later of Chevalier, for her work to help numerous wounded soldiers who were victims of brain and spinal cord injuries. She was also a member of the Society of Astronomy, the Society of Biology and the Royal Academy of Turin.

Following her husband's death in 1917, Madame Dejerine continued to work on her research, specifically in the area of traumatic lesions of peripheral nerves and their main trunks. With Regnard, she wrote on the sympathetic synesthesia of paraplegics and ocular disturbances due to lower dorsal cord lesions. With the collaboration of her daughter, Yvonne Sorrel-Dejerine, also a medical doctor, she published an outstanding study on the 'Paraosteoarthropathies of Paraplegic Patients by Spinal Cord Lesions'. This study was published again recently, in 1991, and continues to be recognized as an important advancement.

However, in order to understand the significance of her career, I had to also research the careers of her contemporaries, other pioneer female physicians across different specialties and countries. As well I had to gain an understanding of the French medical system, the state of the field of neurology at the time of her career, as well the status of women in medicine and in French society.

It was once I had consolidated this work I began to understand the methodology of historical research; that one does not simply just research the historical background of one's subject. History requires one to analyze such evidence and formulate an argument. I decided not to focus on the importance of her research. I was more intrigued by the boundaries she faced and the strategies she used to overcome them. Madame Dejerine-Klumpke's career as a physician and neurological researcher is marked with great accomplishment. What was it about Augusta Dejerine-Klumpke that allowed her to succeed in medicine and science at a time when it was so difficult for women? I examined the strategies utilized by Madame Dejerine that allowed her to succeed against the obstacles of sexism and patriarchy in the medical profession, to become a founder of the field of neurology and a world-renowned scholar. I then comparatively analyzed the

unique strategies used by other early female physicians, and the resultant success of their careers.

It is well understood that the pioneer female physicians faced extreme hostility from the medical community. It was a common belief that the relative physical weakness of the female gender implied a weaker mental capacity and more delicate nervous system. It was also deemed factual that women were 'at the mercy of their reproductive organs', and thus emotional, erratic and unpredictable. The female menstrual cycle made a woman unfit for taking on the responsibilities of judgment which, in medicine, often control the question of life or death. Women were not merely considered inferior to men; they were fundamentally and incomparably different – physically, intellectually and morally.

The 'professionalisation of science' in the 1880's and 90's as a means to regulate and standardize scientific education and research, managed to 'eject women in the name of higher standards'. Hospitals were closed to women physicians, internship opportunities denied; they were banned from consulting with experienced male practitioners, or from renting rooms for medical practice. In addition to these formal barriers, differences in women's preferences and values often persuaded them to choose medical career paths with fewer opportunities for major success. Other priorities in a woman's life - for instance her children and home - might take precedence over the prestige and power associated with high-ranking medical positions. Traits of scientific success, such as personal achievement may not apply as strongly to women, whose 'feminine traits' perhaps emphasize more of a dedication to family and a balance between career and personal life.

Through my analysis of the careers of Dejerine and her contemporaries, it became evident that it was necessary for women to construct a 'public self' in order to transcend the barriers they faced. Their approaches to eliciting change in their profession are all unique, and often had a major influence on the success of their careers.

Many early female scientists, including Elizabeth Blackwell, the first female physician, utilized a conservative approach to advancement in the medical profession. This approach requires the woman to accept inequalities and gender-based stereotypes for short-term gains. That is, the woman exploits the unique skills and talents characteristic of her gender (for example, empathy, intuition, subjectivity, cooperation, attention to detail, patience) to justify her aptitude for certain types of work, usually limited to women's health and pediatrics. Some went as far as to oppose women's activism. Blackwell considered such activism to be 'anti-man' and was critical of Women's Rights Conventions, stating, "To my mind, the time, if it ever existed, for such conventions is clearly past, and their continuance is a waste of time". Blackwell was convinced that the 'unique qualities' of women, such as sympathy and compassion, necessitated that they contribute to distinct niches of medicine that could not be fulfilled by men.

The downside to this method, however, is that women are not integrated into the medical profession, rather given distinct and limited roles.

Other women chose a more confrontational approach. They opposed the traditional ideology of femininity, and considered the female mind to be equally capable of scientific thought. Those in support of this approach believed that women must be integrated into the medical profession, rather than given supplementary or distinctive roles. Although it was acknowledged that women had special strengths, these were considered to be acquired, rather than innate. The downside to such an approach is that such 'sameness' and assimilation as grounds for equality often requires that 'women be like men culturally or even biologically'. That is, women were supposed to assimilate to medicine, rather than vice versa. This could be a difficult enterprise considering that the profession was structured to exclude women.

The career of French psychiatrist, Madeleine Pelletier, corresponds to this theory. Considered to be a 'life-long militant feminist', Pelletier was involved in a multitude of social and political activities, including advocacy for contraception and abortion, which were very daring subjects to discuss at the time. Pelletier adopted a masculine style of dress and cut her hair short. She wrote of the hostility she faced from the public and her need to conceal her political and social views, "I would never say anything about feminism to my patients; the people whom I look after know nothing about my opinions, unless they insist on knowing them. And one must do this, because otherwise it would be impossible to earn a living." After a laborious struggle against bureaucratic rules restricting women from sitting the examinations, she became the first female psychiatry intern in France. However, her career was plagued by isolation and harassment. She was treated with extreme hostility by fellow students and the hospital staff. "The male interns warred with me constantly – it wasn't possible to do [experimental] psychology there." As a result of her unreceptive work environment, she was forced to spend less time at the hospital, and her research activities were compromised. She failed to pass the next 'concours' for a permanent appointment as an asylum doctor. This failure would result in the discontinuation of her medical career. She continued to fuse her psychiatric, anthropological, feminist and political interests into a non-medical career, but this would remain as her greatest professional disappointment. In 1939, she was arrested on an unsubstantiated abortion charge. She was not tried, but incarcerated in a mental institution, where she died within six months.

Was it her dress, her visible revolutionary feminism that marred her success? Mademoiselle Pascal, a contemporary of Pelletier's who scored below her in their internship competition, succeeded Pelletier in passing the second concours, after Pelletier's feminist battle to gain admission had been won. 'Pascal made no pretensions to feminist sympathies', and had an outstandingly successful career, eventually becoming the director of the psychiatric hospital of Maison Blanche. But Pascal was considered 'womanly' by her colleagues and did not visibly challenge gender norms.

Mme Dejerine's style of public persona most suitably fits into the conservative approach. Although she was a pioneer in gaining access to many aspects of medicine and science, it is questionable as to whether she was in fact an open feminist. She is not documented as being part of any feminist organization or publicly supporting the emancipation of women

during her career. Also, despite the demands of her career, she still maintained the ideals of traditional Victorian womanhood, as a wife and mothers.

A fellow medical student of Mme Dejerine's, Blanche Edwards, displayed a contrastingly radical and confrontational public self. It was actually Edwards who was the force that ultimately allowed women access to the externship and internship competition. It was Edwards who led the movement that opened these doors to academic medicine. After her hundreds visits to academic political figures and numerous letters to officials and medical journals, the government overturned the rule. But, Blanche encountered much hostility in response to her overt defiance to medicine's discrimination of women. In 1882, both women became the first female Externes des Hopitaux de Paris. The entire medical community (including the Dean of the Medical School, the majority vote of the Faculty of Medicine, the Advisory Council of the Public Health System and the Association of Former Interns) were in opposition. The student body and faculty quickly polarized and the problem expanded into not merely one school's bureaucratic rule, but a national medical and social issue; an issue of professional advancement, an issue of women's rights. Students opposed to Miss Edwards' campaign went so far as to burn an effigy in her likeness on a boulevard near the Faculty of Medicine.

In 1885, both women were given positions as Internes Provisoires (substitutes) despite the fact that Augusta received the highest marks of all of the competitors in all of the written examinations.

The following year, both Blanche and Augusta tried again for titular internship positions. Augusta was successful and became the first female 'Interne Titulaire' of the hospitals of Paris. Blanche, however, never achieved the rank. The following year when she competed again, she was eliminated from the competition by a technicality - candidates could not be over the age of 28. Thus she was never granted access to academic medicine, though she maintained a successful career as a general practitioner as well as a specialist in women's health and pediatrics. She remained active in feminist movement throughout her life and served as the vice president of the League of Rights of Women in France. An outspoken and determined woman, Blanche Edwards was resolute in her cause to grant access to academic medicine to women. This intimidated the medical community, and perhaps resulted in her receiving such hostile treatment from her colleagues, and ultimately never being granted an internship position.

However Augusta's public persona did not necessarily coincide with her true beliefs. In 1887, *Le Figaro*, a Parisian newspaper quoted Augusta as saying, "Don't write of me; I only ask one thing, to be forgotten now . . . I am a poor woman desiring to work in silence, wanting to teach herself to care for other poor women." Did Augusta Klumpke really see herself as merely a 'poor woman'? She had already been published extensively and received numerous awards for her research. She had worked in the service of numerous respected physicians and researchers, including the Dean of the Faculty, Vulpian. All considered her to be a talented and skilled scientist and doctor. It is difficult to believe that she actually thought herself to be inferior in intellect and capability to males. But, was this perhaps a front, a façade, for the medical community and public at

large? Was she more accepted, more likely to quietly infiltrate the ranks of academic medicine with such a quiet public persona? In her eulogy, a student described her as one who 'led by example'; the 'head of a movement' who 'carried high and far the flag of feminism.' And she did, with every successful advancement of her career open a door for other women. She represented a role model that not only excelled in science, but also maintained the other demands of the traditional female role, as a wife and a mother. She obviously encouraged other women to pursue careers in science. Her daughter became a medical doctor and collaborated on much of Augusta's neurological research in later years. Perhaps if Augusta had been more forthright with her views, her advancements in science may have been more restricted.

The advantage of the nonconfrontational approach can be explored further through Madame Dejerine's relationship with Vulpian, the Dean of the Faculty of Medicine. Prior to the internship competition, Augusta had been working in his service. Sponsorship or recommendation from a Faculty member with such status would have likely assured her a titular position. However, for reasons that were unclear, Vulpian did not recommend Dejerine as he did his other interns for the competition. Many years later, Mme Dejerine clarified that she did not request his recommendation as she didn't want to involve him in the controversy surrounding the competition. As a result, she received only a provisional internship title. This may have cost her immediate success in the internship competition, yet likely maintained Vulpian as an ally.

There is another aspect to consider regarding Mme Dejerine's lack of public display of women's activism: she likely felt it more important to be remembered for her influence on science, and on the development of neurology than for that fact that she was woman. Maybe she wanted to decrease the public's emphasis on the precedent she had set as the first woman intern and increase that on her actual research; less on her novelty, more on her merit as a scientist. As Mary Putnam Jacobi advised her students in 1883, "You are liable to be so much and so frequently reminded that you are women physicians, that you are almost liable to forget that you are, first of all, physicians."

Today's women physicians still face the underlying conflict of their sisters before them: must they emulate the professionalism of men, regardless of its effect on one's personal life, or seek to temper uniquely feminine values into a medical community that is reluctant to accept change?

Women have been a vital vehicle for change in the medical profession, from therapeutic style to advocacy of preventative and interdisciplinary health care. At a time when both men and women are questioning the traditional model of a career in science, it is valuable to look to the methods of change that our predecessors have used. These early women physicians succeeded in challenging both a profession with standards and systems intended to bar the progress of women; and a society bound by scientific 'fact' that deemed women intellectually and physiologically incapable of such a career. Perhaps by looking to the models of change used by our sisters of the past, we can gain insight into methods that we, the physicians of the future, can use to progress into a modern model of a scientific career. Where professional and personal life are not adversarial but

complimentary, and women are freed from formal and informal barriers that still impede their advancement into certain aspects of medicine.

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# **CONTAGION, DISCRIMINATION, AND A DISEASE “MOST DISGUSTING”**

By

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## **Abstract**

**Leprosy has long had a reputation for being one of the most feared of all human diseases. In Canada today the disease is a rarity and the few existing cases are considered little threat to public health; however, this was not always the case. In the mid- to- late nineteenth century two well-publicized outbreaks of leprosy on Canadian soil caused much concern within the nation’s medical and legislative communities. In New Brunswick, the disease was endemic; appearing in several generations of Acadian coastal families. In British Columbia, the disease was primarily foreign-born; appearing in Chinese immigrant workers.**

**In the New Brunswick outbreak, occurring prior to the discovery of the leprosy bacillus, the physicians involved with the situation were deeply divided as to the nature of the disease: was it hereditary or was it contagious? Their decision would prove fateful for the victims of the disease in this area.**

**By the time of the first British Columbia cases the disease was understood to be contagious -- although to a lesser degree than most infectious diseases. In spite of this, as leprosy was occurring in the Chinese, a race felt to be a reservoir of disease, public pressure called for strict measures to be taken against those affected by this illness.**

**Both leprous populations described above posed unique challenges for the authorities in their respective times and places, and the differences between the two scenarios are many. Nevertheless, there are similarities in the histories of these outbreaks, as in both situations issues of race and class became central in the discussion surrounding the appearance of leprosy in these populations.**

Today in Canada leprosy is rare, with an estimated prevalence of 0.6 cases per 100,000 people (Boggild et al. 2004). Currently, all cases of leprosy in Canada occur in immigrants or in Canadian born individuals who have lived in leprosy endemic areas of the world (ibid). However, this was not always the case. In the mid-nineteenth century endemic leprosy was found to exist in Maritime Canada, particularly among the Acadians of northeast New Brunswick. Then at the end of the century, a second leprous population was found in British Columbia, this time in an immigrant group, the Chinese. The



appearance of leprosy on Canadian soil posed several challenges for the medical and legislative communities of nineteenth century Canada, and brought Canadian physicians into the debate regarding the nature of this particularly loathsome disease. At a time when only rudimentary scientific knowledge was available regarding leprosy, Canadian physicians on the frontlines of these outbreaks explored why this disease appeared in certain groups of people; how the disease was transmitted from person to person; and how to best manage those individuals afflicted by the illness. In answering these questions in regard to the Acadian situation, the medical community of eastern Canada made significant progress toward understanding the transmission and pathogenesis of leprosy. However, in both New Brunswick and British Columbia, the extent to which race and class influenced nineteenth century medical thinking would become a dominant theme. The two affected groups, the Acadians and the Chinese, although different from each other in a great many ways, were similar in that both were deemed physically and culturally inferior to Anglo-Saxon Canadians. In both cases, this prevailing attitude of medically endorsed discrimination would have important consequences for the quality of life of those individuals suffering for leprosy.

Leprosy is caused by the bacillus, *Mycobacterium leprae*. The bacillus was first observed microscopically by Armauer Hansen in 1873 making it the first microorganism to be definitively associated with a human illness (Britton and Lockwood 2004). Despite this early discovery, even to this day the pathogenesis of the leprosy is incompletely understood. The bacillus is believed to be readily transmitted, human-to-human, via aerosolized nasal secretions (ibid). However, owing to the complex interaction between the bacillus and the immune system of the human host, of those infected only an estimated five percent develop clinical disease (Grange 1996). Furthermore, of this symptomatic five percent, three quarters will experience spontaneous healing of the initial lesion without progression of the disease (Boggild et al. 2004). Therefore, although leprosy is a contagious disease by definition, significant disease and debilitation will only occur in a small fraction of those infected. Once infection is established, leprosy manifests itself in the skin and peripheral nerves of the cooler regions of the body such as the ears, nose, and distal extremities. Signs and symptoms of the disease will appear, on average, three to five years after infection (Grange 1996). Common presentations of the disease include hypopigmented skin lesions; ulcers on anesthetic extremities, and blindness. Since the 1940's leprosy has been curable by means of chemotherapeutic agents; however, cure is not easily obtained. Leprosy treatment involves the usage of multiple agents for up to two years with extensive follow up to monitor for relapse (ibid).

Historically, leprosy has long been among the most feared of human illnesses. It earned this reputation through its prolonged and highly stigmatizing course and because unlike other plagues which appeared to cause indiscriminate infection, leprosy appeared to choose its victims selectively, as if the afflicted individuals were somehow marked for the disease. In the Medieval period, at the height of Europe's leprosy epidemic, the doctrine of the Catholic Church promoted the exclusion of those afflicted with leprosy from society. This included a ceremony in which the person was declared a 'leper' and was henceforth, made to be legally dead, though still living (Ell 1994). This practice, based upon a mistranslation of the Hebrew book of Leviticus, was interpreted to mean that those

with leprosy were unclean in the body and in the soul. As a result of this doctrine it was believed by the medical community at this time that leprosy was a physical affliction caused by a sinful soul (ibid).

The prevalence of leprosy declined in Europe during the fifteen and sixteenth centuries; however, exploration and colonization brought the disease to previously uninfected areas, including West Africa and the Americas. In North America, the first area to be significantly affected by leprosy was Louisiana. By the early to mid-eighteenth century leprosy became endemic in several areas of this colony, and historically the slave trade has been implicated for this occurrence; however, doubt is cast upon this theory as Caucasians had a higher prevalence of this disease than did the African population at this time (Trautman 1994). While leprosy was becoming an established infection in Louisiana, the first Acadian immigrants began to arrive in the colony, having fled there after their expulsion from Nova Scotia by the British in 1755. Although there is no evidence to support the existence of leprosy in the Acadian population prior to their migration to Louisiana, some members of the Acadian population likely contracted the disease while living in this region. Then, in the late eighteenth century small numbers of Louisiana Acadians returned to Maritime Canada, settling for the most part in Acadian communities in northeastern New Brunswick. Those who returned to Canada from Louisiana were quite likely responsible for the introduction of leprosy to Canadian soil (Losier and Pinet 1984).

Although cross-migration of the Acadian population between Louisiana and New Brunswick is the most likely explanation for the development of leprosy in Eastern Canada, several other theories have been suggested, and it will likely remain a mystery exactly how or when leprosy was introduced into the Canadian Acadian population. However, the first generally accepted case of leprosy in this population occurred in a woman named Ursule Benoit, who began exhibiting symptoms of the disease around 1815. Other than her illness, which claimed her life in 1828, there was nothing particularly unusual about Mrs. Benoit. She was born to New Brunswick to Canadian-born Acadian parents and married an Acadian man with whom she had five children. There were no reports of leprosy in her parents' or her husband's families prior her illness; however, after she became ill the disease appeared in two of her sisters and in her husband (Whitehead 1967). By the 1840's several small Acadian towns surrounding Chaleur Bay, New Brunswick, all had cases of leprosy among their townspeople. The cases were clustered within several families, and in most cases the afflicted families were in some way related to Ursule Benoit and her family (Losier and Pinet 1984). In 1844, the parish priest of Tracadie, one of the affected towns, began to suspect that the disease amongst his parishioners was leprosy, and notified the local health authorities and urged them to investigate the illness (Kato and Marchand 1976). In 1844 the New Brunswick Legislature sent an investigative Commission the region to confirm or disprove the existence of the leprosy. This Commission reported that they found eighteen confirmed cases of leprosy and several other highly suspicious cases. The investigators unanimously agreed that the illness was contagious and advocated for the creation of a lazaretto to separate the sick from the healthy (Losier and Pinet 1984). In response to the report, in April 1844 the New Brunswick Legislature passed legislation which authorized the construction of a lazaretto,

and gave the Board of Health the authority to forcibly remove leprous individuals from their homes and transport them to the facility.

From 1844 to 1849, leprous individuals from the Acadian communities around Chaleur Bay were sent to a lazaretto which was built on Sheldrake Island, a small island in the mouth of the Miramichi River (ibid). Those confined there were expected to be self-sufficient for all of their basic needs such as cooking and cleaning. Additionally, they were expected to tend to the needs of those sicker than themselves. Those confined to the island found the conditions primitive and the amenities lacking; furthermore, many were too ill to work and a huge burden was placed on the healthier few. With the poor living conditions, and deprived from the support of their community, most leprosy victims deteriorated within months of their arrival on the island. During the Sheldrake Island years, the Acadian sufferers of leprosy were given no formal medical treatment. In 1849, thanks in large due to the lobbying efforts of the local Catholic Church, the Board of Health agreed to close the Sheldrake Island lazaretto and to transfer the surviving individuals to a lazaretto which would be built in Tracadie. In its five-year history thirty-seven people had lived on Sheldrake Island. Five people vanished after escaping the island, fifteen died, and another seventeen were transferred to the new facility in Tracadie (ibid).

The Tracadie Lazaretto, while certainly not without flaws, would over the next century prove to be a vast improvement over the Sheldrake Island lazaretto. However, in its early years there was little improvement in quality of life for those confined there. In 1850's the population of the lazaretto grew and the mortality rate remained high. The situation was exacerbated by the lack of formal medical care inside the facility. In 1861, again as a result of the efforts of local parish priest, a permanent physician was finally found for the lazaretto. From 1861 to 1864, Dr. James Nicholson served as resident physician at Tracadie before dying at an early age of tuberculosis. In 1865 Dr. Alfred Corbett Smith, a twenty-five year old graduate of Harvard Medical School, was hired to replace Dr. Nicholson. He would remain at the lazaretto until his death in 1909. In 1868, 'Les Hospitalieres de Saint-Joseph', a Montreal-based order of cloistered nuns, agreed to establish a religious community and nursing hospital at Tracadie (ibid). The presence of the nursing sisters, who would stay with the various incarnations of the lazaretto until it finally closed in 1965, was pivotal in transforming the quality of patient care within this facility (Whitehead 1967). With the arrival of first six 'Hospitalieres' in 1868 the facility for the first time functioned as a hospital rather than a medically enforced detention centre.

At the time of the leprosy outbreak in the Acadian population of New Brunswick, the origin of the disease was a hotly debated topic in the medical circles of Europe and North America. Colonialist expansion by Europeans into Asia, Africa and the Americas brought with it concerns that this dreaded disease, thought to be widely prevalent among non-white peoples, would readily infect European settlers causing widespread disability and loss of life (Mawani 2003). However, the seemingly random nature of the transmission of the disease and its long incubation period led some experts to believe that the disease was not contagious, but hereditary. With the discovery of leprosy in New Brunswick this

debate became a local concern. In their 1844 report to the government of New Brunswick the medical commission led by Dr. Alexander Key stated that they unanimously agreed that leprosy was indeed contagious (Losier and Pinet 1984). This conviction paved the way for the legislation to create the Sheldrake Island lazaretto. In spite of this, one of the other authors of the report, Dr. A.H. Skene, seemed somewhat less certain of the contagious nature of the illness. In a report which he submitted to the Montreal Medical Gazette just a few months later, he first states that those who are vulnerable to the disease are so by virtue of “hereditary taint, and by contagion” (Skene 1844, 113). He explains, rather prophetically, the agent of disease is a “virus which, once introduced, reproduces itself” (ibid, 112). However, he goes on to state that heredity cannot be overlooked since all of the Tracadie cases, according to his research, had occurred in relatives of Ursule Benoit. In 1847, New Brunswick legislature appointed a committee of doctors to investigate the heredity-versus-contagion debate. This committee, led by Drs. Robert Bayard and William Wilson, conducted a thorough investigation of all of the known cases and concluded that the illness was non-contagious and transmitted by hereditary means (Report of the Commissioners 1848). To support their argument the authors pointed out the genealogy of the illness, and they also recounted the numerous reports of healthy spouses who had slept in the same bed as their leprous husband or wife for years without contracting the disease (ibid). Nevertheless, they did qualify their conviction by stating that a small number, perhaps one percent of the population, with no known hereditary connection to the disease may be able to contract the illness through casual contact with a leprosy sufferer (ibid). The significance of this report, aside from the surprisingly accurate description of the immunological basis of leprosy, was that in their conclusions they foreshadowed the modern approach to leprosy management by almost a century. They recommended that the lazaretto be abolished as, “It coerces the leper, and removes him from his family, without any regard to his feelings” (ibid, 64). In the place of a lazaretto, they suggested that the leper should be given a small monetary appropriation and be allowed to be cared for at home. None of the recommendations of this seminal, albeit theoretically flawed, report were followed by the New Brunswick government. The legislature ultimately decided that the medical evidence was inconclusive, and therefore they could not risk the health of the general public by closing the lazaretto (Losier and Pinet 1984).

As the heredity versus contagion debate continued within the medical community there was one aspect of the transmission of the illness that was quite generally agreed upon—that certain peoples, or races to use the term of the time, were more vulnerable to leprosy, either by virtue of some inherited factor or by means of their lifestyle. Although it was acknowledged that leprosy had once plagued the European population and was still endemic in a few isolated areas of the continent, the consensus at that time was that most European ‘races’ were no longer vulnerable to leprosy by virtue of their civilized habits (Mawani 2003). Foreign places and their ‘inferior’ peoples, on the other hand were felt to be a reservoir of leprosy and other diseases that afflict those uncivilized in mind, body and soul (ibid). Race and class were frequently used by English speaking medical and governmental authorities and to a lesser degree by French Canadian religious authorities to explain the existence of a foreign or even ‘tropical’ disease in the Acadian population. The Acadian people were considered to be racially different from the English-speaking

people of New Brunswick and even from the French-speaking population of Quebec. One Quebec-born priest wrote that his parishioners were “Acadian fools who live in disorder...being a racial mixture of Indian, Negro, French, Spanish and even Italian with all of the natural and intellectual defects of their origins.” (Losier and Pinet 1984, 59). The medical community investigating the Tracadie outbreak also implied that the presence of leprosy among the Acadians could be attributed to racial factors, which were then exacerbated by their unhealthy lifestyle. In their otherwise sympathetic 1848 report, Drs. Bayard and Wilson stated that, though they believed leprosy to be an inherited condition, it was one in which, “Filthy habits, [and] bad food...” (Report to the Commissioners 1848, 62) favored the development of the disease. What is more, they felt that the French settlers had created an artificial “Equatorial or Intertropical Climate” (ibid, 62) by over heating their homes in the winter.

Dr. A.C. Smith, the longstanding resident physician of Tracadie Lazaretto, would become known as Canada’s foremost expert on the subject of leprosy. With this notoriety Smith’s racialized attitudes towards leprosy and its victims would shape the Canadian medical opinion on the subject for decades. Although he was known to be a man of considerable good-will, he was steadfast in his convictions that leprosy, while contagious to a degree, preferentially infected inferior classes and races, such as the Acadians (Losier and Pinet 1984). In 1891, reflecting on the New Brunswick experience, he wrote: “Leprosy never appears in the better class of our French population” (ibid, 59). In the 1890’s, after investigating several cases of leprosy among Icelandic immigrants in Western Canada, he reassured authorities that leprosy would not be able to make headway among hard-working people such as these (Losier and Pinet 1984). Here the condemnation of the Acadians is implicitly obvious. There are several reputable reports of the existence of endemic leprosy on Cape Breton Island in the late nineteenth century. Dr. Smith was sent to the island in 1885 to investigate the disease, and concluded that “Leprosy no longer exists –if it ever did exist—in Cape Breton” (ibid, 105). In 1889, Smith returned to the island and this time he confirmed the existence of leprosy on the island and brought one man to Tracadie; however, he did not propose the creation of a lazaretto in Cape Breton, nor did he formally publish his findings (ibid). Later, in 1904, Smith admitted that he had not disclosed his finding at the request of the Nova Scotia government after it was discovered that some of the descendants of the Cape Breton leprosy victims had achieved prominence within business and government (ibid). In addition to assuring a low profile to the Cape Breton cases, Dr. Smith also never made any racial or class generalizations regarding the presence of leprosy among these English speaking Scottish immigrants, an omission which is not likely coincidental. To Dr. Smith the appearance of leprosy in those of superior racial stock was to be regarded as an unfortunate act of nature rather than as a condemnation of the intrinsic worth of the population.

In Tracadie, the ‘Lazaretto Hotel Dieu’ continued to operate until the last patient, cured of leprosy, was discharged in 1965. In the later decades of its operation the inpatient population of lazaretto was increasingly foreign-born, and the last two cases of leprosy from the endemic Acadian population were admitted in 1937 (Whitehead 1967). Since this time there have been no reports of indigenous transmission of leprosy in New Brunswick or elsewhere in Canada (Canada Diseases Weekly Report 1989)

By the 1880's as the number of new cases of leprosy began to decline significantly among the Acadians in New Brunswick, talk of another leprosy epidemic in the making was starting to be heard on the other side of the country, in British Columbia. In this case the leprous population of concern was not a long misaligned group such as the Acadians, but a new immigrant population, the Chinese. Chinese immigrants began arriving in British Columbia during the Gold Rush of the late 1850's and early 1860's (Mawani 2003). However, large scale Chinese immigration did not occur until the 1880's when the construction of the Canadian Pacific Railway placed a huge demand on the Federal Government to find inexpensive manpower. Between 1881 and 1884, 17,000 Chinese labourers arrived in British Columbia for work on the railway (ibid). While this abundant and inexpensive source of labour was a boon to the Federal Government, the Chinese immigrants were viewed with suspicion by the European settlers and local authorities on the West Coast. In response to the concerns of the white population, the British Columbia legislature promptly passed a series of restrictive laws to prevent the assimilation of the Chinese into the province's society. The Chinese were barred from voting; their businesses were spatially restricted into ghettoized 'Chinatowns'; and immediately after the completion of the railway a head tax was created in an effort to limit the immigration of further Chinese (ibid). Amid this sinophobic atmosphere, medical authorities in British Columbia began to draw to the public's attention yet another reason to exclude and restrict the Chinese-- contagion, particularly smallpox and leprosy (ibid). Prior to 1891, isolated cases of leprosy had been reported in Chinese immigrants; however, there was no evidence to support the existence of widespread leprosy within the British Columbia's Chinese community (ibid). Nevertheless, the majority of non-Chinese British Columbians, already convinced that the Chinese were an uncivilized race, were easily convinced that the unsanitary habits of the Chinese made them vulnerable to leprosy; a disease which could then be readily transmitted to whites (ibid). In 1885, the concern regarding Chinese immigrants and leprosy was so widespread that the issue was specifically addressed at the British Columbia Royal Commission on Chinese Immigration. Despite virtually no confirmed evidence of leprosy among Chinese immigrants, the expert witnesses were each asked, "What personal knowledge have you of the presence of leprosy among them [the Chinese] and have you any personal knowledge of leprosy being communicated from them to the whites, and if so, how many instances and under what circumstances" (ibid, 8). Perhaps surprisingly to the Commission, once under oath, most witnesses reported they had little if any, personal knowledge of leprosy among the Chinese. One witness, Chief Justice Begbie, gave the following reply, in a manner that reflected the attitude in British Columbia at the time: "It is common to attribute to the Chinamen generally, that they are infected with disgusting diseases-for example, leprosy" (ibid, 9). Chief Justice Begbie would go on to deny any personal experience with leprous Chinese, calling the concerns "pure imagination" (ibid, 9). At the height of this anti-Chinese fervour, one Nanaimo resident wrote that the Chinese Quarters on Vancouver Island could easily become, "Centres from which contagion would spread all around" (ibid, 8).

In 1891, all fears of Chinese 'contagion' were confirmed when a Chinese immigrant with advanced leprosy was found in Victoria's Chinese Quarter. The Board of Health arranged a thorough inspection of the Chinese district and a further four cases of leprosy were

discovered (Johnston 1995). Canada's leprosy expert, Dr. A.C. Smith of the Tracadie Lazaretto, traveled to Victoria to examine the men, and he confirmed that they did indeed have leprosy. He also recommended that they be promptly isolated to prevent the spread of disease (ibid). In spite of mounting medical evidence that the leprosy bacillus was only weakly contagious, the Victoria Sanitation Committee, reflecting the public's fear of a Chinese plague, recommended that the men be hastily isolated far from the city (Mawani 2003). In response to this recommendation, the Mayor of Victoria and his Aldermen chose D'Arcy Island as an appropriate location for the leprosarium. D'Arcy Island was a small uninhabited island located twenty-five kilometers from the city of Victoria in the Haro Strait, a body of water separating the American San Juan Islands from Vancouver Island. The island was quickly designated for "sanitary purposes" by the British Columbia government who agreed to pay for the construction of a longhouse with six cell-like rooms (Johnston 1995). The City of Victoria agreed to provide the provisions for the five leprous Chinese men, who were taken to the island in May 1891.

From 1891 until 1905 the D'Arcy Island colony was under the jurisdiction of the City of Victoria. This period quite certainly marks the darkest chapter of the history of leprosy in Canada. The men, all Chinese, were left with only the bare necessities of life, and no medical treatment whatsoever. The Victoria Medical Health Officer arranged for a steam ship to visit the island every three months, bringing to the men food, clothes, coffins, and occasionally opium. These meager supplies would be left on the beach by a landing boat guarded by an armed crew member, to prevent the men from attempting to escape by boat (Johnston 1995). As with New Brunswick's failed Sheldrake Island colony some fifty years earlier, the ill men were expected to be self-sufficient in all aspects, including administering to the sick and dying. Not surprisingly there were reports of men going unburied for days as those still living were too ill to complete the task (Mawani 2003). During the D'Arcy Island colony's first decade of existence, there was no one who advocated for the men confined there. In 1895, as a fully modern hospital was being constructed in Tracadie, an inspector with the Victoria Medical Officer of Health's team was quoted as saying:

"They're [the Chinese on D'Arcy Island] better off than half the white people in these hard times. They have all they want to eat and drink, little or nothing to do, nothing to worry them. Oh, they're fairly contented or would be if we'd keep them supplied with opium."  
(Johnston 1995, 952).

By the turn of the century, the attitude toward the leprosy sufferers on D'Arcy Island began to slowly soften, particularly in medical circles. In 1904, Dr. Brydone-Jack, a member of the Victoria Board of Health, began a vocal opposition to the city's inhumane treatment of the men on D'Arcy Island. He pointed out that at this time leprosy patients in Tracadie were being treated in a hospital, while those in Victoria were provided with only basic supplies and no medical care (ibid). Dr. Brydone-Jack was supported by Dr. Fagan, another Board member, who appealed to the province to help the men on D'Arcy Island, who had been "marooned for life" by the City of Victoria (ibid). In 1905, in response to these criticisms, the responsibility for D'Arcy Island and its occupants was transferred

from the city of Victoria to the province of British Columbia. In the one year the island was a provincial responsibility, the food shipments were increased from quarterly to monthly; however, the men were still denied medical treatment. In 1906, with the creation of the Federal Leprosy Act, the island again changed hands, this time from the Provincial to the Federal Government.

Under the auspices of the Federal Government the men confined on D'Arcy Island finally received regular medical treatment, although this was not in a hospital setting as at Tracadie. In addition to medical care, the Canadian Government introduced another strategy for leprosy management-- deportation. At this time, deportation of the Chinese leprosy victims was seen as a humane and cost-efficient approach to dealing with this particular problem (ibid). In the words of Dr. Brydone-Jack, deporting these men would be in their best interest, as once returned to China, "Their own people would take care of them" (Mawani 2003, 14). The Federal Government clearly echoed this sentiment as in 1907 all of the men incarcerated on D'Arcy Island were deported to a missionary hospital in Canton, China. All of the island's buildings were subsequently destroyed and replaced by two new cabins in preparation for the island's new role, that of a temporary quarantine centre for leprosy sufferers awaiting deportation (Johnston 1995). Before the deportation centre was closed in 1924, another twenty-one men, all but one Chinese, were deported from D'Arcy Island. From these figures one may assume that these deported individuals represent all cases of leprosy which were reported in Western Canada prior to 1924; this however, is incorrect. When cases of leprosy appeared in immigrants who had been heavily solicited by Canadian immigrant recruiters, such as the Icelanders, these individuals were actually denied the opportunity of returning home, and instead were sent to Tracadie. In the case of the Icelandic leprosy sufferers, the Federal Government feared that the deportation of leprosy victims would tarnish the reputation of Canada in the eyes of potential Icelandic immigrants (Losier and Pinet 1984). On the other hand, with the completion of the Canadian Pacific Railway, the Chinese were no longer considered desirable immigrants, and as such were deported by the Canadian government.

In its thirty-three year existence the D'Arcy Island colony was the place of banishment of forty-nine men. Of these, forty-three were Chinese, and one was Japanese. Another man, German-Russian by descent, was said to be suffering from "Chinese Leprosy", contracted after living for some time in Victoria's Chinese Quarter (Mawani 2003). In all, seventeen men, all Chinese, died and were buried on D'Arcy Island. In the year 2000, the City of Victoria erected a plaque on D'Arcy Island in memory of these men, many whose names are unknown, the forgotten victims of disease and discrimination.

The history of leprosy in Canada, or more specifically in New Brunswick, is significant for the contribution made to medical science by Canadian physicians. In terms of the elucidation of the nature of leprosy, Dr. A.H. Skene proposed a theory that incorporated both features that we now understand to be prerequisites for the development of leprosy, an infectious particle and a susceptible host, in his paper published in 1844, a full thirty years prior to Hansen's discovery of the leprosy bacillus. Drs. W. Wilson and R. Bayard, who also foreshadowed the immunological nature of leprosy, advocated a humane treatment strategy for the treatment of leprosy sufferers which included the abolishment of



leprosaria; a strategy which would not be utilized for another century after their proposal. Interestingly, and perhaps because of the 1873 discovery of the leprosy bacillus, there was less discussion of inherited transmission of leprosy and much more talk of “contagion” in British Columbia as opposed to New Brunswick. The contagion in British Columbia, however, was felt to be inherently Chinese, less so by heredity, and more by virtue of the unhygienic customs of this ‘race’.

Despite the significant scholarly contribution of some Maritime Canadian physicians, the history of leprosy in Canada is clouded by the legacy of discrimination and mistreatment of leprosy individuals, particularly with regard to the situation in British Columbia. Although the mistreatment of the Acadians with leprosy was more subtle by comparison to the blatant mistreatment of the similarly affected Chinese, upon closer inspection, medically endorsed discrimination is a unifying theme in the two cases. In both cases there are examples of how the medical community readily attributed the presence of certain diseases in a population to the inherent worth of the population, with ‘inferior’ peoples harbouring ‘inferior’ diseases. In New Brunswick, the Acadians with leprosy were denied adequate medical care for close to twenty years, and it can be argued that this period may have been longer if it was not for the support of the Catholic Church. The Acadians, in the eyes of the medical and legislative authorities of the day, were an underclass, who likely brought disease upon themselves, and as such were unworthy of proper medical care. Nevertheless, by the time of the discovery of leprosy in British Columbia, the situation in New Brunswick had been largely rectified as the Acadian victims of leprosy were being treated medically in a hospice setting. In British Columbia, the lessons learned in New Brunswick were ignored, and no effort was made to treat the leprosy Chinese men in similar manner. While the Acadians in New Brunswick were a long persecuted underclass, the Chinese in British Columbia were despised and looked upon as a threat by many. Furthermore, the racial and cultural differences between European Canadians and Chinese Canadians were so exaggerated by Canadian political and medical authorities, that the Chinese were portrayed as scarcely human. To the European settlers of British Columbia, including the medical community, the affected Chinese were simply too foreign to be viewed with sympathy; instead of humanity and charity, the leprosy Chinese received punishment. The Acadians, while lacking in political and economic clout, had at very least an ally in the Catholic Church, an alliance that would prove fortuitous; the Chinese on the other hand, were completely voiceless. By the time of the completion of the Pacific Railroad the Chinese were an undesired group with no allies. Too powerless to resist, the Chinese with leprosy were abandoned, neglected and later deported, all with the sanction of the physicians who had the power to change their fate.

Today, looking back at the history of leprosy in Canada from our modern vantage point, the callous and discriminatory attitude of our Canadian physician forefathers is startling. However, this was not an isolated or particularly unusual case, and many examples of how the medical community has contributed to the discrimination of an already oppressed population can be readily found. Even in our kinder and more equitable time it is temptingly easy to deny or diminish the health problems faced by people in places far from us or in cultures dissimilar to our own. Before we allow ourselves to feel satisfied

with the progress that has been made over the past century, we must look beyond our own borders. With our continued existence of global policies that allow thousands to die each day of treatable infectious diseases in places far from our First World homes and offices, one must question, has the prevailing attitude of Canadian physicians truly changed?

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# **AFTERSHOCKS: THE SECONDARY HEALTH CONSEQUENCES OF EARTHQUAKES**

By

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## **Abstract**

**On January 17, 1995, at 5:46am, Japanese living in the Hanshin-Awaji area awoke to a powerful 7.2 Richter scale earthquake. 5500 people were killed instantly, 41 000 were injured, and 180 000 places of residence were lost. The immediate destruction was terrible. However, more health complications were on their way.**

**Natural disasters plague humanity by unleashing terrible destruction. Earthquakes are a common yet destructive force throughout the world. The immediate death and injury caused by earthquakes is easily seen. However, the secondary health consequences from earthquakes are also devastating. How past earthquakes have affected human health is important for predicting the health effects of future earthquakes. Why these effects occurred is important for prevention of significant health consequences. To answer these questions, past earthquakes were examined and compared.**

**Communicable diseases, psychiatric disturbances, and cardiac disturbances were the most frequently encountered secondary health effects. The great Hanshin-Awaji earthquake in Japan, along with several others, will be used to exemplify and explain these effects. The same secondary effects often follow natural disasters no matter where their location. Although natural disasters are not predictable, their subsequent complications are, and we must be prepared to manage them.**

## **Communicable Disease**

Communicable disease spread after earthquakes has been the most commonly observed secondary health consequence of earthquakes. In the great Hanshin-Awaji earthquake, 8% of the population was forced to reside in shelters. An observational study found that the rate of pneumonia for the entire Hanshin-Awaji area was higher than that for the previous year. However, for those who were living in shelters, the pneumonia rate was higher than those who were able to remain in their own homes (Matsuoka et al., 2000). The same study also assigned a destruction ratio ranking to 48 area hospitals: the higher the destruction with regards to both structural damage and human life loss in the area around the hospital, the higher the destruction ratio for that hospital. It was found that

higher pneumonia admission incidences were present in the hospitals, and therefore the surrounding residential areas, with higher destruction ratios (Matsuoka et al., 2000).

On December 27<sup>th</sup>, 2003, the historic city of Bam, Iran was hit by a 6.5 Richter scale earthquake. The city, built largely out of clay, was devastated. Of a population of 240 000, 35 000 were immediately killed and 75 586 were left homeless. The homeless were put into tent cities controlled by the provincial districts which provided the residents with food, water, and medical services. In this shelter population, medical data was kept. Acute respiratory tract infection incidence within this population rose greatly, beginning with 1507 infections coming to medical attention in January, increased to 8014 infections in February, and increased to 11,320 in March, even after much of the tent city population had left the tent city for other residency (Akbari et al., 2004). Severe diarrheal disease also increased during the 3 months from 118 cases in January, to 1030 in February, finishing with 1224 cases in March. Bloody diarrhea followed with 6 cases in January, 81 in February, and 174 in March. Malaria incidence also increased due to the greater ease of vector transmission with people in close proximity: there were 13 cases in January, 74 in February and 124 in March (Akbari et al., 2004). All the infectious diseases or documented symptoms of infectious diseases in the camp had similar progressions; they initially increased sharply, only to slow when the tent city population density decreased in March as the people left for new homes.

Table 1. Cumulative disease presentations from the population of 75,586 inside the Bam tent cities.

	January 10, 2004	February 15, 2004	March 10, 2004
Severe Diarrhea	118	1030	1224
Bloody Diarrhea	6	81	174
Acute Respiratory Infections	1507	8014	11,320
Malaria	13	74	124
Hypertension	189	1096	1544
Coronary Artery Disease	62	447	57
Committed Suicide	0	10	14

Taken from Akbari et al., 2004. Public Health.

Both the great Hanshin-Awaji and Bam earthquakes showed increased communicable disease spread after the initial destruction. The greatest increase was shown in the shelter populations. These populations were in close proximity and high density, resulting in an ease of vector transmission for disease. These populations were also without public utilities such as flush toilets or clean running water as the public services had been temporarily disturbed. Non-sterile crowded living conditions are known to cause an increase in transmissible disease. Future shelters should aim to keep population densities as low as possible, especially when housing people for great lengths of time as was the case in Bam.

## Cardiovascular Events

The least intuitive secondary health consequence of earthquakes is an increase in cardiovascular events, generally peaking at 3 weeks post-earthquake (Tsai et al., 2004). A large earthquake in Ji-Ji, Taiwan in 1999 also spawned many studies on cardiovascular-earthquake links because of curious doctors observations of increased cardiovascular morbidity and mortality after the earthquake. One study showed that during the 6 week period after the earthquake, significantly higher rates of acute myocardial infarction were reported when compared with the same population and time period of one year prior (Tsai et al., 2004). However, the first rush of cardiovascular anomalies to be studied post-earthquake occurred 4 years earlier, after the Hanshin-Awaji quake.

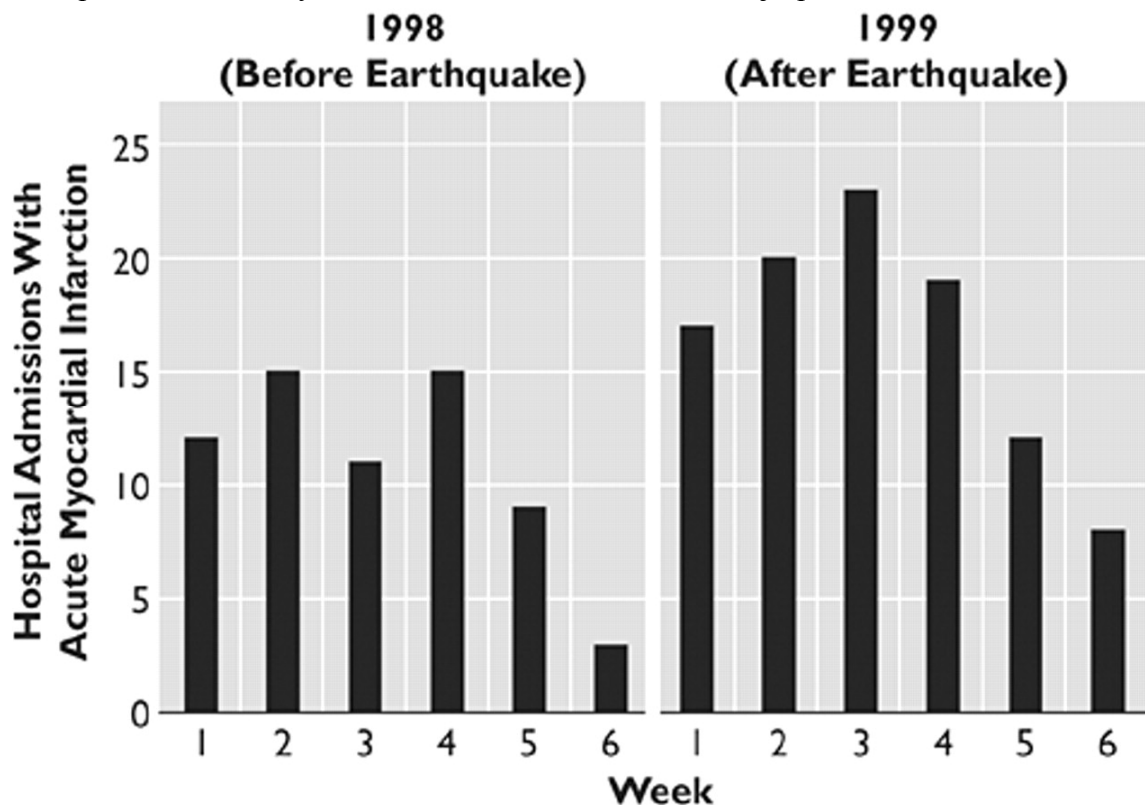


FIGURE 1. Hospital Admissions With Acute Myocardial Infarction in Counties and Cities Close to the Epicenter of the 1999 Ji-Ji (Taiwan) Earthquake During Each Week of Two 6-Week Periods Before and After the Earthquake. Taken from Tsai et al., 2004. Psychosomatics.

After the great Hanshin-Awaji earthquake, investigators reported cardiovascular disease increase. An increase in blood pressure was seen in the first visit after the earthquake by hypertensive patients whose blood pressure had been monitored prior to the earthquake (Kario et al., 2001). During the first 4 weeks after the earthquake, a 3.5 times increase in myocardial infarction cases were seen compared with the same population 1 year prior (Suzuki et al., 1997). A significant increase in myocardial infarction deaths were also reported versus the same population 1 year prior during the 8 weeks (Ogawa et al., 2000), and 12 weeks (Kario et al., 1997) time periods immediately following the quake. In Bam,

the incidence of acute hypertensive emergencies were shown to increase in the tent city population until it peaked in the third month after the earthquake (Akbari et al., 2004). Indeed it is shown that hypertension, and acute myocardial infarctions increase in the general population after earthquakes. The reason likely is because of general physical and mental stress that indirectly increase the workload of the heart, thereby putting those with preexisting myocardial dysfunction at an increase chance to present with an acute event. Indeed, a study of 108 men with anxiety disorders from Awaji island after the Japan quake showed that those with worse cases of anxiety and post-traumatic stress disorder had increased levels of cortisol, an adrenergic secretion and sympathetic stimulator in their blood serum (Fukuda et al., 2000).

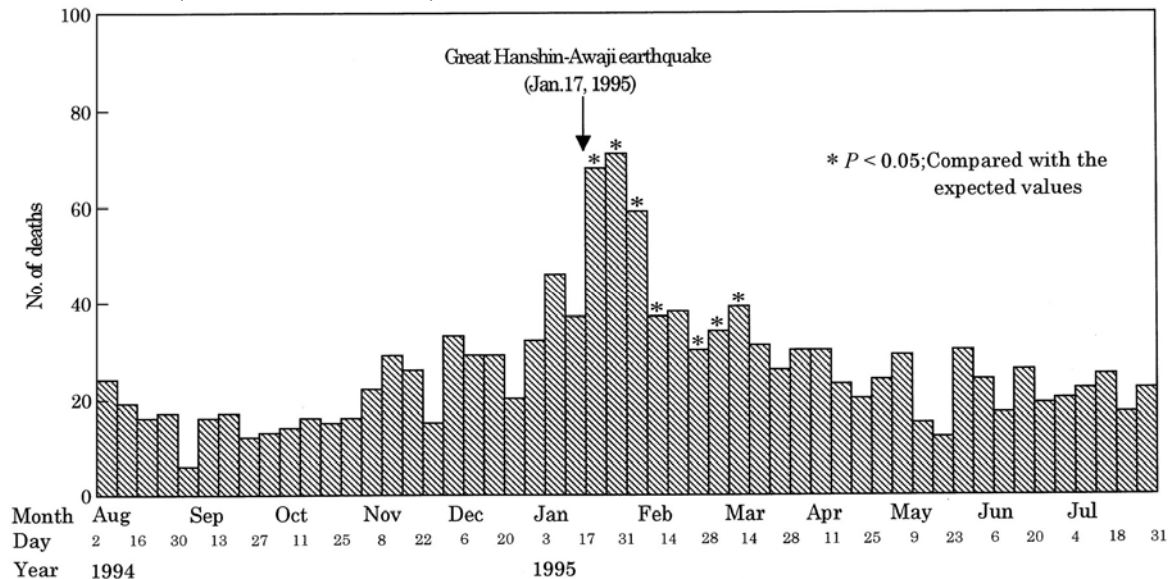


Figure 2. The number of deaths from acute myocardial infarction in the study area of 16 municipalities in the Hanshin-Awaji area from August 1994 to July 1995. Taken from Ogawa et al., 2000. International Journal of Epidemiology.

## Psychiatric Disturbances

Post earthquake stress has caused cardiovascular events in the past. Post earthquake stress has also caused psychiatric abnormalities. In the first of 3 months of tent city life in Bam, not one occupant out of almost 80 000 commit suicide. However, in the second month 10 people commit suicide and a further 13 commit suicide in the third month even while the population of the camps were decreasing (Akbari et al., 2004). A study of 107 male patients of Awaji Island who presented with post-traumatic stress disorder found that those with more severe symptoms of the disease suffered the largest lifestyle change because of the quake (Fukuda et al., 2000). Such life changes were either social, such as occurred with the death of a family member, or health related, such as a new inability to sleep, eat, or exercise or increased drinking, smoking or time spent at work. A post-traumatic stress disorder study was completed by the Soviet government in rural Armenia 18 months after a large earthquake killed 4204 from a population of 8500 in 1988. The surviving population had huge rates of post-traumatic stress disorder. Of this population, it was found that those who lost family members, or those who were trapped inside

toppled buildings had the greatest rates of PTSD (Goenjian et al., 1994). The immediate shock and fear that occurred with earthquakes in Japan, Iran, and Armenia helped to increase the incidence of PTSD. However, lifestyle changes that came from losing family members and property also caused great stress and therefore more PTSD and anxiety.

## Conclusion

Earthquakes have caused great havoc on human populations throughout history all throughout the world. Though their greatest impact on human mortality was instant, they also caused great suffering in the months and years that followed. Communicable disease spread among high density shelter populations has been seen during many disasters, natural or otherwise. Fortunately, this is the most preventable secondary health consequence of earthquakes. With increased sanitation and decreased population densities of shelters, the health of these victims can be improved. With many organization and aid being pooled to help disaster zone survivors, perhaps a greater chunk of resources should be used for those in long-term shelter facilities. Especially in areas such as Bam with endemic transmissible diseases like malaria, a dollar spent today may save 2 in the future and give earthquake survivors a better quality of life. Unfortunately, psychiatric disturbances and cardiovascular events are caused by the stress that accompanied the large upheavals and changes in lifestyle of earthquakes and are therefore not preventable. Fortunately, they are predictable. Health care workers should anticipate their appearance, and be ready to provide supportive treatment to those who need it.

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# **BROCA AND BEYOND: A SHORT HISTORY OF LOCALIZATION IN THE BRAIN**

By

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## **Abstract**

**In 1863, Paul Broca described several patients with similar language impairments who all had lesions of the left hemisphere of the brain. This aphasia, Broca's aphasia, is characterized by impairment in the production of language without impairment in the understanding of language. In almost all of the patients described, Paul Broca found that the lesion involved the third left frontal convolution, which prompted him to consider the speech function to be localized there. This proposal was quite controversial because at the time there were two schools of thought; one was that the faculty of speech was located in a specialized area of the brain and the other that the faculty of speech was distributed all throughout the brain, which followed from the understanding of physiology that two organs that are equal and symmetrical (e.g., the two hemispheres of the brain) should have the same attributes. The description of Broca's aphasia is considered classic in the field of neuroanatomy.**

**Since Paul Broca's localization of the speech function, many other cerebral functions have been localized. Another type of aphasia, Wernicke's aphasia was used to locate an area of the brain important in the comprehension of language. Together, Broca's aphasia and Wernicke's aphasia almost form a double dissociation, with Wernicke's aphasia being impairment in language comprehension without impairment in language production. Other cerebral functions that have been localized include motor, somatosensory, vision, and auditory functions. Recent research has indicated that some cerebral functions may not be as localized for everyone. For example, language functions are generally considered left-lateralized, which is most true with right-handed males. However, language functions in females and left-handed people may be more diffuse or more right-lateralized. Nevertheless, the localization of cerebral functions is very important to medical clinicians and may enable the understanding and treatment of cerebral function deficits.**

Cerebral localization is the determination and the limitation of distinct mental, behavioural and physiological functions to a particular area of the brain. Cerebral localization has a long and varied history, which dates back to antiquity. Cerebral localization is essential for the practice of modern neurology and neurosurgery. This paper will give a brief overview of the history of cerebral localization until the end of the

nineteenth century, pointing out some key events and people. A major focus will be the contributions of Pierre Paul Broca, a distinguished surgeon, anatomist and anthropologist.

The history of cerebral localization can be divided up into roughly three different periods based on the main questions being investigated (Zola-Morgan 1995). The first period, dating from antiquity to the second century A. D., focused on the location of the soul within the body. The second period, dating from the second century to the eighteenth century, focused on whether cognitive functions were localized in the ventricular system or within the brain matter itself. The third period, from the nineteenth century onward, focused on how cognitive functions are organized in the brain.

During the first time period, in antiquity, it was believed that the functions of the rational soul were performed by a substance called psychic pneuma, the animal spirit. Today much of our understanding of the ancient beliefs are due to Galen (ca. 200 A.D.), an ancient scholar of medicine (Green 2003). It appears that Galen recorded his own thoughts on the issue, using ideas that could be traced back to Herophilus and Erasistratus (ca. 270 B.C.) and is thought to have been conceived by Aristotle in the fourth century B.C.. A primitive concept of psychic pneuma can also be found in some passages from the Homeric poems, which reflected beliefs from before the seventh century B.C. (Manzoni 1998). Psychic pneuma was characterized as being a substance that was lighter than air (Manzoni 1998). Galen thought that nerves were hollow and filled with psychic pneuma, which was able to pass through small pores located in the walls of the nerves (Manzoni 1998). Galen also described a complex process by which the psychic pneuma was created. While all psychic pneuma was the same, the function it performed depended on its location. Imagination, thought and memory were in the psychic pneuma contained within the cerebral ventricles. The psychic pneuma that flowed from sensory organs to the anterior ventricles performed the sensory functions. The psychic pneuma flowing from the posterior, or cerebellar, ventricle to the muscles was responsible for voluntary movement (Manzoni 1998). This was the time of humoralism, in which health and illness were thought to result from a balance or imbalance of bodily liquids. It makes sense that mental and nervous disorders at this time were believed to be due to changes of the psychic pneuma or due to a problem with its flow (Manzoni 1998). Galen's beliefs were widely accepted due to their compatibility with Platonic, Aristotelian and Augustinian philosophies, the predominant philosophies of the day, and with Christian and Muslim theologies. Imagination, thought and memory were each later localized their own specific cerebral ventricle (Manzoni 1998).

An important step in the history of cerebral localization was having a better understanding of the anatomy of the brain. Vicq d'Azyr, who received his medical degree in 1774, identified many of the cerebral convolutions as well as internal structures of the brain, realizing that the brain is not shaped haphazardly, but that there are recognizable and consistent structures (Boling, Olivier and Civit 1999).

In 1796 A.D., Franz Joseph Gall was starting to give private lectures on what he called craniology, then organology, and it would later be called phrenology (Boling, Olivier and Civit 1999; Greenblatt 1995). Phrenology is the theory that mental faculties could be

determined by the location of bumps and other topographical features on the skull, which has the basic premise that cerebral functions could be localized (Greenblatt 1995; Manzoni 1998). Gall believed that you could determine a person's strengths and weaknesses by analyzing the bumps of a person's skull (Greenblatt 1995). He localized twenty-six different faculties, eighteen of which were common to humans and animals (e.g., pride and sexual instinct), and the other eight found only in humans (e.g., wit and goodness) (Greenblatt 1995). Phrenology enjoyed brief popularity in both Britain and the United States, however the Western scientific community rejected it by 1843 (Greenblatt 1995). Later, the merits of cerebral localization were debated in part due to the doctrine of phrenology (Boling, Olivier and Civit 1999).

During the first half of the nineteenth century, a holistic or unitary view that the cerebral cortex acted as an undifferentiated whole and that each cerebral function could be conducted by any area was generally held (Heffner 1987; Fishman 1995a). In 1861, Pierre Paul Broca published his report on his famous patient Leborgne. Broca's report and contributions will be explored later in this paper. This report spurred an explosion of research in cerebral localization (Boling, Olivier and Civit 1999). In 1870, Fritsch and Hitzig performed the first experimentally controlled direct electrical stimulation of a mammalian brain and observed muscle movement on the opposite side of the body from the electrical stimulation (Uematsu, Lesser and Gordon 1992; Boling, Olivier and Fabinyi 2002). From then on, electrical stimulation studies were quite common. In 1874, Roberts and Bartholow were the first to perform direct electrical stimulation of a human brain (Uematsu, Lesser and Gordon 1992). Wernicke, in 1874, published his report on the localization of lesions causing a certain disorder that was later named after him. In 1876, David Ferrier performed electrical stimulation studies on many different species in order to map cortical functions. He then tried to transfer these maps onto the human brain (Uematsu, Lesser and Gordon 1992; Boling, Olivier and Fabinyi 2002; Heffner 1987). Ferrier ran into legal problems regarding his animal experimentation because the Cruelty to Animals Act was passed in Britain that year (Fishman 1995b). The act was passed in part due to all the experimentation on animals that was occurring at the time. In 1878, Luciani and Tamburini performed their cortical ablation studies. They removed parts of the brains of animals to observe the effect that removing that section of the brain had, which was done in order to localize brain functions (Uematsu, Lesser and Gordon 1992). Ferrier would also do cortical ablation studies (Heffner 1987).

In spite of all the new evidence pointing to the cerebral localization of function, cerebral localization was still highly controversial in the second half of the nineteenth century and there were several public debates on the issue (Goetz 2000). Ferrier and Goltz were involved in a large debate on cerebral localization at the International Medical Conference of 1881 (Tyler and Malessa 2000). Goltz, an opponent of cerebral localization, believed that the effect of cerebral lesions depended on the amount of cortex involved, not on the location of the lesion because he was convinced that all parts of the parts of the cortex had the same capacity as all the other parts (Fishman 1995b).

Pierre Paul Broca, in his 1861 report, introduced the term "aphémie" to describe the disorder that would eventually bear his name (E. Berker, A. Berker and Smith 1986).

Broca was born in 1824 in Southern France and was a distinguished surgeon, anatomist, anthropologist and neuroanatomist (Shua-Haim, Sabo and Rosee 1999). Broca's report was on his patient Leborgne, also known as Tan because "tan" was the only word he could say. Tan had been an epileptic from youth and had lost the ability to speak at around the age of 30. Though Tan was unable to speak, he still understood other people, so his impairment was only in speech production, not speech comprehension. This "aphémie" is now called Broca's aphasia or alternatively expressive, nonfluent or motor aphasia. This aphasia normally affects both spoken and written language. Broca's description of Broca's aphasia is considered classic in the field of neuroanatomy (Shua-Haim, Sabo and Rosee 1999). After Tan's death, Broca localized the lesion to Tan's left third frontal gyrus and so Broca concluded that the speech capacity was localized in this area, which is now called Broca's area.

In 1863, Paul Broca described over twenty-five aphémie patients who all had lesions of the left hemisphere and in almost all of the patients the lesion involved the third left frontal convolution (E. Berker, A. Berker and Smith 1986). This strengthened Broca's conclusion about the localization of the speech faculty. In order to distinguish himself from Gall, he drew a clear distinction between his cortical localization and Gall's cranial localization (Henderson 1986).

With his reports, Broca also introduced the concept of hemisphere dominance by recognizing the importance of the left hemisphere for speech, which seemed to contradict the understanding of physiology that two organs that are equal and symmetrical (e.g., the two hemispheres of the brain) should have the same attributes (Henderson 1986; Masdeu 2000). Broca's explanation of this contradiction was that from childhood we preferably assign the most difficult operations to the left hemisphere, though this does not mean that the right hemisphere is unable to carry out the same operations (Masdeu 2000). This conclusion leads to the interesting prediction that if the speech centre located in the left hemisphere were damaged, the homologous area in the right hemisphere would be able to take over speech operations (Finger, Buckner and Buckingham 2003). Broca contended that in cases where recovery of speech did not occur it was due to: the age of a patient, with relearning being easier in a child than an adult (i.e., the idea of a critical period); a lack of effort to teach adults to speak again; or that the cortical damage extended beyond the speech region, affecting other brain functions and impeding the relearning of speech (Finger, Buckner and Buckingham 2003).

The Barlow case of 1877 has been used to provide evidence that the right hemisphere was able to take over speech functions. In the Barlow case, a ten-year-old boy had a left-hemisphere injury involving the speech centre. This boy subsequently learned to talk again (after only ten days), but when he had a right-hemisphere injury in the area homologous to the speech centre, he again had a loss of speech with no recovery, implying that the area in the right-hemisphere that had been damaged had taken over the functions of the speech centre in the left-hemisphere (Finger, Buckner and Buckingham 2003). There is an issue with the extremely rapid relearning of speech in the ten-year-old boy however, but additional evidence from the Wada test and PET scans support the idea of the right-hemisphere being able to take over functions from the left-hemisphere under

ideal conditions (Finger, Buckner and Buckingham 2003). Some of the current fMRI research appears to indicate some increased right-hemisphere activity when the left-hemisphere is damaged, but the amount of activity does not correlate well with the level of recovery (Finger, Buckner and Buckingham 2003), showing that many factors are likely involved in the recovery of an aphasic patient.

Broca realized the potential surgical relevance of cerebral localization and in 1871, in order to treat a Broca's aphasic patient, Broca did the first craniotomy made on the basis of a localization of brain function (Cowie 2000, Henderson 1986; Stone 1991). He trephined (made a hole in the skull) at the calculated site and encountered an abscess. Unfortunately this first patient died, however upon autopsy, the patient had a lesion that was worst in the third left central gyrus – Broca's area. Broca continued to develop ways to localize brain lesions and invented several instruments to determine the relationship of the brain and skull (Cowie 2000), including the goniometer, which is still in use today.

Throughout his work, Broca described four different kinds of aphasia, including one that resembles Wernicke's aphasia, however, he failed to differentiate between Broca's and Wernicke's aphasia anatomically (Henderson 1986). In 1874, Wernicke published his report on a disorder in which there is impairment in language comprehension but no impairment in language production (Henderson 1986). Individuals with this aphasia, called Wernicke's aphasia or alternatively sensory, receptive or fluent aphasia, can often speak fluently but what they say makes no sense. Wernicke localized this aphasia to the posterior part of the first temporal convolution of the left hemisphere, an area now called Wernicke's area.

Broca's aphasia and Wernicke's aphasia together almost form a double dissociation, which is very convincing evidence that the speech production and speech comprehension faculties are indeed localized to different areas of the brain. For both types of aphasics, the brain lesion is often not confined specifically to Broca's area or Wernicke's area, meaning that several aphasic patients may have cognitive deficits beyond just language deficits which makes it more difficult to draw conclusions from the available data.

During this time, the latter part of the nineteenth century, a lot of work was being done to localize other cerebral functions as well, including things such as: morality, vision and motor function.

The long and interesting history of cerebral localization is an incredibly important aspect in the development of modern neurology and neurosurgery (Hagner 1995). In fact, Charles Mills, a professor of neurology, noted "the phenomena produced by irritative and destructive lesions of the cortical motor area can be relied upon to lead the neurologist to a precise topographical diagnosis with as much certainty as the stethoscope for cardiac diseases guides the thoracic diagnostician" (Boling, Olivier and Fabinyi 2002). Today this technique is still used and sometimes supplemented with diagnostic procedures like CT and MRI scans.

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# **NASOSEXUAL MEDICINE: UNDERSTANDING THE HISTORICAL RELATIONSHIP BETWEEN THE NOSE AND SEXUAL FUNCTION**

By

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## **Abstract**

**Vienna, 1895: a 27 year old woman, Emma Eckstein, complaining of abdominal pain and moderate feelings of depression related to menstruation seeks advice from physician Dr. Sigmund Freud. Freud diagnoses her with a nasal reflex neurosis that he attributes to masturbation. He then refers her to German laryngologist, Dr. Wilhelm Fliess. To treat Eckstein's neurosis, Fliess performs a turbinectomy. Unfortunately, Fliess unknowingly leaves surgical gauze in the wound and Eckstein returns to Freud months later with a profound infection. Removal of the gauze at this point results in a substantial hemorrhage that Freud describes in his writing as 'near fatal'. Eckstein survives but is disfigured by the operation. In explaining the poor outcome, Freud theorizes that Eckstein's bleeding '[was] hysterical in nature, the result of sexual longing for himself' (Masson, 1985).**

**Although many of the details of Emma Eckstein's medical experience are worthy of further investigation, this paper shall be confined to one: the connection Freud made between Emma's dysmenorrhea and her nose. Despite the now seemingly implausible concept of a nasal reflex neurosis causing symptoms of dysmenorrhea, an association between the nose and the genitals is not so improbable when one examines the connection from a historical perspective. The idea of a relationship between the nose and the genitals has existed in a variety of different cultural contexts throughout history, been supported by prominent Western physicians from Hippocrates to Freud, and does indeed still have applications in modern medicine.**

The cultural nasogenital relationship can be illustrated from a physiognomic, legal and linguistic perspective. Physiognomy, Greek for knowledge of nature, is generally defined as the art of judging human character from the facial characteristics. The nose in particular, its shape and general physical attributes have been thought to be indicative of a person's personality and often sexuality. In Aristotle's work 'Physiognomica', he proposed that lechery could be detected among persons with a similar shape of nose (Blackledge, 2003). The Romans also viewed the nose as an important indicator of sexuality; they equated its size with sexual potency. So much so that the Roman emperor Heliogabalus only allowed men of adequate nose size to become a member of his sex club. The Romans even had a term for the characteristic of big noses (and thus implied sexual prowess), 'nasuti' (Book, 1971). Remnants of the nasuti way of thinking continued

to affect culture for centuries. Michael Scotus, a 13<sup>th</sup> century writer and supporter of physiognomy boasted that he could tell whether a woman was virginal or not by feeling her nasal cartilage (Blackledge, 2003). In the 19<sup>th</sup> century, French author, Balzac, littered his works with colourful descriptions of his character's noses and inferred personality traits. For example, in his novel 'La Vieille Fille', one of Balzac's characters must choose between two men as future father of her children and makes an ill-informed decision as she is not aware that large noses are signals of potency whereas a small nose might imply impotency (Balzac, 1957).

An interesting legal trend that demonstrates a nasogenital relationship is that of nose biting or cutting as a means of retribution for sexual deviance, usually adultery. This practice has been employed by a variety of cultures, including; American Indians (Apache, Blackfoot and Mesquakie tribes), ancient Egyptians, the Ashanti of Ghana and medieval Serbs (Blackledge, 2003). This trend is neither isolated to geographical area nor temporal period; a recent article published in the Lancet notes that local surgeons in Papua New Guinea have documented frequent male nose damage 'due to angry wives' (Okimura, 1998). It is also interesting to note that Thomas Jefferson alluded to nasal punishment for rape, polygamy or sodomy. He suggested that punishment for such an act take the form of; 'if a man, castration, if a woman, by cutting thro' the cartilage of her nose a hole of one half inch diameter at least' (Boyd, 1958). Perhaps this cultural act of exchanging nose for pride propelled the ancient (and still practiced) art of rhinoplasty. Details of rhinoplasty have been found as early as the writings of an Indian physician, Sushruta, in 500 BC, who detailed using a flap of forehead in the reconstruction of the nose (Okimura, 1998).

Finally, language itself serves as proof of the cultural connection between the nose and the genitals. As already mentioned, the Romans coined the term 'nasuti', the necessity of which is indicative of its significance. It is also interesting to note that in Latin, 'nasus' the word for nose was also used for clitoris. Perhaps the similarity between the nose and the clitoris in the Latin language is reinforced by their accompanying lips--the labia majora and minora. Like the Romans, the Mehinaku tribe of Brazil refer to a woman's clitoris as the nose of her vagina (itsi kiri). Language links also exist in a more obscure sense: the French verb 'sentir' means to smell and to feel. The Persian word 'bulah' means both smell and love or longing. In English, we describe powerful scents as 'potent', potency also describes sexual prowess (Blackledge, 2003). Thus, as with many historical ideas, the legacy of the nasogenital connection still exists today within the subtleties of our languages.

As a nasosexual relationship seems to be quite evident in cultural history, it is not surprising that a presumed relationship between the nose and the reproductive organs appears in medical history as well. Interestingly, in contrast to nasosexual culture, nasosexual medicine was generally confined to the female sex. This field of medicine can be traced back to Hippocrates, was subscribed to by Galen, survived the Middle Ages and enjoyed resurgence at the turn of the 20<sup>th</sup> century which resulted in the medical mishap of Emma Eckstein.



The first recorded theory of nasosexual medicine in Western medicine was that of Hippocrates. Hippocratic medicine worked under the presumption of a 'hodos' or path that linked the nostrils and the mouth with the genital orifice in women. At each end of this hodos was a 'stomos', or mouth, through which blood or other humours might leak and through which medicine could be administered (McKay, 1901). This path for treatment was important in a condition Hippocrates referred to as the 'Wandering Womb'. According to Hippocratic medicine, the uterus was thought to be mobile, and was compared to an animal that roved about. Displaced uteri were thought to cause a variety of symptoms by suffocating other organs and displacing humours (McKay, 1901). In order to alleviate the symptoms, it was thought that the uterus needed to be restored to its natural location.

Hippocrates' nasosexual theories are best illustrated in his 'Aphorisms', a collection and summary of his medical observations and deductions. In Aphorisms V.32, Hippocrates notes that 'haemoptysis in a woman is removed by an eruption of the menses', implying that the blood secreted during menstruation could just as well be released by coughing (Coar, 1822). Further more, in V.28, Hippocrates suggests that 'fumigation with aromatics promotes menstruation' (Coar, 1822). Amenorrhea was thought to be a symptom of the wandering womb and in order to coax the uterus back to its proper position, one could apply odours to either end of the hodos. The uterus was thought to prefer sweet scents and shy away from more fetid ones. Along with symptoms of wandering womb, this method of treatment was used to treat uterine prolapse by applying the foul odour at the genital stomos and sweet odours at the woman's nose (McKay, 1901). Hippocrates also used sneezing as therapy and often advocated for the use of sternutatories or medicines to induce sneezing. In Aphorism V.35 he states that 'sneezing, when it occurs during a hysteric paroxysm, or labour, is favourable' (Coar, 1822). Sneezing would clear the 'hodos' of any obstructions and restore the proper humours. Sneezing was also used immediately postpartum for delivery of the placenta: in Aphorism V.49 Hippocrates writes, 'for the expulsion of the placenta, a sternutatory may be employed, the nose and mouth being stopped' (Coar, 1822).

Like Hippocrates, Galen was one of the early proponents of nasosexual medicine. Modifying Hippocrates' concept of the wandering womb, Galen described a Hysterical Syndrome consisting of three different presentations; hysterical convulsion with loss of consciousness, localized spastic affectation of the limbs and hysterical convulsion with consciousness preserved (Siegel, 1973). Although Galen believed that menstruation was intricately linked with the Hysterical Syndrome, he did not subscribe to Hippocrates' belief that it was the uterus' movements that caused said syndrome. Rather, Galen felt that suppression of menses, or 'female sperm' retention allowed toxicities to develop and fester which then caused the Hysterical Syndrome. He likened this to the toxic effects of snake venom. Galen's belief in a physical connection between the uterus and the nose is best illustrated through his suggested treatment. He believed that the expulsion of phlegm through sneezing would restore the natural flow of vapours and dispel the toxins accumulating in the uterus (Siegel, 1973). Thus, like Hippocrates, Galen recommended sternutatories in the treatment of hysteria.

The teachings of both Hippocrates and Galen were an integral part of medicine in Medieval Europe, so it comes as no surprise that nasosexual medicine survived this period, appearing in many of the texts of the time. Women's diseases fell into three general categories in the Middle Ages; uterine suffocation and prolapse, disorders of menstruation and diseases related to childbirth (Barratt, 2001). Many of the texts relied heavily on the use of fumigation as a therapy for uterine problems, subscribing to Hippocrates' theories of a wandering womb (Green, 2001). Fumigation involved the burning of herbs and medicines below the genitals so that the scented fumes rose up and irrigated the vagina. Fumigation was often accompanied by scents being applied to the nose, as in Hippocratic medicine.

Although nasosexual medicine survived the Middle Ages, it was not until the turn of the 20<sup>th</sup> century that new theories in this discipline were introduced. Through these developments in nasosexual medicine, the case of Emma Eckstein can be better understood.

Dr. John MacKenzie, a surgeon at John Hopkins, became interested in the relationship between the nose and generative organs after likening the erectile properties of the tissues covering the inferior and middle turbinate bones and septum to those found in the penis. He is noted as preceding Freud and Fliess in proposing a reflex pathway connecting the nose to the genital tract in 1884 (Rosedale, 1945). He wrote that in some women there is hyperemia of the nasal mucosa in association with their menstrual cycle and that nasal symptoms were more pronounced during the menstrual period. He also wrote that nasal stuffiness and sneezing often occurred with sex which further supported his proposed reflex system (MacKenzie, 1884).

In 1893 Wilhelm Fliess expanded upon Mackenzie's nasogenital reflex theory by suggesting that not only could genital problems influence nasal symptoms, nasal problems be the cause of genital symptoms (Zucker and Wiegand, 1988). He felt that this theory was supported by nasal cocaine and its alleviation of dysmenorrhea. Indeed, if cocaine proved effective treatment to dysmenorrhea in his patients, Fliess performed nasal surgeries as a more permanent treatment. Fliess also theorized that there were two 'genitalstellen', or genital spots, located in the nose, that are most connected to the genitals. It is to these spots that he suggested applying cocaine or other treatment (Brettauer, 1911).

Fliess' influence over Freud's work is generally acknowledged and Freud's respect for his colleague is demonstrated in the published letters he wrote him over a period of twenty years. Freud shows his enthusiasm and support of Fliess' work in one excerpt of a letter, 'Let me recommend you a comparison with Meniere's disease. I hope that the nasal reflex neurosis will soon be generally known as Fliess's disease.' (Bonaparte, 1954). Understanding the intimate relationship Freud theorized between sexuality and psychiatric problems is beyond the scope of this paper. Suffice it to say that Freud often correlated psychological distress of his patients with sexuality. With that in mind and his enthusiastic support of Fliess' 'well-documented' theories of a nasogenital connection,

one may begin to understand how it came to happen psychological symptoms, such as those experienced by Emma Eckstein were treated with turbinectomies.

Freud was not the only physician influenced by Fliess' work; nasogenital reflex theory was a widely accepted theory for over forty years and was prominent in both the fields of otolaryngology and gynecology. The Journal of the American Medical Association published a paper in 1914 that reported 93 women successfully cured of dysmenorrhea by nasal surgery (Mayer, 1914). The term 'vicarious menstruation' was often used to describe nosebleeds thought to be caused by damage inflicted on the nasal mucosa during the menstrual cycle (Zucker, 1988). Like the Hippocratic 'hodos', physicians even proposed an anatomical pathway linking the nose and the genitals. In 1907, Dr. Byron Robinson suggested that the physiology behind the nasogenital reflex was due to sympathetic innervation. He implied that through the ganglia on the trigeminal nerve (which he writes consists of eight ganglia) there is a communication with the nerves that innervate the face and the sympathetic tracts that run to and from the pelvic region (Rosen, 1938).

So strong was the support for MacKenzie, Fliess and the nasogenital theory that in 1911 a paper published in the American Journal of Obstetrics and Gynecology in which the following excerpt was found, clearly illustrating the acceptance of nasosexual medicine as fact:

It is a biological fact, known for centuries, demonstrated daily in the animal kingdom, that there exists a definite connection between the sexual organs and the nasal mucous membrane. Anatomically, a similarity is found in the presence of so-called erectile tissue in both regions. In the nose it is most marked at the anterior end of the lower turbinated, and higher up, in a small circumscribed area, the tuberculum of the septum. Accurate observers have shown that these two areas, which Fliess called 'Genitalstellen' and which we shall term genital spots, are invariably swollen, more prominent, bleed more readily upon slight touch, and are exceedingly hyperesthetic during menstruation. All of these characteristics disappear with the termination of the menstrual period. The connection between the sexual organs and these genital spots must be looked for in the sympathetic system, with which the mucous membrane of the nose is connected through the nervus petrosus profundus, by way of the sphenopalatine ganglion. (Brettauer, 1911)

Despite an apparent dwindling in papers written on the subject, it would seem that nasosexual medicine was still thriving well into the 1940s. A literature review of the nasogenital relationship appeared in the Archives of Otolaryngology in October 1945 in which the author, Dr. Raymond Rosedale, explains that he undertook said review as he had been asked to write a chapter on the nasogenital relationship for a new textbook of obstetrics (Rosedale, 1945).

Today, the idea of a nasoreflex neurosis seems bizarre and out-dated, yet nasosexual medicine still exists, having evolved with time rather than disappearing into the annals of medicine. Recognized medical conditions such as Kallman's syndrome and Cystic

Fibrosis along with the recent studies involving pheromones and a vomeronasal organ all incorporate elements of nasosexual medicine.

Kallmann's Syndrome is a well-documented syndrome that earned a name and recognition in the medical world in the 1940s. This is a genetic disorder that results in gonadotropin-releasing hormone deficiency (and thus hypogonadism) as well as anosmia and midline anatomic defects (Harrison's, 1994). This association of reproductive and olfactory symptoms most likely occurs due to the embryology: the olfactory placode produces olfactory nerves along with other nerves, such as LHRH (GnRH)- secreting neurons which then migrate into the hypothalamus. Although the syndrome only acquired a name in 1944, courtesy of Kallman and co. the pathological association of hypogonadism and anosmia had existed for decades. In 1856 Maestre de Juan performed an autopsy on a 40 year old man and noted that he had absent olfactory lobes, infantile testicles, a small penis and no pubic hair. A similar finding was found a few years later by an Austrian Heschl, who published a paper noting this connection. Kallman's syndrome, although relatively rare, is a recognized disorder today (Harrison's, 1994).

A more common medical condition pertaining to nasosexual medicine is cystic fibrosis (CF). This disorder occurs with abnormal functioning of the chloride channel localized on apical membranes of epithelia. There are many different phenotypic presentations of CF as it can manifest in the epithelia of the respiratory tract, the gastrointestinal system, sweat glands and in males' vas deferens depending on the specific mutation of the chloride channel. Despite the variety of possible phenotypes, typically patients with CF seek advice because of pulmonary symptoms, nasal polyps or infertility. Chronic sinusitis, nasal polyps (leading to nasal obstruction) and rhinorrhea are common childhood manifestations of CF (Harrison's, 1994). Late onset of puberty and infertility is common in both males and females with CF. Thus despite being a systemic disease, cystic fibrosis could manifest itself as a predominantly nasogenital ailment.

Although perfume and its erotic effects have been observed for centuries, it was not until the 1970s when a new perspective of the nasosexual connection was proposed with the study of pheromones. One of the leading proponents of the theory was Dr. Martha McClintock who first wrote about the 'dormitory effect', a term she used to describe the synchronization of the menstrual cycles of female roommates (McClintock, 1971). Although theories of 'pheromones' were made, it took McClintock almost thirty years before she was able to prove that it was indeed a chemical substance secreted by sweat glands that influenced the menstrual cycle. She used the infamous 't-shirt' experiment to support her theories of pheromones. In this experiment, women were asked to rate the desirability of t-shirts based on smell. Each t-shirt was worn by a different man for two consecutive days. McClintock noted that each woman's ranking of desirability could be related to the MHC of the men who had worn the shirts. Since then pheromones have enjoyed a prominent position in the commercialism of sex (Schonwald, 2002).

Along with the study of pheromones, studies involving a related organ have also emerged—the vomeronasal organ (VNO). The VNO, also known as Jacobson's Organ, is the structure thought to be responsible for sensing pheromones and is located bilaterally in

the septum of the nose. Its existence has been confirmed in numerous animal trials and recent studies have documented the existence of the VNO in embryonic stages of humans although controversy remains as to whether it exists and plays a role in adult humans (Bhatnagar and Smith, 2001). Whether or not the VNO is ever proven to play a role in human sexual behaviour, its investigation, supporters and even its detractors are all part of the legacy that is nasosexual medicine.

The concept of a connection between the nose and the reproductive organs has existed in many cultures and in Western medicine for centuries. Although the mechanism of this connection has shifted from a direct path, to the sympathetic nerves, to the reproductive hormones and their role on nasal mucosa and in reproductive organ development, the basic concept of nasosexual medicine remains the same; the nose and sexuality are intricately linked.

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# **“A HOSPITAL FOR THE IDIOT AND THE INSANE”; THE STORY OF NEWFOUNDLAND AND LABRADOR’S HOSPITAL FOR THE MENTALLY ILL**

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## **Abstract**

**Henry Stabb was a dynamic catalyst in the quest for better treatment of the insane in Newfoundland and Labrador. Neither innovative nor steadfast in his ideals, he became frustrated with the treatment of mentally ill patients through a brief but momentous encounter in a St. John’s Hospital. There, he noted “the insane, confined naked or nearly so, in damp, underground cells, chained to benches and walls, covered with filth and vermin, exposed to below freezing temperatures and fed by means of tin cups tied to long poles.” Stabb devoted the remainder of his life to this injustice. He sought to advance a philosophy of non-restraint care for the insane and in this endeavor, established The Hospital for Mental and Nervous Disease in 1854. While carrying an undertone of seclusion, it has been fondly referred to as the Waterford Hospital since 1972. For over 150 years, this facility has provided treatment and care for persons afflicted with mental illness. Nevertheless, the history of this venture is both turbulent and enlightening. This paper proposes to highlight the contributions of Stabb and the remarkable existence of the Waterford Hospital.**

“On the Waterford Bridge Road is the lunatic asylum – a handsome structure, beautifully situated and excellently managed. Visitors are admitted....”

Rev. Moses Harvey, 1894



By the end of the eighteenth century, there was a growing need for change. In a quest for knowledge and a climate of optimism, the enlightenment epitomized liberal ideals. For the mentally ill, this era meant that there was capacity for improvement. “The insane had not lost their reason, but only the full exercise or use of their reason, which could ultimately be restored...” (1). Philippe Pinel and William Tuke had pioneered the ideal

of “moral therapy” and the asylum was born. They had insisted that mental illness was curable. But, restoration to health required:

“...a controlled environment, such as an asylum, where a resident physician could closely observe the behavior of the patient and diagnose a cure. It was imperative to provide a relaxed atmosphere...achieved in part by putting the patient to work, thereby diverting him from concentration on his sickness. Religious instruction and worship could also be used to influence the behavior. Above all, the asylum had to isolate the patient from the outside environment and thus, enable the physician to have the greatest possible influence on him.” (1)

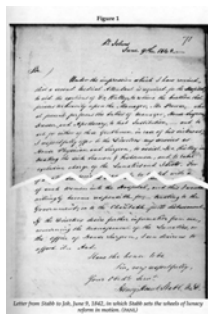
Dr. Henry Hunt Stabb was trained in this environment and was frustrated with the treatment of mentally ill patients during a brief but momentous encounter in a St. John's Hospital. It is not certain when Stabb first sought to transform the small isolated colony island of Newfoundland (NL). Newfoundland was not a hospitable place; its cold and damp rugged shores were most often harsh, isolating, and dreary. Stabb, having been raised in Devon, England and trained in Edinburgh was not shy to fog, drizzle, and rain. As well, his ancestors had made a small fortune off NL's export fish trade since the 1600's. Stabb came to NL in 1832, but the great doctor's presence in historical records was first noted in 1838 when he was appointed one of 4 district surgeons in St. John's. There, he noted “the insane, confined naked or nearly so, in damp, underground cells, chained to benches and walls, covered with filth and vermin, exposed to below freezing temperatures and fed by means of tin cups tied to long poles...had to endure the rattling, scratching, jumping and other uncontrollable noises” (3). In those days, the care of the mentally ill was provided for by the annual poor vote of the Legislature. Patients needed the approval of both the Governor of Newfoundland and the St. John's stipendiary magistrates to be housed in the general hospital. The violent insane were inhumanely confined to basement cells. The chronic insane, including those mentally challenged, were housed in permanent quarters on the 2<sup>nd</sup> story, neighbouring the sick units. None of the building was heated and conditions were deplorable. Eventually, there were so many people being boarded that there was hardly any room for the sick. Chief Justice Boulton described “a scene of wretchedness and misery...which must be heart-rending to anyone whose mind is imbued with the smallest tinge of humanity” (3). Despite the addition of a second wing with funds provided for by the Act for the Relief of Sick and Disabled Seamen, Fishermen and other Persons, conditions improved little. Stabb was not impressed and devoted the remainder of his life to this witnessed injustice. He wrote:

“It is self evident that such a state of things is a reproach to the colony...in which everyone is interested in some degree in as much as insanity spares neither sex nor station, and no one can say, I, at least, shall never require the treatment necessary for a lunatic. Those whom God thus afflicts are above all others dependent upon society for help and now that the proper treatment has been pointed out by the medical profession, it appears astonishing that there should be a moments delay, in those who have the



power entrusted to them...is it not as imperative in a county to provide for the insane poor as for the same poor? Nay, is it not more so?!" (3)

In efforts to improve the situation, the government increased the hospitals grant for mental illness. Stabb saw this as a great opportunity. He appealed to accept sole responsibility for the care and management of these patients. On June 9, Stabb wrote to the legislature. Based on his studies in Europe, he proposed:



“For lunatics, especially, can only be treated with a reasonable hope of success, by a Medical Man residing with them, and under whose constant care they ought to sleep, awake, eat, drink, and act. A system of management, now practiced in all asylums for the insane, because, by it, the peculiar nature of the insanity of each patient – from simple wandering of the mind, through numerous gradations, up to furious delirium, - may be detected.” (3)

He intended to assume all the usual duties and to study the nature of each disease. Whilst the government rejected his proposal, he had nonetheless demonstrated his investment. Pressure on hospital overcrowding continued to mount, and Stabb took the occasion to go public 2 years later. He expanded his argument to include economic incentive and ultimately triumphed. In 1846, the House voted to allot £1500 to the design and construction of a new building modeled after the goals of moral therapy and Stabb was appointed physician for the endeavour. But, tragedy struck, when a fire destroyed 2/3rds of the city leaving 12 of 19,000 citizens homeless. New construction was halted as the city sought to recover. In the meantime, Stabb suggested that he travel through England and France to investigate modern means of construction and treatment. A new system, created in the concept of a therapeutic milieu was to encompass the entire building. Long gone were the days of straight jackets. It was essential that non-restraint be enforced and the program of energetic activity, air, exercise, and particularly, employment be designed to distract the mind and ease destructive tensions under the direction of competent and kindly staff (3). But in the Americas, the debate remained passionate, and Stabb found himself amidst the heated friction. However, he sided with the British and achieved success. During his venture, several colleagues proved to be an asset. He engaged an architect to incorporate the latest in heating, ventilation, and sanitation. He also learned of the most common pitfalls; overcrowding, the use of large dormitories, insufficient land, inadequate funds, and staff dissension. He was soon, however, to face them all (3).

On his return to Newfoundland, when preparing to hire a manager and matron, he was avidly disappointed to learn that the project had not even begun and that the site was even in question. His plea was then reverted to a temporary building. In 1847, the government agreed and placed the former fever hospital, Palk's Cottage, at Stabb's disposal. He called it The Provisional Asylum for the Insane. Initially, 11 patients were transferred from the St. John's Hospital. Stabb described the relocation, “Some would seize my hands to shake, others would forcibly kiss them, so deeply grateful were those poor creatures...and the sheer fright of the staff at seeing so many lunatics at liberty!” (3). He noted the utter demise of the patient's condition on transport. “One woman, about 45 years of age, was a

frightful object, in filth and rags; lower limbs contracted, knees touching the chin,...unable to support herself in a sitting position who spent the whole day and night roaring and cursing, saying she was on fire for her sins. In a matter of months, she was discharged a modest, clean and respectable woman walking freely about” (3).

Yet, the task at hand was almost insurmountable. Having committed all of his energies to this ambition, he realized the inability of this transient home to allow for moral treatment. To maintain himself financially, he had to continue his general practice. He was also to serve as both physician and superintendent, responsible for overseeing medical care as well as the supply of food, clothing, and bedding (3). Stabb was dissatisfied with the structure, unable to separate the noisy ones from the others, he could only categorize patients based on sex. There was not enough ground to allow for ample exercise. In the coming year, Stabb acquired an additional 19 patients. Overcrowding in the general hospital led the Governor to discharge all patients well enough to leave. Consequently, all lunatics were transferred to the provisional asylum. Over the next 2 years, the patient population doubled. Despite the addition of 2 outbuildings and an extension, there continued to be more patients than beds. The problem was further complicated by the deterioration of the building into an unsanitary, rat infested fire hazard (3). Patients were harassed by townspeople and, on one occasion, Stabb had to resort to requesting military guards for protection. When his manager hit a patient, his tolerance was exhausted and he sadly conceded, “I have no one on whom to rely, no one accustomed to this type of work.” In the end, Stabb returned to the government for help:

“I speak then, in the name of those, who tormented night and day incessantly with furious excitement, curse their existence and with horrid blasphemies demand relief from their intolerable misery. The asylum is not good enough and I have feared coming forth, for I would be fired, and they would have no one!” (2).

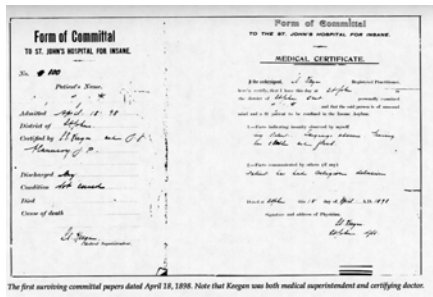
In 1852, the Legislature again approved funds for construction of the new facility. The cornerstone was laid in July, 1853 and in December, 1854, 50 patients were transferred from the provisional asylum. Stabb had written to his comrade Dorothy Dix in 1855, “I see you dislike the term asylum....So do I, and more so, the term lunatic.” Hence, the new building was titled, The Hospital for Mental Diseases. It was situated on 18 acres of land, approximately 3 miles from St. John’s. Three years later, Stabb took up residence at the site.

“The location was secluded, healthful, and serene, commanding a pleasant view of forested hills and cottage farms. The land was well wooded and a substantial brook was contained within. The land was suitable for farming and there was plenty of space to move about in an unfettered atmosphere but within fenced enclosures. The establishment was to be self supported. It was to be bright and attractive, with an emphasis on comfort and symmetry. The design was to be functional with a central administrative block flanked by separate male and female wings. The internal arrangement was to be such as to permit classification, or segregation of

patients by form and intensity of illness, so as to avoid contamination of groups. A separate location was provided to the violent and refractory cases. Above all, there was to be a large amount of personal contact between the patient and his sympathetic, omnipotent physician. The patients were to receive plenty of food, fresh air, and exercise and to be kept clean, comfortable, and busy at all times” (3).

Numerous rules were to be implemented and daily activities such as meal times and sleeping arrangements were predetermined. At its opening, Stabb believed that there were 4 types of insanity; mania, melancholia, amentia (imbecility), and dementia. The etiology ranged from physical, hereditary, to congenital. Stabb also suggested that insanity was related to contemporary social conditions; the more mobile and complex the society, the greater the proportion of insane and the more restless and irritable their demeanor. In this regard, Stabb noted that the majority of patients were admitted during the 2<sup>nd</sup> and 4<sup>th</sup> quarters, reflecting the local lifestyle where the population was busy with the fishery in summer and cut off by ice in winter. Outport patients frequently were dropped off in the spring and picked up in fall. In the early years of the asylum, over ½ of the patients were single, and nearly 1/3 were between the ages of 20 and 30. By far, most were fishermen, fishermen sons, wives, widows, or daughters. Only a small proportion were readmitted (13%). Patients spent an average of 261 days at the asylum. St. John's locals occupied 75% of the beds and 25% of the island's population. Stabb argued that city locals were more inclined to insanity due to greater pressures, unhealthy living conditions, and vice. In the year 1860, Stabb claimed a recovery rate of 54.7%. By 1870, he had adopted the use of cured, convalescent, and improved and reported rates of 32.5%, 25%, and 12% respectively. In 1866 Stabb wrote, “the institution prospers” (3).

Despite Stabb's intentions, translating moral treatment into reality proved to be an overwhelming task. Despite much optimism, the transition was difficult. Only one wing was available in the beginning. Designed to house 33 patients, 50 patients were transferred. As the asylum grew, overcrowding rapidly became a problem. The building became a dumping ground for unmanageable patients. Chronic overcrowding, understaffing, and a lack of funds soon rendered moral treatment unattainable in practice. While the asylum was to be self-supported, the farm land was rough and yields uneven. The grounds, while adequate in summer could not be utilized in winter, and winters were long and activities for patients indoors were lacking. As the asylum grew, the care of the patient fell into the hands of the attendants who were increasingly under trained and overworked. The therapeutic milieu inevitably deteriorated. By the mid 1880's, this was evident. There had been a gradual accumulation of chronic and congenital cases, which changed the basic structure and purpose of the asylum. The theory of curability, the driving incentive behind the asylum movement, proved to be unrealistic and was ultimately responsible for its downfall (3). Predictably, there was a decline in recovery rates and fewer discharges. The institution was no longer seen as a treatment facility and became a custodial institution. Thus, it did not warrant high costs and cut backs ensued. Stabb retired in 1890 due to ill health and old age. Unfortunately, despite pioneering such intense efforts, his memory was obliterated by the last years of his service and the state of the asylum. He died a mere 2 years later.



The first surviving committal papers dated April 18, 1898. Note that Keegan was both medical superintendent and certifying doctor.

While there was little change in the field of psychiatry, physicians became preoccupied with administrative duties. They were now responsible for over 200 patients and success was defined by seclusion and economy. In 1890, a public inquiry was held and suggested that a law be enacted to govern admissions and the Act Respecting Insane Persons was passed in 1897. This allowed for the first committal papers (3).

Nevertheless, the trend continued. Whilst applicants were screened, patients proved to be a heterogeneous group of individuals including lunatics, idiots, epileptics, paralytics, elderly, and the physically disabled (3). The asylum unfortunately strengthened the idea of isolation and confinement. Patients continued to be harassed and public fear heightened. The population had shifted and now included mostly middle-aged patients. Despite the new admission process, discharges were infrequent. The physical structure began to show signs of wear and tear. Desperately in need of repairs, it was no longer up to standard. Pessimism dictated the treatment of the insane; mental patients became particularly vulnerable to deprivation - of funds and of social ties. Keegan, the superintendent at the time, captured the atmosphere with, "Rattle his bones over the stones, He's only a pauper, whom nobody owns." There was, however, a modest attempt at cosmetic reforms. The government hired a new physician to visit the asylum. Initially, reports that previously violent patients were now quiet and accommodating were released. However, these reports were premature. The new doctor's personal and professional conduct was soon questioned. He had apparently been drinking much of the time and had made advances towards many of the resident women. Further exacerbating the scenario, there was no record of the medications utilized and suspicions grew. Keegan again sought help. He wrote;

"During years of procrastination, government after government has contented itself with patchwork solutions, money has been spent without showing any results, but the day has come when you cannot procrastinate any longer, when the government is morally bound to take the matter up, and when, for humanity's sake, the insane portion of the community must be treated in a proper and Christian manner" (3).

He invited the members of parliament to visit the institution. When they did, they were dismayed by what they saw and promised help.

At the turn of the century, there was reason for optimism. Keegan suggested the building be renamed and the St. John's Hospital for the Insane was born. In 1900, plans were drawn for the complete renovation of the facility. It was revealed that the facility was neat, clean and the grounds attractive. This proved to be far from the truth. In the first independent review of the facility, Moody reported in 1911 that there was "a complete lack of administrative ability and technical knowledge of the most rudimentary kind." He

addressed the lack of classification of patients and the absence of observation facilities. He had witnessed a majority of bed-ridden patients indiscriminately locked in their rooms. There were no detailed notes of individual cases, no progress notes, nor record of illnesses'. Seclusion and restraint were routine and newly admitted patients were frequently stripped, straight jacketed and locked in a cell. He reported that meaningful employment was virtually non-existent (3). This was a far cry from moral therapy.

Despite advances in psychiatry elsewhere, the effects would take years to reach Newfoundland. By the 1920's, Newfoundlanders finally viewed the psychiatrist as a medical physician. Ultimately, this resulted in a distinction between mentally defective and mentally ill; whereas one was a social problem, the other was medical. Thus, juvenile mental defectives received their own ward whilst the adults were also separated from mentally ill patients. The word imbecile was purposefully lost. The records of physical exams were kept and evidence found was listed in the registrars. A policy whereby patients who became psychotic while in the General hospital were to remain at the General altered perceptions and may have been the first recognition of delirium in NL. The admission process was reviewed. But, the newfound success saw the number of patients grow to roughly 400 and beds were once again, at a premium. As might be anticipated, the depression was to pose a threat to the advancement of psychiatry on the home front. With decreasing available funds and enhanced hospital reputation, many patients were held at home and sometimes in jail. Some even resorted to sleeping on floors. At the time, it was estimated that 600 beds would be required to meet the colonies needs. The death rate in the first year of admission proved to be considerably high, likely as a result of tuberculosis. But public perceptions continued to linger and patients were deemed most safe isolated from the community.

In 1930, the Mental Treatment Act was passed. It favored the term mental hospital as compared to asylum. Lunatic was abolished and traded for patient or person of unsound mind. Insanity likewise became mental illness. This act created 3 types of patients; voluntary, temporary, and certified. A voluntary patient could discharge themselves with 72 hours notice. A temporary patient was incapable of deciding on their own treatment but was deemed likely to benefit from intervention. They would have to be discharged within 28 days or be certified appropriately. The act also encouraged outpatient treatment, general hospital units, aftercare services and psychopathic hospitals, thereby narrowing the gap between medicine and psychiatry. In keeping with the trend, the hospital was renamed the Hospital for Mental and Nervous Diseases. In 1934, Commission government took office following a period of economic turmoil and near financial collapse. Outpatient clinics were initiated under the current superintendent, Grieve. However, having filed for a social worker, he was disheartened with the lack of support and the clinics were abolished. He nonetheless had suggested that mental illness had its roots in childhood and led a path for research and primary prevention. In December, 1939, the death of a male patient who had been beaten by 3 older attendants sparked considerable controversy and investigation. Scheduled for trial in the spring, the incident severely crippled the hospitals reputation. Staffing concerns were brought forth and the neglect this encouraged was obvious. Patients had not been bathed in weeks and were not

seen by a doctor promptly. The judge was sufficiently shocked by what he heard and suggested a grand jury investigate the matter. Public outrage brought more funding.

During this time, psychiatrists continued to rely on hydrotherapy, drugs, and occupational therapy (3). Hydrotherapy had not changed much since the Greeks who had suggested its soothing powers. But, the methods had been slightly revised with the addition of hot air and hot water systems, saline and sitz baths, and hot and cold wet packs. The first bath was implemented at the Hospital for Mental and Nervous Diseases in 1938 but by the mid 1940's, it was no longer in use. Patients were finally again allowed to enter city streets. One in 5 patients could be tentatively released during working hours. This did much for the integration of the mentally ill, but patients still faced considerable obstacles as they were often barred from public places. Medical interventions included special diets. Lumbar punctures were used to drain cerebrospinal fluid and surgical interventions related mostly to the female reproductive tract and tonsillectomies. Medication possibilities were limited and consisted mostly of barbiturates which were used for purposes of restraint. Psychotherapy could utilize all forms of influence – reeducation, relaxation, discipline, and psychoanalysis. However, this was resource intensive and considerably time consuming. Occupational therapy was often misused as a means of unpaid labour and despite the insistence that it was a valid means of therapy, the hospital continued to have inadequate resources, lacking in workrooms as well as personnel. The first tuberculosis study was done at the hospital in 1936 and 35 patients were noted to have active TB while another 26 had healed lesions. The female work rooms were converted to TB wards. The percentage of deaths from TB dropped substantially. Moreover, patients no longer contracted the disease post admission. Inversely, the farm and other construction projects continued to provide work for 50 -60 men. A group of men, called the “cowboys” tended cows. This was later seen as the first successful occupational therapy program. During the World War II, when labour was scarce, 10 men were employed to stack rations and this was the first real example of working parole. A grand jury was asked to review these programs and advised scrupulous examination of the work so as to avoid exploitation. Fever therapy, although initiated elsewhere in the 1920's as a treatment for tertiary syphilis was not available in NL until 1938 when Kathleen Fraser strapped a test tube to her body and successfully transported malarial blood from Saint John, New Brunswick. It was immediately injected into 9 patients who developed malaria fever and were cured with quinine. In July of 1940, of 25 patients discharged, 16 were listed as recovered and 7 as improved. These numbers were a vast comparison to only 5 years previous. Despite these advancements, all somatic therapies were discontinued in 1943 (3).

But a change of tides was imminent. Gerald O'Brien, a 27 year old man from Newfoundland who had been trained in Dublin and had had acted as a superintendent at an Irish mental hospital was recruited to be assistant medical superintendent. A 29 year old man, Clarence Pottle, also a Newfoundland native, had studied medicine at Dalhousie and had some army psychiatric training and was recruited as a resident psychiatrist. A man named Charles Roberts would renew tenure as superintendent. These three would be the guides for the most explosive time in psychiatry history (3). When O'Brien came on the scene in 1945, he was astonished to note that attendants were still hosing patients down to keep them quiet.

In 1946, the activities for the mentally ill greatly improved. Films were provided weekly and several picnics, concerts and an annual boxing-day party were hosted by community volunteers. This said much for community awareness. A lunacy commission began to monitor monthly accidents, escapees, sickness, admissions, and readmissions. Admissions continued to pose several problems and for the first time, readmissions were noted to be both worrisome and laboursome. It was brought forth that the criminally insane must also be treated as insane and hence, provided for in the hospital setting. However, in 1945, one sexual deviant reported, "...of penitentiaries or the mental hospital, the hospital was the preferred place to be!" (3).

Patients at this time were divided into 7 broad categories; mental defective, aged and senile, manic-depressive, schizophrenics (accounting for the majority of patients), alcoholics, neurosyphilitics, and epileptics. The physicians suggested that alcoholics, syphilitic and epileptic patients be treated at the general hospital or at a location designed for that purpose. However, it was also argued that additional doctors and staff were essential. It was believed that psychiatry must break free from the institution and start playing a role in the community. "Ultimately, sooner or later, the public must see mental illness as another form of illness requiring medical treatment in a similar fashion" (3).

Following the war, there was an explosion in treatment modalities in psychiatry. O'Brien reinstituted insulin and ECT therapies. The first lobotomies were performed in the late 1940's. At the same time, three beds were allotted for psychiatry in the general hospital. Day time programs were instituted. In 1947, outpatient clinics were again established. The following year, they were expanded and finally, a social worker added to the staff. An integrated outpatient and day care facility was developed and augmented in 1951. A full-time psychologist and dentist were added to the staff and shortly thereafter the first physiotherapist was employed. Educational requirements were finally established and mental health education became a priority. In 1950, the EEG became available as a diagnostic tool. In 1951, artificial fever therapy was finally discontinued for penicillin in the treatment of syphilis. The first private practice of psychiatry was started in 1952. In 1954 reserpine and chlorpromazine were introduced as treatment possibilities. This revolutionized the hospital setting. It allowed patients previously unable to tolerate any form of social therapy to participate. Further, it decreased the need for one-to-one care. Open wards became possible and the use of ECT greatly diminished. Confederation with Canada accentuated reform by providing standardization and funding.

This marked the beginning of decentralization, a revolutionary term in the era of the asylum! In 1959, the term institutional neurosis was introduced. This implied the possibility of harm from admission and furthered the momentum. It was described as apathy, a loss of individuality, interest, and initiative. More for the Mind was created in 1963. It encouraged primary and secondary prevention and utilized community resources in the care of patients. Nevertheless, the belief in curability was high and the mental health movement brought psychiatry to the forefront. At its peak, the hospital housed almost 1000 patients during the mid 1960's.

In spite of considerable progress, the Brain Commission was formed in 1965 and concluded the following about the state of mental health in Newfoundland: few psychiatrists, no service provision in rural communities, only one voluntary agency working with mentally defective patients, a shortage of psychiatric clinics for children, a shortage of psychiatric nurses, no special features for alcohol and drug addictions, no individual rehabilitation, and far too few beds available for psychiatrists at the general hospital (3). The coming decades were devoted to changing these facets. Inpatient care, forensic services, and community care were optimized. A new Mental Health Act was adopted in 1971. This enabled the addition of a new unit at the general hospital. Committed patients now would have access to any necessary medical service, not only those provided for at the mental hospital. Revisions of the Diagnostic and Statistical Manual of Mental Disorders transformed diagnostic psychiatry.

In 1972, the hospital was renamed The Waterford Hospital. By the year 2000, it had added dialysis, blood collection, and x-ray units. It may be speculated that this was to reduce stigma and isolation, but most likely it optimized costs and utilized existing space. Mental illness has now refocused ideologies to emphasize mental health. The mental health program has established and maintained St. John's only recycling program. The Waterford Hospital now provides beds for less than 200 patients. It stands tall, across from the city's favoured park with wooded paths and running rivers. Patients are permitted to wander freely throughout, beyond fenced enclosures. I am certain that Stabb would be pleased despite the rocky evolution.



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# **THE HISTORY OF ACUPUNCTURE: THE HEALING POWER OF SOLID STEEL NEEDLES**

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## **Abstract**

**Acupuncture is one method of complementary and alternative medicine utilized by many to achieve wellness. Acupuncture is from the Latin word acus (needle) and punclura (pricking) named so by Jesuit missionaries returning from China. The use of solid needles on specific points of the body is used for the treatment and prevention of illness. The origins of acupuncture are debatable, but it is believed to be the oldest surviving medical discipline. The first written history of acupuncture was in China over 2400 years ago. Acupuncture is part of Traditional Chinese Medicine dated back to 200 BC in the “Yellow Emperor’s Classic of Internal Medicine” (Huang Dei Mei Ching)**

**Both Chinese and Western medicine originate around the healing philosophy of concepts such as energy (Qi) and magical cures. There is evidence of Western medicine in the Mediterranean civilizations around 3000 BC. A description of the medicine used was a mixture of magic and religion. Across in the continent of Asia, evidence of acupuncture dates it back to the primitive society (New Stone Age 10000-4000 years ago). Ancient people made stone needles called bian stones. Acupuncture needles of copper then iron replaced the originals of stone, bone and bamboo in the Chou dynasty (1122-249 BC). Another technique was bloodletting at acupuncture points based on Chinese medicine theories for “naturalistic” reasons for healing. Similarly, the practice of bloodletting occurred in the Roman Empire by the famous physician Galen (129-216 AD).**

**Due to acupuncture’s many years of history, interpretation and modernization different approaches exist. Never the less, in a short period of time the use of acupuncture in the current health care system has increased significantly.**

## **Introduction**

Today’s model of health care is the patient centered model where physicians and patients take on a partnership of teamwork. The physician works with the patient to provide care most appropriate to the patient’s personal values. Complementary and alternative medicine (CAM) is increasingly sought out by patients in addition to the biomedical therapies. Professional and public interest have significantly increased in Canada towards

CAM (Shahjahan 2004). Approximately more than 30% of adults use some form of CAM with as many as 70% of these patients doing so without the knowledge of their primary care physician (Eisenberg et al in Cenicerros and Brown 1998). Eisenberg et al. suggests that a reason for the lack of knowledge may be that physicians are unaware of alternative treatments. Due to acupuncture's increasing popularity, physicians should be aware of the history, philosophy, and therapy of it. Acupuncture is a form of Chinese Medicine and CAM with beliefs that sickness occurs because of an imbalance of Qi. The use of solid steel needles on specific points of the body is used for the treatment and prevention of illness. The treatment goal of acupuncture is to re-balance Qi by working with points on the surface of the body that will affect what goes on inside the body.

### **Initial Stages: Acupuncture in China**

The term acupuncture is from the Latin word *acus* (needle) and *punctura* (pricking) named so by Jesuit missionaries returning from China (Cenicerros and Brown 1998). The origins of acupuncture are debatable, but it is believed to be the oldest surviving medical discipline (Pearson 1987). Evidence of acupuncture dates it back to the primitive society (New Stone Age 10000-4000 years ago). There is evidence of Western medicine in the Mediterranean civilizations around 3000 B.C. (Dr. Warren 2004) Hippocrates (460-377 BC) is said to have inserted needles into patients' ears to cure impotence (Dung, Congston and Dunn 2004). The first written reference to acupuncture occurred in China dating back to 2400 years ago (Hurtak 2004). Different sources state that the "Yellow Emperor's Classic of Internal Medicine" (Huangdi Neijing) by unknown authors (500-300 BC) described acupuncture as a Chinese medical system (Kaptchuk 2002, Cenicerros and Brown 1998, Beijing College et al 1980). The translation of the text to English varies, Ramey (2004) stated the translation of the Huangdi Neijing as the 'Inner [esoteric] Classic of the Yellow Emperor (Huang Di). The text is the oldest Chinese medical text that would be equivalent of the Hippocratic corpus. (Kaptchuk 2000). This text summarizes ancient knowledge about research on anatomy, physiology and the diagnosis and treatment of disease (Hurtak 2004). The text is set as a dialogue between the Huang Di, the yellow emperor and his doctor Chi Po. The work contains detailed descriptions of techniques for acupuncture and moxibustion (treatment by applying heat to acupuncture points). At that date 365 specific body points had been identified, tested and listed.

The precise origins of acupuncture techniques are arguable also. Artifacts have dated acupuncture to 1000 BC. One legend states that the discovery of acupuncture was by a soldier in war. The soldier was shot by an arrow, but found that when shot by a second arrow, the pain from the first arrow was relieved (Pearson 1987). Kaptchuk (2002) describes a multilinear approach to the development of acupuncture. Before the use of needles on acupuncture sites early Chinese texts described methods of moxibustion. The introduction to "needle like" therapy that used bamboo or bone needles to open abscesses may have contributed to the needle technique. Acupuncture needles of copper then iron replaced the originals of stone, bone and bamboo in the Chou dynasty of 1122-249 BC (Hurtak 2004). Another described technique was bloodletting at acupuncture points based on Chinese medicine theory for "naturalistic" reasons for healing. Similarly, the practice

of bloodletting occurred in the Roman Empire by the famous physician Galen (129-216 AD) (Dr. Warren 2004)

The discovery of Stone Age mummies with nondecorative tattoos suggests another precursor route (Kaptchuk 2004). In 1991 the remains of Otzi a man who died approximately 5000 years ago was found in the Alps between Austria and Italy with 57 acupuncture like points tattooed on his body (Dung, Clogston and Dunn 2004). Otzi is believed to be the world's oldest iceman discovered by an Austrian mountaineer.. (Connolly 2004). Although this theory to explain the origins of acupuncture is recent, most of acupuncture's history is found in China.

About 250 AD, a physician named Huang Fu Mi of the Jin Dynasty wrote "The systematic Classic of Acupuncture and Moxibustion" (Chia Yi Ching), giving a systematic use of acupuncture for medical treatment. During the Tang dynasty of 618-907 AD Chinese medicine schools were founded and examinations were implemented for education. Anatomic models were built for showing all the acupuncture points in the Sung dynasty (1021 AD). The models were the casting of two life-size bronze figures marked with acupuncture points. (Beijing College et al. 1980). During the Ming Dynasty of 1368-1644, the Compendium of Acupuncture and Moxibustion was written. This text forms the basis of modern acupuncture and has been an essential reference book since its publication.

In China acupuncture interest began to decline in the 1700 and onwards as some believed it to be regarded as superstitious and irrational. (White and Ernst 2004). Another source related the decline in interest due to the political nature in China, of a country under the rule of semi-feudalism and semi-colonialism. The science and culture of that time destroyed traditional Chinese medicine including acupuncture. (Beijing 2004). In the Qing Dynasty of 1900 Chinese culture continued to decline with the influence of western medicine and the foreign ruling dynasty of the Manchu's (Kaptchuk 2000). In 1929 acupuncture was outlawed in China along with other forms of traditional medicine. (White and Ernst 2004). With the establishment of the People's Republic of China in 1949 by the Chinese Communist government a resurgence of acupuncture and Chinese Medicine occurred. Chairman Mao reinstated traditional medicine to provide basic levels of health to the country. In the 1950's the Academics of Traditional Chinese Medicine was established in Beijing, Shanghai and other major cities with investment in scientific research for acupuncture. (Kaptchuk 2000). Treatment with acupuncture became available in separate acupuncture departments within Western-style hospitals (Whyte and Ernst 2004).

Acupuncture began to be an important therapy in other East Asian countries such as Japan and Korea in the 1600. The practice was introduced to Korea first then traveled to Japan through a monk named Zhi Cong who carried with him Chinese medical textbooks. The introduction of the Asian medical method outside of Asia occurred much later.

## **Influence on Other Countries**

There are several influences for the beginning of acupuncture outside of East Asia. The first known work in a Western language (French) on acupuncture was by P.P. Harvieu, S.J in 1671 who served as Jesuit missionary in China (Carruba and Bowers 1974). However, Dr. William Rhijne wrote the first medical essay on acupuncture published in 1683 based on his observation of the practice by the Japanese. (Carruba and Bowers 1974). He was a Dutch medical doctor whom introduced acupuncture into Europe after a trip to Japan (Pearson 1987). Dr. Rhijne worked for the East India Company and lived in Japan due to the Dutch's established trading post in a country that wanted minimal contact with the West. The Dutch were forbidden to learn about Japanese culture and the language. However, Japanese doctors often disguised as servants came to the trading post to learn Western medicine from the doctors. In exchange the Japanese taught the Dutch about their system of Chinese traditional medicine and culture.

The education about acupuncture for Western doctors is evident an editorial about Dr. Rhijne work as referred to in the scientific literature *Lancet* vol 1 1823 titled as "Acupuncturation". The article states that "much has lately been said of the efficacy of this remedy in various affections....the facility with which it may be used, leads us to hope that this remedy may meet with a trial from many intelligent practitioners, who may give to the profession the fair and important result of their observations." The article describes Dr. Rhijne's observation of acupuncture, when it is used, the description of the needles and the mode of using them.

Sir William Osler (1849-1919) a Canadian physician and one of the most influential physicians in history described using acupuncture and recommended its use for low back pain (Cencieros and Brown 1998). However, one author states that the above comment was deleted from subsequent issues of Osler's textbook (Ulett in Whyte and Ernst 2004). A French diplomat, George Soulie de Morant who served in China in the 1900's became highly proficient in acupuncture. Upon return to France in the 1920's-1940's he introduced the French medical community to acupuncture (Schulman 2004). In the 1950's acupuncture was introduced to the USSR because of close political ties with China (Stux and Pomeranz 1989).

In North America the popularity of acupuncture occurred in 1972 after the U.S. President Nixon's trip to China. During this historical trip a reporter with the New York Times was treated with acupuncture for postoperative complications of an appendectomy (Cencieros and Brown 2004). An article appeared in the New York Times and subsequently teams of U.S. physicians made trips to China to assess acupuncture, particularly its use for surgical analgesia (Diamond in White and Ernst 2004). However, acupuncture proved to be unreliable as an analgesic for surgery in the West despite what the physicians witnessed in China. Despite acupuncture's longevity in Chinese medicine there are still many barriers towards a transition to Western medicine. Perhaps a major element is behind the philosophy of Chinese medicine versus the biomedical Western view (Kaptchuk 2004).

## **Philosophy of Acupuncture and Traditional Chinese Medicine**

East Asian medicine describes health as a qualitative state versus the quantitative value placed on western medicine (Kaptchuk 2004). Both Chinese and Western medicine originated around the healing philosophy of concepts such as Qi and magical cures. However, the similar beginnings branched off to very different current health models. A description of Western medicine origin was a mixture magic and religion. In a similar pattern, the Chinese doctors had a traditional theory that was based on a philosophical view of nature. The philosophical system to describe the natural law is Taoism first described 500 BC by Laotse (Stux and Pomeranz 1995). Basic knowledge of the natural processes in the irrigation of the fields influenced the development of the concepts of the flow of life energy (Kaptchuk 2000). The system describes health and illness with terms such as Yin-Yang and Qi (pronounced chee) that comment on a person's state of being and behaviour. Yin and Yang (481-221 BC) concepts developed from the original meaning of Yang which was the sunny side of the mountain and Yin, the shady side. Yin is associated with cold, darkness, and passiveness. While Yang is associated with heat, light and assertiveness. The two forces yin and yang are complementary opposites.

The interaction of the opposing forces Yin and Yang gives rise to the flow of vital energy (Qi) The concept of Qi is not scientifically clear but is used to describe life energy. The concept of Qi goes beyond the western idea of energy in physical terms, therefore the translation as vital energy is not completely satisfactory. (Stux and Pomeranz 1987). The Qi governs the functions of the organs and their various interactions. There are three forms of Qi in the body respiratory, food (digestive process) and hereditary (inherited energy from parents). All combined they form the fundamental Qi that flows throughout the entire body. Qi flows through the body like the water in the rivers flows through the continents. Qi flows along pathways termed channels or meridians. Meridian came into the English language through a French translation of the Chinese term *jing-luo*. Jing meant "to go through" or "a thread in a fabric", *luo* meant "something that connects or attaches or "a net" (Kaptchuk 2000). Meridians are the pathways that carry Qi and blood through the body, but they are not blood vessels. They are an invisible network that links together all the organs and connects the interior with the exterior of the body. According to Chinese tradition most illnesses and disturbances stem from the flow of Qi; either an excess, deficiency or a blockage of the vital energy in the organ systems and the channels. The target of Chinese medicine is to treat 'disharmony' between the three concepts of Yin-Yang and Qi. Acupuncture is used to correct disruptions in harmony by inserting needles into precisely defined specific points. The basis for acupuncture and meridians are that working with specific points on the surface of the body will affect what goes on inside the body. The needles are used to correct the flow of Qi in order to achieve balance and health.

## **Scientific Theories**

In the 1950's there began to be scientific research into the theories behind why acupuncture works. Prof Han in Beijing researched the release of neurotransmitters with acupuncture needles particularly endogenous opioids that relieve pain (Han in White and

Ernst 2004). In Han's study he demonstrated the blockade of acupuncture analgesia in rabbits by ICV injection of naloxone (opioid antagonist) (Stux and Pomeranz 1989). According to Stux and Pomeranz (1995) acupuncture stimulates nerve fibers in the muscle, which send impulses to the spinal cord and activates three centers (spinal cord, midbrain and hypothalamus-pituitary) to cause analgesia. In the spinal cord enkephalins and endorphins are released that block pain messages. The midbrain uses enkephalin to activate the raphe descending system which inhibits spinal cord pain transmission using serotonin and norepinephrine. Beta endorphins are released by the hypothalamus-pituitary. Another theory for pain relief stems from the Gate Theory for pain. Stimulation from needles is believed to interfere with the pain signals to the brain. In the early 1970's more than 500 randomized controlled trials for acupuncture were performed in North America, Europe, Australia and New Zealand (Kaptchuk 2000). The majority of the studies were for pain relief. However, there were problems related to the RCT such as a small number of participants, the level of training of acupuncturists was unknown and finding a control group for acupuncture is a challenge. One placebo for acupuncture is called sham acupuncture that uses techniques that are not intended to stimulate known acupuncture points (NIH 1997). However, there is disagreement between the needle placement and unknown effects of needles in unknown points.

Adverse events associated with acupuncture are rare and include transmission of infectious diseases, pneumothorax and other problems associated with organ punctures, cardiac tamponade and broken needles. More common side effects are bruising, itching or redness, and dizziness/discomfort. According to Kaptchuk (2002) data from prospective and retrospective data indicate that acupuncture is a very safe intervention in the hands of a competent practitioner.

The use of acupuncture is considered by many eastern practitioners to be a complete system of disease treatment (Cencieros and Brown 1998). However, there are weaknesses with the focus on the "whole" person belief system. For e.g. a malignant tumor cannot be separated from the whole body. Nor can Chinese Medicine offer a prognosis for a tumor as benign or malignant (Kaptchuk 2000). The limits may exist because there are no new theories or techniques to yin and yang, unlike the biomedical model. As such acupuncture is used as a complementary (paired with) method to conventional medicine not as a replacement.

### **Current Acupuncture in Western World**

Scientific advances in acupuncture research along with the side effects of treating chronic pain with multiple medication have helped to increase acupuncture usage (Stux and Pomeranz 1995). A recent study done by Birch, Hesselink, Jonkman, Hekker and Bos (2004) concluded there was international agreement of acupuncture treatment for certain procedures. Acupuncture appeared to be effective for postoperative dental pain, postoperative nausea and vomiting and chemotherapy related nausea and vomiting. However, for conditions such as chronic pain, asthma drug addictions and neck pain there is inconclusive evidence to prove its efficacy. Due to the vast areas of the world (e.g. China, Japan, France) that acupuncture has reached there exists a problem with competing

theories and treatment. Different therapeutic approaches such as the use of different acupuncture points leads to controversy as to which works better (NIH 1997). In 1997 the National Institute of Health in the U.S. conducted a review about the efficacy, safety and issues around acupuncture. The NIH is also responsible for conducting clinical trials for acupuncture. Currently, in Ontario there are over 6500 acupuncturist practitioners (Shahjahan 2004). In Canada the Chinese Medicine and Acupuncture Association of Canada (CMAAC) was established in 1983 in Ontario. There were several purposes of this organization such as: to regulate the profession, to unite practitioners across the country, to promote the profession through conferences with exchange of scientific research, to increase education to the public and other health care practitioners and to implement a high standard of education for practitioners. The Institute of Chinese Medicine and Acupuncture in Ontario is a four year program with a pre-requisite of three years in science. Several schools exist through out Canada now. Many medical practitioners such as physicians, dentists, physiotherapists, chiropractors and veterinarians practice acupuncture.

## Conclusion

Acupuncture is one method of complementary and alternative medicine utilized to achieve good health. The first documented reference of acupuncture is traced back to over 2400 years ago in traditional Chinese Medicine. Acupuncture is believed to be one of the oldest surviving medical disciplines. Needles are used on specific points of the body to correct disruptions in harmony of a person's Qi or life energy. Due to acupuncture's many years of history, interpretation and modernization many different approaches exist. Never the less, in a short period of time the use of acupuncture in the current health care system has increased significantly. Acupuncture focuses on a wholistic, energy based model versus the biomedical model of the West. Although the two East and West models of health differ the ultimate decision for treatment is made by the patient. Therefore, the role of a physician is to help patients make an informed decision about treatment choices and may need to integrate both for a patient to heal.

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# MEDICINE AND THE RECENT HISTORY OF MARIJUANA

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## **Abstract**

**Marijuana is not yet a drug owned and operated by the medical profession, but there are noteworthy reasons why medical students must be familiar with this fascinating plant. With official debate ongoing about the possible decriminalization of medical marijuana in Canada, it is imperative that future physicians in this country have a broad understanding of where this drug has been, such that - if the time and milieu arrive - we are prepared to thoughtfully direct its medical use. Furthermore, given that over fifty million Americans have smoked marijuana at least once, a thorough understanding of marijuana, one of man's longest standing botanical obsessions, will be at the heart of thousands of patient-doctor encounters regardless of the politico-legal outcomes. Most interestingly, recent studies suggest that a significant proportion of medical students, (curious individuals that they are) will have a personal interest in marijuana: between ten and sixty percent of medical students have used marijuana.**

**From its proposed beginnings in ancient Asia, claims of medicinal uses of marijuana have been wide-ranging: from alleviating headaches, to attenuating the carnage of premenstrual symptoms, to curing depression, marijuana has been at some time the touted cure for virtually all medical hardships. But what happened? Somewhere in the complicated history of marijuana, it was dropped by the medical community – but not by the public it served!**

**Hence, study of the history of marijuana offers the unique opportunity to analyze the relationship of the medical profession with the social, political, and legal forces that shape its practice. Though medicine is undeniably guided by objective, scientific, laboratory based principles, the history of medicine's relationship with marijuana illuminates the non-scientific, but equally potent influences affecting contemporary clinical practice.**

## **Introduction**

To truly grasp North America's favorite illicit drug, it is imperative to understand its history. Whether government officials, law enforcers, or physicians like it or not, marijuana continues to be, as it has been for hundreds of years – or thousands, depending upon the part of the world one finds one's self in – among the most popular drugs used by

the public. In North America, marijuana use is second only to alcohol and tobacco. With a lifetime prevalence of marijuana use in America approaching fifty percent in 2000 [1], every physician-trainee should expect to see patients who use marijuana. Hence, it is the physician's duty to be at ease with this drug, in terms not only of its effects, uses, and risks, but namely, if one wishes to understand motivations, enthusiasm, and novel research of marijuana, one must understand its history. The history of marijuana is intricate and takes the reader around the world, visiting many mysterious people and fascinating places – only to end up back at home where the debate about marijuana, particularly in its medical uses is writing the history of marijuana's most recent chapter. Thus, the future of medicine holds a place for marijuana, whether it is decriminalized medical marijuana or the never-ending illicit use of marijuana as a recreational drug. Before embarking upon this history, two final statistics should be presented for physicians or students who have become interested in marijuana of their own accord, for more personal reasons. Suffice it to say, you are not alone: 20% of medical students have used marijuana ten times or more [2].

### **Before Marijuana was “Marijuana”**

Three components of the ancient history of marijuana were often mentioned in the last 100 years, so it is useful to be aware of the allusions. Not only have these cultures given us fantastic stories, they also chronicle the nature of man's relationship with cannabis throughout the ages. With these stories in mind, the modern day reader is equipped to understand contemporary debate about marijuana in an historically sensitive light, and moreover, to understand that current ideas about this drug exist on a continuum of ideas which was borne thousands of years ago, so that before us (and particularly in Canada), we can see being written the most recent chapter in marijuana history. It may be seen as a great privilege to be a physician-trainee in this era in which medicine's is the limelight in which this ancient substance finds itself.

*Ma.* The earliest record of human interaction with cannabis comes from the Stone Age [3], in the small, Chinese, off shore island of Taiwan, where an archaeological team, on unearthing a 10 000 year old ancient community discovered pottery into which had been impressed braided fibers of the stalk of cannabis. Hence, this finding represents a relatively developed interaction with cannabis. A rich history exists about the stalk and fibers of cannabis which is not mutually exclusive with the history of the psychoactive properties of the plant with which medicine and most contemporary usage of the plant is concerned. Hence, this account is included here because of its importance in demonstrating the antiquity of the relationship our species has developed with cannabis. To remain focused, the wonderful history of hemp the clothing, the rope, the paper, the bowstring - though fascinating in themselves, will be foregone here to allow more detailed discussion of the history of the part of the plant which the invaluable stems and stalks support: the flowering tops, seeds, and the resin.

Thus, as far as has been traced, the Chinese were the first to use hemp as a textile, but cannabis soon found itself affecting many parts of ancient Chinese life, including the medicine man. Relying at first on an understanding of medicine as a magic to dispel

disease-causing demons, medicine men beat the stalks of marijuana plants on the beds of the ill to exorcize the demon. This early form of medicine continued until approximately 2800 B.C. when Shen-Nung, a legendary Chinese emperor became concerned that the ill who were not cured by the medicine men required an alternative. Shen-Nung was an expert farmer and began a search for curative materials in plants. As previously noted, cannabis had been grown for a variety of integral purposes in ancient China, so naturally it was part of the search for medicines. After self administering a variety of poisons and subsequently discovering their anecdotes, Shen-Nung authored the Pen Ts'ao which has come to be known as the Materia Medica. Importantly, this original Pen Ts'ao has not been retrieved, but a 100 A.D. version whose unknown author has claimed to incorporate the original, contains reference to Ma – or cannabis. It was noticed by the ancient Chinese that the cannabis plant is dioecious, wherein they saw yin qualities in the female plant and yang in the male. This concept of yin and yang has been preserved through the ages and is today utilized by the proponents of Traditional Chinese Medicine. It was the yin, containing more active ingredient than the yang which Shen-Nung suggested be administered for menstrual fatigue, gout, joint pain, beri beri, constipation, and absent mindedness [3]. The Pen Ts'ao, which included this early information on the medical application of cannabis earned Shen-Nung the title of Father of Chinese Medicine for which modern day pharmacies in China continue to give 10% discounts on the first and fifteenth day of every month.

Hence, cannabis as a medicine was first mentioned in ancient China. However, the many other important advances, particularly in clothing and paper-making, which cannabis afforded the ancient Chinese, as a psychoactive substance, cannabis was restrained to small sections of the population and it was not as a medicine or drug that the ancient Chinese found cannabis most useful. It is important, though, to know that while the ancient Chinese found novel uses for the plant, the cannabinoids were brewing and without the non-pharmaceutical uses of cannabis, its history may have been much shorter.

*Bhang, ganga, and charras.* For the development of cannabis into a common psychoactive substance, one must consider ancient India where cannabis and religion became intertwined and cannabis became holy. In a classical Hindu text, the Athurveda, whose composition is dated between 2000 and 1400 B.C., cannabis is extolled as a “remover of anxiety” [4]. Of course, such texts were reserved for the learned and it was hundreds of years before bhang, the social lubricant and derivative of cannabis still used today found its way to the masses. Over these years, legends grew and an association between Lord Shiva and cannabis was fashioned. Though this association between Shiva and cannabis continues to this day, learned Hindus deny a true linkage, suggesting instead that this false belief arose as the Tantric branch of Buddhism developed. Ancient ascetics in the Himalayas, who were in near constant meditation of Shiva are said to have used the cannabis to slow their minds sufficiently to allow them to teach their (as yet unenlightened) disciples. Hence, the pupils, seeing their spiritual gurus using cannabis began to use it themselves [5]. From these individuals, the Tantric religion developed around 700 A.D. In this tantric tradition, bhang, a concoction of cannabis, milk, and a variety of spices was ingested followed in about half an hour by a sex act consecrated to Goddess Kali. The bhang purportedly sensitized the body and gave the devotee a sense of oneness with the Goddess.

Over the next thousand years bhang found its way into common social gatherings and was served at weddings, festivals, and visits to friends' homes, much as alcohol is employed in current Western society. Ganja is a more potent product than bhang and was used by warriors before battle to implant valiance and courage into their hearts. The use of bhang continues to the modern day. The value of bhang to the social fabric of many Indians is shown in the following quotation from the 1890 Indian Hemp Commission which was conducted to asses the feasibility of curtailing bhang use: "It would rob the people of a solace in discomfort, of a cure in sickness, of a guardian whose gracious protection saves them from the attacks of evil influences. So grand a result, so tiny a sin!" [3] Hence, it is in India where masses became used to and enjoyed the psychoactive properties of cannabis. At the current time, most marijuana use in North America is non-medicinal and can be called "recreational." It shall be seen later that it is from India that Western medicine first heard of cannabis, through Dr. William O'Shaughnessy, who shall be described later.

*Assassins.* Before moving from India to Western medicine, a final story from the distant past must be told as it is often encountered today and has given birth to some of the important myths about the effects of marijuana which remain in the lay information, but which should be recognized as myth by the astute modern physician concerned about side effects of marijuana use. When Prophet Mohamed died in 632 A.D., the newly developing religion of Islam was leaderless, as no leader had been identified by Mohamed before his death. As can be imagined, much blood was shed for the next fifty years while two distinct trains of thought, the first believing a leader should be picked by vote (Sunni) and the second relying on bloodlines (Shiite), were formed. Within the Shiites, a later division occurred when Caliph Jafar-i-Sadiq refused to allow his eldest son Ismail to succeed him, as he had drunk wine. The Ismailis thus were formed as those who supported Ismail, claiming that the restrictions of alcohol written in the Koran should not have been taken literally. The Ismailis remained in obscurity until the 10<sup>th</sup> century when an Ismaili dynasty gained the Egyptian throne. The newly empowered Fatimids sent missionaries to convert people to Ismaili. One such consecrate was the Persian Haan-ibn-Sabah. With the Fatimads, Hasan learned not only Ismaili doctrine, but also techniques of assassination. Hasan later decided that Ismailis were corrupted and led a movement in which he was an intermediary of Allah, and which would bring Ismailis back to orthodoxy. As his movement grew, Hasan was able to procure a mountain fort. In Marco Polo's version of the remainder of the story, which he learned upon exploring the area, Hasan's men were trained assassins and would sacrifice their lives in an instant in Hasan's command. Such devotion was attributed to an initiation process in which devotees were drugged, taken to what they were told was paradise, complete with luscious women and fruit. Though there is no mention of cannabis, over the course of time the story has been so mutated that the drug which the devotees were given was said to be hashish, a cannabis derivative [3,4]. Furthermore, the stories of the assassins were perverted by the introduction of a fabricated detail: that before their missions, the assassins ingested hashish and thus, that hashish caused violence. Amazingly, this myth has continued until very recently and is finally being laid to rest amidst new scientific study.

## Cannabis Into Western Medicine

Dr. William O'Shaughnessy first went to India in 1833 after recently graduating from medical school at the University of Edinburgh in 1830. He was still a young man, only twenty-four and was positioned by the British East India Company in Bengal as an assistant surgeon and professor of Chemistry at the Medical College of Calcutta. It was here that O'Shaughnessy observed the use of cannabis for patients and he began an intensive study of ancient Oriental texts as well as having conversations regarding the use of cannabis with doctors familiar with its use. In his groundbreaking paper, "On the Preparations of the Indian Hemp, or Gunjah," [6] O'Shaughnessy details his animal experiments which subsequently led him to his preliminary experiences with humans for diseases including hydrophobia, rheumatism, tetanus, cholera, and infantile spasms. O'Shaughnessy holds many claims to fame, including discovery of intravenous electrolyte support for dehydrated patients, as well as bringing the telegraph to India, for which he was knighted. During an 1842 visit to England, by which time his 1839 report was stirring interest in Europe, O'Shaughnessy gave some hashish to Peter Squire, a pharmacist in London who subsequently created "Squire's Extract," which was used as an analgesic. At this time, physicians were restricted to the opiates for analgesia, which were so burdened by their addictive potentials that they often created problems equal to the ones they were prescribed to treat [3]. The side effects of the opiates – chronic constipation, respiratory and cardiac depression, pruritis, and loss of appetite – were considered far worse than the mild euphoria and drowsiness of cannabis. Hence, cannabis in this tincture form was popularized such that by 1850 it was in many British pharmacopeias and had in fact crossed the Atlantic into the US pharmacopoeia also. The list of diseases for which cannabis was suggested was extensive including neuralgia, tetanus, typhus, cholera, rabies, dysentery, alcoholism, opiate addiction, leprosy, incontinence, snake bite, gout, convulsive disorders, menorrhagia, and uterine hemorrhage. Given Sir John Russell Reynold's (physician to Queen Victoria) alleged prescription of cannabis for Her Majesty's menstrual cramps and his comments that cannabis is "one of the most valuable medicines we possess,"[4] helped cannabis become more and more popular. Of course, this popularity also demanded scientific study and so a great number of preliminary studies into the study of cannabis use initiated in the last half of the 1800s.

The major problem among the many benefits was of accurate dosing, its insolubility in water, and the fact that tinctures settled out and had to be shaken forcefully. And hence, the opiates were still preferred, though with the feeling that an alternative might be approaching. Pharmaceutical companies began the process of determining and isolating the chemicals from cannabis with the hope of standardizing the dosages. Chemistry advanced rapidly in the late 19<sup>th</sup> century and the results were synthetic drugs, particularly aspirin around 1890. Quickly, the synthetic drugs, which offered enhanced control replaced marijuana in its major application – as an analgesic. Thus, the last half of the 19<sup>th</sup> century marked western medicine's first lost opportunity to take full advantage of cannabis.

In the early 1900s, nearly one million Americans were addicted to opium, specifically to the morphine within it. The hypodermic syringe had been invented in 1845 and opium's

water solubility (unlike cannabis's) allowed for such indiscriminant use of the drug that during the Civil War, opium withdrawal came to be known as "army disease." Patients loved it and doctors love it, too. So, comparatively, cannabis, which was more or less limited to the "writer's, thrill-seekers, and bored upper class," [3] was a minor problem.

### **Racist sentiment, Anslinger, and Canuk**

The sudden infusion of Chinese immigrants to America in the 1860s as a cheap source of labor, and the end of economic boom times by the late 1870s led to social prejudices against the Chinese. In 1882, the Chinese Exclusion Act prohibited Chinese immigrants from entering the United States for ten years. Understandably insulted, the Chinese embargoed American manufacturers. In reaction, knowing that China was fighting local opium problems, President Roosevelt tried to mend relationships with the Chinese, a huge marketplace for American goods, by showing concern for the Chinese opium problem at an international congress in 1909 in Shanghai. Realizing its hypocrisy in promoting opium control abroad without any opium control at home, Congress quickly passed a law. Regardless, the Chinese market was still not reclaimed in 1909 so a similar attempt to show compassion was undertaken. This time, to convince China and thereby reopen the market, Hamilton Wright, the US delegate lobbied Congress for far reaching antinarcotics laws. Pharmaceutical companies vehemently resisted any such change and Wright went to The Hague in 1911 without strict domestic antinarcotics legislation. The other delegates quickly realized that the US would not be obliged to follow any of the international agreements without domestic laws in place, and the second attempt of the US to impress the Chinese failed [3,4].

In 1914, the Harrison Act, with persuasion from Wright, was adopted. It allowed only physicians and dentists to prescribe opiates, making it illegal for individuals to procure opiates on their own. The Narcotics Division of the Internal Revenue Bureau (IRB) was created as the office to deal with the new Harrison Act. However, as the IRB felt the need to justify its existence as more than a narcotic filing cabinet, ideas were entertained for expansion. But, the IRB required some issues which would be immediately important to Congress and which would validate expansion of the Narcotics Division. So the issues were created. Media frenzies took place focusing primarily on drugs as child victimizers, criminal creators, and addicts. The frenzy did in fact lead to Harrison Act reform. Medicine was dearly affected by these reforms. Principally, physicians were required to keep track of their prescriptions and narcotics could only be given to addicts under strict regulations. Physicians were harassed; some were humiliated in court; many felt that the doctor patient relationship was being compromised [3,4]. Much of this, of course, was the result of anti-Chinese racism.

Thus, a similar series of events some years later is not surprising. The Mexican population in the southern United States exploded around 1910, and Mexicans were willing to work for measly compensation. And on top of this, they smoked marijuana. The 1930s US economy was falling into the Great Depression and, as always, someone had to be blamed. Anti-Mexican sentiment had been steadily growing over the last twenty years so it was not

surprising that “Marijuana became the pretext for vexing the Mexican just as opium had been the pretext for vexing the Chinese years before”[3].

*Anslinger.* Crimes were sensationalized and marijuana was always the culprit. The Licota brutal murder story of a man who axed his family to death in Tampa was linked to marijuana (though, Licota had been found criminally insane many months previous to his smoking marijuana). This story was repeated by Harry Anslinger, the Commissioner of the Bureau of Narcotics during hearings of the Marijuana Tax Act of 1937 [3]. Given the sensationalism regarding marijuana for the past years, links between marijuana and crime, regardless of the stretch, created the air in which people could believe that marijuana caused wretched crimes by making its users wretched criminals. Quickly, proponents of anti-cannabisism rediscovered the old story of the Assassins. The etymological argument that from “Hashashin” meaning “hashish-eater” came “assassin” meaning “killer” was enough to convince many and cause hysteria in others. When it was later claimed that marijuana had infiltrated the White community, particularly school children – well! Enough was enough!

To elaborate, Anslinger had been made Commissioner of the newly formed Bureau of Narcotics in 1930 and though he had originally not wanted the Bureau to spend its resources on marijuana, in the middle and late 30s, when the depression was intense, Anslinger needed to turn to marijuana and in fact needed to make it appear as big a problem as possible such that funding to the Bureau would be preserved. He realized, from the past American experiences, that to get changes in drug laws, America had first to be embarrassed. In 1936, he was an American delegate to the Conference for the Suppression of Illicit Traffic in Drugs. There, he pressed for cannabis to be included, with the goal of forcing change in marijuana laws domestically, thereby assuring that his Bureau would remain well funded. His counterparts felt that not enough study of cannabis had been undertaken to warrant such an inclusion [3].

Anslinger returned to America to attempt to enact marijuana laws without the international community’s pressure. Building on the scaffolding of anti-Mexican (and therefore, anti-marijuana) racism and fear of deadly effects of marijuana in children who were now apparently being lured to it, along with the fabricated link between marijuana and criminals, not to mention the Assassins, Anslinger fought for federal legislation to control marijuana traffic. What was the medical profession’s role in all of this? President of the American Medical Association (AMA), Dr. William Woodard could still recall the days in which the Harrison Act had caused serious roadblocks for US physicians. He spoke out against the new proposed laws which would create even more in the way of irritation to the country’s physicians. Unfortunately, Woodard was virtually ignored as the AMA had recently annoyed Congress by blocking the Social Security Act, which Congress had not forgotten. The House of Representatives passed the Marijuana Tax Act on August 3, 1937. Since then, patients in America have not been able to use marijuana to for treatment under federal law. The 1937 Act carried a \$2000 fine and up to five years imprisonment for the first offense. By 1951, the use of marijuana was thought to be rising and the US federal government’s policy believed strict laws could fix the problem. Hence, in 1951, the Boggs Act demanded imprisonment for five years for a first offense, five to

ten for a second and ten to twenty for a third. In 1956, the minimum imprisonment was again increased by the Narcotics Act [3].

*Janey Canuk.* In Canada, the scene moved somewhat more slowly. Opium use in British Columbia among the Chinese was the main concern such that in 1911 Canada passed the Opium and Drug Act which banned opium and its derivatives. Cannabis was not included in the Act probably because it was not an issue. That is, until 1920 when Janey Canuk, also known as Emily Murphy was asked to write a series of articles on drug problems in Canada for MacLean's magazine, marijuana was virtually unknown to Canadians. Canuk's writings, however, painted a different picture and were compiled into "The Black Candle" which was able to convince Canadians of the necessity to fear cannabis [7]. Without having truly even heard of marijuana, it was included as a regulated substance in the Opium and Narcotic Drug Act of 1929. In 1934 the Canadian Medical Association Journal wrote an editorial elucidating the catastrophic nature of cannabis and by 1938 it was still illegal to grow marijuana in Canada. By 1939 it was no longer dispensed in over the counter form in pharmacies, and was it was finally removed from prescription drugs by 1954. The 1961 Narcotic Control Act applied stringent penalties for possession, (which were subsequently softened to a fine and misdemeanor in 1970-1972) [3].

## **The Sixties**

So, at the beginning of the 1960s most of the pot smokers in USA were Blacks or Mexicans – both minorities. Hence, the stringent laws were not posing a major threat to mainstream America and were therefore, largely ignored by mainstream citizens. However, when one considers that by 1969, up to 70% of college goers on some campuses [3] (i.e., middle or upper class youth) had been smoking marijuana, it is clear that the epidemiology of marijuana in the United States had undergone a major change. Suddenly, parents of college students had to worry that their children would end up in jail and so the marijuana laws became very important very quickly. President Kennedy responded by creating an Advisory Committee on Narcotics and Drug Abuse whose conclusions spoke harshly against the current marijuana policy. Though marijuana was not legalized, decriminalization (where possession carried a fine of \$100) was adopted in some areas, for example, Michigan. Some States followed, including in 1973 Oregon, and later Alaska, California, Colorado, and others [8]. At the federal level, possession of marijuana was (and is) still a federal offense, creating an interesting situation for patients and doctors in States where state and federal law were inconsistent. Research was needed urgently to dispel myths and learn more about this drug. Led by the research of Weil and Zinberg at the University of Boston, from which institute they published "Clinical and Psychological Effects of Marijuana in Man," [9] a wave of scientific inquiry took form which sought to validate anecdotal claims of marijuana's uses from the 1800s. Even in the face of this forthcoming evidence, the US government did not yield.

## **The Seventies, Eighties, and Nineties**

The United Nations, in the face of contrary evidence, had been persuaded by Anslinger by 1954 that "there is no justification for medical use of cannabis preparations"[3]. Using the



by now age old technique of effecting change in domestic US policy by creating international policy first, by 1967 America approved the above UN Economic and Social Council statement and by 1970, marijuana became a Schedule I drug [4], thereby placing it in a category alongside heroin and LSD – drugs with high potential to do harm – and importantly, in a category that prevented clinical use. So, if it had not been clear before, physicians were not to prescribe marijuana to their patients.

*First Patients.* Throughout the 1970s and 1980s, patient with a variety of medical problems, in particular multiple sclerosis, arthritis, epilepsy, muscular dystrophy, and cancer disclosed to their physicians that smoking marijuana, though illegal, provided much needed relief. A number of interesting groups were formed. The National Organization for the Reform of Marijuana Laws (NORML), in 1970 tried to lobby the government to reclassify marijuana from Schedule I to another, less restrictive Schedule. This has not occurred [4]. Interestingly, a speech instructor named Robert Randall in 1975 was arrested for growing marijuana at his residence in Florida. Randall was a glaucoma sufferer (he died in the 2001 from other causes) and has been hailed the father of the medical marijuana movement [10]. In his defense, he used the medical necessity plea, implying that the evil that he had to commit by smoking marijuana was less than the alternative evil: going blind. Amazingly, he won his case and as a result, the US government initiated the Investigative New Drug program (IND) which would supply marijuana to patients for whom it was a medical necessity. In the wake of this victory, many states began to legislate in favor of medical marijuana. In 1992, the IND program was shut down having granted around twenty patients government marijuana. It was a huge increase in AIDS patients applying for the program and the resulting image that the government was providing marijuana to whomever that the Bush administration could not tolerate. Hence, no new applications were taken and the seven remaining survivors of the original IND still receive medical marijuana from the US government [3,4,10].

*USA.* Through the 1990s, the US government employed entirely unsympathetic approaches to medical marijuana users. For example, William Foster of Tulsa, Oklahoma received a sentence of 93 years for growing and using marijuana to treat his crippling rheumatoid arthritis. In his defense, the Society of Neuroscience had proven that the drug had been useful in symptomatically controlling his disease – but to no avail. This ill-natured government policy did not sit well with man citizens and when the issue of medical marijuana was put to vote in a variety of states, citizens voted for it and for instance, the Compassionate Use Act was passed in California in 1996. Of course, medical marijuana is still illegal federally. Buyer's clubs opened up in which clean cannabis was sold to patients who could present a letter from their physician stating that marijuana may be useful to them. Whenever found in the USA by federal authorities, the clubs have been promptly shut down and patients are left to purchase marijuana on the streets. In the government's opinion, there is not enough evidence to show that marijuana is safe and effective [4,8].

The National Institute of Drug Abuse (NIDA) in the USA provides all the regulated marijuana to the seven remaining patients of IND as well as overseeing the research grade marijuana for scientific purposes. Though stating that research is necessary, this

organization has made it difficult to obtain marijuana for research purposes and so research has been present, but greatly slowed. Anecdotally, some researchers have claimed that upon being rejected by NIDA, they have reapplied stating that they will be researching the negative impact and adverse effects of marijuana and their applications have been successful [11]. If this is true, it is a very serious hindrance to medical research.

*Britain.* Medical associations worldwide throughout the 1990s have provided their governments with scores of advice and scientific information regarding medical marijuana and its potential. In 1997 the British Medical Association campaigned to legalize medical marijuana in Britain, with a hope of rescheduling marijuana to Schedule II such that it could be prescribed. This was not accepted by British government, but the juries have been consistent in the UK in using common sense and typically acquitting many medical marijuana users. Medical marijuana for research purposes in Britain is grown by GW Pharmaceuticals and clinical trials are underway for the use in multiple sclerosis. GW Pharmaceuticals is currently developing a mouth spray drug delivery system to deliver marijuana extracts. Soon, marijuana extracts may have the necessary validity and associated technology to convince even the most steadfast antinarcotics governments [4].

*Canada.* Canadian government has shown leadership in medical marijuana legislation. Canadian medical students should be aware of the leadership role this country has taken regarding compassionate use of marijuana by specific patients. On July 30, 2001, the Narcotic Control Regulations was amended and novel Marihuana Medical Access Regulations came into force, “establishing a compassionate framework to allow the use of marijuana by people who are suffering from serious illnesses and where the use of marijuana is expected to have some medical benefit that outweighs the risk of its use. Under the new regulations, those who fall into one of three categories can apply for an authorization to possess marijuana for medical purposes. Holders of this authorization may possess a maximum 30-day treatment supply of marijuana at any given time.” [12] The categories mentioned above have classified patients into three groups who are believed to possibly benefit from marijuana as medicine.

From Health Canada Online [13]:

Category 1: This category is for applicants who have terminal illnesses with a prognosis of a life span of less than 12 months.

Category 2: This category is for applicants who suffer from specific symptoms associated with certain serious medical conditions, namely:

Multiple Sclerosis: severe pain and/or persistent muscle spasms

Spinal Cord Injury: severe pain and/or persistent muscle spasms

Spinal Cord Disease: severe pain and/or persistent muscle spasms

Cancer: severe pain, cachexia, anorexia, weight loss, and/or severe nausea

AIDS/HIV infection: severe pain, cachexia, anorexia, weight loss, and/or severe nausea

Severe forms of Arthritis: severe pain

Epilepsy: seizures

Category 3: This category is for applicants who have symptoms associated with a serious medical condition, other than those described in Categories 1 and 2, where among other things conventional treatments have failed to relieve symptoms of the medical condition or its treatment.

Concurrent with the ability of patients in Canada to obtain medical marijuana, a research plan was formed in 1999 as collaboration between Health Canada and the Canadian Institute of Health Research: the Medical Marijuana Research Program. This allows today's sufferers to use marijuana in the forms available today, while providing a means for increasing our knowledge for the next generation. Researchers applying to these programs can be provided research grade marijuana for their studies. Currently, over 700 patients have been given licenses to grow their own marijuana or to have it supplied to them by Prairie Plant Systems.

## **Conclusion**

The medical usefulness of marijuana is not a new suggestion and has in fact been brewing for thousands of years. The story of marijuana as a medicine is intriguing not only in its historical aspects, but also in the depth of ethical, social, and political issues which it forces the interested reader to churn. Given its tumultuous history, the novel programs in place in this country allowing for compassionate use of marijuana are praiseworthy, but are bound to be extremely complex. Further research is required and is underway such that marijuana is likely to regain clinical usefulness and the lessons of millennia gone by shall not be lost.

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# THE CONDOM: HIDDEN IN THE BACK POCKET OF HISTORY

By

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## Abstract

**Historical and archeological descriptions of covering male genitalia during sexual activity reach far into antiquity; however, the origin of the condom in its contemporary form remains unclear. It is unknown whether male genital coverings in ancient cultures were intended primarily to serve as contraception, prophylaxis against disease, modesty, decoration, or other mystical purposes. The earliest archeological samples of condoms are from Britain, where primitive versions have been found and dated to the 17<sup>th</sup> century. However, the first recognized written description of a true penile sheath apparatus intended specifically to protect against venereal disease belongs to Gabriello Fallopio's 16<sup>th</sup> century work *De morbo gallico*. Many individuals thereafter, including the mysterious Dr. Condom, have provided historians with clues as to the condom's elusive lineage, including those who have documented its use in writings, as well as those who have innovated in its production and usage. Technological advances in material sciences have contributed significantly to improvements in the condom's design through the ages. Usage of the condom has been influenced strongly by medical progress, including infectious disease knowledge and hormonal contraceptive use. However, various social forces have also influenced its popularity, including the acknowledged promiscuity of military personnel, contraception civil rights movements, and the commercial popularity of coin-operated dispensing machines.**

The condom is an elusive item in the annals of history, as its cultural taboo seems to have secluded it from the mainstream of historical documentation. Delving into interdisciplinary sources, however, reveals an interesting story of the condom's evolution. Through time, the condom has been used for multiple purposes, and played a variety of roles in everyday culture. It has also reflected socioeconomic class differences and technological progress. As one of society's most symbolic icons, the significance of the condom has truly changed with the ages.

Early descriptions of penile coverings reach back into antiquity, where pre-classical Egyptian men were said to have enveloped their penises in a linen sheath (Stevens 1975). It is believed that the pharaoh Tutankhamen regularly utilized a similar device made out of leather (Pravda 2004). Numerous other societies in antiquity also have left clues hinting towards the use of condom-like apparatuses. The ancient Japanese civilization developed the "kavagata" – a version of the condom made out of soft leather (Pravda

2004). Weak sources point to condom use in the Roman civilization as well. With military conquests, Roman legions were said to have been provided with dried cattle intestines to curb pestilence. Stories have also been told of legions engaging in a ritualistic practice of using tissue from their defeated enemy corpses to fashion penile coverings (Pravda 2004). Elsewhere, the famous cave paintings in Combarelles France include depictions of penile drapery. Through all of these cross-cultural examples, a variety of materials have been described: animal bladders, intestines, skins, vegetation, and leathers (Himes 1936).

The legend of King Minos of Crete from approximately 3000 BCE also provides a rich cultural example of the use of a penile covering. The story is one of Minos's infidelity against his wife Pasifaya. Pasifaya discovered Minos's adultery and cursed him such that, when copulating with another woman, Minos's ejaculate would take the form of deadly serpents and scorpions. It would be clear who Minos's extramarital lovers were as they would be killed by his ejaculate. Minos's solution to this conundrum was to use a goat's bladder as a barrier during intercourse. This proved to be successful, and he thus made regular use of such devices (Phillips 2001). This legend, first told by the Roman author Liberalis in the 2<sup>nd</sup> century CE, has not been substantiated with historical evidence, though the story is a clear example of condom use.

While it is interesting to seek and discover examples of condom use in distant antiquity, the cultural challenge today is to understand why they were invented. It is easy to quote the dogma that necessity is the mother of invention; however, it is difficult to ascertain which necessity was being met by these penile sheaths, except in the case of Minos's infidelity. Current condom use is directed at protecting against transmission of infections as well as contraception. In the absence of historical documentation and evidence from classical cultures, historians have been left speculating as to whether they were developed and used primarily for venereal disease protection, contraception, or more curious behavioural concerns of decoration, mystique, and mating rituals (Hall 2002).

The absence of convincing historical evidence of the human motivation for condom use is finally addressed in 16<sup>th</sup> century Italy. The great Italian anatomist Gabriello Fallopio left behind, after his death, a volume entitled "De morbo gallico" (on the French disease). This work, devoted to research and commentary on Syphilis, was published posthumously and contains in it the first documented example of an individual describing the purpose of donning a penile sheath apparatus. In it, Fallopio claims to be the inventor of a linen device which would be worn by the male during intercourse for the purposes of protecting against venereal disease (Fallopio 1564). In this way, Fallopio is often referred to in the literature as the inventor of the condom, not because he claims to be the inventor, but because his text is the first to describe a penile sheath for a specific purpose, namely infectious protection. Interestingly, his version of the condom involved fitting it over the glans but under the foreskin, or intra-urethral insertion (Fallopio 1564).

Another key figure in the history of condoms is the mysterious Dr. Condom. Variant spellings (Cundum, Quondam) and stories have been attached to this court member of King Charles II of England. Popular myth has it that Dr. Condom was given the task of

developing a device that would allow King Charles II the ability to copulate with lovers without danger of fathering illegitimate children (Hall 2002). In this case, the motivation for the device was not so much disease prevention as it was progeny prevention. However, little definitive evidence exists to verify this man's existence, and many believe his story to be apocryphal (Kruck 1981). If Dr. Condom did not exist, then the question of the etymology of the condom remains unanswered. Two hypotheses have been entertained. The first calls to the early Roman usage of the condom and the Latin word *condos* meaning "receptacle". The second calls to the ancient Persian culture and the term *kondū* or *kendu*, which was a long thin sack used to store grain (Phillips 2001).

In contrast to the questions surrounding England's Dr. Condom, England is home to the earliest hard archaeological evidence of condom use, where pieces of shaped and contoured animal intestine were found in Dudley Castle. Based on events of the English Civil War involving Dudley Castle, these condoms were dated to be from the early 17<sup>th</sup> century (Gaimster et al 1996). Descriptions of these condoms and other such devices of the time suggest that these devices were made from animal and or vegetable matter, and, in the spirit of Fallopio, were used primarily to protect against venereal disease transmission (Hall 2002).

The interplay between the condom and the military is not unique to the ancient Roman legions and the English Civil War. While social portrayal today continues to propagate an association between military personnel and sexual promiscuity, historical examples do provide some basis for the stereotype. Sexual promiscuity came to be such a threat to the health of soldiers that in World War I, condoms were routinely distributed to personnel alongside daily essentials in order to curb the high rate of venereal disease (Hall 2002).

By that time, the industrial revolution and the gilded age of technology had allowed for the vulcanization of rubber in the 1840's and the mass production of quality condoms. Indeed, with technological advances in materials science, condoms began to achieve broader and broader usage and appeal. In eras past, condom production directly from raw materials was limited by time, expertise, and wealth, for either single-use or re-usable forms. By the turn of the 20<sup>th</sup> century, however, the industrial manufacturing process allowed manufacture and distribution on a grander scale (Himes 1936).

Also contributing to the rapid growth in condom use were strong social forces of sexual taboo. The condom had a distinct advantage over the leading contraceptive alternative, female pessary devices, in that the condom did not require expert fitting or involvement of third-parties including health professionals. Condoms could be discreetly purchased in stores, and with time, even more clandestinely obtained from coin-operated dispensing machines. Thus, parallel advances in technology both in production and distribution strongly influenced the popularity of the condom (McLaren 1991).

Broader social movements of birth control in the early twentieth century also had an important role to play in the popularization of condoms (McLaren 1991). A significant shift in social mores ensued, whereby society came to realize that responsibility of birth control and safe sexual intercourse was to be shared by both the man and the woman. The

condom placed newfound responsibility on the man in sexual relations, whereas traditional social roles had understated their role.

Medical advances too affected the life cycle of the condom. Growing knowledge of infectious disease and transmission gave rise to a more informed medical community and general public. However, medical advances soon had the opposite effect on condom use. The advent of antibiotics afforded an effective medical option of treating venereal disease rather than prevention. Furthermore, the advent of hormonal therapy in the 1960's and the birth control pill afforded the population with another approach to contraception that was not as cumbersome, unaesthetic, and unappealing as condom use (Hall 2002). There were strong social impacts from these advances as well, as the shift of responsibility for contraception and safe sexual intercourse once again swayed away from the male and back towards the female.

Recent years have led to a resurgence of condom popularity, however, largely due to HIV and its threat of an incurable sexually transmitted infection (Salem 1992). In the present day, condom use is very much widespread and a part of the cultural consciousness of sexually active individuals. Yet, despite its status as a powerful cultural icon, it is still shedding its cloak of social taboo, be it in youth education or drug mart purchases. It is clear, however, that the condom's history is woven into many other aspects of social history, including responsibility-sharing in sexual relations, class differences, military conquests, technological progress, and medical knowledge.

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# **ANTI SMOKING INITIATIVES IN NAZI GERMANY: RESEARCH AND PUBLIC POLICY**

By

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## **Abstract**

**In 1939, German scientist Franz H. Muller published the world's first epidemiological, case-control study showing a link between tobacco smoking and lung cancer. Another more rigorous epidemiological study by Eberhard Schairer and Erich Schoniger in 1943 further supported this link**

**These studies were conducted under a Nazi regime very supportive of anti-smoking initiatives. In addition to funding research, the government posted propaganda, passed legislation and offered medical assistance in an effort to encourage Germans not to smoke.**

**This anti-smoking campaign was part of a public health initiative that included restrictions on alcohol and exposure to occupational contaminants as well as an emphasis on good nutrition.**

**A number of reasons have been postulated for the Government's desire to improve health-related behaviour. One is economic; medical care and lost productivity from sick workers was expensive. Another is strategic; Germany was at war and needed its soldiers to be healthy. A third is ideological: the Nazi government seemed to view alcohol, workplace pollutants and especially tobacco as *genetic poison* to the pure German race.**

**After the defeat of Germany in World War II, the research showing a link between smoking and lung cancer went virtually unnoticed by academics in the rest of the world. Perhaps this is partly due to the connection between the anti-smoking campaign and Nazi ideology.**

## **Introduction**

The causal link between tobacco smoke and lung cancer is well established. The credit for statistically proving this usually goes to studies from the 1950s by British and American scientists such as Sir Richard Doll, A.B. Hill, Cuyler Hammond and Ernest Wynder (Witschi 2001). Yet, researchers in Nazi Germany found the same

epidemiological link a decade earlier, but their studies received little attention after World War II.

This paper will discuss this research into the link between smoking and lung cancer carried out in Nazi Germany. The research helped spawn anti-smoking initiatives which were the centerpiece of a preventative public health campaign that also targeted alcohol, nutrition and occupational carcinogens. The Nazi Government's rationale for improving public health included economic, military, and most importantly, ideological motives. This Nazi ideology, specifically racial hygiene, is a major reason why the research linking tobacco and lung cancer went virtually unnoticed after the war.

## **Section I: Research into the Link between Tobacco Smoke and Lung Cancer in Nazi Germany**

Prior to 1900 lung cancer was a very rare disease, but its incidence rose rapidly in the industrialized world starting in the first decades of the 20<sup>th</sup> Century. For example, German autopsy records show that it only represented 1% of cancer deaths in 1878, 10% in 1918 and 14% by 1927 (Witschi 2001). Preceding this surge in lung cancer was an even larger increase in tobacco consumption beginning in the latter decades of the 19<sup>th</sup> Century. This was partly due to inventions such as safety matches and industrial-scale cigarette rolling machines (Proctor 2001).

Despite this temporal correlation, doctors and researchers didn't initially recognize the link. Early hypotheses about the cause of the lung cancer epidemic included automobile exhaust, road tar and sequelae from the 1919 influenza pandemic.

Among the first to postulate the link between tobacco smoke and lung cancer was the German clinician Schonherr in 1928 who noted that many of his female lung cancer patients were exposed to "2<sup>nd</sup>-hand" smoke (Smith, Strobele and Egger 1993). Other doctors, such as Fritz Lickint in 1929, noted increased frequency of smoking in patients with lung cancer.

Scientists working during the Nazi reign in Germany built upon this earlier research. In 1939, Franz H. Muller published the world's first epidemiological, case-control study showing a link between tobacco smoking and lung cancer. He compared the tobacco consumption of 86 men with lung cancer to 86 healthy men (controls) of the same age (Shairer and Shoniger 2001). Patients with lung cancer were more likely to be heavy smokers than the control group and likewise the control group were more likely to be moderate or non-smokers than the lung cancer group.

This link received further support from another, more rigorous epidemiological study by Eberhard Schairer and Erich Schoniger in 1943. Questionnaires were sent to relatives of 195 patients who had died of lung cancer asking about duration and amount of smoking. They also sent questionnaires to relatives of 555 relatives of patients who had died of other types of cancer, mostly stomach and colon, as well as to healthy controls (Shairer and Shoniger 2001). Their response rate was 57%. In their analysis, Schairer and

Schoniger attempted to account for confounding variables such as occupational exposure to dust. They concluded “there is a high probability in support of the contention that lung cancer develops much more frequently in heavy smokers and is much rarer among non-smokers than expected” (Shairer and Shoniger 2001, 26). Later analysis of this study found their results to be statistically significant with  $p < 0.0000001$  (Smith, Strobele and Egger 1993).

These studies were financed under a Nazi regime very supportive of anti-smoking initiatives. In March 1939 there was a large conference about the effects of alcohol and tobacco, attended by 15000 health researchers and professionals. At the meeting Hans Reiter, head of the Reich Health office “charged all the medical societies of Germany with the responsibility for determining scientifically the degree to which tobacco caused disease” (Smith, Strobele and Egger 1993, p. 221).

The Nazi government’s support of research into the health effects of tobacco extended to the very top of their government. In April 1941, Adolf Hitler donated 100 000 Reichmarks (RM) of his personal finances to help fund the establishment of the ‘Scientific Institute for the Research into the Hazards of Tobacco’ in the city of Jena (Zimmermann, Egger, Hossfeld 2001). This institute funded the study by Shairer and Shoniger as well as other research into the health impacts of smoking including ‘nervous disorders’, gastrointestinal function, and tobacco's effect on the body’s potassium: calcium ratio.

## **Section II: Public Anti-Smoking Initiatives in Nazi Germany**

Such research helped provide scientific rational for the Nazi government’s public anti-smoking initiative which included propaganda, education, legislation and economic measures.

The Nazi government’s anti-smoking advertisements often used role models, most notably Adolf Hitler who was an ardent anti-smoking activist. One advertisement read:

Brother national socialist, do you know that your Fuhrer is against smoking and thinks that every German is responsible to the whole people for all his deeds and omissions, and does not have the right to damage his body with drugs? (Smith, Strobele and Egger 1993, p. 221).

The education ministry ordered education about the dangers of tobacco to be included in the school curriculum and smoking was banned in schools (Proctor 1997). Anti-smoking propaganda was also disseminated through the Hitler Youth, League of German Girls and Federation of German Women. A popular slogan aimed at the latter group was: “Die deutsche Frau raucht nicht!” (“The German woman does not smoke!”) (Proctor 2001, 33). Also, restaurants and cafés were prohibited to sell cigarettes to women. Smoking among women was further restricted by denying tobacco-rationing coupons to women younger than 25.

Restrictions were also put on the advertising of cigarettes. For example, advertisements couldn't imply that smoking had any hygienic value or associate it with masculine or feminine imagery (Smith, Strobele and Egger 1993). The government passed legislation banning smoking in many public places, including military barracks, government offices, workplaces and trains. Specific groups of men were also prohibited from smoking including uniformed soldiers and anyone under 18 (Proctor 1997).

In addition to putting restrictions on smoking and its advertising, the Nazi government also implemented medical programs to help people quit. These included counseling, provision of nicotine gum and use of silver nitrate mouthwash which made cigarettes distasteful (Proctor 1997). The government also researched ways of producing nicotine-free tobacco and by 1940 it comprised 5% of the German tobacco harvest (Proctor 1997).

Also, the Nazi government used economic means to limit tobacco consumption. For example, in June 1940, the government ordered that cigarette rations for soldiers be limited to 6 / day (Proctor 1997). In 1941 the government raised taxes on cigarettes to approximately 80%.

Just as the research into the dangers of tobacco smoking in Nazi Germany was ahead of the rest of the world, so too were these public anti-smoking initiatives. The government's multi-pronged combination of advertising, legislation, medical therapy and economic measures is similar to the strategy used in current anti-smoking programs.

### **Section III: Public Health Initiatives in Nazi Germany**

The Nazi government's anti-smoking campaign was part of a broader public health initiative that emphasized preventative medicine. It included restrictions on alcohol and exposure to occupational contaminants, as well as encouraging better nutrition.

In an attempt to limit alcohol consumption, the Nazi government used similar strategies to their anti-smoking campaign. For example, an advertisement claimed that alcohol "was sapping the strength of the German people" (Proctor 1997, p. 472).

Government authorities promoted a diet high in fruits and vegetables, while encouraging a reduction in fatty foods such as meat and whipped cream (Smith 2004). Also, a concerted effort was made to encourage bakeries to make whole wheat bread instead of white. As well, laws were passed that limited the use of carcinogenic additives, such as some dyes, in food.

Regulations were also put on occupational exposure to toxins. For example, the use of asbestos in factories was limited (Proctor 1999)

### **Section IV: Reasons for the Public Health Initiative**

A number of reasons have been postulated for the government's desire to improve health-related behaviour. One is economic; medical care and lost productivity from sick workers

was expensive. Another is strategic; Germany was at war and needed its soldiers to be healthy. A third is ideological: the Nazi government viewed alcohol, workplace pollutants and especially tobacco as 'genetic poison' to the pure German-Aryan race.

Throughout the 1930s, lung cancer had risen to be the 2<sup>nd</sup> most common cause of cancer death in German men (Proctor 2001). By 1944, it was the most common. This rapid increase was a large expense for the German healthcare system as well as health insurance companies. Furthermore, workers' morbidity and mortality affected the bottom line of companies. Thus, the increase in lung cancer and other tobacco-related morbidity had a large impact on the economy. In 1941, the Nazi government's accounting division estimated that smoking was costing the economy approximately RM 4 billion annually (Proctor 1997). To put this huge sum in perspective, Germany's entire military budget in 1938, at a time when it was preparing for war, was only RM 16 billion. Thus the government had a strong economic impetus to attempt to reduce tobacco consumption.

Similarly, the rise in morbidity and mortality from lung cancer was a concern to the military, who needed soldiers to fight during World War II. Furthermore, there was concern that smoking tobacco would affect the German soldiers' stamina and military prowess (Proctor 1999).

A third and likely more important reason for the German government's public health campaign involves Nazi ideology, specifically racial hygiene. This was a central tenet of Nazism, involving the maintenance of a 'pure' Aryan race. The racial hygienists attempted to accomplish this goal through three main avenues:

Racial hygienists distinguished 'positive', 'negative' and 'preventive' racial hygiene, encompassing: (1) encouragement of breeding among the 'fit' (e.g. by marital loans and prizes for large families); (2) limitation of breeding among the 'unfit' (especially by sterilization); and (3) prevention of exposure to genotoxic hazards (Proctor 2001, 32).

Racial hygiene helps explain the Nazi government's public health policies that attempted to ban or decrease the use of many potential mutagens ranging from food dyes to asbestos and especially tobacco smoke. For example, in 1939, the Reich Health office commissioned studies investigating the effects of smoking on chromosome damage (Smith, Strobele and Egger 1993).

After 1941, most of Germany's research into the health effects of smoking involved the Institute for Struggle Against Tobacco Hazards in Jena. It was founded and directed by Dr. Karl Astel. He was Dean of the University of Jena, head of both the Office for Racial Affairs and the Office for Public Health and Social Affairs for the state of Thuringia, a high-ranking SS officer as well as a leading racial hygienist (Zimmermann, Egger, Hossfeld 2001). His rationale for anti-tobacco research is evident through his belief that: "We cannot change our genes, but at least we can safeguard them from future damage" (Proctor 2001, p. 32). Astel was also involved in other aspects of the Nazi's racial hygiene campaign including organizing the euthanasia programs that murdered over 200 000

mentally and physically disabled. As well, he was involved in organizing Hitler's 'final solution' to murder all Jews (Proctor 2001).

## **Section V: Why the Anti-Smoking Research Went Unnoticed After World War II**

After the defeat of Germany in World War II, the research showing a link between smoking and lung cancer went virtually unnoticed by most academics. This would have been partially due to logistical reasons. During World War II, German scientific journals were not sent abroad (Proctor 2001).

Another, more important reason that the research went largely unnoticed was because it was done in Nazi Germany. Even though both Muller's and Shairer and Shoniger's studies were purely epidemiological, many people associated all research from Nazi Germany with the atrocious human experiments carried out by some scientists. Thus, after World War II the scientific community ignored much of the research, because, as famous biochemist James Watson explained, some thought "that good work simply could not have been done by Nazi scientists" (Proctor 2001, 34).

Muller's 1939 paper wasn't completely ignored; it was occasionally referenced in the 1950s, even in the influential papers by British and American authors such as Doll and Wynder whose studies' are generally credited with demonstrating the link between smoking and lung cancer (Proctor 1997). Yet, Shairer and Shoniger's study, which was methodologically and statistically superior, was barely cited at all. For example, a search of the citation index showed that in the 1960s, it was only cited 3 times, and only once in the 1970s (Proctor 2001). The study also went unnoticed in Germany. In 1953, a German bibliography was published about the links between tobacco and cancer. It didn't mention Shairer and Shoniger's study.

Perhaps this is because Shairer and Shoninger's study was conducted at the Institute for Struggle Against Tobacco Hazards in Jena. Astel, the founder and director of the institute was personally involved in the Nazi sterilization, euthanasia and murder of the Jews. Also, some scientists connected with the Institute did engage in horrific human studies including research on prisoners at Buchenwald Concentration Camp (Proctor 2001).

Conversely, Muller's study was completed before the conception of the Institute, and so has no connection with it or with Astel. Also, the paper doesn't include any Nazi ideology. For example, "race", a common theme in many medical studies from Nazi Germany, was not mentioned at all (Proctor 1997). Furthermore, Muller includes references to work by Jewish authors in his study. Thus, Muller's article may have been considered less associated with the Nazi regime than Shairer's and Shoninger's. Perhaps this is why it received some minimal attention in the decades after the war, compared to almost none for the paper by Shairer and Shoniger.

## **Conclusion: The Effect of the Nazi Government's Anti-Smoking Policies**

Despite the Nazi government's scientific and public health anti-smoking initiatives, German tobacco consumption continued to rise throughout the 1930s. One reason for this increase in tobacco consumption despite the aggressive public health initiative may have been that smoking was a form of passive resistance against the authoritarian Nazi government (Smith, Strobele and Egger 1993). In the latter stages of World War II, tobacco consumption did drop considerably, but wartime rationing and economic problems were likely a large factor.

Thus, at first glance, it appears that the Nazi government's anti-smoking initiatives were a failure. Yet, the rise in smoking throughout the 1930s was due to growth in the German economy. It is likely that the Nazi government's opposition to smoking caused this increase in tobacco consumption to be less than it would have been otherwise. Furthermore, a recent study showed that in 1990, lung cancer mortality among German women was significantly lower than among American women - 8/100 000 vs. 32/100 000 (Proctor 1997). As much of the anti-smoking policies were aimed at women, it is likely that the Nazi government's public health initiative is partly responsible for this lower rate.

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# **DID THE MEDICAL PROFESSION OF THE THIRD REICH, NAZI GERMANY, SHOW ANY EVIDENCE OF FOLLOWING THE HIPPOCRATIC OATH?**

By

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## **Abstract**

**Adolph Hitler's Third Reich is no doubt one of the clearest examples of centralized control and institutionalized fascism of the 20th century. The question of the role of physicians during Germany's National Socialism is one that needs exploration. Physicians during Hitler's dictatorship were faced with many ethical challenges and as such responded in various ways. Whether or not these physicians maintained the principles of medicine: such as those they ascribed to while taking the Hippocratic oath is quite controversial. The Hippocratic oath is an oath that despite being dated back to Ancient Greece represents virtues relevant to physicians today. Upon examining those principles of the Hippocratic oath -as stated after the 1948 Geneva Convention-it has been concluded that physicians during Nazi Germany did not adhere to those altruistic principles they had once sworn by. This conclusion has been reached by using a line-by-line comparison of the 1948 Geneva Convention's Hippocratic oath and the actions of physicians during the Third Reich. Although the conclusion is a rather blunt one it is also important to include such confounding factors as the ideology of Europe at that time. Hitler's ideology was quite a predominant and popular ideology, and as such it would have been difficult to dissent from such an institutionalized movement**

Through most of recorded history, physicians have been one of the most educated and well-respected members of any society. Today, as medical students graduate and become official doctors they recite an oath that guides their moral and ethical conduct in their role as healers and caregivers. This oath, the Hippocratic Oath, has been linked to Hippocrates, a celebrated ancient Greek physician. Thus, this oath has been in existence for almost two thousand five hundred years, and is still as valid today as it was in the past. However, there have been times in history when doctors have deviated from the ethical and moral principles of the Oath. A notable recent example is the actions of the medical profession of the Third Reich in Nazi Germany. The seven points of the Oath will be examined here, point by point, with a discussion of how the German medical profession of this time dealt with each part of the Hippocratic Oath.

“I will give respect and gratitude to my deserving teachers.” This first point of the Hippocratic Oath pertains to all physicians, because at one time they too were medical students. This is the only point of the Hippocratic Oath that the German physicians

seemed to have adhered to. In the early 20<sup>th</sup> century, the medical sciences in Germany were likely the most advanced of any developed nation. Medical students and trained doctors from all over the world came to the University of Leipzig to spend time learning from the world-renown German teachers. In fact, it was almost unheard of for medical schoolteachers at Harvard or John Hopkins University to not have spent at least a year in Germany learning medicine from ‘the best’ (Michalczyk, 1997). However, it must not be forgotten that there were no documented protests when all Jewish medical professors were terminated from their positions without warning and without compensation.

“I will practice medicine with conscience and dignity. The health and life of my patients will be my first consideration.” The 1946 Nuremberg Trial revealed that German doctors did not heed this point of the oath in any appreciable manner. Medicine in the Third Reich of Nazi Germany was unscrupulous and without moral or ethical principles. The health and life of patients was often the last thing the doctors cared about. A prime example that illustrates this is the construction of six “euthanasia” centres across Germany. It is important to note that these “euthanasia” centres were separate from the concentration, or death camps established in Germany. The “euthanasia” centres were mainly to help improve the German race by eliminating the old and weak Aryan Germans. Euthanasia is in quotation marks because the word euthanasia had a different meaning in Nazi Germany than it does today. Euthanasia is defined in modern dictionaries as the intentional killing of a patient by a physician in order to end unbearable and hopeless suffering at the patients’ explicit informed request (Oxford Dictionary, 2001). However, euthanasia in Nazi Germany was the murder of anyone deemed a misfit. Jews, Gypsies, homosexuals, and the mentally and physically handicapped all fell into this category of misfits. However, the doctors running these centres ultimately had control over who would be euthanized and who would not; the result is that healthy Germans were also sometimes euthanized. The majority of victims who died at these centres were unaware they were going to their deaths. Doctors often lied about the cause of death of these victims to their families. A notable example from Michalczyk’s video recording is one in which a family was notified that their grandfather had died from a burst appendix, when in fact that gentlemen had his appendix removed in an operation 8 years earlier. In Hadamar, mentally retarded children were ‘euthanized’ by starvation, often with the consent of their parents.

“I will hold in confidence all that my patient confides in me.” While it is now obvious that Nazi doctors lied to their patients, they also used them in various experiments with no doctor-patient confidentiality whatsoever. Most things of note that patients told their doctors were recorded and included in the experimental results with no attempt to hide their patients’ identity. For example, Nazi physicians from the death camps thought they could change prisoners eye colour from brown to blue by injecting methylene blue dye into their eyes (Michalczyk, 1997). After recording their patients’ reactions and concerns, most notably the excruciating pain, all of the patients were subsequently murdered via the gas chambers.

“I will maintain the honour and noble traditions of the medical profession. My colleagues will be my brothers and sisters.” It is important to note that Jewish doctors were barred

from practicing medicine in Germany before World War II began. This created a need for physicians, whereby applicants who were part of the Nazi Party were granted entry into medical school over those applicants who were not. Gilbert (1986) aptly summarized the change of the medical profession during the Third Reich: In “the SS doctors... the healer had become the killer. The trained, professional saver of life, dedicated to healing, had become the self-taught, enthusiastic taker of life, dedicated to killing.” However, German physicians upheld the second part of this line of the Hippocratic Oath to a minor degree, to treat their colleagues as brothers and sisters. Nazi doctors maintained a unified front throughout the Third Reich, and even afterwards. There was little dissent or doubt amongst the ranks of the Nazi German physicians, which Drobniowski concludes represented the cohesiveness of the esprit de corps, “inculcating a sense of elitism and isolation from the main population” (1993).

“I will not permit consideration of race, religion, nationality, party politics or social standing to intervene between my duty and my patient.” Nazi physicians violated every one of the categories involved in this part of the Oath. However, before highlighting the atrocious activities German doctors partook in, it would be informative to examine the current socio-political movements at that time. In the early 20<sup>th</sup> century, Eugenics was a popular socio-political movement. Eugenics is the study of improving a species by artificial selection, and usually refers to the selective breeding of humans (Oxford Dictionary, 2001). During this time, most developed nations believed that eugenics could be used to eliminate virtually all problems found in society, ranging from poor health and genetic abnormalities all the way to violent crimes and larceny. In the United States, Charles Davenport claimed that the incoming immigrants would lead to the eventual American population becoming darker, shorter in stature, and significantly more violent (Michalczyk, 1997). The Germans envied the American eugenics movement, especially when twenty-three American states made a law to sterilize misfits; those who were mentally retarded or morally deviant. Over five thousand American citizens were sterilized at hospitals in these twenty-three states. Thus, it is of little surprise that the medical community in Germany supported the Nazi Party because the Nazi’s promised to enact a similar eugenics law in Germany. In 1933, the Law of the Prevention of Genetically Diseased Offspring came into effect in Germany. Over the next seven years, between three hundred and five hundred thousand Germans were forcibly sterilized in German hospitals. Thus, party politics played an influential role in the medical community of Nazi Germany. Furthermore, after 1942, most German physicians played a role in the state sanctioned genocide of virtually all non-Aryans. Race, religion, nationality, and social standing clearly intervened between the Nazi physicians duty, and their patient.

“I will maintain the utmost respect of human life.” The horrific experiments that concentration camp doctors performed on their prisoners is testament to the complete and utter violation of this part of the Hippocratic Oath. Many prisoners were sent to be pharmaceutical guinea pigs, while others were subjected to brutal physical experiments. One of these experiments, the high altitude test, consisted of placing a prisoner in a pressure-controlled room, and observing them whilst lowering the pressure in the room until the prisoner died. Another well-documented experiment is one designed to help German Air Force pilots survive longer in the frigid North Atlantic Ocean waters.

Prisoners were placed in ice baths in various positions with different types of equipment to see how long they could survive in the cold water. These types of experiments would definitely not be allowed to occur today even with animal subjects, let alone human ones. The medical community around the world was shocked to learn of these atrocities when they were brought to light during the Nuremberg Trials.

“Even under threat I will not use my knowledge contrary to the laws of humanity. These promises I make freely upon my honour.” It is clear by now that Nazi doctors violated any and all laws of humanity. The threats they faced came from the fear of a disintegrating and dissolving nation. Many German physicians believed the evil they were committing was to heal their ‘sick’ nation. They believed they could use eugenics to purify Germany, and possibly, the rest of the world. In essence, Nazi physicians believed their suffering patient was Germany itself, and their violent crimes against humanity were the treatments to cure this patient. Even after the Nuremberg Trials, most German physicians had no ethical or moral dilemmas with what happened during World War II. Two notable physicians that raised their concerns, Alexander Mitscherlich and Hanauske-Abel, were ostracized, with the former being sued by his colleagues for ‘dishonouring the German profession’ and the latter being barred from practicing medicine by the West German Chamber of Physicians (Drobniewski, 1993).

Although the comments about Nazi physicians made in this discussion are generalized to all German physicians who worked during the Third Reich, it is likely that there were a small number of German physicians who obeyed the Hippocratic Oath. We cannot solely blame the Nazi physicians for the violations they committed to their patients. The atrocities of World War II were probably due to a combination of the physicians themselves, the socio-political environment they were encompassed by, and various influences from the Nazi party and their fellow colleagues. The Hippocratic Oath is an apt summary of the moral and ethical obligations physicians have to society at large, and specifically, their patients. Nevertheless, history has shown that the Hippocratic Oath is ineffective against the power of an opposing state.

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# **THE POWER TO KILL: MEDICAL ATROCITIES AND THE NUREMBURG CODE**

By  
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## **Abstract**

**“The regimen I adopt shall be for the benefit of my patient, according to my ability and judgment, and not for their hurt or for any wrong”**

**-Hippocratic Oath**

**In 1939, the dark shadow of war covered the face of Europe. Thousands upon thousands died upon the battlefield, further multitudes suffered atrocious conditions and were murdered in concentration and work camps. And further thousands were tortured and murdered in the name of medical science.**

**Experiments carried out at Ravensbruck, Dachau, Auschwitz, Buchenwald and Sachsenhausen concentration camps were medico-military in nature as well as racially motivated. In Ravensbruck, 74 female political prisoners were operated on to create wounds which were then purposely contaminated to replicate wounds suffered by German soldiers in the field and test the antibiotic effectiveness of new substances such as the sulphonylamides. They were observed as their wounds festered, as some of them died and the survivors were permanently disabled.**

**Following World War II, at the 1947 International Tribunal in Nuremberg, some 20 doctors were charged with War Crimes and Crimes Against Humanity. Their crimes included some of the most sadistic and horrifying experiments in the long history of medicine. The wrongs they did their victims defy comprehension in today's world of sterile technique, voluntary participation and informed consent. But it is from their trial that the Nuremberg Code arose, a landmark set of guidelines which has since defined ethically permissible medical experimentation**

## **Introduction**

Medicine has been through numerous times of darkness in its long history but one of the darkest in recent memory was during the Nazi rule of Germany. The number of atrocities that occurred during those years is beyond comprehension. Millions were slaughtered and thousands were used in horrendous medical experiments which they often did not survive. The role of doctors as the trusted figures bringing healing and hope was completely subverted into a horrible parody as they selected who would live or die, as they mutilated

and caused untold suffering to thousands. The Hippocratic Oath, sworn by all physicians, was broken many times over.

During World War II, Nazi doctors conducted as many as 30 different types of experiments on concentration camp inmates. The victims were subjected to these studies without their consent, most often forcibly as they feared for their lives. They suffered horrendous pain, mutilation and psychological trauma. Many died in the process of the experiment and if not, were subsequently executed. The survivors were scarred for life, often with permanent disabilities that prevented them from living normal lives after the war. (USHMM, Morrison 2000)

After the end of World War II, 23 of the Nazi doctors involved in these medical atrocities were tried in what was known as "The Doctor's Trial" in Nuremberg, Germany. The trial also led to the creation of one of the most important documents on the ethics of medical research, the Nuremberg Code.

This paper will provide an overview of the medical experiments that were performed under the Third Reich and then delve in depth into the events at Ravensbruck concentration camp to give the reader a closer look at the victims, the suffering they underwent and a glimpse of what later became of them. We will then examine the fallout from these events, specifically the Nuremberg Doctor's Trial and resulting Nuremberg Code.

## **Medical Experiments**

Medical experiments performed by doctors during the Nazi regime were carried out at many concentration camps including Dachau, Auschwitz Buchenwald, Sachsenhausen and Ravensbruck. These experiments were characterized by their horrendous disregard for human suffering and the lives of prisoners. By defining certain groups of people as "subhuman", German scientists and doctors were able to subject them to the kinds of research that by law was not even permitted on animals (Seidelman, 1996). The men and women involved never consented and were forced to participate in these dangerous studies against their will. Not only were the studies inherently dangerous, but many of them were purposely designed to have a fatal outcome (Cohen).

The experiments can be grossly grouped into three categories. The first focused on medico-military studies intended to facilitate the survival of Nazi soldiers during the war. The second was aimed at developing and testing new pharmaceuticals and treatments for wounds and injuries incurred by soldiers and the third was racially motivated. (USHMM; Cohen) However, to use the terms "experiment" and "research" with the connotations which they carry in the present day does them too much honour. These pseudo-scientific exploits bore little resemblance to the planned, control group compared and ethics board approved research which is currently the norm. Indeed, many seemed more like a perverse attempt to satisfy researcher's curiosity with little basis in current knowledge nor likelihood of obtaining relevant or usable data.

The Medico-military experiments were initiated at the direct behest of Heinrich Himmler, the head of the Gestapo and second in command to Hitler. They claimed to study the conditions encountered by German soldiers in battle. With this dubious justification, Dr. Sigmund Rascher performed Hypothermia studies on hundreds of prisoners at Dachau, submerging them for hours in tanks of ice water and recording their physiological responses as they screamed with the agony of their limbs freezing. Rascher also performed horrendous high-altitude experiments using a decompression chamber to simulate sudden exposure to low atmospheric pressure. This was supposedly done to investigate ways to rescue pilots after they are forced to abandon their craft at altitude. He would often dissect the victims' brains while alive to show the formation of air-bubbles in the subarachnoid vessels. Needless to say, few of the subjects survived. (Cohen; USHMM)

The pharmaceutical research stemmed from the multitude of German Armed Forces casualties who died as a result their wounds and infections. This lead to interest in sulfanilamides as a potential new treatment of wartime wound infections. However, these drugs were not tried on wounded soldiers but on previously healthy prisoners who were wounded, suffered contamination and deliberate infection to reenact wartime conditions. These were among the experiments carried out at Ravensbruck concentration camp (Cohen). Experiments at other concentration camps also involved immunization of inmates with experimental compounds and sera for the "prevention" of contagious diseases such as malaria, typhus and tuberculosis. (HE-NME)

The Nazi doctors were charged with protecting and furthering the health of the *Volks* ("people"). This lead to a wide array of experiments with the goal of furthering Aryan racial purity and supremacy. Doctors at Auschwitz and Ravensbruck searched for the cheapest and fastest methods of mass sterilization of undesirable and genetically inferior groups such as Jews and Roma (HE-NME; Lifton, 1986). Dr. Clauberg psychologically tortured and caused to be inseminated hundreds of Auschwitz's female prisoners. And the infamous Dr. Mengele, the "Angel of Death" performed his atrocious studies of twins, believing that he could unlock the secret of heredity in man and that of multiple births to help the Aryan race repopulate the world (Cohen; Lifton, 1986)

## **Ravensbruck**

The Ravensbruck concentration camp, located 85 km north-west of Berlin, begun operations in May of 1939. It was the only exclusively female camp during WW II. Initially designed to house around 4,000 inmates, this number was reached within its first year and a half of operation, whereupon new transports of prisoners from German acquired lands lead to progressively severe overcrowding (Morrison, 2000). By the end of the war, approximately 123,000 women belonging to nearly 40 nations had been imprisoned at the camp through its operation. Poles (25%), Germans (20%), Jews (15%) and Russians (15%) constituted the largest national groups. Over 80% were political prisoners (Gajewski, 2005)

Unlike the infamous extermination camps epitomized by Auschwitz, Ravensbruck was a labour camp through most of its history. Women were exploited to perform farm work, road building and worked long hours in textile and electrical component factories producing materials for the German war effort. Executions did happen but it was in the last year of operation (1945), as German forces were pushed out of conquered territories by the Allies and evacuated camps such as Auschwitz, that it transformed into a full scale death camp with poisoning, gun-point executions and gassing of prisoners. (Morrison, 2000)

### **Medical Experiments at Ravensbruck**

The most infamous experiments to be carried out at Ravensbruck involved the testing of sulfonamide drugs for wound infections and also a number of bone, muscle and nerve regeneration and transplantation experiments (Jewish Virtual Library).

Who were the victims? They were 74 young Polish women, one German and one Ukrainian. Most were around 20 years of age; many were university students and teachers. The Polish women had mostly arrived at Ravensbruck as part of a transport from Lublin in September of 1941 and had originally been arrested for connections to the Polish resistance group, the ZWZ. Thus, they were classed as Political prisoners and summarily given the death sentence without even a semblance of a trial. United by their nationality and their time together at the Lublin interrogation centre, they formed a close community while at Ravensbruck. This closeness helped them survive when they became the “kruliki”, “Lapins” (rabbits) or guinea-pigs in Dr. Gebhardt’s experiments (Morrison, 2000).

The sulfanilamide experiments were carried out from July 20, 1942 until August 1943. They were motivated by the German war effort, where on the Russian front heavy casualties were occurring from gas gangrene (Mazal Library). They were performed primarily by Drs. Gebhardt, Fischer and Oberheuser. Dr. Gebhardt was an internationally renowned surgeon and director of the prestigious Hohenlychen clinic near the camp which was reserved for the elite of the Reich (Tillion, 1975). Dr. Fischer performed most of the surgeries at the instructions of Dr. Gebhardt. Dr. Herta Oberheuser was the camp physician at Ravensbruck. She examined and chose the group of women who would be used in the experiments, assisted during their surgeries and had direct charge of the victims post-operatively (Morrison, 2000; Tillion, 1975).

The sulphonylamide experiments occurred in several series, each involving ten to twelve women. They would be removed from their regular barrack, crudely anesthetized and subsequently have their lower leg deeply incised. To the wounds were applied either i) a bacterial culture and wood fragments ii) bacterial culture and glass fragments or ii) bacteria plus wood and glass. The bacterial cultures included staphylococci, streptococci, para-oedema malignum, and earth (tetanus) supplied by the Hygiene Institute of the Waffen SS. Upon contamination of the wounds, the skin was closed and the limb was dressed with plaster into which windows may be cut to facilitate observation of the surgical site. The women were then given various sulfonilamides including catoxyn and



marfanilprontalbin. The women subsequently suffered from great pain and fevers but as there were no deaths, this experiment was criticized for not conforming sufficiently to battlefield conditions. In order to increase the severity of the gangrene, in the next series the circulation to the inoculated area was interrupted by tying off blood vessels and muscles on either side. This was meant to simulate battlefield gunshot wound conditions. This led to greatly increased severity of infection- five women died as a direct result and six were subsequently executed by shooting. The women who survived had lingering infections, necessitating repeat admissions to the camp hospital. On some the wounds failed to heal for more than two years and there was at least one whose old wound continued to discharge for the rest of her life (Mazal Library).

The second group of experiments occurring at Ravensbruck began in August 1942 and continued for a year. Dr. Stumpfegger and others severed muscles, shattered and removed bone, cut nerves all ostensibly in the name of learning more about the regeneration of these tissues. In many cases, the victims were submitted to repeated surgeries which resulted in long periods of illness, severe pain, permanent deformity and disability (Mazal Library; Morrison, 2000). Several further atrocious experiments were attempted where whole limbs (entire leg, arm with scapula) were severed from the hapless victims with the ostensible purpose of transplanting them onto wounded soldiers. These were universally fatal to the victim and it cannot be imagined that the supposed recipient reaped any benefit from the sacrifice (Mazal Library).

The victims of these experiments never volunteered or consented to be Nazi guinea-pigs, in fact they protested vocally and in writing to the camp authorities. At the Nuremberg trial several testified that they would rather have died than continued with the experiments as they were convinced that they were to die in any event. (Mazal Library) In time, their resistance grew so strong that male guards had to forcibly carry them off to the Bunker (camp prison). One of the survivors testified at the Nuremberg Trial:

"I resisted and hit Trommer in the face and called him a bandit. He called some SS male guards who threw me on the floor and held me down while ether was poured over my face. There was no mask. I fought and resisted until I lost consciousness. I was completely dressed and my legs were filthy dirty from walking in the camp. As far as I know my legs were not washed." (Mazal Library: NO-864, Pros. Ex. 229. Ppg 396)

The post-operative conditions were also atrocious. The victims would only sporadically be examined by doctors, left for days to weeks without dressing changes. As they lay helpless in their beds, burning with fever, their calls for water or morphine to dull the pain would be ignored (Mazal Library-testimony). After release from the hospital they were still in miserable condition but were forced to work, knitting and weaving garments and shoes for the German armies. Only the care of their fellow prisoners allowed them to survive (Tillion, 1975).

In total, 63 of the 74 Polish women survived; four had died as a direct result of the experiments and six were executed. (Gayewski, 2005) In the last months of Ravensbruck

this was truly a challenge. Not only were the camp conditions so severely deteriorated with overcrowding, disease and lack of food that hundreds of able-bodied prisoners died, but the "rabbits" were ordered executed. With the Allies approaching, the Nazis were trying to eliminate evidence of some of their heinous crimes. However, the "rabbits" plight over the previous years had gained them the sympathy of other prisoners who went on to share what meager rations they could, hid them under floorboards and helped them switch identities by take the numbers of dead prisoners. Not a single one was betrayed. In the spring of 1945, as the Germans began the evacuation of Ravensbruck, some of these crippled women were forced on a death march with hundreds of other prisoners. Only eighteen were evacuated on Red Cross transports (Morrison, 2000).

## **Nuremberg Trial and Code**

Following the completion of World War II, the leaders of the Nazi regime were brought to trial in the first International Military Tribunal at Nuremberg. Following this tribunal, the United States conducted twelve additional trials of Nazis from law, ministry, finance and other sectors, many of the actual perpetrators of the war crimes. The judges and prosecutors of these cases were solely American. The first of these proceedings was the Doctor's Trial.

The Doctor's Trial, alternately known as the Medical Case and officially designated as USA vs. Karl Brandt et al., was tried at the Palace of Justice in Nuremberg. The indictment was filed on October 25, 1946 against 23 physicians for their involvement in the murder and torture of prisoners in medical experiments. The tribunal convened 139 times until the judgment was finally passed on the 19<sup>th</sup> of August, 1947. Of the 23 doctors charged, sixteen were found guilty; of these 7 were sentenced to death by hanging and were executed on June 2, 1948 (Mazal Library). The remaining charges ranged from life imprisonment to 10 years (Shuster, 1997). However, many of the prison sentences were subsequently decreased, for instance in the case of Dr. Oberheuser.

Of the physicians involved in the Sulphonilamide experiments, Drs. Karl Brandt, Handloser, Gebhardt, Fischer and Mrugowsky were convicted and Karl Brandt, Karl Gebhardt and Joachim Mrugowsky were executed (Mazal Library). Dr. Oberheuser, the only female defendant in the Doctor's trial, was convicted for her crimes and received a 20 year sentence. However this was later reduced to 10 years which was further shortened due to "good conduct". She was released in April 1952 and subsequently started up in private practice. For all the horrors she had committed and participated in, she was still allowed to practice! When this became known to the Association of Former Ravensbruck Concentration Camp prisoners, they protested vehemently until her license was finally revoked in 1958 (Dorner, 2001). It seems monumentally unjust that after participating in such heinous acts from the position of medical power, violating all aspects of the Hippocratic Oath, a number of these doctors were still allowed to return to their normal lives and practice.

The Nuremberg trial truly brought to light the insufficiency of the Hippocratic oath and ethics when dealing with the matter of medical experimentation on human subjects.

During the Nazi era, the application of the Hippocratic Oath was warped beyond comprehension as doctors performed experiments in the name of the State or “greater good” while completely disregarding any personal rights of, or obligations to their victims. Furthermore, during the trial proceedings, several of the German doctors had argued in their defense that no international law or statement differentiated between what constitutes legal or illegal human experimentation (Shuster, 1997). The observation of this gap in the governance of medical science was extremely concerning to the prosecution members. In April 1974, Dr. Leo Alexander, an American physician consult to the prosecution, addressed a memo to the chief prosecutor outlining six points to aid in the distinction of legitimate research (Shuster, 1997). These points, as well as input from Dr. Andrew Ivy, prosecution advisor on behalf of the American Medical Association, formed the core of what was later presented as the Nuremberg Code.

### **The Nuremberg Code**

1. The voluntary consent of the human subject is absolutely essential.

This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, over-reaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment.

The duty and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs or engages in the experiment. It is a personal duty and responsibility which may not be delegated to another with impunity.

2. The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.
3. The experiment should be so designed and based on the results of animal experimentation and a knowledge of the natural history of the disease or other problem under study that the anticipated results will justify the performance of the experiment.
4. The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.
5. No experiment should be conducted where there is an a priori reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects.

6. The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.
7. Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.
8. The experiment should be conducted only by scientifically qualified persons. The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.
9. During the course of the experiment the human subject should be at liberty to bring the experiment to an end if he has reached the physical or mental state where continuation of the experiment seems to him to be impossible.
10. During the course of the experiment the scientist in charge must be prepared to terminate the experiment at any stage, if he has probably cause to believe, in the exercise of the good faith, superior skill and careful judgment required of him that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

The Nuremberg code has at its centre the primacy of the rights of the human subject in experimental research. Whereas the Hippocratic oath is focused on the physician and their role, the Nuremberg code completes and supplements the Oath by specifying patient autonomy and empowering them in the patient-doctor relationship. The overriding requirement of the Code is the fully informed and freely given consent of the patient. This is the pivotal aspect that was universally violated in the medical experiments of the Nazi regime. Furthermore, when coupled with criterion 9, the right of the subject to withdraw from the experiment at anytime of their choosing, the Code empowers the subject to a level not previously seen. By Hippocratic ethics, the patient is the silent partner in the patient-doctor relationship, actively participating only to seek out the initial help but then trusting blindly in the physician's knowledge and beneficence. However, when the goal of the physician is research, their care for the patients' direct well-being is jeopardized.

Furthermore, 4 through 8 directly attempt to protect the patient from any possible harm, injury, disability or death. But at its core, it is by empowering the patient, that the Code provides a new balance between doctors and their patient-subjects which will hopefully prevent the reenactment of the medical crimes of the past. And while the Nuremberg Code has not actually been passed as law in any country, its basic tenet of informed consent has been universally accepted and is articulated in international law as part of the United Nations International Covenant on Civil and Political Rights.

In remembering the stories of the ones who suffered in a time of unbridled medical power and disregard for the sanctity of human rights and lives, we do honour to the victims and moreover, take it upon ourselves to ensure that the past is not allowed to be repeated. May they rest in peace.

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# **IT'S MY BODY AND I CAN DIE IF I WANT TO: THE AUTONOMY REVOLUTION**

By

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## **Abstract**

**“Revolution” is not too strong a word to describe the great transition that has taken place over the last 30 years in the ethics of clinical practice in North America. Hippocratic notions of benevolent paternalism were overthrown and the age of principlism was ushered in with the publication of Beauchamp and Childress’ “Principles of Biomedical Ethics” in 1979.**

**Of Beauchamp and Childress’ four guiding principles, none has seemed as controversial and revolutionary as the principle of respect for autonomy. Despite the changes in the medical community that this principle has precipitated, the idea in itself is far from new. The concept of respect for autonomy dates back to the times of Immanuel Kant and John Stuart Mill, and became well integrated into the North American political, economic, and social systems. Despite the far-reaching influence of the autonomy principle, however, it was not until the 1970s that respect for autonomy began to be firmly entrenched into the clinical practice of medicine.**

**Many factors may have contributed to the rise of autonomy in clinical ethics, from Beecher’s report of violations of the rights of research subjects, to technological advancements in medicine and the rise of the so-called “risk society” described by Onora O’Neill (2002). Perhaps most importantly, the autonomy revolution might never have occurred if not for the input of the general public.**

In its current formulation, respect for patient autonomy means that doctors help patients to make decisions that are free of the controlling interference of others, including interference from the medical profession; at the same time, doctors attempt to facilitate these decisions by removing barriers to meaningful choice, such as inadequate understanding of the issues at hand (Beauchamp and Childress 2001). These ideas form the basis of the practice of informed consent and the right of patients to exercise their autonomy by refusing treatment.

The modern concept of respect for another person’s capacities to govern his or her own life can be traced back to the philosophical writings of Immanuel Kant (1724-1804) and John Stuart Mill (1806-1873).

In Kant's view of ethics, morality is based not on the consequences of actions but on the rightness of the rules or maxims that drive one's actions. Thus, in order for people to make morally good decisions, it would be necessary for them to make independent choices. Society should not interfere with these decisions, and every person should be treated "as an end and never as a means only" (Beauchamp and Childress 2001). In essence, Kant put forth the idea that it was morally necessary to treat people with the respect and dignity consistent with their being autonomous beings, albeit justified in a manner that most modern people would find to be convoluted and unfamiliar.

The formulation and justification of respect for autonomy as we know it today was probably most clearly stated by John Stuart Mill in the 19<sup>th</sup> century. Unlike Kant, Mill was a utilitarian, believing that the moral rightness of an action or decision could be judged by its consequences. Consequently, moral good according to Mill was that which resulted in the largest benefit and minimum harm to the greatest number of people. To him, good resulted for society when individuals were allowed to flourish as well-developed human beings; these people reached their maximum potential and contributed to the well being of themselves and humankind. According to Mill, in his 1859 work "On Liberty", individuals needed to be protected from the so-called 'tyranny' of government and pressure placed on minority groups by the majority in society, if they were ever to reach this ideal state of development (O'Neill 2002).

The broad influence of the Millian concept of autonomy on North American society can be readily seen by a casual glance at the prevailing social and economic systems. The rights of individuals to govern their lives are played out in systems of democratic and responsible government, and the free market economy revolves around the autonomous decisions of individual buyers and sellers. The concept of respect for autonomy and the means to enforce it have been entrenched in North American society for over a hundred years.

Despite the triumph of autonomy in many aspects of life and society over the years, medicine was curiously resistant to the invasion of this concept. While Hippocrates recognized the need to do good while avoiding harm to patients, he did not recognize the need to respect the patient's perspective (Hebert 1995). In fact, Hippocrates felt that patients might be best served by choosing carefully what one told the patient and concealing most things from him or her, a course of action that would be an appalling violation of the autonomy principle in modern bioethical thinking. Yet, Hippocratic benevolent paternalism persisted in North American medicine for years.

Benjamin Rush (1745-1813), the famous American medical teacher and a signer of the Declaration of Independence, stated, perhaps ironically, that it was essential for physicians to maintain "an inflexible authority... in matters essential to life" (Jonsen 2000) even as the United States was beginning a new era of independence and throwing off the authority of its colonial rulers. When the American Medical Association published its first Code of Ethics in 1847, the contents emphasized professional justice and social duty more than truth-telling and patient autonomy (Jonsen 2000). A hundred years later, in 1950, the AMA Principles of Medical Ethics devoted 16 pages to "relationships within the

profession” and only 6 pages to the “duties of the physician to patient and public” (Jonsen 2000).

The physician-centered ideology of North American medical ethics during the early 19<sup>th</sup> century likely reflected the issues of the day that physicians were dealing with; maintaining standards of education and professional conduct among doctors were paramount. This was reflected in Thomas Percival’s 1803 work “Medical Ethics” (Percival 1985), a book which strongly influenced the AMA’s 1847 code of ethics (Jonsen 2000). In such a climate, respect for patient autonomy would be quite out of place, for if physicians focused their energies on ensuring that they provided skillful, professional services, and patients as a result received satisfactory care, it would be ridiculous to introduce confusion by asking the patient to grant permission for this care to be given.

If the existing status quo was to change, events would need to occur that would increase the relevance of patient autonomy to clinical practice. In parallel to the rise of autonomy as a bioethical principal in the 1970s, great changes were indeed taking place in society that forced doctors and patients alike to re-examine the ethical principals defining the nature of the physician-patient relationship.

The dramatic changes taking place in society can be summarized in three general categories. Firstly, revelations of severe violations of patient rights in medical research provided a motivation to introduce changes to medical ethics. Secondly, technological advancements produced ethical dilemmas the likes of which were never seen before, and these changes forced society to consider the importance of patient autonomy. Lastly, the social climate of North America was changing, and this forced the medical profession to adapt accordingly.

Medical research is a fitting place to begin tracing the modern rise of autonomy in clinical ethics. As it is a commonly accepted principle that the subjects of medical research are more vulnerable than the average patient (Hebert 1995), it seems reasonable to expect that ethical concerns regarding patient rights would become most apparent in this aspect of medicine. Indeed, ethical issues arising from research provided some of the earliest steps by which respect for autonomy became accepted in medicine.

The first of the major revelations of the abuse of research subjects came to light after the Second World War, when ghastly Nazi experiments on living prisoners, and the use of gas chambers to eliminate persons deemed to be a burden on the state, were revealed to the world. The response to these crimes, the Nuremberg Doctor’s Code, was written in 1947, asserting that the voluntary consent of human subjects must be absolutely essential to clinical research (Hebert 1995).

The Nuremberg Doctor’s Code made a firm statement on the necessity of defending patient autonomy by using of informed consent, and yet, if the AMA’s code of ethics issued just three years later is any indication, the autonomy revolution was still twenty to thirty years away. It is apparent that the standards set for medical research did not transfer



immediately into everyday clinical practice (O'Neill 2002). Some insight into why this might have occurred may be gleaned from medical ethics books at the time.

In his book, "The Ethical Basis of Medical Practice" (1950), Harvard theologian Willard Sperry reasoned that Nazi crimes should teach physicians that the doctor must put the "worth of the individual" ahead of the interests of society when it came to patient care. Quite importantly, he did not conclude that patients must be informed and asked for consent; rather, the power to define and safeguard patients' best interests remained firmly in the hands of doctors.

The abuse of patients in medical research did not end with the fall of Nazi Germany. In 1966, Henry Beecher published a ground-shaking report of ethical violations in American medicine, including the injection of hepatitis virus into mentally handicapped children (Jonsen 2000). The final outrage in American medical research probably occurred when the Tuskegee syphilis study made the front page of the New York Times newspaper in 1972. In this study, effective treatment for syphilis was withheld from unsuspecting black male patients, who were misled so that the natural course of the disease could be studied (Jonsen 2000). In the aftermath of public outrage provoked by this information, the US government created the National Commission for the Protection of Human Subjects of Biomedical and Behavioural research, better known by its publication, the Belmont Report of 1979.

One of the writers of the Belmont Report was Tom Beauchamp, a co-author of the revolutionary "Principals of Biomedical Ethics". He acknowledged that the two works were written simultaneously and mutually influenced each other; the Belmont Report reaffirmed the principles of autonomy, beneficence, and justice, and also the use of informed consent to protect patients (Beauchamp 2003, 17-46). Unlike the Nuremberg Doctor's Code, the Belmont Report was followed by the changes in clinical practice that have unfolded since the 1980s.

The obvious question that arises is why the Belmont Report had the effect that it did, while the Nuremberg Doctor's Code did not. Perhaps the Beecher report and the Tuskegee study finally drove home the idea that it was not only Nazis who failed to respect patient autonomy, and that autonomy needed to be respected everywhere. However, the latter point was also strongly reinforced by issues arising from changes in medical technology occurring in late 20<sup>th</sup> century.

The latter half of the 20<sup>th</sup> century saw the development of mechanical ventilation and other life support measures, which patients realized could be used to keep them alive after they became completely incapacitated. This possibility raised many ethical questions, which were crystallized in the case of Karen Ann Quinlan in the late 1970s.

Karen Ann Quinlan fell into a coma after taking alcohol and Valium in 1975. Her father requested that life support be discontinued, based on what he thought her wishes would be (Hebert 1995). The New Jersey Supreme Court ruled that it would not be homicide if

physicians were to do so, which clarified the right of autonomous patients to refuse treatment and the legal permissibility of doctors respecting that right.

The Quinlan case was to clinical medicine what the Tuskegee study was to medical research. While the abuse of research subjects led to the modern formulation of respect for autonomy in medicine, it was the issues concerning a patient's right to die by refusing treatment that gave clinicians, and not just researchers, a practical reason to implement the principle.

This explanation is complicated, however, by the fact that patient refusal of life-sustaining treatment was observed before the development of mechanical ventilation. As early as 1950, Willard Sperry discussed a dilemma that arose when US President McKinley was shot in 1901. The unlucky president developed peritonitis and was kept alive on oxygen, in pain, for hours, as he begged doctors to let him die. Long before ventilators were available, penicillin and sulfa drugs saved patients, such as those with incurable, progressive multiple sclerosis, who would have preferred to die of their infections (Sperry 1950).

Even earlier than 1950, the issue of respect for autonomy had appeared in a different form. In the 1914 Justice Benjamin Cardozo heard the case of *Schloendorff v. Society of New York Hospitals*. A patient had refused to give consent for an operation, but the surgery was performed without her knowledge during an abdominal examination under anaesthesia. Unfortunately, she contracted an infection and developed gangrene that led to the amputation of several of her fingers. The judge recognized that the surgeon was in the wrong and that "every human being of adult years and sound mind has a right to determine what shall be done with his own body" (Young 1998, 441-451).

The increasing awareness in clinical practice of the need to respect patient autonomy, then, cannot be explained solely by the fact that autonomy issues arose with the development of mechanical ventilation. The fact of the matter is that such issues arose on several occasions prior to the 1970s, and had little impact on the practice of medicine. Most likely, the main reason the Quinlan case had the impact that it did was because it captured the public sentiment in a way that multiple sclerosis patients or victims of surgery gone wrong could not. As stated so eloquently by California's Natural Death Act, "For many, the ultimate horror is not death, but the possibility of being maintained in limbo in a sterile room, by machines that are controlled by strangers" (Young 1998, 441-451). This, in all likelihood, was the reason clinicians were finally forced to recognize the importance of respecting patient autonomy.

Finally, an evaluation of the changes in medical ethics beginning during the 1970s would not be complete without putting them in the context of the social changes that were occurring simultaneously.

Into the 1960s, physicians were presumed to have moral authority regarding the conduct of medical practice, because they were believed to have wisdom and authority by virtue of them having made difficult decisions for their patients in the past. However, into the

1970s this presumed authority of physicians was questioned. A moral vacuum was created as this taken-for-granted source of moral agreement was lost (Engelhardt 2003, 91-112), a phenomenon H. Tristram Engelhardt Jr. referred to as the “deprofessionalization” of medicine.

As the public interest raged about the questions brought up by the ‘right to die’ issue, the United States was wrestling with other ethical questions surrounding controversies such as the Vietnam War, the availability of safe abortion and contraceptives, and the civil rights movement. This opened the door for academic ethicists to apply their theories to practical matters, including medicine, in a way that they had never done before.

The introduction of new modes of ethical thought and reasoning to medicine helped to fill the void left by physicians when their role in defining ethical policy was no longer accepted without question. It was these new ways of thinking about medical ethics, such as Beauchamp and Childress’ principal-based theory, which helped to shape modern bioethics and the principle of respect for autonomy as they exist today.

Into the future, the principle of respect for autonomy will continue to stimulate thought and discussion in bioethics. For example, Onora O’Neill (2002) has put forth the idea that informed consent may become nothing more than a fad to maintain the trust of the public in a fearful, so-called “risk society” that is losing trust in medical technology they cannot control.

While the future of autonomy in bioethics remains to be seen, the medical profession has much to learn from the story of its rise to popularity. Patient autonomy was a concept that existed, and was recognized in a non-clinical setting, long before it became widely accepted by physicians. Without the questioning eye of the public scrutinizing the profession, this acceptance may have been even more delayed. Partly because of this, ethics in medicine has evolved to bring in experts outside of the medical field to raise and discuss bioethical issues, with input from the public, whether or not they appear to be immediately relevant to physicians. Hopefully, these changes will inspire physicians to likewise remain adaptable, flexible, and open-minded in a world where medicine changes more rapidly than ever.

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# THE PREVALENCE “QUACK” DOCTORS IN MODERN INDIA

By

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## Abstract

**One obstacle India faces in providing adequate healthcare to her citizenry is the prevalence of “quack” doctors. Though universally denounced, quackery seems to thrive in India. The question then, is why? Many authors have elucidated the economic, social and legal factors behind quackery in India. This paper diverges from the traditional analyses (as far as can be ascertained) by linking modern quackery to India’s history of medicine. This paper argues that there has historically been reliance upon, and legitimacy conferred to, “peripheral” medical models. Throughout the subcontinent’s history, various political and socioeconomic factors have resulted in different medical models evolving or being imported. In each instance, this has resulted in disenfranchisement of a significant proportion of the population. Removed from the mainstream medical model, each disenfranchised population has come to rely on the peripheral medical framework. It is tenuously proposed that quackery’s prevalence in modern India is simply the continuation of this historical process. A process promulgated in post independence India, by the factors outlined in the traditional analyses. Using research papers, books, government documents and news articles, this paper devotes itself to exploring this issue.**

## Introduction

India faces numerous challenges in providing adequate healthcare services. One specific obstacle, consistently referred to in the Indian literature and media, is the prevalence of “quack” doctors. For instance, a 2004 study conducted in the West Bengal, by the Pratichi Trust and Nobel laureate Amartya Sen, found that quacks were an economic drain on the poor and hurt their patients by providing inadequate and inappropriate health services (Hindu 2005). This is a conclusion reiterated in numerous other sources. Yet, despite being denounced by the government, courts and civil society, quackery still thrives. This forces one to ask, why is quackery so prevalent in India? This is an important question because understanding the reasons underlying the prevalence can potentially guide future policy solutions.

The work of other researchers in this field can be distilled to a few core, yet interrelated, issues (see Peters et. al., Lawyers Collective, & Rohde et. al). The most common explanation is that there is an economic incentive for quackery. In the Indian context, this

argument emerges from the government's legitimatization of private healthcare services to meet societal health demands. The government's policy provides quackery an economic motive.

A second explanation for quackery in India is that quacks meet a health need. It is clear that the Indian government is unable to meet the needs of a growing population, with increasingly varied requirements. As such, quacks fulfill a void.

A third explanation for quackery in India is that no legal deterrent to quackery exists. It was only recently that the Indian Supreme Court outlawed quackery, and existing legislation/regulation does not explicitly ban them. Moreover, the intricate federal-state healthcare relationship leaves many loopholes through which quacks walk through. Conversely, there lacks adequate enforcement of the laws/regulations that do exist. Quacks, for the most part, live in a legal and regulatory void.

As many authors have previously discussed the economic, social and legal factors of quackery in India, this would be an appropriate time to retreat from the subject. However, the author would like to diverge from the traditional analyses (as far as can be ascertained) by linking modern quackery to India's history of medicine. This paper argues that there has historically been reliance upon, and legitimacy conferred to, "peripheral" medical models. Throughout the subcontinent's history, various political and socioeconomic factors have resulted in different medical models evolving or being imported. In each instance, this has resulted in the disenfranchisement of a significant proportion of the population. Removed from the "core" medical model, each disenfranchised population has come to rely on a peripheral medical framework. It is tenuously proposed that quackery's prevalence in modern India is simply the continuation of this historical process. A process promulgated in post independence India by the factors outlined in the traditional analyses.

Using research papers, books, government documents and news articles, the rest of this paper devotes itself to exploring this issue. The paper first provides a functional definition and profile of quackery in India. Following this, the paper discusses the thesis. By briefly outlining the history of medicine in India, the paper attempts to draw parallels between history and quackery today.

## **Definitional Issues**

Quackery is not a problem specific to India. Quacks are found in all societies – developed and developing. Nor is quackery a recent phenomenon. Ancient Indian medical texts refer to quacks, and Charaka, the vaunted Indian medical figure, called quacks the "accompaniers of disease," urging rulers to treat them as such (Chowdhury 1988). The term itself has more modern origins. It is derived from the word quacksalver and was originally used to denote one who quacks like a duck to sell their wares (Bigsby 1998). In India, the definition of quack was concretized in the landmark 1996 Supreme Court case, *Verma v. Patel*. In this case Poonam Verma launched a wrongful death suit against homeopathic doctor Ashiwani Patel. In deciding against Patel, the Supreme Court wrote "a person who does not have the knowledge of a particular system of medicine but

practices in that system is a quack . . . to put it differently - a charlatan or a cheat” (Lawyers Collective 2005).

In India, quacks are found in all areas of healthcare. Quackery ranges from physicians, pharmacists/pharmacies, laboratory services etc. This paper however, exclusively deals with untrained persons working as physicians. Recent statistics indicate that there are ~1.25 million of these persons in India. This is a phenomenal number considering there are ~503,000 licensed allopathic doctors and ~1.11 million licensed doctors in all regulated fields (Allopathy, Ayurveda, Unani Tibb, Homeopathy and Siddha). There are more quacks than there are doctors (Peters et. al 2002).

A quack is likely to be male, with 90% of them practicing allopathy close to their birthplace (Rhode et. al 1995). Twenty five percent are graduates of a medical system but 50% have no formal training. For the purposes of conceptualizing the problem, quacks can be roughly divided into two categories (Peters et. al 2002). Those with no training, yet practicing allopathic medicine and those with training in traditional medicine, yet practicing allopathy or some mixture thereof. Another study investigated the motivations of quacks. Overwhelmingly, quacks stated that they had a desire to help others. Profit was a secondary motive (Kakar 1983). Another study investigated the quacks’ practice. Interviewing 542 patients who had visited a quack, the authors found that no physical examinations were conducted in 47% of the cases, and that the medications administered were blatantly wrong/harmful to the patient. However, these same authors found that the patients were satisfied with the care they received. Quacks held convenient clinic hours, had a helpful attitude, and a ready access to medication. Furthermore the patients interviewed felt comfortable with quacks because the quack was a longstanding member of the community (Rhode et. al 1995).

## **A Brief History of Medicine**

Medicine in India has a long and storied history. In the Harappan and Mohenjodaro civilizations (~2500-1700 BCE) the priest-healer held an exalted position. He may have led the purification exercises and likely served as a shaman. As illness treatment was likely tied to their religious beliefs, Zysk speculates that the priest-healers’ process of healing likely included magical séances, mantras, plants (for healing properties) and ritualistic dances. Each civilization also placed great importance on personal hygiene and public health measures. Archeologists have found evidence of public baths, waste treatment protocols, a bath/toilet in each house, and the infrastructure for mass collection and purification of drinking water (Zysk 1991).

With the fall the Harappan and Mohenjodaro civilizations (due to climate change and military conquest) and the rise of the Vedic era (1500-350 BCE), the focus of medicine shifted, resulting in many people being marginalized. Public health initiatives were lost and over time, the role of the healer lost status amongst the ruling elite. Though respected and understood to be an important part of society, it appears that physicians, and medicine, were denigrated for their “impurity.” Researchers of this era speculate that physicians existed outside of accepted society, roving the countryside in organized sects.

They increased their knowledge by sharing practices, and made their living by administering herbal remedies to the ailing (Chowdhury 1988).

This changed with the era of Buddhist influence in India (350 BCE – 350 CE). In the 3<sup>rd</sup> century BCE, the emperor Ashoka laid claim to a vast part of modern day India. Renowned for many accomplishments, of particular importance was his focus on healthcare. His second stone edict dictated that he would provide healthcare to his citizens and import pharmaceutical plants to regions where they were not available. Prior to Ashoka and the era of Buddhist influence, the wandering ascetics used the monastery as a place of refuge (e.g. during monsoons) (Zysk 1991). It was here that medical knowledge was shared and expanded upon. Medical knowledge eventually became codified and the provision of medical care became part of the Buddhist ethic (Hughes et. al 1995). Originally, healthcare provision was limited to monks tending to other monks, but later expanded to include the citizenry, with the monastery becoming a central place of healing (Kumar 2003). By the time of Ashoka's second edict, the use of the monastery to provide health services to the general population was an established practice. His dictate accelerated the process and the construction of hospitals began, expanding with subsequent rulers (Zysk 1991).

The decline of Buddhism, with the concurrent rise of Hindu orthodoxy, saw dramatic changes (Somjee 1995). It was during this period that the Ayurvedic system was codified, and this era is generally referred to as the Classical Era (Chowdhury 1988). However, it was also the period where the marriage between medicine and social norms became entrenched (Somjee 1995). Of particular note was the intertwining of the caste system with the practice of medicine. During the Vedic era, the ruling elite had divorced themselves from the practice of medicine. In the Classical Era however, the ruling elite became the arbiters of medicine while enforcing stricter notions of caste purity. As such, the practice of medicine became an instrument of the elite. As Chowdhury notes, the student should be, “around sixteen, and he should be good looking, intelligent, honest and free from vices and physical deformities. Preferably he should come from a good family.” (1988 pg. 147) Chowdhury goes on to explain that students were “limited to a few from the privileged class of society”(Ibid). Another issue is that while medicine was under the purview of the ruling elite, many of the required services were stratified by caste (e.g. touching others). The long-term sequela was the disintegration of the public health/hospital system, and the consequent disenfranchisement of many people from mainstream medical knowledge.

Because of these changes, the Classical Era witnessed the rise of alternative medical systems. Alchemy was introduced between 700 and 800 CE. Siddha and Tantricism were founded and folk medicine became reconstituted. As the social elite controlled access to, and knowledge of, Ayurveda, Ayurveda began to degenerate in the villages and remote areas. What emerged was a combination of Ayurveda and magical explanations for diagnoses and treatment. As these communities became further isolated, disease recognition, herbal treatments, and the rational underpinnings of each, were lost (Chowdhury 1988).



The later part of the Classical Era, and the beginning of the Mughal Era, introduced Unani Tibb (Chowdhury 2002). Practiced by the Muslims, it was originally developed in Arabia and later migrated east to Persia and beyond. By the 10<sup>th</sup> century it had a rudimentary presence in India. Later, the Mongol invasions of the modern day Middle East resulted in the dramatic immigration of Unani Tibb practitioners to India. During the reign of Akbar another wave of practitioners followed. In both instances, the political and social climate was ideal for Unani Tibb researchers and practitioners to thrive (Sheehan 2002). In India they found patronage under the Mughal Empire, and Unani Tibb flourished, becoming the official medical system of the Mughal Empire. However, it was not universally accessible. During the Mughal Era (and beyond) there existed a schism in medical models, whereby Muslims exclusively used Unani Tibb, while Hindus used the other systems available (Ayurveda, Siddha, folk medicine) (Kumar 2003).

The decline of Unani Tibb as the state's medical model coincided with the increasing prominence of the British in India. With the colonization of India, the British removed state support for Unani Tibb and focused their resources on allopathic medicine, while at the same time reviving the structures of public health (Kumar 2003). The reconstitution of a public health system was flawed however. Services were limited to urban areas where the British lived, and accessible only to the British and the rich Indian elite (Somjee 1995). The rural (where the majority of Indians lived) and poor populations (the majority of Indians) were disenfranchised from this new mainstream medical model. This situation was acknowledged in the 1944 Bhole Committee report (commissioned to investigate health services for independent India) (National Health Policy 2002). During their reign the British did not outlaw the indigenous medical systems. Rather, they simply withdrew support. As such, Ayurveda, Unani Tibb, Siddha and the various other medical systems existed in the periphery.

This situation existed well into Independence (1947) (National Health Policy 2002). As mentioned, the seminal Bhole Committee Report found that there was a marked discrepancy in the level of health services between rural and urban centers. To rectify this, the Committee proposed, and the subsequent Government accepted, the allocation of resources into public health and the use of rural aid workers. In a series of five-year development plans, this was the health model India pursued. In the early 1970s, the India government took the further step of recognizing and regulating India's indigenous medical models (National Health Policy 2002). As such, Ayurveda, Unani Tibb, Siddha, Yoga and Homeopathy (imported from the West) all moved from the periphery to the core. This conceptual shift was restated in the 2002 National Health Policy. From available research, it appears it was the first time, since the Buddhist era, that all of India's citizens, and her medical models, were accepted and supported by the state.

It is at this juncture that the traditional analyses of the prevalence of quacks make an appearance. The government has underserved India's urban poor and rural communities. To alleviate this shortcoming, the government has increasingly relied on the private sector (Special Issue 1994, Peters et. al 2003). However, this is an inadequate solution, as access to the regulated private sector is beyond the means of the disenfranchised. Whole communities are removed from the private/public medical model and quacks thrive as

peripheral alternatives because they fulfill a need, have an economic motive and legal loopholes exist.

This overview of the history of medicine in India is intended to illustrate that the reliance on peripheral medical models has existed since the Vedic era. In the Vedic era, the disenfranchised population turned to the wandering ascetics for medical services. The Classical Era saw numerous changes in healthcare delivery. Because of Hindu orthodoxy, medical services were removed from the public sphere to be replaced by new medical models and the introduction of a folk medicine-Ayurveda mixture in rural communities. Unani Tibb flourished in the Mughal Era. However, it was only available to Muslims and the disenfranchised Hindu majority used preexisting medical models. Finally, during the British Era, India's poor and rural communities (both Hindus and Muslims) relied on the unregulated traditional medical models, foregoing the regulated allopathic system. Extrapolating this historical analysis to the modern era, the prevalence of quackery in India today is due to the disenfranchisement of a population from the mainstream medical model. It is a continuation of the pattern repeated throughout Indian history.

This argument is further strengthened when looking at the relationships between the core and peripheral medical models throughout history. The wandering ascetics emerged from priest-healers, and the religious beliefs of the Vedic era. The monastical medical providers during the Buddhist era derived their knowledge from the wandering ascetics. The alternative medical models emerging in the Classic Era were also related to each other. Alchemy and Siddha drew their reliance on rationality from Ayurveda while Tantricism was a reaction to Hindu orthodoxy. The widely practiced folk medicine was a mixture of Ayurveda and religious beliefs. During the Mughal era, the development of Unani Tibb was in great part influenced by the indigenous medical practices in India. As an illustration, many works were translated from Sanskrit to Persian and incorporated into Unani Tibb doctrine (Kumar 2003). Certain aspects of quackery in the modern era can be similarly viewed. The vast majority of quacks claim to be adherents of the allopathic system and the jargon used, the investigations performed, and the treatment prescribed all have basis in allopathy.

Another factor strengthening the argument that quackery is simply a continuation of a historical process is found in looking at medical education. While great centers of medical training existed throughout the various eras, the literature indicates that a large proportion of medical practitioners had apprentices (Chowdhury 1988). The student served under the master for a period of time and only when deemed ready, did they work alone. They did not work in true isolation however; they often maintained roots in their community and consulted with peers on specific issues. This pattern of training and practice is similar to some quacks (Kakar 1983). As mentioned earlier, just under 50% of quacks have formal training and the vast majority practice in their community of birth.

The factors forcing the disenfranchised to rely on peripheral medical alternatives bear reiteration. The shift toward the wandering ascetic was precipitated by the evolution of religious doctrine, the same reason why Siddha, Tantricism and folk medicine emerged. The Mughal Empire's patronage of Unani Tibb and focus on the Muslim population

relegated the Hindu population to the margins, a process repeated under the British with their focus on allopathy. In the modern era it is neither religious doctrine nor the political climate that relegates a significant population to the periphery. As has already been discussed, modern marginalization had an economic locus.

## Conclusion

The traditional analyses of why quacks exist in India focus on the economic incentives, the demand for health services (legitimate or otherwise), and the legal loopholes through which quacks operate. Acknowledging these established factors, this paper attempted to argue that quackery in modern India is the continuation of a historical process. Throughout India's history, people have been disenfranchised from mainstream medical services due to political, social, and economic factors. And throughout history the disenfranchised turned to a peripheral medical model not sanctioned by the ruling elite – exactly what happens each time a person visits a quack today.

How does knowing this influence the government's response to quacks? Can they ignore them, fight to eradicate them or incorporate them into the public health model? History indicates that the disenfranchised will always turn to the periphery for health services. It is the periphery that meets the needs of this population. One must then question whether it is in India's (and her citizenry's) best interest to investigate how quacks can be utilized/trained to provide proper and appropriate medical services - a process that may bring India closer to meeting her health objectives.

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# **IS CAPITALISM GOOD FOR HEALTH? A LOOK AT CHINA'S RURAL HEALTH CARE DELIVERY IN THE PAST 50 YEARS**

By

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## **Abstract**

**People's Republic of China was formed in 1949, followed by a tumultuous period of political upheavals, economical uncertainties, and natural disasters. The new government struggled to bring order to a country with a crumpling economy and almost nonexistent rural health care. Two models of health care delivery were put into action over the past 50 years, revolving around major political changes. During the time of the Cultural Revolution (1965-1970) lead by Mao ZeDong, rural health care was delivered by barefoot doctors and covered by cooperative medical services (CMS). However, after a change in political power and under the directions of Deng XiaoPing, China was stepping into a new era of market-based economy. With the appearance of Capitalism and democracy in the country, China's health care system was affected by a new decentralization and privatization. Rural doctors gradually replaced barefoot doctors and CMS was slowly diminishing in popularity. Using interviews with former barefoot doctors, Chinese government reports, and secondary literary resources, I will examine the effectiveness of the two models of health care delivery implemented by the Chinese government over the past 50 years.**

In the 1950s, China's vastly growing rural population was living in very poor conditions and suffered from malnutrition and infectious disease. There was no rural health care at the time, and sick peasants were only able to go to herb doctors and witch doctors for help. In response to the increasing demand voiced by the tired and angry rural population, the Communist party tried different ways to improve the overall health of the country, and especially that of the working class and the peasants. A year after it was formed, China held its first National Health Congress, bringing attention to rural health care for the first time. The new health care policies focused around removing pests, preventing epidemic diseases, sanitation, and mass health campaigns in the countryside. There was also an increase in health care resources countrywide. At this time, China was heavily dependent on its agricultural productions. The countryside was divided into communes and further into production brigades and production teams. Rural health care was carried out in individual communes, as doctors from urban cities were unwilling to practice in the countryside. The health care system soon proved to be inadequate as China faced 3 years of natural disasters (1959-1961), which resulted in a devastating drop in crop production and further political upheaval.

After so many years of famine, poverty, poor health, and political instabilities, the public was feeling hopeless and bitter towards the Communist Party. Chairman Mao responded with the Cultural Revolution in 1965, to reexamine and reevaluate government officials and methods. Many intellectuals with questionable political backgrounds were tortured and killed at this time. Mao wanted to break the barrier between intellectuals and those without proper education, such as peasants and workers. Interestingly, this devastating political movement initiated a substantial change in rural health care. In 1965, Mao gave an important speech known as the June 26<sup>th</sup> Directive:

“Tell the Ministry of Health that it only works for 15 per cent of the total population of the country and this 15 per cent is composed mainly of gentlemen while the broad masses do not get any medical treatment. First, they don’t have any doctors. Second they don’t have any medicine. The Ministry of Public Health is not a Ministry for the people, so why not change its name to the Ministry of Urban Health, the Ministry of Gentlemen’s Health, or the Ministry of urban Gentlemen’s Health? In medical and health work, put the stress on rural areas.”

The renewed emphasis of bringing health care into the countryside became the pivotal motivation in the development of the first model of rural health delivery. This model, characterized by barefoot doctors and CMS, was carried on with fervor in 1965, and lasted until 1980. During this chaotic time of countrywide school closures, medical schools were closed, administrative apparatus in hospitals and institutions were broken up, and intellectuals were relocated into the countryside. Mao’s actions succeeded in allocating health care resources from urban cities into rural areas, and in training a large team of rural health care professionals in a relatively short amount of time.

Due to Cultural Revolution and school closures, 15 to 18 year-old intellectual youths from urban areas were sent to work alongside peasants in production brigades. Each production brigade sent two candidates to commune, district, or county hospitals for trainings to become barefoot doctors. The candidates were chosen from intellectual youths or older Chinese herb doctors who seemed to genuinely care for others. Barefoot doctor trainings usually lasted six months to a year. Half of the time was spent doing in-class learning, and the other three to six months were spent practicing medicine in a clinical setting. All the teachings were done in the hospital by practicing physicians. Each day, trainees spent six hours in class, and three in the hospital wards interacting with patients. Due to the nature of the training, the courses were focused on diagnosing, treating, and preventing common diseases. The trainees were briefly taught in Anatomy, Physiology, Pathology, Pharmacology, and Microbiology. They were taught a few common and epidemic diseases in each of the body systems. Both traditional Chinese medicine and Western medicine were taught. There was an examination at the end of training, but those who did not pass were still able to practice, as there was no formal certification given to barefoot doctors.

After training, the barefoot doctors returned to work in their respective production brigades. Usually one barefoot doctor is trained at a time, and worked under the supervision of a more experienced barefoot doctor. At this time, the doctor-patient ratio in an average production brigade was approximately 1:600. Each production brigade had a

clinic, in which the two barefoot doctors worked. On a typical day, one would stay in the clinic, while the one made house calls and walked around rice paddies to treat peasants as they worked in the fields. The term “barefoot doctor” came from the fact that they were being paid as peasants and that peasants were barefoot while working in the rice paddies. The primary duties of barefoot doctors were to effectively deliver basic medical care and preventive medicine. The barefoot doctors were responsible in making sure that all the peasants got the proper vaccination and in educating the public on proper measures against common epidemic diseases. They also grew their own herbs and made them into medicine, as the production brigades usually had limited funding and were unable to afford all the required medications. Barefoot doctors acted in the role of general practitioners and were able to treat all types of illnesses, but because they only had limited training, they have very limited medical knowledge.

Cooperative Medical Services (CMS) was an essential component of the first model. It was set to pay for the health care services provided by the barefoot doctors. During the time of Cultural Revolution, China was a Communist country, and had a centralized government. The land belonged to the government, and the production brigades paid the peasants for work accordingly. Everyone who worked for the brigades were required to participate in CMS. The expenses spent in the previous year determined membership fees, which usually turned out to be less than 1 – 3% of a family’s annual disposable income. This was an affordable amount, even for the poorest families. Additional financial support came from production team, commune, and national levels. Finally, a very small fee was paid with each visit to the clinic, to help maintain the medical equipment. Visits to a hospital were also funded by the CMS, as long as the patient was accompanied by his or her barefoot doctor. Barefoot doctors had a stable income comparable to that of a healthy and strong young peasant. However, they were not earning as much as the physicians who worked in hospitals.

Although this model only existed from early 1960s to 1980, it made a significant contribution to rural health care, and succeeded in bringing a reasonable standard of affordable health care into 80-85% of the rural population for the first time. However, with the end of the Cultural Revolution and the beginning of Capitalism around 1980, CMS gradually dissolved, while the health care system became decentralized and privatized like the rest of the country. On one hand, the withdrawal of a centralized government meant new freedom for the economy; on the other hand, it also meant a withdrawal of government subsidies and social services in health care. Consequently, without centralized support, health care became unattainable by most of the rural population because they could not afford it.

Along with the disappearance of CMS, the status of barefoot doctors was also being scrutinized by the public in mid-1970s. Stringent regulations were imposed on the barefoot doctors, resulting in their eventual replacement by rural doctors. Barefoot doctors started to receive more criticism from within the country regarding the inadequacy of their roles as health care professionals. Various malpractice stories circulated around and forced the government to demand an improvement on the barefoot doctors’ trainings. Schools were opened again in 1970 with the end of Cultural Revolution, and new

institutes were built in counties specifically for the training of rural doctors. The “new curriculum” now required two to three years of education. Barefoot doctors were encouraged to go back to these medical institutes for a more complete training. However, many barefoot doctors seized the opportunity of better education and entered medical schools instead, so that they were able to practice in cities, aggravating the shortage of rural health care professionals.

Furthermore, by the end of 1970s, major cities required formal licensing examinations as a regulation for barefoot doctors, who were now referred to as rural doctors. The rural doctors were tested on both traditional Chinese medicine and Western medicine. If they failed, they were given a chance to retrain and retake the exam. Only those with a valid license can practice medicine in rural areas. Due to the licensing exam and the opportunity for advanced training, the numbers of barefoot doctors decreased significantly, dropping from 1.8 million in 1975 to 1.5 million in 1980. The most recent regulation placed on the rural doctors was the Rural Medical Management Regulations passed on July 30<sup>th</sup>, 2003, effective January 1<sup>st</sup>, 2004. According to the new regulations, a rural doctor can practice only if certified and in possession of one of the following: a medical degree, experience at a medical facility continuously for more than 20 years, or certified provincial training. They are also required to go for two-month training sessions every two years and to be reexamined every two years.

By the late 1990s, CMS basically no longer existed in the countryside; only 10% of the rural areas were still covered by it. Rural doctors were no longer paid by CMS, and had to charge each patient for medical care. They no longer worked for the government, and became part of the privatization that was spreading throughout the country. Rural doctors still performed tasks similar to those of barefoot doctors, managing primary medical care and preventive medicine. However, they now worked in their own private clinics, and were able to charge as much as they liked due to a lack of standardization in the rural health care system. Rural health care quickly deteriorated under the new health care delivery model, due to the lack of public health care and uncontrolled billing system.

Over the past 50 years, China’s rural health care has gone through very significant changes, first with a system dominated by barefoot doctors and CMS (1949-1979), and more recently by a system of rural doctors and private clinics (1980-present). But is change always for the better? CMS was first implemented soon after the formation of PRC in 1949, at a time in which rural health care was virtually nonexistent. It quickly matured with the addition of barefoot doctors after Mao’s Directive in 1965. Because of the short training period, a strong team of barefoot doctors rapidly formed a comprehensive network of rural health care professionals centered around production brigades. Within a few years, this system effectively brought adequate health care into the homes of 80-85% of China’s rural population. With 90% of the countryside covered by CMS, health care was affordable even for the poorest families. This impressive achievement was recognized by World Health Organization: China’s health coverage received praises internationally during the 1970s, and China was known as one of the countries with the most extensive health care coverage in the world.



Unfortunately, with the implementation of the new system of rural doctors and private clinics, China's rural health care deteriorated just as suddenly as its initial improvements had appeared. As early as 1985, only 5% of the rural areas were still covered by CMS. By 1998, less than 13% of the rural areas had any type of health care coverage. Rural health care is crumbling under the new system mainly because health care has become a market-based system. The effects can be shown by several sets of numbers. First, government health care funding has been declining countrywide over the years: going from less than 20% in the 1990s to 15% of the total funding in 2000. This means that the patient pays over 60% of the medical bills. Second, there has been an increasing discrepancy between the funding for urban and rural areas. From 1997 to 2001, urban population, which consists of 20% of the total population, was using 80% of total health care funding and resources. In 2001, urban health care funding was 3.6 times that of rural areas. Third, rural health care expenses have been declining as well: between 1997 and 2001, less than 15% of government funding went into rural health care. Finally, rural health care system has become progressively more privatized since the withdrawal of the centralized government and the decline of CMS. In 2001, 41.2% of rural health care was run by groups, 6.4% by county hospitals, and 49.8% by rural doctors working in private clinics. The overall lack of funding not only affects rural doctors, but hospitals as well. In an average commune hospital, 3.5% of the funding comes from the government, 14.5% from groups, and 82% from billing patients. Almost 70% of county hospitals lack funding.

The market-oriented changes of the health care system have significant consequences. First, the peasants can no longer afford medical care. In 1985, 23.7% of peasants did not go see a doctor when they were sick, the number increased to 33.2% in 1998, among which 63.7% was due to financial difficulties. Second, there has been a steady decline in indices of rural health. Two-week sickness rate increased from 69.0‰ (1985) to 128.2‰ (1993). The chance of getting a chronic disease increased from 86.0‰ (1985) to 130.7‰ (1993). In 2001, compared to urban population, the rate of death at delivery for women was 1.9 times higher in rural areas, the mortality rate for children was more than 2 times as much, and the lifespan in rural areas was 6 years shorter. Third, sickness causes a huge decline in the financial state of peasants. In the rural communities, around 20% of the poor families became poor due to some kind of sickness. There are approximately 13 million peasants facing the dangers of bankruptcy caused by being sick each year. Lastly, the international evaluation of China's health care system has also suffered a great decline. In an assessment done by WHO in June 2000, China ranked 188 out of 191 countries under the section of "financial burden fairness".

China has experienced a serious decline in its rural health care delivery since the implementation of the new system. The Chinese government has received numerous complaints from within country, especially from the rural populations, as the unhappy peasants struggle with an inadequate health care system and overwhelming medical charges. Criticisms and pressure from international sources have also been made, particularly after the recent SARS epidemic. The government recognizes the shortcomings of the health care system, and has tried different methods to improve it, such as training more health care personnel directly in the countryside to ensure that they stay and practice in the rural areas. It has also promised to increase funding for health care and is

considering tightening regulation on the existing rural doctors, especially with the standardization of medical bills. In 2003, the Chinese government passed new regulations to ensure immediate and mandatory report of infectious diseases, as a result of the SARS incident. Finally, there is a new move to revive CMS. A new form of Cooperative Medical Services is to be effective in January 2010. With this new social insurance system, the central government will cover 1/3 of the medical bill, the local government, another 1/3, and the patient pays the rest. However, the scheme applies only to “big diseases”, and the effects still remain to be seen.

Rural health coverage continues to be a problem all over the world, especially in countries with a vast rural population, such as China. When the Communist party took over the control of a new nation 50 years ago, they became responsible for the health of a population suffering from years of civil wars, natural disasters, and inadequate health care. In order to provide a fast relief to the problem, China adopted a new health care delivery model by employing barefoot doctors to provide adequate care to the most common illnesses. This system effectively made medicine available in almost every part of the country. Despite the success of the first model, the country adopted a new model in accordance with the new market-based economy and a move towards Capitalism and democracy. As China opened its doors to decentralization and privatization, the same happened in health care. With the new model in place, rural doctors were better trained, but at the same time, the availability and affordability of health care were greatly decreased. The newfound democracy might work for the rest of the country, but fundamental systems such as health care and education cannot be completely privatized. Such vital systems must have some kind of government assistance if they are to be available to everyone who has the need, as demonstrated by the different effects of the two health care delivery systems. In conclusion, ironically it seems that the solution to a health care crisis generated by economic liberalization and increasing political freedom will be the revival of a much older and less elite system generated in Communism, a political and economic culture thought to have faded into history.

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# **THE HISTORY OF TRADITIONAL CHINESE MEDICINE (TCM) IN TAIWAN. -THE LONG ROAD TO INTEGRATION WITH WESTERN MEDICINE**

By

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## **Abstract**

**As more and more people in the western world are turning to Traditional Chinese Medicine (TCM) to answer their health needs, questions are being raised about the convergence of western and TCM in health care systems in various countries around the world. In the eyes of the West, Taiwan, a westernized Chinese territory geographically and politically removed from mainland China, has become a leading model of the so-called “integration” of the two forms of medicine.**

**The existence and progress of TCM in Taiwan has been the product of Chinese influence and immigration for more than four centuries. TCM has, however, been subject to a rather turbulent evolution in Taiwan due to the changing nature of relations with mainland China and due to foreign occupation. Japanese and eventually Republic of China (ROC) rule of the island during the period of great westernization in South-East Asia resulted in a decline of TCM practice in the first half of the 20<sup>th</sup> century. Ironically, heightened interest in traditional medicines in the Western world along encouraged Taiwan to adapt an official policy of integration in the early 1990s. Despite, the official position of integration, these two disciplines may simply co-exist and tolerate each other in Taiwan as opposed to being truly integrated.**

**This presentation, in exploring historical trends, examines the struggle for TCM to find its place in Taiwan the economic incentives behind the move to integration, the cultural and professional response to this trend, as well as the remaining obstacles that face the true complementary integration of these two forms of medicine in Taiwan. Lessons learned here might be applicable to western nations, which find themselves facing growing social trends toward the dual use of western and TCM.**

## **Introduction**

More and more people in the western world are becoming interested in Traditional Chinese Medicine (TCM) as an alternative to Western medicine. The World Health Organization (WHO) has been promoting the integration of traditional medicine into health care systems throughout the world since 1977, especially for developing nations, which often lack modern western medical resources. However, TCM remains subordinate to Western medicine around the world, which raises the question as to whether the two disciplines can actually be truly integrated or are they destined to merely co-exist. Taiwan is a capitalistic, westernized democracy politically and geographically removed from mainland China. In recent years Taiwan adopted an official policy of TCM integration with Western medicine, but it too has faced great challenges. Lessons learned from this south pacific island might be of relevant to Western countries facing similar questions regarding the place of TCM in predominantly western medical cultures.

## **History of TCM in Taiwan**

The history of TCM in mainland China goes back more than 3000 years. In Taiwan, however, TCM has probably only existed to any significant degree for about 400 years, since the period of Dutch colonization (1624-1662) brought with it the first mass migration of Chinese people to the island. Although the Dutch were defeated by Chinese Ming dynasty-loyalists in 1662, Taiwan did not officially become a part of China for another 200 years. In 1887, the subsequent Qing dynasty claimed Taiwan as a province of China in fear that both Japan and the USA were eyeing the island as part of their own South-East Asian expansion plans. The Qing Empire attempted to limit migration to Taiwan, but because the growing population of young men on the mainland had few occupational prospects, illegal immigration continued. Many such men married aboriginal women of Taiwan, which secured their claims to land on the island. Undoubtedly, this period brought a further influx of Chinese medical culture to Taiwan. However, the free spread of any form of Chinese culture in Taiwan would not last long.

In 1895, only 5 years after Taiwan had been claimed as a Chinese province, the Japanese defeated the Qing dynasty in the Sino-Japanese war and Taiwan was ceded to the Japan. The period of Japanese rule in Taiwan was one of great economic and educational development and by the early 1900s Taiwan was self-sufficient and considered the second most developed region in East Asia behind only Japan. The Japanese rule was less oppressive in Taiwan than in other occupied territories such as Korea. The rulers insisted the Taiwanese people assimilate into Japanese culture, but did not entirely outlaw Chinese culture. In fact, when the Japanese established the first modern western hospitals and medical schools in Taiwan, a program of Chinese medical education was initiated. It is believed that the Japanese hoped to control the practice of Chinese medicine by teaching it, and slowly converting it into western medicine. TCM practitioners were licensed as “Class C” physicians, to be slowly replaced by the “Class A” physicians of western medicine. At this time Chinese medical practice was declining at a much faster rate Taiwan than it was in mainland China, but the Japanese approach of slow assimilation at least allowed TCM to survive until the time when Chinese rule would return to the island.

Meanwhile, in mainland China a trend was occurring which would later challenge TCM in Taiwan more so than Japanese rule –the westernization of Chinese culture. The 19<sup>th</sup> century handed China two humiliating military defeats, first the loss of Opium Wars to Britain and France, and second, the loss of the Sino-Japanese War to what was known an increasingly westernized Japan. China believed that the secret of Western success in these wars lay in the modernized approach to science and technology. Therefore, during the late 1800s Chinese intellectuals and reformers began calling for modernization of Chinese culture by westernization. Eventually the government adopted western science, including western medicine, as a means of modernization and cultural advancement. At this time western medicine already had a foothold in China as Western missionaries had been spreading western medicine along Christianity from as early as 1935 when the American physician and Presbyterian minister Peter Parker established an ophthalmic clinic at Canton. The establishment of Western medical hospitals and clinics in China in the latter half of the 19<sup>th</sup> century meant that Chinese people had a chance to compare western medicine to TCM for themselves. Importantly, this was at a time when western medicine was making some of its most tangible progress with insight into the importance of hygiene and anti-septic procedures in the quelling the spread of disease. As Christianity and western medicine were gaining ground, Confucianism, which provided some of the founding elements of TCM, was declining in Chinese society. Eventually the Qing rulers established a health care system based solely on the Western model.

The Revolution of 1911 ended the Qing dynasty rule with the establishment of the Republic of China (ROC) in 1912. The new governing Nationalist party intensified the Westernization policies to the point where it attempted to abolish TCM altogether. Chinese medicine supporters however protested and prevented its eradication. The ROC adopted a policy not encouraging, but was simply tolerating TCM as a folk medicine of historical significance. Beginning in 1929, the ROC began an official policy of “Scientification” of Chinese medicine, whereby they planned to modernize TCM by providing westernized scientific explanations to explain its observational efficacy. This remains a big part of the approach to TCM in both mainland China and Taiwan today.

## **China Divided**

Japanese forces invaded mainland China in 1931. While fighting the Japanese, the Nationalist government of President Chiang Kai-Shek became embroiled in a civil war with insurgent Communist Party of China forces led by Mao Zedong. The Japanese were eventually defeated in World War II, and as stipulated in the Cairo Conference of 1943 Taiwan was return to the ROC. The civil war continued on the mainland, and after many successive defeats including the loss of Beijing, the exhausted Nationalist government troops and 2 million refugees fled to Taiwan in 1949. Mao Zedong founded the Peoples Republic of China (PRC) in October 1949 and Chiang Kai-Shek proclaimed Taipei, Taiwan, the temporary capital of the ROC in December of the same year.

The split of the “two Chinas” had a significant impact on the evolution of TCM in both China and Taiwan. In mainland China, TCM was promoted together with western medicine. One reason for this is that at the end of the war years China had limited western medical resources with which to serve its growing population. Therefore, the TCM

treatments that had served China well enough for centuries were thought suitable enough again to help in this time of national need. In addition, the holistic approach of TCM, that is the equal importance of all parts of the system, could be used as a metaphor for communism. While encouraging TCM, the PRC government tightly controlled teaching and literature, and in order to keep TCM in line with the modern scientific world, removed the elements of Chinese medicine, which it saw as superstitious or magical. So a form of refined TCM was encouraged in China. Meanwhile the mass migration to Taiwan in 1949 brought many TCM practitioners to the island. The ROC in Taiwan continued the Japanese policies of tolerating but not encouraging TCM. Taiwan had greater supply of western medical resources at this time and did not feel pressured to resort to TCM. However, the people were largely free learn as they wish and to read what were considered the classics of Chinese medicine such as Huang Di Nei Jing (The Yellow Emperor's Classic of Internal Medicine). Therefore, in Taiwan it was easier for TCM to persist with less change.

### **Regulation and Education of TCM in Taiwan**

When the ROC government took over control of Taiwan from the Japanese it established licensing provisions and the so-called Special Examination for Chinese Medicine, but this was the extent of the role of the government in TCM. Unlike, their Japanese predecessors, the ROC did not set up any formal instruction or education of TCM. Although some private exam preparation courses would spring up from time to time, for the most part, people would prepare for the exam through self-study or apprenticeships. The Special Examination tested detailed knowledge of the classic TCM literature and was renowned as being quite difficult to pass. Only those passing the exam were allowed to practice TCM, but Chinese pharmacists were allowed to sell herbal medicines to patients without prescriptions and were free to suggest remedies and even diagnose conditions. Many of the upper middle class and well-educated refugees who fled to Taiwan soon joined the ranks of the Chinese medical doctors, and the number of licensed TCM practitioners in Taiwan jumped from less than 20 in 1949 to more than 1500 in 1954.

Despite the immigrant boom years of TCM in Taiwan, Western medicine continued to overshadow its Chinese counterpart. This was not helped by the fact that the loose training requirements of Chinese doctors were well known among Taiwanese people. Patients continued to experience the “miracles” of modern medicine while learning to distrust the quality control of TCM. It wasn't long before the significantly increased workforce of TCM practitioners realized that a more structured educational system of Chinese medicine was needed to enhance their credibility. In 1958, TCM enthusiasts in the central city in Taichung established China Medical University (CMU), the first university in the ROC to undertake the teaching of Chinese Medicine.

The Department of Medicine of CMU trained students in both Chinese and Western medicine. Another division of CMU, the School of Chinese Medicine, was set up to prepare students for the Special Examination for Chinese Medicine, with emphasis on classical literature. Students of the Department of Medicine, on the other hand, took a different national examination, which had less emphasis on the classics and was said to be easier than the Special Exam. If graduates of the Department of Chinese Medicine passed

their national examination they obtained a license to practice TCM. In addition, they were given the opportunity to take the national licensing examination for Western medicine. This is considered one of the greatest obstacles to the advancement of TCM in Taiwan in the last 50 years. Often due to greater prestige and financial compensation, approximately 60% of the CMU medical department graduates go on the practice western medicine not TCM. In 1960, due to waning interest in TCM (and contrary to the founding principles of the CMU), the Department of Medicine ceased teaching both forms of medicine, to concentrate solely of Western medicine. The separate Department of Chinese Medicine was set up, but attracted less students than the main Department of Medicine.

Another problem of the two-exam system was that licenses received by passing the Special exam or the national exam were equal, and the holders of these licenses were given the same privileges. Without asking to see a physician's credentials, patients had no way of knowing which kind of license a TCM practitioner held. A survey conducted in 1989 showed that 98% of all doctors of Chinese medicine had no formal training TCM. As such the initiation of formal training programs did not end public scepticism of Chinese medicine. Despite its subordinate position to Western medicine, small private TCM clinics numbered in the thousands throughout Taiwan and accounted for one-third of all outpatient visits in the 1970s.

### **The Move Toward Integration**

For much of the 20<sup>th</sup> century TCM practitioners had little, if any, say in policy-making and the delivery of health care in Taiwan, and only a very small government funding was provided for the training and practice of Chinese medicine. The loose licensure system continued to fuel public distrust of TCM until very recently when the Special Exam was phased out. These issues combined with the Chinese medicine "brain-drain" did little to further the prospects of TCM in Taiwan. In the 1980s, no public hospital offered TCM services, and the ROC government was not interested in the integration of TCM with Western medicine. This was until the Western world itself became interested in various traditional forms of medicine including TCM.

One event that has been associated with sparking TCM interest in the West was then-US President Richard Nixon's visit to China in 1972. In addition to the already increased spotlight on Chinese culture due to Nixon's visit, when New York Times reporter, James Reston, who was in China covering the event, developed appendicitis, acupuncture was used to provide anaesthesia during his surgery. At the same time increasing numbers of Westerners were becoming weary of the side effects of modern medicine. Furthermore, in 1977, the World Health Organization (WHO) made its landmark statement promoting the integration of traditional medicine into health care systems throughout the world. In more recent years Western nations began putting huge amounts of money into TCM research and practice. For instance, in 1993 the United States allocated US\$113 million of TCM research, and in 1997, the National Institutes of Health reported that over 1 million people receive acupuncture alone each year.



The growing popularity of TCM in the west over the latter part of the 20<sup>th</sup> century did not escape notice of Chinese medicine practitioners and the ROC government in Taiwan. This rejuvenated the spirit of TCM and attracted more young people to the TCM, but perhaps more importantly for the future of Chinese medicine in Taiwan, it opened the government's eyes to the potential of huge commercial markets and a more prominent place for Taiwan on the world's medical stage. In this regard, the WHO has stated that the Western Pacific region, including Taiwan, has the ability to produce herbal medicinal products with a global value of US\$60 billion.

In the early 1990s the Taiwanese government officially adopted a policy of integration of Chinese and Western medicine. From this point on, changes to the health care system of Taiwan designed to give TCM a more prominent role, began to occur at a rapid pace. In 1990, Taipei Veterans General Hospital became the first publicly funded Western-style hospital to open a full-fledged TCM department. In 1991 Yang Ming University became the second university to offer a training program in TCM establish an Institute of Traditional Medicine. Perhaps the most significant step all was the extension of full national health insurance coverage to TCM in 1995. Surveys suggest that approximately 30 percent of Taiwan's population have taken advantage of this development since. Chang Gung University in the northern county of Taoyuan began offering courses in TCM in addition to western medicine in 1998. In the same year, the CMU established the Graduate Institute for Integrating Chinese and Western Medicine. This was followed by the opening of Chang Gung University's Institute of TCM in the year 2000. More recently, CMU has been attempting to attract international students to its TCM programs.

In order to quell the long-lasting distrust of TCM held by Taiwanese people and perhaps the western world, the ROC began programs designed to more efficiently control and regulate the quality of TCM in Taiwan. In 1995, the government established the Committee on Chinese Medicine and Pharmacy (CCMP) to oversee the regulation and the TCM industry. By 2005 all of Taiwan's manufacturers of herbal medicines will be required to pass Good Manufacturing Practices (GMP) standards. The CCMP has recently subsidized nine western-style teaching in Taiwan to conduct clinical trials of Chinese medicine, and has funded two exchange programs between practitioners from Taiwan and mainland China. Furthermore, work on traditional herbal medicines makes up the majority of the governments biotechnology development projects. Most recently, Taiwan's president Chen Shui-bian proposed spending US\$1.5 billion on Chinese herbal medicine development over a five period.

Although the ROC government has taken great strides to implement its official policy of integration, in practice the relationship between Chinese and Western medicine in Taiwan seems to be one of coexistence. Part of the reason for this lies in people's long-held attitudes toward the two forms of medicine. Most Taiwanese people believe in the ability of TCM to improve illness to a certain degree, however, they often believe Western medicine is more efficient and more convenient (i.e., it is easier to take drugs than attend weekly acupuncture sessions). Patients also choose one form of medicine or the other depending on their specific complaint, but do not undertake an integrated program of both TCM and western treatments for their ailments. This is of course partially due to attitudes of the doctors themselves. Although practitioners of both disciplines respect the other,

there is little cross-referral between the two systems, particularly in the private medical sector. The lack of involvement of TCM practitioners in policy-making decisions has also impeded integration. One area where integration is perhaps more of a reality is in the area of scientific research, where TCM and Western medicine practitioners are collaborating more than ever.

### **The Future in Taiwan and the West**

The major hurdle in front of medical integration in Taiwan is the same as that elsewhere – that is overcoming the basic philosophical differences between the two forms of medicine. The approach of Western doctors is much more along the lines of attacking the specific pathologies of a disease. In comparison TCM doctors employ traditional theories to the workings of the whole body within its environment. Such differences will take more than money and governmental policies to overcome. However, recent educational movements toward integration in Taiwan such as specific training programs that cover both disciplines will hopefully increase the understanding of each, and allow for greater communication and collaboration between TCM and Western medicine. Likewise, if integration of the two medical disciplines is to occur in the West, post-graduate programs in TCM should be offered to graduating physician as part of the standard medical education curriculum.

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# **REGULATION OF TRADITIONAL CHINESE MEDICINE (TCM) IN CANADA: EXAMINING PUBLIC PROTECTION AND INTEGRATION WITH A HISTORICAL PERSPECTIVE**

By

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## **Abstract**

**Traditional Chinese medicine (TCM) has a long history, with its popularization within Canada since the 1980s. This can be seen especially with respect to its increased use among established healthcare professionals and with most medical schools now having a component of it as well as other complimentary alternative medicine courses in their curriculum.**

**However, the road to its regulation has been arduous, with practitioners still facing numerous obstacles. Since 1983 the Chinese Medicine and Acupuncture Association of Canada has been lobbying for regulation across the country. After twenty years, there are still only four provinces that currently have policies in place regulating the profession. British Columbia has taken the lead in this aspect while other provinces have chosen to ignore regulations or are now attempting to develop their own guidelines.**

**The potential for the future is immense. Numerous past studies have indicated that the ultimate goal of self-regulation is to improve professional standing and quality of care. Our past research has indicated that with regulation of TCM, the profession will also become one step closer to achieving integration with Western-style medicine. This presentation examines, from an historical perspective, trends to further regulation and its affect on integration into the Canadian healthcare scene.**

## **Introduction**

The increasing number of immigrants from Asia to Canada over the last few decades has contributed to a rise in Chinese culture within the country. This is seen through the popularization of Chinese art, philosophy and cuisine, just as some facets of Chinese culture that have seen an integration, at some level, into Canadian society. One aspect of Chinese culture that has lately seen a movement towards integration in Canada is Traditional Chinese Medicine (TCM). This is reflected in an increase in numbers of practitioners and their patients in Canada (APC Canada 2003).

This shift has raised many issues concerning the health and safety of TCM practices. The first concern is the legitimacy of the many TCM practitioners in the country. Because of the increase in popularity of TCM, many so-called TCM “doctors” have been setting up practice without any recognized or certified education. Also, many TCM treatments, such as those using exotic herbs and ingredients, have not been properly inspected but are continue to be used in the country. Therefore, Canada has seen movements towards regulation of TCM in the provincial level (Boon 2002).

The purpose of this paper is to ask whether the goals of regulation should not only be to help address concerns about public safety, but also to integrate TCM into Canadian healthcare in such a way that the benefits of it can be maximized. In spite of the skepticism regarding TCM, many believe that there is indeed a role for TCM practices in the realm of Canadian healthcare. For example, some people who do not find resolution to particular pains or aches find that acupuncture has resolved their problems. Whether or not these kinds of treatments are scientifically proven at this time may not be the issue. Rather, we must look at the fact that some people find satisfaction in using TCM as a complementary and alternative method in health treatment. Therefore, integration of TCM into Canadian healthcare is key to determining this role. This must be one of the goals of regulation.

### **TCM in Canada**

The theory of TCM offers a holistic approach of health. Therefore, rather than just dealing with the patient’s disease or illness, the general health and well-being of the patient plays a significant role into the diagnosis (Reid 1996). The organs and tissues of the body are connected through theoretical meridians by flowing energy life force called ‘qi.’ The theory is that everything is connected in the body, and a problem with a particular organ or tissue, can be detected by this interconnection using methods such as pulse diagnosis and tongue diagnosis (Li 1993).

In Canada, it is believed that the TCM practice began when the first Chinese immigrants began to settle down in the country in the 1800’s. However, only in the last few decades, with Canada’s growing Asian population, has there has been a significant popularization of TCM in the country. This is fostered by the demand and also the supply, which is the increase in TCM practitioners.

TCM practice is used in complementary in alternative roles in Canada. Through conversations with Dr. Quan De Zhou, The Vice-President External of the Canadian Medicine and Acupuncture Association in Canada, the most common patient that presents at the TCM practice are those that have immigrated from Asia. There is a strong belief in TCM in Asia, especially among the older population that continues after immigration. But because of the increasing popularity of Chinese culture in North America, there are those that have lived in Canada all their lives that have tried TCM, were satisfied with the results and have returned for future problems and complaints. Usually TCM is introduced to these patients by friends and family. However, it is not rare that some family physicians will often recommend TCM to patients in certain cases.

These cases are most commonly complaints such as chronic pain. Many patients find that acupuncture therapy helps a great deal at eliminating pain that could not be addressed in a western medicine approach. Also, another complaint that is common in the TCM practice is that of something TCM practitioners call “Symptoms-No-Diagnosis.” This is a complaint such as minor headaches, nausea or weakness that usually have no determined origin. TCM practitioners usually have much success with these types of patients and provide patient satisfaction with their treatment. A less common presentation at the TCM practice but that has gained some interest is that of cancer treatment side-effects. Some patients being treated by chemotherapy and radiation therapy have visited TCM practitioners to control the side-effects.

### **Integration into Canadian Healthcare**

The TCM practice in Canada has many fundamental differences from that of China. Firstly, most TCM practitioners in China have been educated in Western Medicine. At the same time, Western-medicine-trained physicians in China are also educated in TCM. It is the belief of both schools of medicine that certain illnesses are better suited for one type of practice while other illnesses are better suited for the other practice. Therefore, integration is instilled into their medical system. For example, when a patient visits a Western-medicine physician in China, the physician will treat the patient to the best of his ability. However, if the physician feels that there is a need for TCM, he will refer the patient on, or even treat the patient if he was happened to be trained and educated in TCM. This would also occur in the other direction, ie. from TCM to Western.

However, in Canada, there is no such collaboration between the two schools. This could be attributed to the fact many western physicians either do not believe in TCM practices or are not educated or knowledgeable about it. Many feel it is lacking since there is inadequate scientific evidence of its efficacy. However, although many randomized controlled studies, are being done all around the world to study the efficacy of TCM, its scientific validity is not the issue. It is rather the fact that many people in Canada are finding satisfaction in TCM treatment and therefore we must find a way to achieve integration to ultimately benefit the patients.

### **Introduction of Regulation**

The history of regulation of TCM in Canada has been a long and arduous task. However, before examining its conception and methods utilized to achieve this goal, it is important to also analyze the need for regulation and why so many individuals have spent so much time either working for or against regulation in Canada.

TCM has a long history in Canada with individuals practicing this medicine since the first Chinese immigrants arrived in Canada. Since then, it has evolved into an alternative that is well sought out by individuals from all walks of life. However, its practice and the qualifications of the practitioners vary across Canada. It is for this reason that proponents of TCM have been seeking a self-governing body through regulation that would meet

provincial requirements and specific standards with the ultimate goal of TCM designated as a health profession. (Welsh et al. 2004)

The debate surrounding the issue of regulation encompasses two important aspects: pro-regulators and anti-regulators. The pro-regulators consist of individuals attempting to achieve regulation and argue that the form of healing is used by thousands of individuals around the country and needs to be regulated for their protection. By ensuring a regulatory body, it is possible to implement guidelines pertaining to education, eligibility, competence, conduct as well as continuing education and research. One TCM practitioner has been noted as saying that “its longevity has already proved its efficacy (Kelner 2004).” By achieving this, the general population would be protected because they would be confident in knowing their practitioner is duly qualified, as has been seen in many other self-regulated professions such as medicine and engineering. In addition, the self-regulatory body would then have jurisdiction to implement penalties and discipline members not abiding by their rules.

On the other hand, the parties against regulation have long since argued that there is an ultimate lack of scientific-based evidence supporting the practices of TCM. Because of this, it is irrelevant that so many individuals use it and the presence of thousands of years of clinical evidence; the argument persists that the practice is not appropriate and does not abide by modern-day standards (Johnson 1999). Finally, the other main argument against regulation is that since there is no scientific-based evidence supporting TCM, granting a “doctor” title would eventually lead to the lower status of western-style physicians. Allied health professionals have been said to be threatened by competition from CAM practitioners and have been looking to the medical professionals to protect them and their professional autonomy (Kelner 2004).

### **The Chinese Medicine and Acupuncture Association of Canada**

Individuals have attempted to develop some form of guidelines for TCM since the early 1970’s however the formal attempt for achieving regulation did not begin until the conception of the Chinese Medicine and Acupuncture Association of Canada (CMAAC) in 1983 by Dr. Cedric Cheung. Facing language barriers, cultural differences, media and the current medical establishment, the sole purpose of this organization was to promote the profession as a viable alternative and complement to conventional western-style medicine (CMAAC 2004). It is an alternative because individuals are often not satisfied with conventional healthcare and it is complementary because the vision was to unite eastern and western practitioners so that both styles could be used simultaneously. Other goals of the association were to establish higher standards of education and training and promote scientific research. By accomplishing all of these tasks, the ultimate goal was to protect the public.

With the establishment of the CMAAC main office in Ontario and recognizing the need for regulation across Canada, the next step was to implement CMAAC chapters in the remaining provinces so that a united voice was present in order to lobby government. In 1985, chapters opened in Alberta and Quebec, followed by Manitoba, British Columbia

and Saskatchewan all in 1990. The 1990's was witness to the Atlantic provinces implementing chapters with New Brunswick, Nova Scotia and Newfoundland and Labrador all implementing offices in 1991, 1993 and 1996 respectively (CMAAC 2004). As a result of this, TCM was able to achieve a coordinated effort in its voice on regulation.

## **Regulation in Canada**

Regulation of TCM in Canada has consistently been a battle of the two main players: TCM medicine and conventional Western-style medicine. In addition, each province has a health professions regulatory body which makes recommendations to the provincial government regarding regulation of various health professions. In 1979, the World Health Organization (WHO) indicated that there were forty-three diseases treatable by acupuncture and this is expanded when one includes acupuncture, moxibustion and Chinese herbs utilized in combination (CMAAC 2004). As a result of this, the provinces attempting regulation have had some success promoting acupuncture and its regulation first, followed by regulation of TCM as TCM and acupuncture are extremely intertwined.

## **British Columbia**

The process in British Columbia first began in the 1970's with various acupuncturists seeking self-regulation. It was not until twenty years later in 1991 that a group of acupuncture societies submitted an application to the British Columbia Health Professions Council (HPC) seeking regulation. This request was granted in 1993 however it was not until 1996 when the provincial government approved the College of Acupuncturists of British Columbia, a self-regulating body (BC-HPC 1993).

However, during the process of acupuncture regulation, the designation of acupuncture was opposed by the College of Physicians and Surgeons of BC as well as the TCM Association of BC. The College insisted the practice is a treatment modality and did not necessitate regulation as a separate health profession while the TCM Association argued that acupuncture is simply a component of a broad-based practice of TCM and as a result, submitted a separate application for the designation of TCM as a health profession. Due to the increased resistance to acupuncture and its association with TCM, the HPC held public hearings in 1997 and concluded that TCM cannot be separated from Acupuncture and recommended a combined college resulting in the establishment of the College of Traditional Chinese Medicine Practitioners and Acupuncturists of BC in 1999. The HPC stated that the "public interest in ensuring availability of regulated services" was the key driving force promoting regulation (BC-HPC 1998). Therefore, all aspects of TCM would be regulated together, but integration was not cited as a reason for pursuing this task.

The entire process of regulation took almost two decades for the BC government to accept and regulate its practice however, it is now playing an important role in spearheading acceptance of TCM. It became the first government in North America to designate TCM a health profession aside from just acupuncture and TCM practitioners are now primary contact physicians with no referral required.

## **Ontario**

Even though the CMAAC was founded in 1983 in Ontario, it has not seen the same successes as witnessed in Ontario. In 1991, a proposal was sent to Ontario Ministry of Health requesting designation as a health profession. However, due to unknown political factors, the proposal was resubmitted in 1994 along with a 10,000 signature petition supporting TCM as a commonly used health profession (CMAAC 2004). The Ministry referred to the Health Professions Regulatory Advisory Council (HPRAC) to guide it in its decision in June 1994 (ON-HPRAC 2001). However, as has been seen in many provinces attempting to achieve regulation, government will has been somewhat lacking and sometimes processes were required to be resubmitted due new governments. Therefore, the provincial government again asked the HPRAC for its advice in February 1999 looking for additional information with new research that had been performed on acupuncture. Citing issues of public safety, the ministry requested the process be given “appropriate priority” (ON-HPRAC 1999). As a result and as witnessed in British Columbia, the HPRAC held public discussions in September 2000 which finally resulted in the April 2001 recommendation that the profession of TCM and acupuncture be regulated with its own act and that a “College of Traditional Chinese Medicine and Acupuncture Practitioners of Ontario be established” to govern the profession (ON-HPRAC 2001). Since then, the recommendations have not been put into policy.

## **Other Provinces**

The history of regulation in the remaining provinces has been somewhat inconsistently documented. Alberta and Quebec have both regulated acupuncture in 1988 and 1995 respectively but have not proceeded with TCM regulation (Acupuncture Regulation 1988). The concepts are somewhat different in that acupuncturists are not the primary point of contact and cannot advise patients about a cure. Therefore, the patient must consult a medical doctor before seeking treatment, and six months afterwards if treatment is not successful. In the Atlantic Provinces, progress has been quite slow being made. In Newfoundland and Labrador, major papers were submitted and then re-submitted in 2001 and 2004 respectively whereas in New Brunswick, a 1998 comprehensive package sent to the Government of New Brunswick is still pending a legal review (CMAAC 2004).

## **Conclusions**

The history of regulation of TCM in Canada is important to analyze in order to determine its relevance in the Canadian healthcare scene. Regulation has been achieved in British Columbia for TCM and acupuncture but has not been widely accepted in most other provinces. This raises the issue of inter-provincial qualifications and the notion of practices being acceptable in one province and not the other. However, as history has shown, the barriers to regulation are complex. In British Columbia, many internal divisions existed within the College of Acupuncturists of British Columbia. Debates regarding grand fathering issues, educational standards, funding and lack of knowledge of establishing a governing body were quite frequent and not uncommon (CTCMA 2005). Moreover, the lengthy process of regulation is quite evident with the need to submit and



then resubmit documents and the frustrations associated with reeducating politicians, has caused many delays in achieving regulation.

Regulation's full impact on the Canadian healthcare scene is still yet to be seen as it is a rather new process. However, by examining the past provincial regulatory movements, the question of the extent to which regulation impacts integration is raised. By regulating TCM, we have addressed some of the issues of safety in TCM practices however the goal integration is not yet in reach. The next steps should be perhaps to examine new approaches to regulation and assess whether a more integrative role of TCM can be attained through these processes. This integrative role is essentially a more collaborative relationship between western and TCM practitioners. It is through this relationship that we can ultimately establish a role for TCM in Canada so that it ultimately benefits the patients.

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# **HOW MEDICINE SHAPED HISTORY: THE EPIDEMIOLOGICAL CONQUEST OF LATIN AMERICA**

By

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## **Abstract**

**In 1519, the brash Spaniard Hernán Cortés and his band of 613 *conquistadores* landed on the shores of Aztec Mesoamerica, now Mexico, with only 16 horses and 10 bronze cannon and soon proceeded to establish New Spain, laying the foundations for an empire that would last three centuries to come. Mesoamerica, however, was not wild and unpopulated, nor was it inhabited by nomadic hunter-gatherer societies. Rather, Aztec Mesoamerica was heir to a long history of rich civilizations – most notably the Maya – and, in 1500, had a population approaching 25 million so that the Aztec capital city of Tenochtitlan ranked among the world’s largest with an urban population between 200 000 and 300 000. Nonetheless, by 1521, Tenochtitlan had fallen and Cortés began to control the Aztec Empire. How, then, did this small, almost negligible numerically, band of conquistadores conquer Aztec Mesoamerica?**

**The answer, or at least part of the answer, lies in a small microbe – the smallpox, or *Variola*, virus – imported by a single infected slave accompanying the conquistadores. This introduction of smallpox into Mesoamerica in 1520 may be termed the biological warfare of the sixteenth century, for the subsequent epidemic swept through the region, destroying Aztec populations – lacking immunity - so that Mexico’s pre-conquest population of 25 million plummeted to 1.6 million by 1618. Meanwhile, the Spaniards – possessing some immunity – remained relatively unscathed.**

**While traditional scholarship attributes Spanish military success to military superiority, advanced technology and tactics, exploitation of indigenous rivalries, psychology, and the historical agency of Cortés, this paper will attempt to highlight the key role of epidemiology and smallpox in the conquest of Latin America - specifically, the conquest of Mesoamerica. The introduction of smallpox reinforced the effects of the other elements of conquest, both accelerating the initial stages of conquest and, also, allowing for the long-term consolidation and maintenance of Spanish colonial rule.**

In order to understand the role that epidemiology played in the clash of civilizations that was the Spanish conquest of the Aztec, it is first necessary to develop an understanding of the pre-conquest Aztec population. While determining the demography of and reconstructing a civilization that flourished half a millennium ago is not without complications and controversies, it is clear to historians that the Indians of central Mexico prior to 1519 were not the nomadic, sparsely distributed Indians of the North American tribes; rather, the pre-conquest Aztec were an Empire – densely settled, socially stratified, and highly developed as a population. Indeed, Woodrow Borah and Sherburne Cook's seminal work on population demographics places the population of central Mexico at 25.2 million - with an average density of 49 inhabitants per square kilometer - on the eve of conquest, as determined by fiscal and agricultural data (1963, 88-90). However, the Aztec were impressive not only in numerical terms. In addition to establishing Aztec hegemony throughout Mexico, the Aztec built magnificent temples and cities housing a socially stratified population and supported by an effective army. (Burkholder and Johnson 2001, 18-19) The Aztec also developed extended commercial routes, large markets, and an educational and propaganda system to unite their Empire not only through war but also by commerce, taxation, and the common language of Nahuatl. Moreover, the Aztec possessed an elaborate ideology uniting "warfare, human sacrifice, and religion" to "explain the workings of nature and satisfy[y] spiritual needs" (Burkholder and Johnson 2001, 18-19). These projections tally with the sixteenth century impressions of the conquistadores who stated that "Mexico was a very great city built in the water like Venice, and that it was governed by a great prince called Montezuma" (Diaz del Castillo qtd. in Maudslay 1928, 68). Consider the reflections of Bernal Diaz del Castillo – both soldier and chronicler of the conquest – upon crossing Mexico on the causeway of Itztapalapa:

“We were amazed and said that it was like the enchantments they tell us of in the story of Amadis, on account of the great towers and [temples] and buildings rising from the water, and all built of masonry. And some of our soldiers even asked whether the things that we saw were not all a dream.” (qtd. in Maudslay 1928, 14).

Having considered the scope of the pre-conquest Aztec civilization, the immensity of the Spanish conquest becomes apparent, lending support to the theory that a multitude of factors ultimately contributed to Spanish victory over this ancient civilization.

Conversely, let us consider the other side: Cortés and his conquistadores. The conquistadores could not have presented a sharper contrast to the territory and the peoples they set forth to conquer, for Cortés' force was no elite squadron of professional soldiers. Rather, it more closely resembled a rag-tag assembly of precisely 508 men, “not including ship masters, pilots, and seamen, who numbered one hundred and sixteen horses and mares” all transported in “eleven ships great and small” (Diaz del Castillo qtd. in Maudslay 1928, 12). As Francisco de Jerez so astutely remarked in 1534, the salient point is that these men were “neither paid nor forced but went of their own will” (qtd. in Restall 2003, 27). Centuries later, in the words of historian James Lockhart, they were not soldiers but “free agents, emigrants, settlers, unsalaried and ununiformed earners of

*encomiendas* [grants of native American labor] and shares of treasure” (qtd. in Restall 2003, 35). Tellingly, *soldado*, the Spanish term for soldier does not appear in the sixteenth century accounts of the conquest drafted prior to the 1560s and 1570s, revealing that at the time of the conquest, even the conquistadores did not consider themselves to be soldiers (Restall 2003, 28-30). These men lacked formal training and military ranking and were in fact from a wide range of backgrounds, frequently but not necessarily hailing from middle class trades or professional backgrounds, and possessing varying degrees of literacy though with an average literacy rate slightly higher than that in Spain (Restall 2003, 34-37). Indeed, Cortés himself was no prince, no general, no gallant, no visionary – not even a soldier. Instead, he was simply a man who had fled Spain for the island of Hispaniola in the New World as a 19 year old in order to escape both the boredom of the study of law and “death at the hands of a jealous husband” (Burkholder and Johnson 2001, 42). Moreover, this expedition to the Mesoamerican mainland had no authority save that which it conferred upon itself: having been officially removed from command of the Mexican expedition by the Governor of Cuba, Diego Velázquez, Cortés simply stated that he “intended to be Captain” and “embarked all his soldiers in the night,” cutting preparations short and setting sail for Mexico despite Velázquez’ edict (Díaz del Castillo qtd. in Maudslay 1928, 81). In the process, Cortés became an outlaw, slated for detainment or imprisonment if captured by Velázquez’ men. Even within this band of 500 outlaws, the initial lack of unity and trust was such that upon their arrival on the Mexican shores, Cortés felt it necessary to “destroy the ships, lest any of the soldiers should mutiny and wish to return to Cuba” (García qtd. in Maudslay 1928, 13). Thus, brutal, aggressive, determined, and wily though the conquistadores may have been, the nature of the Spanish expedition to the Mexican mainland further emphasizes that the favorable interactions of a variety of factors were responsible for the success of the conquest.

In view of the immense contrast between the invaders and the invaded, with the odds so heavily favoring the Aztec, a Spanish conquest seems unfathomable and the central question remains: *How* was a small band of conquistadores able to vanquish and establish control over the great civilization of the Aztec? Although military superiority, technology, tactics, exploitation of indigenous rivalries, communication, psychology, and institutional imposition, and individual personalities all contributed to the Spanish victory, it must also be remembered that “they did not come alone to the New World, but brought with them animals and plants; weeds, seeds, and diseases ... the invaders had brought with them more means than they knew to conquer a continent” (Melville 1994, 1). The conquest of the Americas was in part a case of “ecological imperialism” (Crosby *Ecolog Imp* 1986) where Old World microbes, notably small pox, devastated New World populations susceptible to the disease; small pox destroyed the Aztec not only in pure numerical terms, but also militarily, psychologically, and socially.

Small pox was not endemic to the Americas but imported in 1492, “when the isolation of the New World was broken, when Columbus brought the two halves of this planet together, the American Indian met for the first time his most hideous enemy: not the white man nor his black servant, but the invisible killers which those men brought in their blood and breath” (Crosby *Colomb Exch* 1972, 31). Although historians are in agreement that small pox – and a variety of other Old World diseases including small pox, typhus,

measles, diphtheria, whooping cough, chicken pox, influenza, typhoid, and trichinosis – were introduced to the Americas by the invaders from the Old World, (Settipane 1995, 2) the specifics of the introduction of the small pox virus to Mexico remain contentious. The New World small pox epidemic seems to have begun in December 1518 or January 1519 on the island of Santo Domingo, spreading to Puerto Rico and the Greater Antilles before hitting the Spanish settlement of Yucatán on the Mexican coast in the 1520s. (Crosby *Colomb Exch* 1972, 48) A variety of mechanisms for disease transmission to the Yucatán have been postulated. For instance, it has been suggested that small pox was introduced to Mexico first either by a group of shipwrecked Spaniards on the Yucatán coast in 1511 or by Hernández de Cordoba's expedition surveying the same coast in 1517. Alfred Crosby, however, discounts both theories as unlikely since "small pox had not appeared in the Greater Antilles, the likeliest source of any smallpox epidemic on the continent until the end of 1518 or the beginning of 1519" (*Colomb Exch* 1972, 48). The most widely accepted theory – both currently and at the time of conquest – is that the arrival of small pox in Mexico coincided with Cortés' invasion of the continent. Specifically, a single black slave accompanying Cortés' rival, Panfilo de Narváez, is believed to have been infected with the microbe. Francisco de Aguilar, one of the original conquistadores, later stated that this single individual then "infected the household in Cempoala where he was quartered; and so it spread from one Indian to another, and they, being so numerous and eating and sleeping together, quickly infected the whole country" (qtd. in Crosby *Colomb Exch* 1972, 48-49). Diaz del Castillo corroborates this information while reporting the introduction of small pox into Mexico in May 1519:

"[Narváez] brought with him a Negro who was in the smallpox, an unfortunate importation for [Mexico], for the disease spread with inconceivable rapidity, and the Indians died by thousands of it ... Thus black was the arrival of Narváez and blacker still the death of such multitudes of unfortunate souls ..." (qtd. in Bianchine and Russo in Settipane 1994, 14).

This theory, however, is not without its share of flaws and criticisms either. When considering the transmission of small pox in the conquest era, it must be realized that the voyage from Europe to America "was one of several weeks, so that, even if an immigrant or sailor contracted smallpox, he would most likely be dead or rid of its virus before he arrived in Santo Domingo. Moist heat and strong sunlight, characteristic of a tropical sea voyage, are particularly deadly to the small pox virus" (Crosby *Colomb Exch* 1972, 46). There are no non-human carriers of small pox and small pox is spread only through intimate human-to-human contact (Bianchine and Russo in Settipane 1995, 13). Therefore, the transmission of small pox from the Old World to the New by a single individual is only plausible in the case of "an especially fast voyage" (Crosby *Colomb Exch* 1972, 46). It is in fact quite likely that there was more than a single source of disease; despite the long duration of the typical voyage, small pox could be transmitted across the Atlantic in the presence of "several nonimmune persons who could transmit the disease from one to the other until arrival in the Indies," or through the presence of small pox scabs – "in which the virus can live for weeks" – on board (Crosby *Colomb Exch* 1972, 46). Regardless of the exact sequence of disease transmission, however, the key

point is that small pox was introduced to Mesoamerica at the time of conquest, sparking whole scale devastation of Mesoamerica through a series of 14 to 17 epidemics between 1520 and 1600 (Settipane 1994, 1).

Perhaps a more interesting point of discussion is the incredible susceptibility of the Aztec to small pox – European data illustrated that in small pox endemic populations, the mortality rate is 3-10% of annual deaths in the society whereas this number climbs to 30% case mortality in an unimmunized population (Crosby *Colomb Exch* 1972, 44); among the Aztec, however, the population decline was 90-95% from 1519 to 1620 (Melville 1994, 4)! Why were the Mesoamerican Indians so devastated by small pox while the conquistadores escaped relatively unscathed? Again, historians are divided on this issue and it remains one of the more intriguing mysteries of epidemiological history. In “Virgin Soil Epidemics,” Crosby suggests that the devastating effects of small pox among Amerindians may be attributed to the fact that the entire Mesoamerican population was immunologically naïve, having never had previous exposure to small pox, and was therefore also immunologically defenseless (qtd. in Melville 1994, 4-5). The problem with this simple rationalization, however, is that “everyone who contracts smallpox is immunologically naïve” (Bianchine and Russo in Settipane 1995, 15). Clearly, additional factors must be at play to account for the increased mortality in virgin soil epidemics: Crosby illustrates that several factors contribute to the high mortality rate of such virgin soil epidemics. For one, in endemic populations, small pox is characteristically a childhood disease – perhaps it is possible that course of small pox infection is milder in children than in immunologically naïve adults? Also, Crosby points out that when a disease is not endemic to the population, nor is the knowledge required to manage that disease; interestingly, “where help is not available, mortality rates are very high, even in populations where these diseases are endemic” (Melville 1994, 4-5). For instance, the disease was spread throughout Mesoamerica partially due to a lack of quarantine as “apparently healthy people fleeing their villages ... carr[ied] the contagion to new communities” (Melville 1994, 4-5). Crosby also claims that “the Amerindians were rarely infected by a single disease; it was much more likely that they would be faced with a barrage of new infections. Where several virgin soil epidemics occur at the same time, the mortality rate soars” (Melville 1994, 4-5). While Bianchine and Russo subscribe to the theory that unusually devastating effects of small pox epidemics may be attributed to the nature of virgin soil epidemics, they also suggest that mortality may have been increased by a lack of nourishment and adequate hydration, the incidence of secondary infections like pneumonia, “generalized terror and disorganization” due to a lack of familiarity with small pox, and a lack of healthy individuals to care for the ill due to the “simultaneous infection” of the population (in Settipane 1995, 13). Like Crosby, they state that “given comparable care when ill and knowledge regarding the potential for surviving the illness, the death rates for virgin-soil populations and reportedly exposed Caucasian populations for measles were similar,” which disputes the theory that Amerindians had a greater genetic susceptibility to these diseases than did the Europeans (in Settipane 1995, 15). Still, none of these hypotheses can adequately explain why contemporary Europeans acquired the milder *Variola minor* form of the disease while the Aztec contracted *Variola major*. If the hypothesis that childhood small pox infection is milder than the course in adults is to be believed, then why are there no accounts of a milder small pox course in

Aztec children (Bianchine and Russo in Settippane 1995, 15)? Additionally, it is interesting to note that small pox in Europe had been present in Europe since the tenth century, causing primarily mild disease – although mortality due to subsequent myocarditis with heart failure or extensive dermal involvement and sloughing did occur – and likewise, had a very limited effect on the sixteenth century conquistadores, a much more malignant form of the disease returned to “ravage Europe 100 years after its introduction into the Americas” (Bianchine and Russo in Settippane 1995, 13-15). We have considered differences among hosts, and between environments, but we have not yet considered the third aspect of disease – the pathogen itself. Perhaps the *Variola minor* of small pox mutated before infecting the Americas? Maybe a more virulent African strain of small pox was imported from the Old World rather than the European *Variola minor*? Could it even be possible that European and African small pox strains generated a new *Variola major* strain that “rampaged through the Americas” and then returned to infect Europe (Bianchine and Russo in Settippane 1995, 15)?

Irrespective of *why* small pox had such profound effects on the Aztec, the fact remains that disease irrevocably shaped conquest history in terms of sheer population devastation alone. As stated earlier in this paper, it is now clear to historians that the projected pre-conquest population of central Mexico of approximately 25.2 million declined by 90-95% to about one million by 1605; this rapid decline was largely due to the effects of disease, although warfare, slavery, mistreatment, and malnutrition were also contributing factors (Settippane 1995, 1). This epidemiological conquest of the New World by Old World microbes was captured best by a German missionary who stated, in 1699, that “Indians die so easily that the bare look and smell of a Spaniard causes them to give up the ghost” (qtd. in Settippane 1995, 1). Nor were the conquistadores unaware of this phenomenon; Toribio Motolinía claimed that “more than one half of the population died ... They died in heaps, like bedbugs” (qtd. in Crosby *Colomb Exch* 1972, 52). Similarly, the humanist and champion of the Indians, Bartolome de las Casas tried to account for the surprisingly rapid depopulation of the Americas:

“There used to be great numbers of Indians, but by reason of many diseases and pestilences which they usually have in the province, they diminish greatly because being sick with measles, smallpox, catarrhs, blood flux, and great fevers, they bathe in the rivers without waiting for the diseases to subside, and so they die” (qtd. in Bianchine and Russo in Settippane 1995, 12).

We have few written records of Aztec perceptions at the time of conquest, but the comments of a single Amerindian following the conquest of the Yucatán are insightful, serving to highlight the tremendous impact of disease on Mesoamerica:

“There was [prior to the conquest] no sickness; they had no aching bones; they had then no high fever; they had then no smallpox; they had then no burning chest; they had then no abdominal pain; they had then no consumption; they had then no headache. At that time the course of humanity was orderly. The foreigners made it otherwise when they arrived here” (qtd. in Crosby *Colomb Exch* 1972, 36).



In addition, Aztec illustrations in the codices developed in conjunction with Catholic religious orders show illustrations of scores of Amerindians covered in the pox, ill and dying (illustrated in Settipane 1995, 2). Thus, if conquest is measured by depopulation alone, it is clear from all sources – modern and ancient, Spanish and Indian – that the Old World defeated the New, at least epidemiologically.

However, the effects of disease in Latin America were not limited to a simple depopulation of the region; rather disease had a significant impact on the military, psychological, and social aspects of the conquest. Disease cannot be considered in isolation, for, as Crosby said, “nothing can be understood apart from its context, and man is no exception” (*Colomb Exch* 1972, xiii Preface).

In terms of the military conquest of Mesoamerica, disease played a critical role, for it significantly weakened the Aztec, tilting the balance favorably towards the conquistadores. Some historians rate the impact of small pox so highly, that it has even been stated that small pox “played as essential a role in the advance of white imperialism overseas as gunpowder – perhaps a more important role, because the indigenes did turn the musket and then rifle against the intruders, but smallpox very rarely fought on the side of the indigenes” (Crosby *Ecolog Imp* 1986, 200). To fully realize the impact of disease on conquest, consider the Spanish siege of Tenochtitlan and the subsequent surrender of the Aztec capital city in August 1521: the Aztec forces, led by Cuitlahuac, were in a position to “annihilate” Cortés and the conquistadores when small pox intervened, not only wreaking death and destruction on the civilian inhabitants of Tenochtitlan but also infiltrating and disrupting the function of the army, as soldiers – including Cuitlahuac, successor to the Aztec Emperor Montezuma – succumbed to the disease. The effects of the disease on Tenochtitlan were so disastrous that even Cortés and his hardy band of conquistadores could scarcely bear the sight:

“The streets, the squares, the houses and the courts ... were covered with dead bodies: we could not step without treading on them, and the stench was intolerable ... Accordingly, they were ordered to be removed to the neighboring towns, and for three days and three nights all the causeways were full, from one end to the other, of men, women and children so weak and sickly, squalid and dirty, and pestilential, that it was a misery to behold them” (Diaz del Castillo qtd. in Bianchine and Russo in Settipane 1995, 14).

In a sense, then, Tenochtitlan, and much of Mexico, was conquered not by Spanish guns and sabers, but by the invisible microbes that accompanied these unknowing conquistadores. To quote Crosby once more, “Had there been no epidemic ... Cortés might have ended his life spread-eagled beneath the obsidian blade of a priest of Huitzilophochtli” (*Colomb Exch* 1972, 49).

Similarly, the psychological effects of disease – on both the Aztec and the Spanish – were profound. The fact that Montezuma welcomed, rather than attacked or repulsed, Cortés to his city has long puzzled historians. One possible explanation for Montezuma’s fateful delay and hesitation in challenging the Spanish is that the Montezuma believed that the Aztec prophesy had been fulfilled: the arrival of Cortés was the return of the Aztec God Quetzalcoatl to reclaim his kingdom” (Settipane 1995, 3). This explanation may seem far-fetched until one remembers that the Aztec were a people who believed so deeply in cosmology that they routinely sacrificed tens of thousands of human victims at the altar, tearing out the victims’ hearts with obsidian blades on the tops of great pyramids, with the heat of the sun beating down – all necessary, in the Aztec belief system, to supply the universe with enough life force for life to continue round (Burkholder and Johnson 2001). Under these circumstances, is it still far-fetched to think that the Aztec believed that these strange men who wore shining silver armor, rode great unknown beasts – horses, and came from the sea on ships “whose sails resembled the heavenly clouds” (Settipane 1995, 3) were demigods? For instance, consider Christopher Columbus’ record of the reaction of the Arawak Indians – on an island off the coast of Mesoamerica – to the Spaniards: the Arawak would kiss the Spaniards’ “hands and feet, marveling and believing that they came from the sky ... [and] feeling them to ascertain if they were flesh and bones like themselves” (qtd. in Crosby *Colomb Exch* 1972, 4). This case of mistaken identity was further perpetuated as small pox entered the picture, killing and disfiguring the Amerindians but leaving the Spaniards untouched; both sides soon came to believe – to some degree at least – that God had intervened on the side of the Spaniards (Restall 2003, 133). This undoubtedly impacted both Indian and Spanish psychology, deflating Aztec optimism while bolstering Spanish hopes and ambitions. For instance, phrases such as Gaspar Marquina’s exclamation upon the conquest of Peru, “We took this ... by a miracle of God,” are commonplace in the writings of the conquistadores (Restall 2003, 133). In addition, the Aztec experience with small pox paved the way for the subsequent institutional conquest of the Americas – that is, the religious conquest – as some Aztec, had come to believe that the God of the Spaniards was more powerful than that of the Aztec and were now more amenable to conversion (Settipane 1995, 3). Though not central Mexican in origin, Pedrarias de Avila’s letter to the King in 1525 is fairly typical of Mexican perceptions of disease and providence:

“... more than 400 000 souls have been converted to our holy Catholic faith of their own free will, and more continually come to request baptism, because the Indians in one town where a wooden cross had been set up tried to burn it and never succeeded, and then all the people of the town died of pestilence without an Indian remaining, and seeing this miracle and other miracles that have occurred, the Indians of the region around came to be baptized and request crosses” (qtd. in Restall 2003, 133).

Moreover, even if it did not kill, disease weakened and undermined Aztec society irrevocably. The New World epidemics had very high mortality rates, particularly among those aged 15-40 years – that is, the group most involved in producing food, obtaining shelter, and maintaining the economy; when a large proportion of this group is waylaid by

disease, not only do their dependents suffer, but society ceases to function effectively (Melville 1994, 5). Hence, “the demographic collapse of the New World populations was reflected in a declining labor pool, altered settlement patterns, and changes in the exploitation of natural resources” (Melville 1994, 5). For instance, Lesley Byrd Simpson suggests that the lands freed by the depopulation of the Indians as they succumbed to one Old World microbe, allowed for the expansion of the domestic animals introduced by the Spaniards, further perpetuating the conquest of Old World biota over New (qtd. in Melville 1994, 6). Finally, it must be pointed out that as in the case of any society faced with a sudden slew of deaths and rapid depopulation due to factors beyond control, the small pox experience contributed to a sense of fatalism among some elements of Aztec society, though ironically, it was a Spaniard who captured it best: “There is no remedy, and the Indians are coming to an end” (don Felipe Huaman Poma de Ayala in 1615 qtd. in Restall 2003, 100).

In conclusion, then, the history of the conquest is one of guns and arrows, of conquistadores and emperors and stalwart slaves, of territory and weaponry, religion and economy, but it is also a history of disease, and an exercise in epidemiology. Although our information is filtered down through the centuries and reliant primarily on the – admittedly biased – eyes and ears and pens of the conquistadores, it is nonetheless clear that the role of small pox and disease in the conquest of Mesoamerica was profound. The epidemiological conquest of the Americas not only resulted in the demographic collapse and depopulation of the Aztec but also accompanied and reinforced the military, psychological, and social elements of conquest.

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# **NORMAN BETHUNE AND THE FIRST BLOOD TRANSFUSION AT THE FRONTLINE**

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## **Abstract**

**On July 17, 1936, Spanish military forces stationed in Morocco mutinied and proclaimed a revolution against Spain's elected government. The uprising marked the beginning of the Spanish Civil War. Shortly after the outbreak a spokesman from the Committee to Aid Spanish Democracy visited Dr. Norman Bethune in Montreal. The Committee invited Bethune to lead the Canadian Medical Unit in Madrid. Although one of the highest paid physicians in Canada and one of the world's top thoracic surgeons, he left for Madrid to help.**

**On his arrival in Spain, Bethune toured hospitals and the front line. He soon realized that a hundreds of people fighting at the front line were bleeding to death before they could receive medical treatment in the hospitals. To overcome this obstacle and to save the soldiers at the battlefield, Bethune created the Canadian Blood Transfusion Service - a mobile blood-transfusion service that could rush bottled blood in refrigerated trucks to the wounded at the front. Bethune's mobile blood-transfusion service represented a monumental advance in military medicine and saved many lives.**

Norman Bethune was born on March 3, 1890, in Gravenhurst, Ontario. In 1912 Bethune entered the University of Toronto Medical School, but in September of 1914, soon after the onset of World War I, he left to join the Canadian Army Medical Corps as a stretcher bearer. In April of 1915, he suffered a serious leg wound during a battle in Ypres and was unable to continue his duties (Walt 1983). He returned to Canada, completed his medical studies, and graduated in December of 1916. But before long Bethune returned to the military, this time serving as Surgeon-Lieutenant on a Royal Navy aircraft carrier by early 1917 (Walt 1983). Following the end of the First World War, Bethune traveled to London, in February of 1919, and trained as a surgical intern for six months at the Great Ormond Street Hospital for Sick Children (Walt 1983). Following his internship, Bethune returned to the Canadian armed forces once more, this time serving as a Medical Officer with the Canadian Air Force (Walt 1983). After seven months of service, he returned to London to complete a surgical residency. He became a fellow of the Royal College of Surgeons of Edinburgh in February of 1923.

Shortly after his exams, he married Frances Penny, the daughter of a wealthy Edinburgh family. The two set off on a five month honeymoon through Europe, visiting the leading

surgical clinics in Paris, Vienna, and Berlin, while enjoying the skiing and spas of Switzerland. With the little money they had left, they traveled to Detroit in 1924 to set up practice, and after a difficult start, began to enjoy a prosperous practice. Although Bethune enjoyed the vibrant growth of Detroit, Frances despised its industrial culture; their marriage suffered. Coincident with the dissolution of his marriage in 1926, Bethune noticed that he was losing weight, coughing incessantly, and fatiguing easily. Twenty-two months after arriving in Detroit, Bethune was diagnosed with bilateral pulmonary tuberculosis.

Bethune entered the Trudeau Sanatorium at Saranac Lake in December of 1926. The mandatory rest furnished Bethune with ample opportunity for reflection and introspection. He began to ponder on the subtle structure within society and the association between tuberculosis and poverty. Bethune realized that tuberculosis was essentially a result of socioeconomic conditions. He believed that this should concern physicians, and could not comprehend their indifference. But with the termination of his divorce, the exhaustion of his financial resources, and the prospect of death hanging over him, Bethune's time in the Trudeau Sanatorium was also an emotionally consuming period for him. He expressed his despair by writing poetry and painting his famous sixty foot mural entitled *A TB's Progress* on his cabin walls. He also read extensively on tuberculosis, and became familiar with the works of John Alexander, of the University of Michigan, and Edward Archibald, of McGill University. Each suffered from pulmonary tuberculosis, persevered, and later became experts in the surgical treatment of pulmonary tuberculosis. Making little progress by October 1927, Bethune demanded a artificial pneumothorax be performed, as described by Alexander. His progress was spectacular and two months later he was discharged from the Trudeau Sanatorium.

After a few months conducting research at the tuberculosis hospital in Ray Brook, NY, as recommended by Edward Archibald, Bethune joined Archibald at the Royal Victoria Hospital in Montreal to train as a thoracic surgeon. His tenure in Montreal proved exceedingly fruitful. He quickly became one of the premier thoracic surgeons in North America: Over the next four years he published ten research articles, invented several thoracic surgery instruments, perfected an artificial pneumothorax apparatus, and by 1935, he was elected a councilor to the American Association for Thoracic Surgery (Stewart 1977; Walt 1983). By 1933, however, Bethune had overstayed his welcome under Edward Archibald, and left the Royal Victoria Hospital to assume the position of Chief of Thoracic Surgery at Sacre-Coeur in Cartierville, just outside of Montreal.

In the midst of the Depression, while at Sacre-Coeur, Bethune thrived as a surgeon and as a person. The social conscience that began to germinate at the Trudeau Sanatorium flourished. He left the Trudeau Sanatorium on a personal crusade to cure tuberculosis surgically, but he could not operate on the patients as quickly as the bacteria was spreading among the impoverished. He soon realized that the pervading social conditions were supremely conducive to the transmission of tuberculosis. Bethune then reflected on the strange equation that had idle physicians sitting in their offices and sick patients sitting at home with no means to buy medical attention. If he wished to eradicate tuberculosis, a reform of the medical system was necessary. In 1935 he formed the Committee for the

Security of the People's Health, an informal group of physicians, economists, sociologists, nurses, lawyers, and others who gathered to discuss the present social ills and formulate solutions. They devised a health care system based on socialist and communist models, and presented their model - which bears considerable resemblance to our present health care system - to the public just before the Quebec elections of 1936 (Walt 1983). It was soundly rejected by all political parties. In August of 1935, Bethune traveled to Russia for the First International Physiological Conference. Although Pavlov presented his seminal work on classical conditioning at the conference, Bethune spent more time examining the Soviet health care system (Allen and Gordan 1989; Walt 1983). He returned to Montreal profoundly impressed with the general availability of health services to all its citizens, and was determined to advocate his beliefs even more vigorously than before. That December he presented his revolutionary ideas to the Medico-Chirurgical Society of Montreal. He was expelled from the society shortly thereafter.

The Spanish Civil War began, in July of 1936, with an attempt by senior military officers to overthrow the recently elected, leftist, Republican government. Aided by Germany and Italy, the Nationalist forces, led by General Francisco Franco, soon gained control of large regions of the country. The news of the recent Spanish military coup disturbed Bethune. Coming so soon after Mussolini's occupation of Abyssinia in 1935 and Japan's occupation of Manchuria in 1931, to Bethune, it seemed Fascism was spreading over the globe like a pall. A few weeks later, a representative from the Committee to Aid Spanish Democracy approached Bethune in his office and asked him to lead a medical unit they wished to send to Spain. He promptly accepted. Telling his friends and colleagues that "it is in Spain that the real issues of our time are going to be decided," on October 24<sup>th</sup> of 1936, Bethune resigned his position as Chief of Thoracic Surgery at Sacre-Coeur and abandoned his peaking medical career for Spain (MacLean and Entin 2000).

He arrived in Madrid on November 3<sup>rd</sup> with no clear idea of what he was going to do. During the first several days, in the company of Henning Sorensen, a multilingual Danish-Canadian who volunteered as his interpreter, he toured the city's military hospitals and casualty clearing stations near the front lines outside Madrid, examining the types of wounds the soldiers suffered and keeping notes on the percentage of fatalities and recoveries after surgery along the way. A week later, when he became certain of what was missing in the army's medical services, he traveled to Valencia. At the Socorro Rojo Headquarters (a Spanish trade union relief organization which functioned as the only effective medical service in Republican Spain at the time), Bethune explained to the committee that in all wars, even the most highly organized medical services suffered from one serious defect (Allen and Gordan 1989): Never before had provisions been made for the wounded who bled to death on the battlefield or during the trip from the front to the base hospital, or who were so weakened by blood loss or shock that they were unable to survive surgery once they arrived at a base hospital. He acknowledged that Dr. Federico Duran Jorda had done excellent work in storing blood and organizing blood banks in Barcelona. But what did it matter if Duran Jorda had an exceptional blood bank in Barcelona if the soldiers died in Madrid?, he argued. The main problem had yet to be addressed decisively: the battle wounded needed transfusion of blood at the front. Bethune was convinced blood transfusions at the front line would result in an immediate

and pronounced decrease in combat fatalities. To achieve this, Bethune proposed a mobile blood transfusion service that would gather blood from volunteers in the cities, store it, make it available to casualty clearing stations and field hospitals, and above all, provide transfusions at the front line, while the fighting was in progress (Allen and Gordan 1989).

The proposal was received with significant skepticism. Two of the three doctors on the Socorro Rojo committee believed the project was impractical and infeasible. Fortunately, for Bethune and for the Spanish, one physician, a senior member on the committee, felt that the service was necessary, and prevailed on his junior colleagues to support the mobile transfusion service (Allen and Gordan 1989).

The next morning he and Sorensen set out for Paris and then onto London, purchasing medical supplies and establishing contacts along the way. After completing his purchases, Bethune locked himself in a room and fervently studied all the available literature on the latest techniques of blood transfusion. He returned to Madrid on December 6<sup>th</sup> with a station wagon, refrigerator, autoclave, incubator, and various other supplies, as well as a new recruit, Hazen Sise, another young Canadian (Allen and Gordan 1989). The Socorro Rojo had not been idle in his absence. In preparation for one of the most novel medical projects in military history, the Spanish authorities arranged quarters for Bethune's operation - the fifteen room flat formerly occupied by the German Embassy's legal counsel (Allen and Gordan 1989). Within the apartment, a laboratory, two refrigeration units, and transfusion rooms were assembled. Moreover, Socorro Rojo assigned two young Spanish doctors to work with Bethune as assistants, along with two laboratory technicians, three nurses, a security guard, and other maintenance workers. Once the institute was built, donors were recruited by press and radio advertisements, and the Servicio Canadiense de Transfusion de Sangre began to function.

Ten days later, on December 23, the first transfusions of stored blood, delivered the mobile transfusion service, were given in University City (Allen and Gordan 1989). In a letter to the Committee to Aid Spanish Democracy, Bethune described a typical transfusion within the city as follows:

“We get a phone call for blood. Snatch up our packed bag, take 2 bottles (each 500 c.c.) - one of group IV [O] and one of group II [A] blood - out of the refrigerator and... off we go. Our bag contains a completely sterilized box of instruments, towels, etc. so we can start work at once. The man is lying down most frequently on a stretcher so we kneel down beside him, prick the finger and on a slide put 1 drop each of Serum type II and type III [B]. If his red blood cells are agglutinated by II he is III, if by both he is a type I [AB], if neither, he is group IV. So now we know what blood he can take safely. If I, III or IV he gets our bottle of blood group IV (the universal donor). If he is a II he gets blood group II... Then the proper blood is warmed in a pan of water and we are ready to start. The man is usually as white as the paper, mostly shocked, with an imperceptible pulse. He may be exsanguinated also and not so much shocked, but usually is both shocked and exsanguinated. We now inject novo-caine over the vein in the bend



of the elbow, cut down and find the vein and insert a small glass Canula, then run the blood in. The change in most cases is spectacular” (Stewart 1977).

In Madrid, the Servicio Canadiense de Transfusion de Sangre served about 56 hospitals with 10,000 beds, and deliveries were made to the Madrid hospitals by road, or often, by foot carrying blood in knapsacks (MacLean and Entin 2000). By the end of December, 1,000 donors had been enrolled, and about 8 bottles of blood were being collected per day (Alexander 1999).

During November and December, Franco made Madrid the focus of the war, but by the end of January, the war was expanding outside of Madrid, particularly in the South, and Bethune was drafting plans to expand the perimeter of the mobile transfusion service. He presented his plans before Socorro Rojo, only this time the committee was more receptive to his proposals, and on February 8<sup>th</sup> the Spanish authorities gave Bethune authority for transfusion over the entire front, over 1000 km in length, including both the Madrid and Barcelona services, gave him the rank of Commandante, but renamed the service the Instituto Hispano-Canadiense de Transfusion de Sangre (Allen and Gordan 1989; Franco et al. 1996). Bethune soon established two additional centres, both much larger than the first, with a combined staff strength of 100 (Alexander 1999). The number of volunteer blood donors grew to nearly 4,000 (Alexander 1999). The Madrid service included four motorized vehicles and delivering, on average, 100 litres of blood per month to over 100 hospitals and casualty clearing stations up to 100 km away, and one shuttle service bringing blood from Dr. Duran Jorda’s centre in Barcelona, which was relatively quiet, to areas of where combat was greater, such as Madrid, Guandalajara, and Sierra de Guandaramma (Allen and Gordan 1989). The service operated 24 hours a day with many transfusions delivered by Bethune himself, as he loved the excitement of combat.

However, in April of 1937, the Republican Government began to exert its authority, demanding all organizations involved in the war to operate under the authority of the Ministry of War. Moreover, they sought to restructure the authoritative structure of the mobile transfusion service by introducing two Spanish physicians to oversee the Instituto Hispano-Canadiense de Transfusion de Sangre with Bethune. He rejected the interference and promptly wired the Committee to Aid Spanish Democracy in Canada, demanding they withdraw the Canadian-led team. The Committee to Aid Spanish Democracy, however, conducted their own investigation, and decided it was best if Bethune returned to Canada, alone.

With the blood transfusion methods he introduced at the fronts, fatalities among wounded had been drastically reduced, in some sectors, by as much as 75% (Allen and Gordan 1989). In all the Instituto Hispano-Canadiense de Transfusion de Sangre transfused about 5,000 units, accounting for nearly 80% of all transfusions during the war (Franco et al. 1996).

On June 6<sup>th</sup> of 1937, Bethune returned to Canada, and received a hero’s welcome (Allen and Gordan 1989). Although, he was bitter about his enforced departure from Spain, his experiences in Spain as witness to air raids on civilians and the strafing of refugees fueled

his desire to aid the Spanish cause in any manner possible. Bethune commenced a lengthy speaking tour of North America, raising funds to support the medical needs of the Spanish people. By the end of the speaking tour in September of 1937, the second Sino-Japanese War was just beginning, and Bethune decided to continue his battle against fascism in China. In January of 1938, Bethune joined the Canadian-American Mobile Medical Unit going to China, where he died, in November of 1939, of septicemia acquired from a bone fragment while he was operating bare handed in a cave on a wounded Chinese soldier with the enemy just minutes away. His work in China earned him veneration among the Chinese people and world renown.

Norman Bethune traveled to Spain to help fight fascism. In the process he made a fundamental advance in blood transfusion philosophy and technology, created the Servicio Canadiense de Transfusion de Sangre, and saved countless lives. But it is strange that Bethune, a surgeon, decided to design a mobile transfusion service. After all, he knew very little of the detailed procedure of blood transfusion, nor had he ever performed a blood transfusion. Moreover, experienced surgeons were desperately needed on the Madrid front. It would have been natural for a man of his expertise to enter a military hospital and devote his energy to surgery. Instead he resisted pressure to become a military surgeon, and created a mobile transfusion service. Bethune's insight was to recognize, where others did not, the need for a mobile transfusion unit at the front. But where did the insight and inspiration come from? I believe Bethune's work in Spain was inspired by the work of two of his colleagues: Drs. Edward Archibald and Federico Duran Jorda.

During the first world war Archibald spent 18 months in France: four months of which were spent in a casualty clearing station close to the front lines (Pelis 2002). At the casualty clearing station, surgeons were being confronted by a problem that most seldomly faced in their peacetime practices: shock. Soldiers would present with a weak pulse, rapid shallow breathing, pallor, clear but lethargic thought processes, low temperature, and low blood pressure. British surgeons who remained obstinate in their practice habits continued to infuse these patients with saline solution (Pelis 2002). Many soldiers died. Archibald too observed the pervasive problem of shock, but he arrived in France convinced that intravenous saline was at best a temporary measure and that a timely blood transfusion might save patients suffering from shock "complicated" by hemorrhage (Pelis 2002). Transfusion, however, was an elaborate procedure. It demanded the attention of two surgeons and a well-trained nursing staff, and it necessitated the donor's presence in the operating room. In a busy casualty clearing station surgery ward, a procedure that was virtually impossible. But without the transfusion, patients did not survive their stay at the casualty clearance station, let alone the journey back to the base hospital. Archibald, therefore, decided to apply a newer method of performing transfusions: Just before the onset of the war, three different research groups independently concluded that the addition of sodium citrate to blood would hinder its coagulation and not harm the patient. Archibald believed citrate transfusion to be "peculiarly suited" for military surgery (Pelis 2002). Donors could be bled in a separate room, at their leisure. The surgeon could then perform the transfusion by himself, with blood at hand, when he needed it. Furthermore, he could use the blood

without fear of clots obstructing the syringe and ruining the transfusion. “Nothing could be more simple,” Archibald asserted. By the war’s end citrate transfusion had become an integral part of the resuscitation of patients in shock, and Archibald published the first paper extolling its potential battlefield merits (Pelis 2002).

After returning to the Royal Victoria Hospital in Montreal, he brought in Norman Bethune as his assistant. Bethune trained under Archibald for five years. It is difficult to imagine that over those five years Archibald did not share his experiences in the First World War and expertise in the management of shock with blood transfusion with Bethune, especially since Bethune had an interest in military medicine.

Then there was Dr. Frederico Duran Jorda of Barcelona. As battles were raging in Central and Southern Spain and hundreds of people began dying of trauma injuries, Duran Jorda became seized with the crucial importance of large scale blood supplies (Coni 2002). He conducted a number of studies on blood globules, the properties of plasma, and designed new technical instruments to facilitate the collection and preservation of the siphoned blood (Coni 2002). His expertise led to the creation of the Barcelona Blood Transfusion Service, and the worlds most advanced blood bank at that time (Coni 2002).

All blood was collected into a closed system, under strictly aseptic conditions. Citrate and glucose were added after collection, and bloods of the same group were mixed. Duran Jorda was able to test for syphilis and malaria, and had even acquired an X-ray machine to avoid using people with tuberculosis as donors (Coni 2002). Blood was kept under refrigeration, which was provided by electric ice-boxes whenever current was available. It was supplied to military base hospitals in heat-insulated wood or canvas boxes, with thick cord linings. Transfusion data were recorded on special cards provided with all blood containers. Blood was prescribed by surgeons but administered by personnel of specially trained transfusion teams. However, under Jorda’s system, only badly shocked casualties received blood at casualty clearing stations, and most transfusions were given in hospitals located far from the front lines, where the transfusions were needed most.

It is certain that Duran Jorda’s work contributed to Bethune’s creation of the mobile transfusion unit. When Bethune arrived in Spain he toured Duran Jorda’s blood bank in Barcelona, and later he consulted Duran Jorda on the collection and storage of blood.

Bethune’s inspiration to create the mobile transfusion unit came from two sources, I believe. First, as he was touring the casualty clearing stations, and military hospitals across the front line it is likely that the frequent site of young men dying of hemorrhage and shock reminded him of Archibald’s experiences in the first world war and Archibald’s work in hemorrhage and shock management with blood transfusion. Thus the need for blood transfusion to treat hemorrhage and shock was likely inspired by Edward Archibald. Second, when Bethune first arrived in Spain he toured the Duran Jorda’s eminent blood bank in Barcelona, likely noting its technological advancement, but also its distance from the front line. Thus the need for the blood transfusion to be as close to the battle front as possible was probably inspired by Duran Jorda’s miscalculation.

Bethune's genius was to recognize the importance of hemorrhage in wound shock and realize the need for blood transfusion at the front where the wounded lie. For the Spanish Republican military, Bethune's creation of the Servicio Canadiense de Transfusion de Sangre meant an immediate change in their fortunes: Before the mobile transfusion unit was created, the Republican forces were losing soldiers to hemorrhage and shock faster than they could recruit them. Once the mobile transfusion service began delivering blood to the front lines, in many sectors, over half of the lives thought lost were saved and the casualty percentage fell. For blood transfusion, Bethune's work in Spain unequivocally demonstrated the value of blood in shocked and hemorrhagic, dying soldiers. For Military Medicine, Bethune's creation of the Servicio Canadiense de Transfusion de Sangre marked a change in patient care philosophy: Before Bethune, doctors waited kilometers behind the front lines for the dying soldiers to be delivered to them. Bethune, on the other hand, went to the soldiers. A philosophy first expressed by him in Spain as "Doctors! Go to the wounded. Do not wait for them to come to you!" and made famous in China. Norman Bethune's contributions to medicine and the Spanish Republican military were remarkable if not heroic.

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# **MOXIBUSTION: A PRISONERS' OF WAR ACCOUNT**

By

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## **Abstract**

**During World War II, prisoners of war (POWs) were subjected to unequivocal, often unimaginable, malnutrition, abuse, and torture. In the aftermath of war, allied interrogators took statements and affidavits of evidence from thousands of POWs. Allegations of appalling conduct against POWs by the Japanese were collected and many Japanese were tried and convicted of war crimes in the later 1940s. The evidence for these war crimes was abundant and self-evident.**

**However, some allegations of war crimes against the Japanese, although perceived to be straightforward in context, presented a magnitude of complexity. Distressing and painful as the burns were to the startled POWs—they were actually procedures of a medical therapy having a rich and deep history extending back more than two millennia. The therapy was, none other than, moxibustion.**

**The science of moxibustion has a close relationship with acupuncture. Moxibustion follows acupuncture's beliefs that in the human body there are special networks of meridians and secondary channels which are independent of the nervous system and circulation.**

**In moxibustion, usually a grain-size cone of moxa or dry yellow spongy substance made from an herbal plant "mugwort" are placed on the acupoints and lit with an incense stick. There are two types of moxibustion. Direct moxibustion is where the heat penetrates deep into the skin where as indirect moxibustion involves burning moxa cone on the head of inserted acupuncture needles.**

**Because of the difference of quality and processing of moxa between Japan and China—the Japanese, in general, prefer direct moxibustion while the Chinese perform indirect moxibustion. Direct moxibustion, although a form of medical treatment, can be painful. Coincidentally, it can be perceived as a form of deliberate torture and discomfort for patients—especially if these patients are POWs who are unfamiliar with the concepts of oriental medicine.**

Amidst the conflicts of war come thousands of untold stories of pain and suffering. Aside from the horrific accounts of frontline casualties, the plight of prisoners of war (POWs) in World War Two (WWII) is often forgotten. There were more than 140,000 prisoners in

Japanese war camps. Of these, one in three died from starvation, work, and punishment, or from diseases for which there were no medicines to treat (Wheeler 2005). Sickness, brutality, starvation, and forced labor plagued the existence of tens of thousands of Allied POWs in WWII. More than a quarter of them died in captivity (Roland 2001).

WWII POWs experienced the harsh and cruel realities of combat. POWs were essentially fallen and captured soldiers in the line of duty who endured psychological and physical torment throughout their imprisonment. Twentieth century POWs, in general, had infinitely better conditions than was the case for previous centuries. Until the eighteenth century, prisoners were routinely mutilated, killed, or even enslaved by their captors (Roland 2001).

In 1929, the Geneva Convention was signed by many nations—establishing rules for the treatment of prisoners of war, the sick, and the wounded (a revised convention was drafted on October 21, 1950). One country that did not fully sign the Geneva Convention was Japan. It had fully ratified the convention on the treatment of the sick and wounded in the field, but did not ratify the convention on the treatment of POWs. Although Japan did not have legal obligations in international law for the treatment of POWs, it did ensure that clothing, rations and racial customs of POWs would be considered. The terms of the [Geneva Convention](#) were ignored by the Japanese who made up rules and inflicted punishments at the whim of the camp commandant (Wheeler 2005).

With no adherence to the Geneva Convention, there was great anxiety amongst the governments of allied nations whose troops faced the Japanese in their rapid advances in Asia. One such place that the Japanese invaded was Hong Kong. Allied soldiers captured in the Crown colony of Hong Kong were subjected to grim year's imprisonment where many were labored, sickened, and often died (Roland 2001). Throughout WWII, POWs in Hong Kong and other imprisonment camps were subjected to unequivocal, often unimaginable, malnutrition, abuse, and torture.

The majority of prisoners were put to work in mines, fields, shipyards and factories on a diet of about 600 calories a day. One POW recalls:

I was - a white slave. I worked 12 hours a day on a diet of Soya beans and seaweed (Wheeler 2005).

Prisoners were rarely given fat in their diet and all were continuously hungry. The majority survived on barley, green stew, meat or fish once a month and seaweed stew. [Red Cross](#) parcels were not distributed to the prisoners (Wheeler 2005).

In the aftermath of war, allied interrogators took statements and affidavits of evidence from thousands of POWs. Allegations of appalling conduct against POWs by the Japanese were collected and many Japanese were tried and convicted of war crimes in the later 1940s (Roland 2001). The evidence for these war crimes were abundant and self evident. The war had ended in Hong Kong formally and officially on September 16, 1945 (Roland 2001).

Although the war was over, the aftermath for the POWs had just begun (Roland 2001). For one soldier of the Winnipeg Grenadiers, the war did not end until March 29, 1953. He had been seriously ill as a prisoner, and hospitalized from April 1942 until war's end (Roland 2001). His story was just one of many POWs, who continued to suffer after the end of the war. What was this place these men traveled so far to defend, and too often died for?

However, some allegations of war crimes against the Japanese, although perceived to be straight forward in context, presented a magnitude of complexity. One complaint expressed by a few POWs was that the Japanese had tortured them, burning their bodies by lighting combustible substances piled onto various parts of their body (Roland 2001). One account by a POW was as follows:

Riggs was burned on the arms, approximately that far (indicating) on both arms. A fellow by the name of Thomas was burned on the ears and neck, behind the ear and on the back of the neck (indicating). Swisher was burned on the stomach and arms in the same manner (indicating an area about the foot)...the scars were large, red, ugly looking things. I have never seen anything else quite like it. It was very apparent that there was a lack of proper equipment for them to treat the wounds properly (Roland 2001).

What was being done to these prisoners? It was well known that many Allied prisoners were subjected to torture, but in those cases mass evidence was obtained—such as pictures of barbaric procedures and hideous beatings.

Distressing and painful as the burns were to the startled POWs—they were actually procedures of a medical therapy having a rich and deep history extending back more than two millennia. The therapy was none other than moxibustion.

The science of moxibustion has a close relationship with acupuncture. In moxibustion, usually a grain-sized cone of moxa or a dry yellow spongy substance made from an herbal plant "mugwort", (*Artemisia vulgaris*) is placed on the acupoints and lit with an incense stick (Kaplan 2001).

There are two types of moxibustion. Direct moxibustion is where the heat penetrates deep into the skin whereas indirect moxibustion involves burning a moxa cone on the head of inserted acupuncture needles (Kaplan 2001)

Direct moxibustion can be further categorized into two types: scarring and non-scarring. With scarring moxibustion, the moxa is placed on a point, ignited, and allowed to remain on that point until it burns out completely. This technique can lead to scarring and blisters. Non-scarring moxibustion is when the moxa is lit and placed on the skin, but then is immediately extinguished before it can burn the skin. This type of direct moxibustion can decrease the symptoms of immediate pain (Acupuncturetoday 2005).

Because of the difference of quality and processing of moxa between Japan and China—the Japanese, in general, prefer direct moxibustion while the Chinese perform indirect

moxibustion (Dharmananda 2004). Direct moxibustion, although a form of medical treatment, can be painful. Coincidentally, it can be perceived as a form of deliberate torture and discomfort for patients—especially if these patients are POWs who are unfamiliar with the concepts of oriental medicine.

The science of acupuncture and moxibustion is a subject dealing with the prevention and treatment of diseases by needling and moxibustion methods. For thousands of years, the Chinese populations used these techniques for a wide range of medical purposes. Acupuncture and moxibustion are an important component of traditional Chinese medicine with a long history.

Before one can truly appreciate the art of moxibustion, one must understand the philosophy of TCM. Over 8000 years ago, Fu His, a Chinese philosopher who lived in the Yellow River area of China, would meditate and observe the flow of energy within man and the environment (Suvow 1998). By observing nature, he formulated two symbols—a broken line and an unbroken line. These symbols represented the two major forces in the universe—creation and reception (Suvow 1998). TCM is rooted in the ideology of how the interaction of these two forces forms life. Chung-I, is based on the ideology that the human being is a microcosm constantly interacting with the larger universe which influences and control every aspect of life, including health (Jirui & Wang 1988).

The art of moxibustion and acupuncture is based on the belief that in the human body, there are special networks of meridians and secondary channels which are independent of the nervous system and circulation (Horner 1998). Termed the Ching-lo system, it connects the internal organs with points on the skin. These points were historically counted for as 365, but now may be as high as one thousand (Bowers 1973). The energy of life, the Qi, constantly flows through these channels. The meridians divide the ducts through which the Qi flows through.

The Chinese word, "Zhen Jiu" literally translates into "Acupuncture & Moxibustion". Rarely in the medicine practiced in ancient China were acupuncture needles inserted without also treating patients with moxibustion, a therapy which involves the burning of specific herbs at acupuncture points (Dharmananda 2004). The original Chinese term for what we today routinely call acupuncture is zhenjiu, which refers to needling (zhen) and moxibustion (jiu), two techniques understood to be essential parts of one fundamental approach to treating disease and maintaining health. Nonetheless, compared to acupuncture, moxibustion is usually deemed a secondary practice (Dharmananda 2004). The root word, "moxa" is actually derived from the Japanese. Thus the word, "moxibustion" has origin in the Japanese word "mokusa" that means "burning plant stick" (Kaplan 2001).

The evolution of moxibustion started with primitive man warming themselves by fire to stop 'cold' pain in parts of the body. This evolved into using methods of burnt hot stone or sand wrapped in animal skin or bark to treat diseases with local hot compression (Dharmananda 2004). Soon, people gradually advanced the technique, using ignited



branches or bundles of hay to warm the diseased part of the body. This is the most primitive form of moxibustion (Dharmananda 2004). Gradually, leaves from the moxa plant were chosen as the most effective moxibustion material. Research has shown that *Artemisia vulgaris* acts as an emmenagogue—an agent that increases blood circulation to the pelvic area and uterus and stimulates menstruation (Acupuncturetoday 2005).

The origination and main application of moxibustion is described in the *Suwen* (the textual basis of ancient and modern concepts about acupuncture and moxibustion treatments) as follows:

The North is the region where heaven and earth secure and store. Its land lies at a high altitude, its people live in earthen mounds. Wind and cold and icy chilliness dominate; its people find joy in living in the wilderness and in consuming milk. Their depots are cold and generate diseases of fullness. For their treatment, moxa burning is appropriate. Hence, moxa burning originated in the North (Dharmananda 2004).

The reference here is to the north of China, specifically to the tribes of Mongolians, who drank mare's milk and lived at high altitudes. Most Mongolians lived in cold climates and their illnesses were categorized as entailing fullness. Thus, moxibustion was used to treat people who had a cold or stagnant condition. The burning of moxa is believed to expel cold and warm the meridians, which leads to smoother flow of blood and qi.

In modern medicine, however, moxibustion is believed to initiate a non-specific healing reaction throughout the body. It is believed that through local tissue damage (extended cellular damage by the intense heat of moxibustion) the production of immunological mediators and neurotransmitters is stimulated (Dharmananda 2004).

Through the application of moxibustion came new innovations in delivering the treatment to patients. There are currently over fifty different kinds of moxibustion methods. They range from different shapes of mugwort cones or rolls and materials placed on the skin, to different temperatures and manipulation of moxibustion (Dharmananda 2004).

In ancient times, acupuncture and moxibustion were used together in the form of *zhenjiu*. Nowadays, acupuncture seems to be used more independently from moxibustion. Acupuncture therapy report complex treatment patterns involving numerous acupuncture points. Moxibustion is usually done on only one or two of the points in a complex treatment pattern including acupuncture. As a result, the main part of therapy is the needling, with moxa as a small portion of the treatment (Dharmananda 2004).

Thus, now with the pertinent information on moxibustion, one can further delve into the situation of the POWs in Japan. Japanese soldiers used acupuncture or moxibustion on Allied POWs with utterly good intentions, but the harsh effects of the treatment were deemed to be a form of torture. The Japanese were unwilling to hear debate about their orders to have moxibustion administered. Although deemed to be medical treatment, moxibustion was often accompanied with brutality. An allied medical officer, a POW, in the Taisho Camp recalls:

For diarrhea and beriberi the treatment consisted of burning some sort of fusee on various parts of the body and to be done everyday for ten days. Because I protested against this procedure I was beaten for an hour and a half, and then the treatment was carried out (Roland 2001).

Many other allied POWs of the Japanese camps recognized what their captors were trying to accomplish. Not so much during their stay at the camp, but more so in post war reflection:

Although brutally uncomfortable, the patients submitting to this ridiculousness would survive, but for the rest of their lives, as a reminder of the practice, they would carry moxa scars on their bodies as a result of the questionable procedure (Roland 2001).

It is to be noted that POWs captured and incarcerated at Hong Kong faced unbearable conditions. Starvation and diseases like diphtheria, beriberi, dysentery, and tuberculosis afflicted all these unfortunate soldiers. Day to day rations were limited and mainly limited to barley porridge. Most of these medical ailments did indeed stem from a poor diet. Despite the dispiriting circumstances of their captivity, these soldiers tried to find ways to improve their existence and keep up their morale. Psychologically, for many of these soldiers being POWs, implied failure as soldiers.

With the poor living conditions came disease. The Japanese used moxibustion as a form of medical treatment. But the rationale of medical treatment did not imply there was no force used while delivering the treatment:

My god, it was awful pain, when the fire came close to your skin, If you showed any tendency of moving they would holler at you and raise the rifle butts, and you had to stay there until they were done and then they would let you up. I would have open ulcers and sores for months after (Roland 2001).

Though the delivery of moxibustion appeared to be harsh and barbaric, many POWs welcomed it as medical intervention. Amidst the beriberi, appendicitis, and other disorders, the “oriental therapy” administered to these POWs seemed to alleviate some of the symptoms. With harsh working conditions, the hot weather and poor morale, moxibustion did provide some patients with medical benefits:

They burned right through the skin and the water came out the holes, big pans of it. They drained the fluid and I felt much better. I fainted during the burning but I guess that saved my life. Many boys who had it as bad as I did died before the treatment was given to them. My swelling came down and I felt better (Roland 2001).

In the end, one must wonder if moxibustion really did work for these patients. Systemic burns were prone to infections and psychologically disturbed POWs were beaten while given treatments. However, in many cases, it was noted that POWs did improve once receiving the treatment. The administration of moxibustion on POWs by the Japanese is a

classic case of culture clash. The treatment gave impressions of cruel torture and to the Japanese it was seen as normal therapy.

As is true of many folk remedies, be that western or eastern, the effectiveness often depends on having faith in the efficacy of the treatment. Where moxibustion is a common cultural practice (Chinese, Japanese, other cultures), people are used to the procedure and often get symptomatic relief (Roland 2001). Westerners, in this case the POWs, knew nothing of this so called bizarre practice. Thus it was interpreted as torture. In many cases, moxibustion did not cure POWs pneumonia, and neither would most Western remedies in that era.

Although the details are gruesome and the depictions of burning skin are horrendous, most of the evidence strongly suggests that in most instances, if not all, the procedure was used as medical therapy. Some of the Japanese observers may have rather enjoyed watching POWs scream with pain, but they understood that the torture was incidental (Roland 2001). It was a discomfort that was normally experienced by Japanese of all ages that undergo moxibustion for medical purposes.

The use of oriental medicine by the Japanese on POWs was seen by some as torture. In the strenuous circumstances it was used in, one can argue that the environmental factors (torture, poor diet, and physical labor) in the prison camps only perpetuated the painful treatments of moxibustion into the context of torture. The Western POWs were psychologically inept and their health status was miserable. The use of any treatments in these situations, be it oriental medicine or the western medicine alternatives at the time, would not have helped to alleviate most of the illnesses that were rampant in the prisoner's camps.

The use of moxibustion in these camps was no more than a case of cultural clashing. To the Japanese, whose prison camps were the basis to the POWs ailments, they were attempting to treat their prisoners in a cost effective manner. To the ailing and weak POWs, blisters and scars from the moxibustion treatments left constant reminders of the conditions they encountered in the prison camps. It was just another form of psychological and physical torture to which they had become all but accustomed to during their imprisonment.

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# AN EXPLORATION OF ANAESTHESIA THROUGH ANTIQUITY

By

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## Abstract

**“To avoid pain, in surgical operations, is a chimera....”**

**Velpeau (1839)**

The struggle to alleviate pain is not a new one. The modern day science of anesthesia provides this remarkable ability with great success. The present era began in 1846 with the reported use of ether as an anesthetic during surgery. The field blossomed quickly and the field of surgery grew exponentially. However, the history of anesthesia does not begin here; an exploration through antiquity is required to gain a true understanding of the foundations of this impressive science.

Throughout history and across civilizations, the use of herbal remedies as medicines is well documented. Even though the anesthetic capabilities of some of these methods is debatable, it is worthwhile to explore the history of the science of anesthesia. Herbal remedies as analgesics and sedatives have a rich history. Indeed, before ether, chloroform and nitrous oxide there was hemlock, mandrake and dwale. Physical attempts at anesthesia were also frequently employed, including a literal blow to the head. Although they were often unsatisfactory these methods withstood the test of time in the pre-modern era. Finally, several breakthroughs in anesthesia occurred as civilization marched onward towards the modern era. Attempts at sedation took many forms in ancient times. It is these antiquated methods of anesthesia that are the subject of investigation in this paper.

The chimera is a mythical beast whose body is composed of parts of natural animals. The French surgeon Velpeau describes a chimera of pain and surgery. He argues that they are combined into one entity that is impossible to separate. In the modern era of anesthesia pain is separated from surgery with great ease. However, prior to modern anesthesia humankind still partook in surgical interventions. The problem of pain during surgery has victimized humans throughout the ages. The history of anesthesia will provide an interesting and impressive account of how this problem was addressed.

Before discussing the history of anesthesia it is necessary to explore the state of surgery in the pre-modern era. Surgery in ancient times included amputation, caesarian section, treatment of hernias, hemorrhoids, tumours and tooth extraction (Ellis 1946, 6) as well as

attempts to cure epilepsy, serious headaches, insanity, and depression fractures of the skull (Raper 1945, 44). It was not unusual for a surgeon to approach a patient with several strong men to literally hold the patient down. A good surgeon is one who can perform quickly and one who has strong nerves to withstand the screams of the patient. The concept of surgery without anesthesia is expected to cause some shock to those who practice modern medicine. However, the testimony of patients screaming during an operation and the intense psychological distress caused to patients awaiting surgery establishes that the problem of pain was very real (Raper 1945, 49). It is therefore highly likely that for as long as patients were subjected to surgery people have searched for methods of anesthesia.

Medicinal plants have been used throughout the ages to treat many diseases (Subbarayappa 2001, 135). Medicinal plants alone or in combination were often utilized as anesthetics. Dioscorides, a Greek physician in the first century AD recorded hundreds of plant preparations for use in medicine. Pliny the elder, a Roman of the same era as Dioscorides recorded the use of opium and henbane (Rey 1995, 41-43). These therapeutic plants were well known in antiquity and there are many records of their use (Ellis 1946, 5).

The first description of a preparation used for anesthesia is found in the 9<sup>th</sup> or 10<sup>th</sup> centuries AD where the *spongia somnifera* or the soporific sponge is first mentioned in the context of anesthesia (Prioreschi 2003, 214). This concoction was made with the following ingredients: mandrake, opium, hemlock and henbane. The plant extracts were dissolved in water and soaked in a sponge. The sponge was then left to dry in the sun. When needed the sponge was placed in warm water and then placed under the patient's nostrils to be inhaled, putting him to sleep. Once the surgery was complete the patient would inhale vinegar fumes and awaken (Prioreschi 2003, 246).

Mandrake or *Mandragora* was a popular agent with many references throughout the ages (Raper 1945, 11). Its particularly curious physical characteristic bifid root resembled the form of man, which undoubtedly added to the mystique surrounding the plant (Carter 2003, 145). The medicinal activity of the mandrake was well known to many ancient civilizations including the Egyptians, Greeks, Assyrians, Babylonians, Hindus and Chinese. Babylonians are believed to be the first users of mandrake in pain relief more than 2000 years B.C. (Raper 1945, 11). The Greeks described its use mixed with wine and given prior to surgery to avoid pain. There is no doubt as to potency of the mandrake root and its use during surgical procedures of ancient times is well documented (Ellis 1946, 65). Pliny went as far as claiming that anesthesia can be induced by smelling the juice (Robinson 1946, 20). However, it was also identified as a narcotic and necessarily a poison when taken in large amounts. Dosing was also a problem as the potency of the plant was variable based on season and geographic location. This caused it to fall out of favour (Carter 1996, 1631).

The opium poppy is the oldest, most familiar and most effective of all the ancient drugs. Opium's use in pain control can be traced back to the Roman Empire (Ellis 1946, 44). However, its regular use for anesthesia is only observed in the Middle Ages. Opium is a

well-known potent narcotic and pain reliever. Dosing was again a problem since in high doses the opium will cause central nervous system depression and death (Ellis 1946, 51). As with mandrake the variable effects of the opium poppy made it difficult to consistently use as an anesthetic.

Dwale was a liquid mixture that the patient was required to drink prior to surgery. Recipes for dwale were found dating back to the 12<sup>th</sup> century AD. Dwale was composed of bile of a boar, lettuce, vinegar, bryony root, hemlock, opium and henbane. All of these were mixed together in wine and drunk by the patient to render him asleep before surgery. To arouse the patient afterwards, vinegar was used just as it was in the case of the *spongia somnifera* (Carter 1999, 1624). Bile, lettuce, vinegar and bryony root can be discarded as ineffectual ingredients in the realm of anesthesia and will not be discussed. While opium has already been dealt with, henbane and hemlock are both important plants in the history of anesthesia.

Henbane or *Hyoscyamus* and hemlock were not referred to nearly as much as mandrake or opium. Henbane was a lesser-known sleep inducer. It was generally used as a local anesthetic in treatment of toothache (Ellis 1946, 80). However, it too has deadly consequences if ingested in high amounts and was considered a dangerous medication. Hemlock was the poison ingested by Socrates that caused his death. It was a well-known drug and obviously quite dangerous. It was also described in the 15<sup>th</sup> century as a method of inducing sleep before surgery (Ellis 1946, 82). Both of these were strong poisons and were not frequently used.

At this stage in the discussion it is important to note that potent analgesics, sleep inducers and anesthetics were known and used by people throughout antiquity. Problems arose for several reasons including method of administration, lack of dosing control and most of all the ever-present danger of fatal overdose. These methods all fell out of favour and patients still endured pain during surgery.

The discussion must turn now to one of the oldest and most popular anesthetics, alcohol. Alcohol has always been a vital part of the struggle against pain. It was likely the spur that caused people to attempt to alleviate pain through ingestion of medicines (Raper 1945, 16-18). Often, other herbal remedies are mixed in with alcohol and administered for pain relief, a fact that certainly improved the potency of these ancient medicines (Ellis 1946, 55). For example, the often used laudanum, which was very popular and was one of the only known consistent pain relievers of antiquity, was simply opium mixed with alcohol. Although alcohol alone is not sufficient to be deemed an anesthetic in the true sense it does have a valuable place in the history of medicine (Raper 1945, 17)

The investigation into anesthesia through antiquity shifts to a discussion of physical mechanisms. Herbal remedies were discovered to be either ineffectual or too dangerous. In an attempt to control pain patients were literally clubbed on the head prior to surgery. In ancient Egypt men who dispensed this treatment became highly skilled in the technique. The blow had to be strong enough to knock the patient out but not too strong

as to kill him. While this method was crude and unsatisfactory, it was used throughout history as it was better than providing nothing (Raper 1945, 37).

Local pressure proximal to the site of surgery was found to help control pain. By using a tourniquet that placed pressure on both the vessels and the nerves, it was found that pain could be numbed. This method was found to cause significant pain itself as well as tissue injury, which increased the risk of infection (Raper 1945, 38). This method can be traced back to ancient Egypt, 2500 BC, where evidence has been found in the form of pictures. These pictures show pressure being placed on the brachial plexus during surgery on the hand (Ellis 1946, 9). This was a very crude method of anesthesia that did not provide much benefit to the patient.

The carotid artery translated from the Greek means artery of sleep. It was found that by choking both arteries, a person could be rendered unconscious. One could imagine that this was a truly ineffective method since the patient would regain consciousness soon after the pressure was removed (Raper 1945, 38).

The exploration thus far has discovered many options for anesthesia throughout antiquity but none of these are viable, reproducible or effective options. The attention shall now be turned to more contemporary methods with significantly more promise.

Joseph Priestly is credited with the invention of the first modern anesthetic, nitrous oxide or laughing gas, in 1773. This gas is still used in the modern day as an anesthetic (Fülöp-Miller 1938, 41). Unfortunately, during Priestly's era doctors were not courageous enough to make use of the new discovery for fear of its potential danger and despite the positive outcomes of his experiments (Fülöp-Miller 1938, 44). It took another pioneer in the form of Sir Humphry Davy to bring nitrous oxide into popular use (Raper 1945, 55). Davy showed that nitrous oxide was a safe and breathable gas (Robinson 1946, 51). He further went on to show that nitrous oxide could render a person unconscious and went as far as to write that it was capable of removing physical pain, even during surgery (Robinson 1945, 55). No surgeon made use of the newfound anesthetic and so nitrous oxide was destined for rediscovery at a later date.

Henry Hill Hickman was another man who came close to a breakthrough discovery. His idea of suspended animation involved introducing sufficient inhalant so that painless sleep could be induced. His initial experiment in the 1820s involved depriving an animal subject of air and providing carbon dioxide alone, essentially anesthesia by asphyxiation. He noted that without oxygen an animal would soon be unconscious and would remain so throughout the surgery. As a further benefit the subject did not bleed as much and healed much faster (Robinson 1945, 57-58). In retrospect this was not much different from the carotid artery compression discussed previously (Raper 1945, 57). This discovery truly provided an alternative to pain during surgery. Hickman attempted to present his results with the animal subjects in the hopes of gaining recognition and eventually attempting the procedure on humans. However, his theory on suspended animation was ignored completely and this promising discovery died with him (Raper 1945, 58-60).



It is commonly accepted that 1846 was truly the birth of modern anesthesia with the use of ether in surgery. However, ether was discovered in the 14<sup>th</sup> century by Raymond Lully, who synthesized it from sulfuric acid and alcohol. He named it sweet vitriol. The power of his discovery eluded him and the discovery remained dormant until the 16<sup>th</sup> century when Valerius Cordus rediscovered it (Fülöp-Miller 1938, 24-26). Cordus recorded the method of synthesis and his contemporary, Paracelsus, documented its analgesic effects on chickens. Paracelsus determined that it quieted all suffering and relieved all pain (Raper 1945, 35). At this point in history, approximately three hundred years before Morton's landmark discovery the effects of ether were recorded for all to appreciate. As with Day and Hickman, this discovery too was buried and ether was forced to wait for its famous unveiling (Fülöp-Miller 1938, 26).

Mechanisms of pain control found their way into the culture of their time. Their existence was common knowledge and they provided plot mechanisms to both Marlowe and Shakespeare (Carter 1996, 1632). However, these plants did not provide adequate anesthesia. The practice of surgery was continuing to flourish and the need for pain control was great.

It is worthwhile here to discuss what is truly meant by anesthesia. The exploration of the history of this science unveiled the possibility of providing some pain relief and methods of rendering a person unconscious but it cannot truly be declared that the ancients were in fact practicing anesthesia. A general anesthetic not only puts a patient to sleep but also keeps him asleep throughout the operation (Raper 1945, 18). The medicinal herbs discussed in this paper had the capacity of causing some degree of unconsciousness yet these did not replace the physical means of clubbing and physically restraining a patient. One must ask the question, how effective could the *spongia somnifera* or dwale be if a patient can be roused by simply inhaling vinegar. Furthermore, a utilizable drug must be reproducible and consistent in its effects. Since the potency of the plants was variable with the season and geographic area, it was impossible to establish a single effective and reliable method of providing anesthetic coverage during surgery (Carter 1996, 1631).

The discovery of anesthesia by inhalation, nitrous oxide, carbon dioxide and ether, provided a great benefit and it is only at this stage in history that people truly began practicing anesthesia. A gas can be administered until the patient is unconscious. No longer were people tied to the variable potency of the ingredients or to the innate variability of the patient's metabolism and overall health. It is at this stage in history that the foundation for modern anesthesia is built.

It has been over 150 years since the Velpeau's chimera has been abolished. The ability to remove pain from surgery is one of the great marvels of modern medicine. By investigating the history leading up to this great discovery one may gain an appreciation of the great trouble that pain has caused humanity. Those whose experiments whether they were successes or failures deserve praise since they furthered humanities understanding of the science of anesthesiology and in doing so helped solve the problem of pain during surgery.

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# **THE DEVELOPMENT OF MEDICINE IN MEDIEVAL ISLAMIC: A FOUNDATION FOR WESTERN OPHTHALMOLOGY**

By

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## **Abstract**

**The conquests of Muhammad starting in the 7<sup>th</sup> century lead to the spread of Islam and the teachings of the Qur'an, a theology believing that genuine health and happiness is the natural state of existence. While medieval Europe rejected the medical knowledge of the pagan Greeks, the early Islamic world was eager to assimilate and expand the Hellenistic medical teachings, emerging as the collector and preserver of Western medicine.**

**The Royal Library in Baghdad became a centre for the Arabic translation of scientific and medical text from Greek, Persian, Syriac, Hebrew and Indian manuscripts. Under the common language of Arabic, an international community of physicians built upon these classical foundations, developing and writing their own original contribution to medical knowledge.**

**For ophthalmology especially an extensive literature developed. The prevalence of eye diseases in the Islamic lands resulted in a particular interest in the skilful diagnosis and treatment of eye diseases. Using the principles of clinical observation and codifying diseases, many ocular diseases were described or classified for the first time.**

**Intricate surgical excision with an array of minute instruments was used in the treatment of several external diseases of the eye such as pannus and pterygium. Suction removal of cataracts using a hollow needle was also described. Their advances in the knowledge of optics, anatomy and physiology of the eye became major contributions to modern Ophthalmology.**

**Latin translations of the extensive Arabic literature on Ophthalmology permanently influenced late medieval Europe. Through this route, many of these contributions of early Islamic empire remain today. Medieval Islam made these advancements because it eagerly encouraged knowledge and physician thinkers from all cultures.**

## A Medium for Medieval Medicine

Three civilizations emerged from the fall of Rome in 476 during the middle ages: the Byzantine Empire, the Early Medieval West, and Islam. The Islamic empire emerged as the sole preserver of the classical knowledge of Ophthalmology and added contributions that are still significant to the specialty in modern times. The Islamic empire was able to achieve its great contribution to Western ophthalmology as a result of the unique cultural conditions within its borders during its establishment and its golden age.

In 622 when Arabia was fractionated into many different tribes, Muhammad founded his ideal community in a city named *Medina*. *Medina* was where religion and the state became one (Matthews, 2003). *Medina* provided the conditions for the unfolding of *Shariha* – the Islamic way of life, of which medicine was an integral part. The *Qur'an* gave general guidelines and rules on nutrition, cleanliness, martial relations and child rearing. Muhammed gave specific instructions on various aspects of health and treated people himself, stressing that genuine health is the natural state of existence (Khan, 1986). Since the opposite, disease, was common, medicine thus became a central part of medieval Islamic culture (Savage-Smith, 2005).

After a series of major battles that led to the conversion of the inhabitants of *Mecca*, Muhammad went on to construct a network of alliances across the entire Arabian peninsula. When he died in 632, he brought peace to Arabia for the first time (Matthews, 2003). Arabs were united under a new and resourceful religion, which espoused sound health amongst its followers.

A series of caliphs assumed leadership in the post-Muhammad years and they invaded territories beyond Arabia. The Arabs did not destroy the conquered towns; instead, they controlled their new lands through already existing administration. Islam found converts by example rather than by coercion, and left the unconverted to their own faiths (Matthews, 2003). The choice to include other societies within its growing borders allowed the young Islamic world to rapidly flourish, absorbing the culture and scientific knowledge of other civilizations: Persians, Indians, and especially the Greeks.

While conversion to Islam outside the Arabic lands was gradual, linguistic conversion proceeded at a rapid pace. By the time Islam was one century of age, Arabic became the official and working language of all its lands, often completely replacing older languages within the empire's vast and varied dominion. Islam thus not only inherited the earlier scientific and medical traditions, but also received contributions from its non-Arabs and non-Muslims peoples who adopted Arabic as a common language of scholarly communication (Dallal, 1999). This new *lingua franca* enabled a level of unprecedented scientific and medical exchange that enabled the Islamic empire to significantly build upon past knowledge.

Because copying the Qur'an was an act of piety, Islamic culture also had an engrossing tradition of book making, including calligraphy, illustration, papermaking, and binding. Islamic illustration practices were adopted from the Byzantine and Persian cultures, while

Chinese papermaking was improved upon by using linen (Savage-Smith, 2005). Islamic medical knowledge was thus able to be recorded into textbooks and transmitted across its empire and beyond, as well as to influence future medical thought.

Medieval Islamic culture was an excellent medium for the acceptance, assimilation, development and transmission of medical and ophthalmologic ideas. Religion had an impact on the technology of book making and allowed the creation of many new textbooks on medicine and ophthalmology. An united language and a tolerant culture provided a fertile setting for acquiring and expanding on the knowledge of neighbouring civilizations.

### **The Royal Library of Baghdad**

While Christian Europe rejected pagan or heretical sources and thus ignored the only medical knowledge of the period because it came from the non-Christian Greeks and Romans, the Arab ruler encouraged preservation of ancient knowledge (Sinclair, 1978). The knowledge of the earlier Greek medical teachings came to Islam through the Nestorian Christian who were driven out of Byzantine and then settled in Persia (Haeger, 1988). Their translations and teachings were welcomed and valued by an emerging Islamic empire which needed to find ways of dealing with medical problems common to all peoples: disease, pain, injuries, and successful child-bearing (Savage-Smith, 2002). The upheavals in the first thousand years of the Christian era would have cause the loss of many Greek medical works which today are still only known in Arabic translations (Sinclair, 1978).

This heritage of medical theory and practice was assimilated and elaborated by an international community of scholars of many different cultures and languages—Arabic, Persian, Syriac, Hebrew, and Turkish, although Arabic was the common language and Islam the dominant faith (Savage-Smith, 2002; Matthews, 2003). During the Abbasid Dynasty (750-1258), known as the golden age of Islam, the translation of not only Greek, but also Hindu, Syriac and Persian texts accelerated. The capital was moved to Baghdad and the caliphs of this age promoted knowledge and curiosity (Dallal, 1999). The huge Royal Library in Baghdad became a centre where countless precious manuscripts from all corners of the empire were collected for translation into Arabic (Sinclair, 1978).

*Hunayn ibn Ishaq*, a Syriac-speaking Christian working in Baghdad at this time, made Arabic translations of nearly all the Greek medical books known. He also wrote several medical and Ophthalmologic treatises that circulated in Latin versions in Europe, where he was known as Johannitius. His treatises were was fundamental in establishing the basic conceptual framework of medicine in renaissance Europe. Through these translations, a continuity of ideas was maintained between Roman, Islamic and late Medieval European practices (Savage-Smith, 2002).

The Islamic empire were not just transmitters of classical knowledge, Islamic physicians produced a vast medical literature of their own, based on application of Greek doctrines and their own observations (Sinclair, 1978). By the end of the ninth century, Arabic medicine had fully integrated from the Romans the Galenic humoral system of pathology

which required a combination of logical reasoning and clinical observation. Arabic medicine further developed the Galenic tendency to systematize and rationalize by writing medical treatises that organized the vast body of medical knowledge in all branches into one comprehensive and logical structure. *Hunayn's* original work, *Ten Treatises on the Eye*, is an example of this new organisation and an attempt to exhaust all questions related to the eye (Dallal, 1999).

As opposed to theoretical reflections on illness, a new trend was also developed that focused on expanding empirical knowledge and on practical procedures for treatment. The great representative of this trend is *Abu Bakr al-Razi*, known in Europe as Rhazes, who criticized the inherited medical knowledge for its logical inferences that did not always correlate with clinical observations. He pioneered clinical medicine by conducting what amounted to controlled experimentation; for instance, using bloodletting in one group of patients giving no treatment in another group (Dallal, 1999). In addition to his theoretical writing, he also wrote case histories, 900 of which were included in his casebook, *Kitab al-Tajarib*. His casebook described 48 cases of eye conditions and often these contrasted with his theoretical writings. For instance, a third of the ophthalmologic complaints in his casebook, with their complex mixture of symptoms, do not appear in his famous theoretical book, *Kitab al-Mansuri*. Furthermore, several of the treatments used in the casebook deviated from the theoretical work, because the treatments in these cases were adjusted to the particular needs of the patient (Alvarez-Millan, 2000).

Works of the late Islamic golden age reflect the mature development of all these trends. For instance, the *Perfected Book on Ophthalmology* written by *Ibn an-Nafis* (b. ca. 1210) is divided into two main parts. The first part, on the theoretical principles, deals with anatomy, physiology, pathology, etiology and symptomology. The second, on the clinical treatment and surgery, is systemically organized and provides an account of the improvements made based on clinical observation (Hamarneh, 1989).

Early Islam was responsible for translating and preserving all the known medical works at the time into Arabic. This common language was crucial in allowing the empire's international community of scholars improve upon the inherited knowledge in two broad themes: the systematization of contemporary medical and ophthalmologic knowledge in manuals, allowing continued discourse across the empire and later transmission to Europe; and the development of clinical medicine through rigorous research and observation, challenging pre-existing theoretical frameworks. These frameworks allowed the Arabic advancement of classical ophthalmology.

### **A Specialty is Written**

Blindness was a major cause of disability throughout the Islamic lands. As a result, Islamic physicians displayed particular concern and ability in the diagnosis and treatment of eye diseases (Savage-Smith, 2005).

Nearly every medical compendium had chapters on ophthalmology. Rhazes' medical encyclopaedia, *Kitab al-Mansuri*, mentioned earlier, included a large section on the

specialty (Arrington, 1959). This work was one of the most widely read medieval medical manuals in Europe and often reprinted with commentaries by prominent Renaissance physicians such as Vesalius (Savage-Smith, 2002).

In particular, Ophthalmology developed its own extensive specialist literature, with a large number of monographs devoted solely to the subject (Savage-Smith, 2005). The early work of *Hunayn's* ninth-century manual, *Ten Treatises on the Eye*, and *Ibn an-Nafis's* thirteenth-century manual, *Perfect Book on Ophthalmology*, are two examples mentioned earlier. In addition, the *Memorandum Book for Oculists* written in the tenth century by *Ali ibn Isa*, a Baghdad Christian, was the classical Arabic textbook of ophthalmology and became the standard treatise of the eye for several centuries in Islam and Christendom (Shastid, 1927). The text describes over a hundred different diseases of the eye organized by anatomical location (e.g. thirteen diseases of the conjunctiva, four diseases of the iris, etc.) and again combined Greco-Roman knowledge with new observations (Wood, 1936).

However, the Islamic scholarship on ophthalmology was different from its predecessors. In the 800 years between Herophilus and Alexander, there were only five Greek works written on the topic of Ophthalmology, none of them by a specialist physician and none are preserved. Moreover, the writings of Galen referred to Ophthalmologists in a derogatory manner. In contrast, during the 500 years of the Islamic golden age, thirty textbooks on the eye were written, 13 of them preserved to modernity and ten of them written by Ophthalmologists. These doctors had thorough specialty education training and were honoured by the public (Blodi, 1985).

Ophthalmology was a respected and much needed specialty in medieval Islam where it finally matured as a profession. The extensive manuscripts that resulted from the growth of this specialty exerted great influence beyond its borders and its time.

## **New Insights**

### ***Anatomy***

The Islamic scholars based their anatomic knowledge upon Galen's works and as a result made similar errors: the posterior chamber was too deep, the optic nerve had a canal and there was an extra extrinsic muscle (Blodi, 1985). Nonetheless, the culture was responsible for two important contributions to modern Ophthalmology. First, Arabic medical literature contained the first illustrations of eye anatomy, with the earliest drawing preserved appearing in *Hunayn's Ten Treatises on the Eye* (Sorsby, 1933). Later illustrations demonstrated the optic chiasm and brain in *Ali ibn Isa's Memorandum Book for Oculists* (Wood, 1936). This anatomical knowledge was passed on to physicians of the European Renaissance, including Vesalius whose anatomical figures resemble the Arabic (Figure 1) (Sorsby, 1933). Second, modern day anatomical terms of eye parts are derived medieval Latin translations of Arabic terms and not from Greek. For instance, the medieval Latin translation of the Arabic word, *qarniyah*, became a part of the standard

Leipzig anatomical nomenclature as *cornea*. In contrast, Galen used the Greek word, *kerotoeides*, which is not used today to describe the cornea (Blodi, 1985).

### ***Optics***

*Ibn al-Haytham*, known as Alhazen in the West, rejected the Hellenistic theories of vision that believed vision was the result of rays emitted from the eye (Euclid) or transmission of a form from the object to the eye (Aristotle). Alhazen's remarkable insight was that an image of the object is formed due to the emission or reflection of light from the object to the eye (Dallal, 1999). Alhazen worked out the theory of vision sufficiently to create the foundation for the use of lenses to correct vision. However, the recognition of this possibility occurred after the transmission of his discovery to Europe, where Roger Bacon, using this new theory, first suggests the use of lenses for vision correction in the late thirteenth century (Sorsby, 1933).

### ***Physiology***

Rhazes discovered the reaction of pupil to light: "In the middle of the iris appears a hole which now dilates and now contracts, according as the iris feels the need of light; it contracts when the light is strong, and dilates in obscurity" (Shastid, 1927). Although Greek manuscripts first noted the crossing of optic nerves (X or *Chi* for Chiasm), *Ali ibn Isa* noted the Chiasm's role in consensual pupil reflexes and accommodation (Figure 2) (Wood, 1936).

### ***Cataract***

The first authentic document on the treatment of Cataract was by the Roman, Celsus, who described entering a sharp needle into the eye to downwardly displace the lens from the pupil, breaking it up into many fragments if needed (Sorsby, 1933). This technique, known as couching, was commonly employed in the Arabic lands, with the major complications being infection and glaucoma. Although the success rate was only 4 in 10, it found wide acceptance because the alternative was blindness (Savage-Smith, 2005). Ammar, born in the late tenth century, invented the suction method for cataract extraction, by which a glass tube is introduced through a corneal incision for evacuation of the lens by suction (Figure 3) (Shastid, 1927). This technique did not gain popularity in the western part of the Islamic empire, although it was well accepted in the east. As a result, the technique did not reach Christian Europe, where downward displacement of the lens continued to be the treatment for cataract until the eighteenth century. Extraction of the lens was first described by Daviel in 1748, and remains the fundamental basis of cataract removal today (Sorsby, 1933).

### ***External Diseases of the Eye***

Chalazions were described as collections of a gross humor that gathers in the lid. If conservative topical treatments failed, it was incised with a round-headed lancet, scraped



out with the spoon at the end of the sound, closed with a suture, and irrigated (Wood, 1936). Today's treatment is similarly incision and curettage (Bradford, 1999).

Styes were described as an abscess at the root of an eyelash. Treatment was rubbing with very hot bread (Wood, 1936). Modern treatment is likewise hot compress (Bradford, 1999).

Original surgical techniques dealt with treating the sequelae of trachoma, a leading cause of blindness. Trichiasis was treated through extraction of the inverted hairs and cauterization of the roots using a needle that was heated red-hot. Trachomatous pannus was recognized as the superficial vascularization of the conjunctiva and treated surgically by raising the pannus with a number of very small hooks and excising the raised film with very thin scissors or cataract needle (Figure 4).

Pterygium was described as the encroachment of the conjunctiva on the cornea and was removed using a similar technique as the removal of pannus (Wood, 1936).

### ***Surgical Anaesthesia***

In *Ali ibn Isa's* Memorandum Book for Oculists, the reader is asked to sedate the patient before an operation: "If, however, the patient is one of those who cannot hold still and causes you difficulties then put him to sleep" (Wood, 1936). Some authors have suggested that *Ali ibn Isa* meant surgical anaesthesia. The drugs he would have used would have been mandragora and opium (Blodi, 1985).

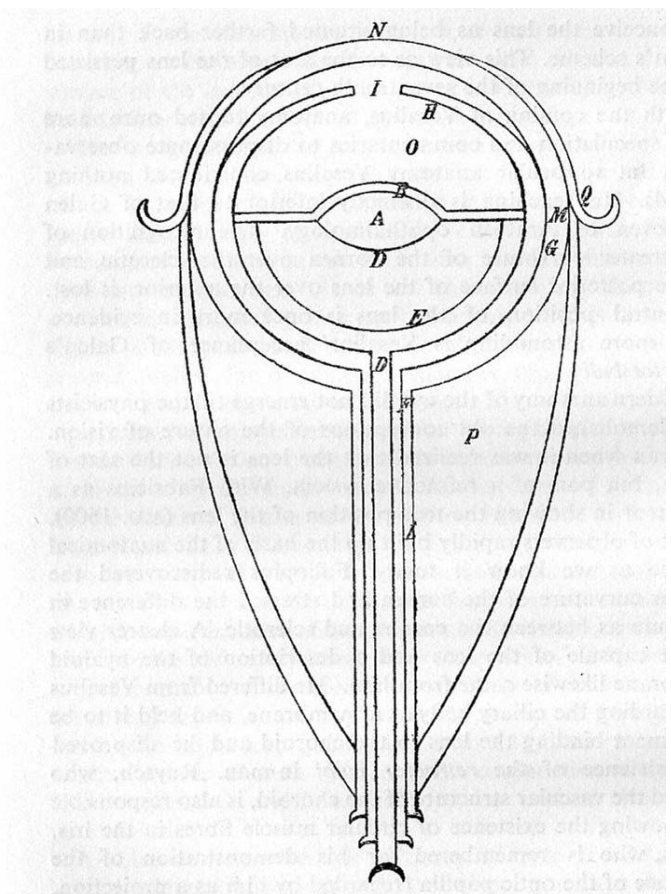
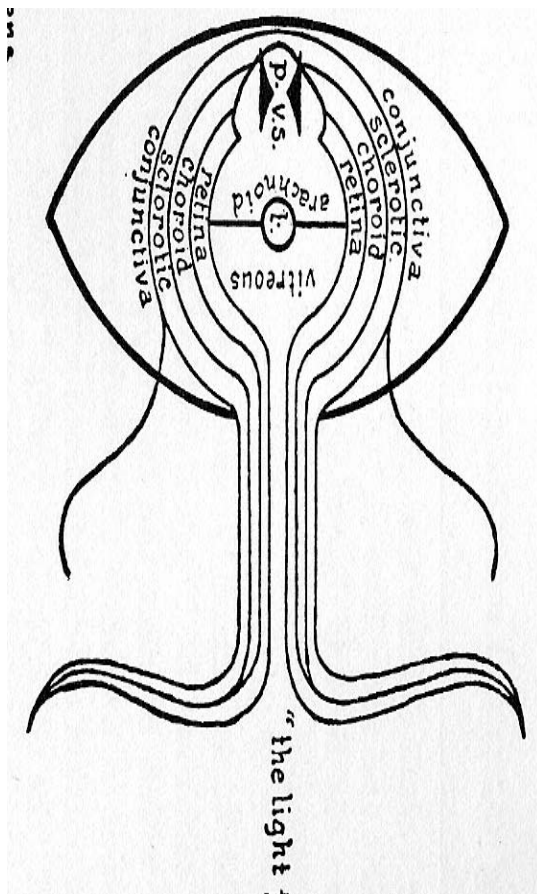
Western Ophthalmology received from Arabic physicians the anatomical terminologies of the eye, the observation of pupillary reflexes, a modern theory of vision and advances in the treatment of external eye diseases. In contrast, the extraction technique for cataract removal did not pass to the western reaches of the Islamic empire which had close contact with Europe. Thus Ammar's technique was not able to pass onwards to Western medicine, where it had to be discovered centuries later.

### **The Reflected Light**

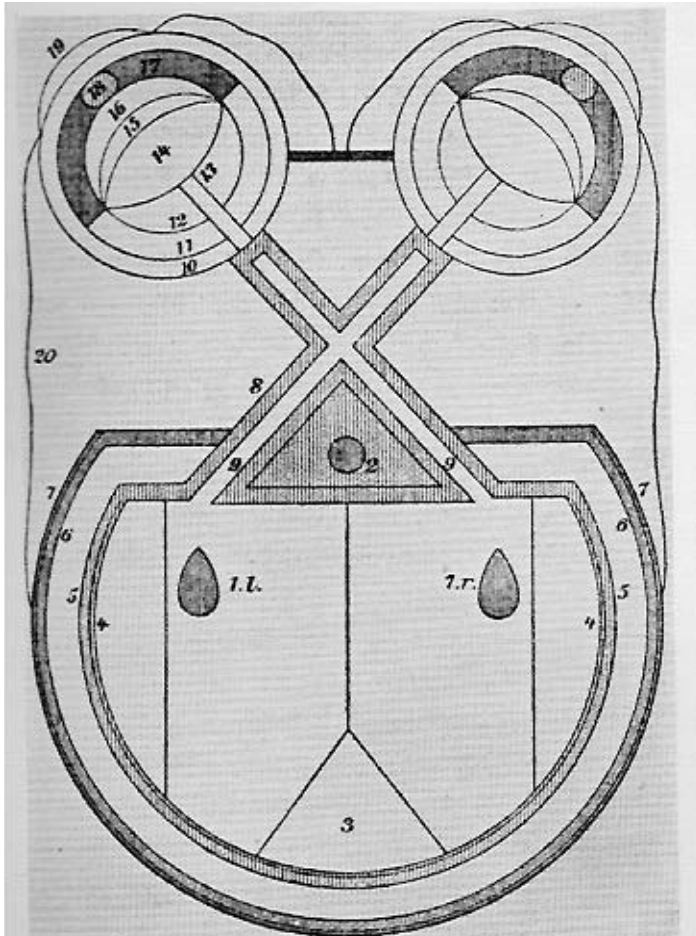
The Renaissance in Europe did not emerge from nothing, but was the result of the normal development of science coming from the Islamic Orient, passing through the multilingual communities of Southern Italy and Spain and finally reaching Western and Central Europe (Hamarneh, 1989). Medieval Islamic medicine influenced Europe through the written textbooks and through traders and travelers. Constantinus Africanus, born in Carthage in 1018 and an Italian monk, translated numerous books from the Arabic into Latin as *Hunayn* did for Greek works. The word, cataract, was created by Constantinus when he translated the word from Arabic to Latin (Shastid, 1927). The translations into Latin occurred at the same time as the Crusades. Although the crusades aggravated the relations between Christendom and Islam, it allowed further opportunities for Europeans to learn different Arabic technologies and practices (Savage-Smith, 2002).

Systematic medical encyclopaedias, such as Rhazes' *Kitab al-Mansuri*, and specialty books such as *Ali ibn Isa's* Memorandum Book for Oculists, carried the classical knowledge of ophthalmology and medicine, strengthened with Arabic improvements, to Christian Europe. Used by European physicians for centuries, these works had permanent influences on the formation of Western ophthalmologic theories, practices and terminology. Rhazes writings were part of the curriculum in Western medical schools until the nineteenth century (Matthews, 2003). Late Medieval European texts on Ophthalmology also took their influences from both classical and Arabic writings. An analysis of *De Oculis*, a Latin textbook about eye diseases written by Peter Hispanus (Pope John XXI) in the thirteenth century, concluded that the text depended on treatises from Hunayn, Rhazes, Constatine, Galen and Plato alike (Daly, 2001).

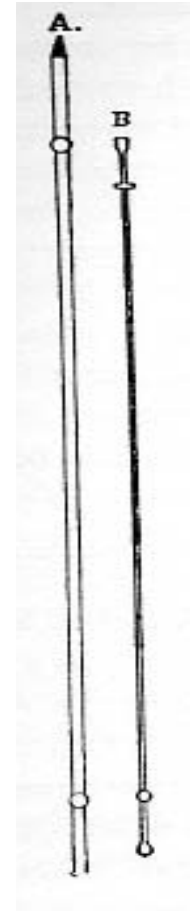
Arabic medicine and ophthalmology was founded on the work of other cultures, especially the Greco-Romans, and several of its brightest minds were not Muslim at all but Nestorian Christian. Yet the golden age of Islam was responsible for numerous advances in ophthalmology that remain with us today. The medieval Islamic empire succeeded so by establishing the common language of Arabic within its borders, allowing discussion of ideas and development of manuscripts by an international community of scholars. Medical knowledge was improved by the systemization of information and testing theory with clinical observation. Specialty literature on the field of Ophthalmology was quite extensive and greatly influenced late medieval European medicine through Latin translations. Curiosity and knowledge, as well as acceptance of other cultures, allowed early Islam to rapidly develop scholarly knowledge in all fields of scholarship, including Ophthalmology, a tradition that remains with us today.



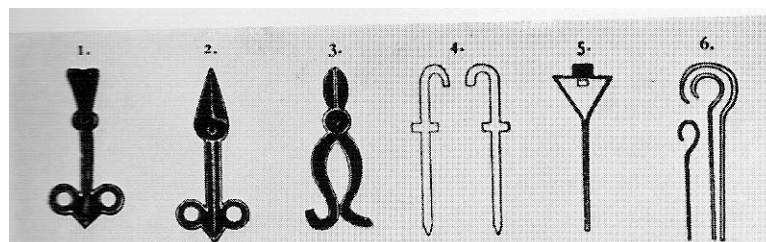
**Figure 1.** Hunayn's figure of the eye, left, is the first known anatomical illustration, originally illustrated ca. 850 and shown here in translated form by Meyerhof (Wood, 1936). Versalius (1514-1565) was greatly influenced by Arabic anatomy of the eye in his figure, right (Sorsby, 1933).



**Figure 2.** The Arabic physicians learned about the optic chiasm from the Greeks. They were the first to illustrate it and note its importance in pupillary reflexes and accommodation (Wood, 1936).



**Figure 3.** The hollow cataract needle, left, was invented by Amman for suction removal of cataracts. The method did not catch on in the west, however, and Celsus' couching method using a cataract needle, right, remained the standard until the eighteenth century (Sorbsy, 1933).



**Figure 4.** Miniature scissors (1-3), lid openers (4), scalpels (5), and hooks were the intricate instruments used in the surgical removal of pannus and pterygium (Blodi, 1985)

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# **PARACELSUS THE INNOVATOR: A CHALLENGE TO GALENISM FROM *ON THE MINERS' SICKNESS AND OTHER MINERS' DISEASES***

BY

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## **Abstract**

**Phillipus Aurelius Theophrastus Bombastus Von Hohenheim, called Paracelsus, occupies a curious place in the history of medical innovators. He is on the one hand celebrated for his emphasis on empirical observation, and on the other hand reviled as a hot-headed and arrogant mystic. His works show great devotion to the Light of Nature, a property of the world which caused it to reveal its God-given healing secrets to the discerning and knowledgeable physician. This emphasis on experience was radical in the days when scholastic study of the works of Hippocrates and Galen, as known through their interpreters such as Avicenna, was the basis of the medical practice. However, Paracelsus was a mediievally-minded man. He rejected the authority of Galen but lacked the tools of the scientific method to replace Galen's teachings with solidly empirical knowledge. Instead, Paracelsus devised a highly creative and interwoven mystical system of macrocosm and microcosm; God had devised the stars, spirits and the natural world in a pattern which was repeated in man's sidereal, spiritual and physical bodies. The wise physician could study the natural world, which was waiting to reveal its healing clues.**

**The purpose of this study is to evaluate Paracelsus as a medical innovator based on a study of one of his most influential and important writings, *Von der Bergsucht und Anderen Bergkrankheiten, (On the Miners' Sickness and Other Miners' Diseases)*, written in 1534. Where in this work has Paracelsus shown innovative thinking, and to what extent were his innovations conducive to the forward progress of medicine? An in-depth look at Paracelsus' theories of pathogenesis, cure, and prevention of miner's diseases will show that Paracelsus was a positive innovator in the history of medicine in his role as a reformer of medical therapies, as proponent of preventive medicine, and as advocate of learning through experience.**

## **Introduction**

Some figures in medical history are remembered for the importance of their contributions to the progress of medicine, others are remembered as icons of the times in which they lived. It is perhaps more unusual for a figure to be most remembered most for a lively and infamous temper, but in the case of Paracelsus, this is precisely what causes him to leap out of the pages of medical history. Phillipus Aurelius Theophrastus Von Hohenheim,

called Paracelsus, was probably not a pleasant man. Many records have come down to us, partly thanks to Paracelsus' prolific output and partly due to the collecting and editing work performed by his follower Huser of Basel in 1589-1591. Even in the sixteenth century, Huser had difficulty separating Paracelsus' own works and history from colourful legends that had risen up around him.(Stillman, 1920; Scarlett, 1941). The records indicate that Paracelsus was on the one hand deeply concerned with the healing of the outcast and sick, and with the reform of a stagnant and bastardized Galenic medicine, and on the other hand was grandiose, self-assured to the point of mania, and suffered from poor political judgment and a wicked temper. (Jacobi, 1988; Scarlett, 1941)

The medicine of Paracelsus' day, that is to say the sixteenth century, was the product of medieval scholasticism filtered through Eastern commentators (Scarlett, 1941) . Galen, as known through Avicenna, was the medical authority of the day, in so far as diseases were not attributed to supernatural influences, in which case the Church held supreme authority (Weber, 1995). Key medical doctrines of this time included the ideas that medical knowledge was complete with the ideas of Hippocrates and Galen. Although these early classical physicians had experimented, this was no longer done in the medieval period. Medieval observations were limited to those which reinforced the pre-existing scholastic theories. Dissections were a rare event indeed, where they were performed they were crude and viewed as immoral. Scholastic medical ideas were based of Galen's theory of four humours: phlegm, blood, yellow bile and black bile respectively representing the elemental influences of cold, dryness, warmth and moisture. Disease resulted from an imbalance in these humours, and was treated with a "cure by opposition" approach using complicated polypharmacies of herbs and unsavoury animal products, or bleeding and purging (Stillman, 1920; Scarlett, 1941). Insanity was viewed as a supernatural affliction stemming from demonic activity (Zilboorg, 1941; Weber, 1995). Paracelsus bursts onto the historical scene in direct and fervent opposition to many of these authoritative ideas. He posits his own elemental system, the idea of like curing like (Pagel, 1982), an increased emphasis on simple herb and mineral remedies (Pagel, 1982), and even discusses natural origins of insanity (Zilboorg, 1941). He emerges from a humble background as a rebel and a wanderer from as soon as history records his presence.

Theophrastus Von Hohenheim was born in Einsiedeln in Switzerland, then a part of Germany, in 1493. His father William of Hohenheim was a local physician, from whom he presumably learned the basics of medicine and his mother belonged to a local order of laywomen. His name Paracelsus, a Latin creation perhaps meaning beside, or equal, of Celsus, a classical physician, was an epithet taken on during his university days (Scarlett, 1941). His early education is mysterious. He may have obtained a medical degree at the University of Ferrara. It is known that he spent some years doing practical work in the Fuggers mines at Huttenberg and Schwaz, at which time it is thought that he wrote an early version of *Von der Bergsucht und Anderen Bergkrankheiten*, (*On the Miners' Sickness and Other Miners' Diseases*). He worked as an army surgeon and journeyed across Europe, before appearing as a practicing physician at Straussburg in 1526, professing to possess a medical degree. The great turning point in his career came in 1527 when he was appointed as city-physician to Basel. He lectured at the university as part of this position, delivering his lectures in vernacular German, an innovative insult to the scholastic

sensibilities of the time. He boasted of, and gave, lectures criticizing Galenism and demanded reform in medicine. His incendiary tendencies went so far as to publicly burn a copy of Avicenna's *Codex* at a student gathering. After a short two years in Basel, he had made so many enemies that he was forced to flee the city in 1528. The years after Basel were spent in wandering and studying in various degrees of poverty. He wrote prolifically on syphilis, plague, and surgery, completing his fundamental books, *Paragranium* and *Opus Paramirium* in 1531. He returned to the mines at Hall and Schwaz in 1532-1533, refining his knowledge of the mining and chemistry of his day. He died in relative comfort in Salzburg in 1541. (Pagel, 1984; Scarlett 1941)

Paracelsus' writings are very broad, and the German in which they are written is difficult and used in a very idiosyncratic manner, making translations difficult (Sigerist, 1941). He seems to have ransacked ancient writers, neo-Platonists and alchemists for ideas which he synthesized creatively to create his own new metaphysics and cosmologies (Stillman, 1920). Reducing his ideas down to their most essential is difficult, but the following ideas represent the core of Paracelsus' thought. Macrocosm and microcosm hold a central place. When God created the universe's astral, spiritual and physical realms, he did so in a manner that echoed the human being's astral, spiritual and physical bodies (Stillman, 1920). Nature was a macrocosm, ordered into different groups and stages of being, which was reflected in the human being's different and ordered components. These components were at their core, not the Aristotelian elements of air, fire, water and earth, but rather Paracelsus' own new elements: salt; the principle of stability, mercury; the principle of volatility, and sulphur; the principle of combustibility. In the centre of the human being, the stomach, was the Archeus, a sort of alchemist that sorted out and arranged the salt, mercury and sulphur in the patient's food and air (Stillman, 1920; Pagel, 1982).

The physician himself was a man gifted by God with the ability to read the Light of Nature (Stillman, 1920), a property of the created universe which revealed the secret patterns of Nature's macrocosm which could be harnessed to heal human diseases. This is probably Paracelsus' greatest scientific achievement: knowledge is to be sought through the observation of Nature. However, Paracelsus was a medieval man, not an empiricist. Without the tools of hypothesis and experiment, he was forced to substitute his own metaphysical theories for those Galenic theories that he had rejected. This is clear enough upon study of his four pillars of the practice of medicine. These are *Philosophy*, which is the study of the Light of Nature, *Astronomy*, *Alchemy*, which is the earliest branch of chemistry and *Virtue*, or theological understanding and right practice (Stillman, 1920) This is not yet scientific medicine as we know it, but it is a beginning.

### **The Von der Bergsucht**

How then are these ideas expressed in *Von der Bergsucht und Anderen Bergkrankheiten*? This book may have been written as early as 1525 (Pagel, 1984), though other scholars favour the later date of 1534. It was published posthumously by Samuel Architectus in 1567, and was not widely read until a century later (Rosen, 1941). It is based on years of up-close observation of the workers made by Paracelsus in local mines, who favoured experience over theoretical talk. As Paracelsus puts it:



-It is no longer meet to speak with the learned men and the philosophers, but with experienced men; for it is the manner and the innate custom of any experienced man not to confront another experienced man with talk...Experience is so constituted, that an understanding of its works makes itself known to everyone without much gab.- (Paracelsus, 1534)

The *Von der Bergsucht* is divided into three books, each subdivided into four tractates. The first book deals with the diseases of miners. The second treats the diseases of smelters and metal workers. The final book is devoted entirely to the disease caused by mercury, which was commonly mined around Tyrol, and which Paracelsus considered unique enough to be treated separately. In each book, the four tractates present in order; an introduction to the disease and elements in question, a pathogenesis for the disease, signs by which the disease in question is manifested, and finally, a tractate concerning itself with the disease's cure. Throughout this section, page numbers are provided to the reference text, *Von der Bergsucht und Anderen Bergkrankheiten* as given in the translation provided by George Rosen in *Four Treatises of Theophrastus Von Hohenheim, Called Paracelsus*.

### **The first book: On The Miners' Sickness and Other Miners' Diseases**

Paracelsus, always humble, begins the first tractate of the first book (on the miner's diseases), with an observation that no scholar until himself has attempted such a classification (57). His self-appointed genius is contrasted with ignorance of all writers to come before him. He then goes on to explain the basics of how sicknesses of the lungs are generated in the second tractate. Air is the food of the lungs, and is digested there (57). Air can be polluted through contact with the stars, whose alchemical furnaces cause air to become separated into its separate elements which are harmful to human health (59). These elements are mercury, which causes disease by coagulating from smoke, sulphur, which can be roasted by fire onto the lungs, and salt, which precipitates into the lungs. Altogether, these imbalanced elements cannot be properly digested by the lungs and form tartarus (60), a sort of mucus that induces disease. Paracelsus draws a distinction between the lung diseases that all people suffer, and those unique to miners. Those suffered by above-ground dwellers are caused by the poisoning of surface air by the celestial stars. Those suffered by miners, however, result from the digestion of subterranean air that is poisoned by subterranean stars. At this point, one could reasonably ask what Paracelsus means by "subterranean stars". These are the minerals themselves, forming constellations under the earth in the same manner as proper stars do in the sky (62, 66). Thus, astronomy, the second pillar of Paracelsus' medicine, informs philosophy (the study of nature), his first pillar of medicine.

This brings us to the third tractate of the first book, which concerns itself with the recognition of miners' diseases. He begins with the statement that physicians are ordained by God to protect men from the inherently dangerous but necessary work of mining (67). Paracelsus understands himself as a divinely ordained servant. His disease signs are founded on the recognition of shortness of breath due to excessive cold, and acidity and

hoarseness due to excessive sulphur (65). Paracelsus expounds the importance of observing disease to be able to accurately identify these signs (71). He then states two ideas of enduring worth to the progress of medicine. One is a recognition of acute versus chronic forms of poisoning, which he attributes to ingestion of the body instead of the spirit of a mineral. Eating arsenic produces instant death, he recognizes. But he also recognizes a vapour coming off the mineral which produces a slower disease with the symptoms we would attribute to pulmonary fibrosis, neoplasms or emphysema (69). The other idea of great importance is his formulation of what would become known as the homeopathic principle. As Paracelsus puts it:

Now our physic (cure) is in mercury, sulphur and salt, and our poison is also in these three things, for they both exist together (69)...For instance: whatever causes jaundice, also cures jaundice. it is thus: good and evil are in the same thing, the jaundice arises from the evil, and when the good is separated from the evil, the arcanum (cure) against jaundice is there (72).

The final tractate of the first book concerns itself with cure for miners' diseases. The first cures are preventative, being recipes for prophylaxis against ore vapours (75). A diet rich in salt and deficient in spices is prescribed for the same reason (77). Once the disease has taken hold, Paracelsus divides his cures into natural cures and arcana cures. Natural cures include sweating and the use of cyclamen roots (77). Arcana cures take advantage of the astrological and elemental correspondences that caused the disease in order to cure the disease. The poisons are divided into arsenic, antimony and alkali sub-types, and each has its own mineral cure designed to produce sweating within the effected organs to wash off the polluting tartarus (78)..

### **The second book: Concerning the smelters and refiners**

Apart from the diseases of miners, Paracelsus also recognized the diseases of smelters and refiners. It is these diseases with which the second book is concerned. In the refiners' fire, ores are reduced to their constituent elements of salt, sulphur and mercury, each of which, in an imbalanced state, has the potential to cause disease (80). The first tractate of the second book concerns itself with elemental vapours which emanate from the refining process. Of these, Paracelsus only considers sulphur and mercury to be harmful, as the salt element remains behind in the ash and slag produced by the fire (81). The poisons saturate the air and are taken in along with good air to the lung (83), where they are transmuted by the lungs alchemical digestive ability to various forms of mucus which Paracelsus describes in some detail (85).

The second tractate of the second book concerns itself with diseases produced by metallic smoke. This is the literal smoke arising from the refiner's fire, and should not be confused with the more spiritual mineral vapours with which the first tractate was concerned. Paracelsus posits a different pathogenesis for the diseases caused by metallic smoke. Rather than coagulating and forming blockages within organs, metallic smoke works more like a dye, staining the tissues with its metallic nature and corroding them (87). This stain enters the lung, but also enter the brain and stomach, producing confusion and colic (91).

The resulting diseases, such as dropsy, jaundice, fever and inflamed points are all ruled cured by the same metallic stain which caused them. Paracelsus emphasizes here that the essential thing for the physician to recognize is not the patient's imbalanced humours, but rather the pattern of disease caused by the metallic poison itself (88).

The third tractate of the second book discusses the salt ores which Paracelsus brushed aside in the first tractate. He considers the salt ores to be beneficial to human health (92). He discusses the beneficial effects of contact with the salt ores in their subtypes as salt, vitriol, and alum. Demonstrating his interest in occupational health and disease, Paracelsus notes that workers most frequently in contact with salt ores, such as dyers and soapboilers, are in health more robust than average (94), unlike the miners and refiners, whose health is frequently weakened (70). He comments also about the general health of the alchemists, stating that their health is stronger than average (how fortunate for Paracelsus himself!). However, he disagrees with the popular belief that this is due to the spiritual nature of the materials that alchemists handle, but attributes it rather to humble living and a temperate diet (97). Perhaps Paracelsus could have made a good spokesperson for today's unpopular but effective lifestyle management programs.

The fourth tractate, on the cure of refiners' diseases, contains cures similar to those offered for miners' diseases. Of interest is a section detailing the symptoms caused by imbalance in the classic Aristotelian elements air, fire, water, and earth; being colic, marasmus, dropsy and quartan fever respectively (101). This demonstrates that Paracelsus, despite his criticism of classical knowledge, had not entirely abandoned that older system. He concludes this cure section with a chapter on "simples", or uncomplicated herbal remedies such as hoarhound, betony and water lily (102). Paracelsus was a strong proponent of simples against rather complicated forms of polypharmacy (Stillman, 1920; Scarlett, 1941).

### **The third book: In which alone the quicksilver diseases are comprehended.**

The final book of the *Von der Bergsucht* concerns itself solely with diseases caused by mercury, here to be understood as the metal quicksilver, and not as part of the salt-sulphur-mercury elemental triad. Paracelsus considers this metal to be quite separate from any other ore he has discussed in this book. As he puts it-

So know here at the beginning of this book that the disease of quicksilver has nothing in common with the sulphuric, mercurial or saline natures, nor is it connected with other metals and ores...For thus is the quicksilver within itself, it contains the good and the evil united, so that they are not to be separated from each other. (103)-

Evidence of the uniqueness of quicksilver is to be found in the name itself; this metal is quick, that is to say, alive. Paracelsus states that mercury is unique because it lacks the coagulation caused by cold that is present in all other minerals such as gold and silver, which causes them to form solid rocks (106). Hence, quicksilver is liquid. Its alchemical properties are always active, and do not require rousing by crushing or burning in the same ways that the properties of ores do (107). Mercury causes disease by two ways,

through its function as a terrestrial star, and through its cold emanation which Paracelsus calls its' winter (110). The second tractate of the third book concerns itself with the terrestrial luna effects, and the third tractate concerns itself with quicksilver's winter effects. In the second tractate, Paracelsus states that quicksilver, due to its aliveness and its propensity to induce lunatic states, is in fact the moon of the terrestrial stars, that is to say, the moon under the earth. Apart from its deleterious effects as the terrestrial moon, Paracelsus also believes that mercury causes disease through its' winter, a property which dulls the body's heat, and forces the heat into a compact ball in the heart (114). The heat produces putrefaction of the inner organs, while the cold produced the shivering and convulsions associated with mercury poisoning (115). In the fourth tractate of the third book, Paracelsus discusses the cure of quicksilver diseases. In this section, he enumerates many accurate symptoms of mercury poisoning, such as tremor, cachexia, oral inflammation and blackened teeth, as well as gastrointestinal disturbances (115-119). Finally, his cure for quicksilver poisoning is to liven the quicksilver with baths and herbs, so that it may exit the body through an ulcer created by the physician with a corrosive plaster (120-121).

## Discussion

Having reviewed the contents of the *Von der Bergsucht*, what can we say about this book's contribution to the forward progress of medicine? I would like to separate Paracelsus innovations into three groups: his introduction of non-Galenic practices in treatment, his emphasis on lifestyle alterations to manage and prevent disease, and his emphasis on the physician's need to observe disease through live experience.

In treatment, Paracelsus rejects the Galenic model by rejecting the theory of bodily humours and by rejecting cure by opposition. Paracelsus' pathogeneses are not internal humoral imbalances, but external poisons that have accumulated inside the body. This is much closer to our understanding of the modern pathogen. Of course, Paracelsus is reluctant to leave the older imbalance model behind entirely, as his dissertations imbalances of air, fire, water, and earth indicate. Paracelsus is also the first to enunciate the idea that the cause of disease may also be its cure; the so-called homeopathic principle which has played such an important part in the history of medicine. This indicates progress away from the idea that substances can be understood as wholly noxious or wholly healthy- one substance may contain both the good and the evil within it. Paracelsus' pharmacy is also of interest to history. He is an early, if certainly not the first, proponent of a return to simple herbal remedies. More importantly, he is the first to introduce mineral remedies effectively. These would become increasingly popular, entering England's materia medica in the next century.

Paracelsus was also a strong advocate of what we might today call "lifestyle management". He clearly understood that certain occupations carry their own specific risks, hence an entire book devoted to the diseases of miners and refiners. Of particular interest is his emphasis on the prevention of disease, something whose importance is sometimes forgotten in today's medicine. Lifestyle control plays some part in this; Paracelsus recommends specific diets and sweatbaths for miners, for example. He also

recommends specific prophylactic therapies. These he divides into those therapies that keep the patient from becoming weak and susceptible to mine vapours in the first place, and those that drive out infections before they take hold. Hence, Paracelsus shows showing a sort of rudimentary understanding of primary and secondary prevention of disease.

Finally, there is Paracelsus' emphasis on experience. This is where Paracelsus' sermons reach their most bombastic heights. He was nothing less than fanatically passionate about rejecting book learning and going out to the patients and local healers to understand disease. In the *Von der Bergsucht* he says

-This experience should defend itself and the results which should move every unbeliever to believe in physic should be examined. For the results are so clear, that they are not in need of any disputation...However, each one should retain his own experience; for who can or wants to fathom the end of medicine? (74)-

Paracelsus seems to be anticipating the secular and empirical trends that would soon sweep medicine as the Renaissance took hold. However, he cannot make the leap away from the medieval scholasticism in which he was raised; he does not have any guides or tools with which to do so. Paracelsus breaks away from received mystical tradition, both Galenic traditions as well as superstitious traditions of magic and supernatural influence that were supported by the church (Weber, 2002). However he is forced to substitute a magic of his own; his own macrocosm and microcosm and his own elements of salt, sulphur and mercury. He cannot be properly understood as a de-mystifier of medical knowledge (Weber, 2002). His own mystical systems are complex and frequently self-incompatible. For all his arrogant confidence in his own mystical ideas however, Paracelsus remained a stubborn proponent of experienced facts, and as the above quotation shows, he remained open to the idea that his own understanding might someday be surpassed by others' experiences.

## Conclusion

Our final vision of Paracelsus as an innovator then, depends on what one considers to be an innovation of *value*. Is it to be the first of an ongoing trend? The *Von der Bergsucht* meets this criterion by being the first handbook of occupational disease, and one of the first therapeutic texts to endorse a homeopathic ideal. Perhaps it is to be the first to describe a distinct disease entity? Paracelsus' descriptions of the physiognomy of mercury poisoning are quite accurate. But these explanations of innovation place great and dubious value on being the first of anything, regardless of the quality of the collection of ideas of which the innovation is "number one". Surely a better explanation would take the future validity of an original, innovative idea into account. On a practical level, Paracelsus' *Von der Bergsucht* is a mixed success. Some of his herbal and mineral cures may have worked, and some undoubtedly did not. His observation that a substance might be helpful or harmful depending on context is a valuable one. However, to focus entirely on the practical therapeutic value of Paracelsus' cures is to miss out on his greatest contribution to the history of medicine. In the *Von der Bergsucht* we see great courage, as well as great

arrogance. This is a catalogue of diseases not heretofore recognized by medical authorities- the idea that the ancients might have missed a few things is radical and valuable. Furthermore, Paracelsus' physiognomic data on the miners' diseases more than any others (save perhaps his studies on syphilis) were based on real, objective observation. It is known that Paracelsus spent a great deal of time in the mines with miners, and in the alchemists' workshop with their minerals. This combination, openness to new ideas and close observation and relationship with the patient, was an ideal of Hippocrates, and is something still highly prized in medicine today. It is also an innovation of which Paracelsus was one of the earliest proponents. For this reason, *Von der Bergsucht und Anderen Bergkrankheiten*, demonstrates the Paracelsus was indeed a positive innovator in the history of medicine.

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# LOVESICKNESS: THE MOST COMMON FORM OF HEART DISEASE

By

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## Abstract

**“My mouth doth water, and my breast doth swell,  
My tongue doth itch, my thoughts in labour be;” (Abrams 1993)**

As Astrophil pines for his Stella in Sir Philip Sidney's sonnet, he describes the physical symptoms of his infatuation which point to a rampant case of lovesickness. In addition to its common presence in works of literature, lovesickness has been described as an actual medical entity with a specific etiology, pathogenesis, and treatment.

Amazingly, many of the described symptoms of lovesickness are consistent across time and place, including fever, agitation, loss of appetite, headache, rapid breathing, and palpitations. On the other hand, several other aspects of the disease and its care differ tremendously depending on the cultural context. Lovesickness (also known as lover's malady, *mal de ojo*, *mal amor*, *amor heroes*, inordinate love, or *philocaptio*) had a variety of proposed etiologies. In the Middle Ages it was often attributed to love philters and demons, while the ancient Nahua of Mexico thought it had to do with the evil eye.

The disease had serious consequences: failure to treat an afflicted patient could result in losing one's genitalia, death, or eternal damnation. Treatments were creative and varied widely, from herbal remedies to the prescription of sexual intercourse to drinking water that had been boiled in the desired person's underwear. Lovesickness is a disease that permeates medical literature since the time of Hippocrates, and may still have a place in modern medicine in the form of somatoform disorder, bipolar disorder, or erotomania.

## Introduction

In a mysterious case description, the physician Erasistratus (4<sup>th</sup> century BC) is called to the bedside of the prince Antiochus who is extremely ill. Upon examination, the prince is weak, emaciated, and near death. No one understands why the prince is so sick, until Erasistratus notices an important sign. As he feels Antiochus' wrist, he realizes that the prince's pulse quickens and he becomes flushed when his stepmother Stratonice enters the room. Erasistratus realizes that Antiochus is suffering from lovesickness, and tells the

King Seleucus, who gives his wife to his son (Pinault 1992). Similar stories are attributed to the physicians Hippocrates and Galen. Indeed, lovesickness is a disease that permeates much of medical literature and the ability to diagnose lovesickness was the sign of a great physician (Pinault 1992). Description of the disease has changed extensively over hundreds of years and may exist in modern medicine in the guise of psychiatric disorders.

## Signs and Symptoms

Lovesickness (also known as lover's malady, *mal de ojo*, *mal amor*, *amor heroes*, inordinate love, or *philocaptio*) had a variety of proposed etiologies, signs, symptoms, and treatments. Interestingly, the signs and symptoms of the illness are often consistent, regardless of at which point in time one examines them or in which culture. Lovesickness involves fixation on a person: the afflicted individual has obsessive thoughts about the object of their fixation (Bynum 2001). Symptoms that are fairly consistently described include insomnia, loss of appetite, hollowing of the eyes, anorexia, pallor, rapid pulse, and jaundice (Bynum 2001, Hefferman 1995, Beecher and Ciavolella 1990, Solomon 1997).

Other symptoms are more specific to the time or place in which they were described. For example, the illustrious Islamic physician Rhazes (850-923 AD) described a very unique syndrome. In the early stages of the disease, the patient's eyesight would become weak, the tongue would dry up, and pustules would grow on it (Beecher and Ciavolella 1990). A dusty substance as well as marks that looked like dog bites would appear on the patient's back, calves, and face. If left untreated, the person would eventually wander at night through cemeteries and howl like a wolf.

In medieval Spain one of the manifestations of lovesickness was the "Frog/Diana syndrome" which was caused by excessive desire of a person. This syndrome caused a person to view something that was unpleasant and repulsive as beautiful and desirable (Solomon 1997).

Some medieval writings hint at a connection between lovesickness and bipolar disease. In addition to depressive symptoms such as weeping, insomnia, and loss of appetite, many patients experienced manic symptoms (Hefferman 1995). Rapid mood swings were common, causing the person to inappropriately burst into laughter and then switch into depression (Solomon 1997). Ferrand describes some interesting signs and symptoms where the patients "have a look about them that suggests they see something pleasing, or else are hearing it, or longing for it...one moment they laugh, a moment later they turn sad and weep, now they jest, and a short time later are sorrowful, pensive, and solitary" (Beecher and Ciavolella 1990). Toohey maintains that although there were depressive and manic forms of lovesickness, the depressive type was more of a cliché. More common was the manic form, which often caused the patient to become violent (Toohey 2004). Similarly, Hippocrates describes some violent symptoms of an illness called melancholy madness, which may have been related to lovesickness (Beecher and Ciavolella 1990). He describes how some women are prone to this condition, which causes them to become insane, homicidal, and produces a desire to asphyxiate themselves. This is akin to the violent impulses that may occur in people during a psychotic manic episode.



The Nahua describe some original signs and symptoms of lovesickness, including grabbing posts as substitutes for the desired person, the formation of blisters on the face, and a red eye with a yellowy mucus discharge (Chevalier and Bain 2003). In extreme cases, the disease interrupted the circulation, causing blood to freeze in the heart. Lovesickness could also result in the disappearance of the genitals.

The 19<sup>th</sup> century physician Wilhelm Griesinger described an interesting case in which the lovesickness a patient was experiencing caused her to have symptoms of hypochondria as well. His patient experienced vague somatic symptoms, including heart palpitations, abdominal pains, and failed appetite (Brown Medical School). She felt that scorching red irons were being forced through her body. She was convinced that she had major health problems such as an aneurysm, cancer of the stomach, or tuberculosis. Another physician actually diagnosed her with tuberculosis, but Griesinger discovered that the true cause of her illness was not being able to be with the man she desired. Indeed, when she ran away with him, her health was completely restored and her preoccupation with illness disappeared. It is clear that although the major symptoms of lovesickness are fairly consistent, the disease also had a lot of variability in its atypical presentations.

### **Etiology and Pathogenesis**

Physicians in the time of Hippocrates believed that maintaining a balance of the four humors of the body (blood, phlegm, choler, and melancholy) was essential to maintaining health (Beecher and Ciavolella 1990, Wack 1990). Disturbances of the melancholy humor led to psychological problems as well as somatic side effects: this resulted in the symptoms of lovesickness. The early Christian writers did not clearly distinguish between illnesses of the body and illnesses of the spirit (Beecher and Ciavolella 1990). They believed that lovesickness was a disease of the senses that could also corrupt the soul.

While medieval medical writings also showed that people believed lovesickness could cause corruption of the soul, they had a more clearly defined etiology and pathogenesis for the disease. The first stage of lovesickness occurs when seeing the object of desire causes overheating of the “vital spirit” (Hefferman 1995). The vital spirit then inflames the middle ventricle of the brain, which is where the faculty of estimation (or the *virtus aestimativa*) is located. This results in dryness in the faculty of imagination (*virtus imaginative*). Consequently the image of the beloved becomes imprinted in the patient’s memory, so that the patient becomes obsessed. This obsession robs the patient of his ability to reason and causes him to behave abnormally (Solomon 1997).

Hereditary causes of lovesickness were considered possible during the Renaissance. The child of a parent who suffered from lovesickness was at a greater risk for inheriting the disease, unless this predisposition was countered by other factors including the other parent’s health status, a good education, excellent discipline, or an orderly lifestyle (Beecher and Ciavolella 1990). It was also believed that most people who developed the illness had a susceptibility to it: young children, the very old, eunuchs, and the impotent were considered essentially immune (Beecher and Ciavolella 1990).

Lovesickness befell men and women equally in the ancient Nahua of Mexico. The disease did not necessarily occur in the person who was experiencing the desire: it had to do with which person was the weakest (Chevalier and Bain 2003). The stronger person had more heat power in their eyes, and could cause harm to others by looking directly at them. For example, a woman might see a man she likes and makes him ill by looking directly into his eyes. For this reason, lovesickness was considered a form of *mal ojo*, or evil eye.

### **Magical And Demonic Causes**

The etiology of lovesickness has also been related to magical and demonic causes. In the Middle Ages, the use of magic in the matters of love was fairly popular. For example, some believed that the hairs from the muzzle of a hyena could act as a love charm when placed on a woman's lips (Wack 1992). Similarly, it was thought that if a woman kept the Eucharistic host in her mouth while kissing her beloved, she could make him fall in love with her permanently. Although the use of magic was fairly common, it was not mentioned in many medical writings at the time since it could not be explained in logical terms (Wack 1992). In the 13<sup>th</sup> and 14<sup>th</sup> centuries, however, academics began writing about "visual *species*," that is, objects that mediated between the physical world and the mind. Visual *species* could cause the disease of lovesickness by imprinting images into the imagination, even from a distance. It followed that incantations and magic could also generate *species* in the mind and cause changes that affected the body. Consequently magic was a possible cause of lovesickness. Temptation by demons was also considered to be a possible etiological factor: it was thought that the Devil had a partiality for inflicting sexually related diseases on people (Ceard 1992). By the 15<sup>th</sup> century, lovesickness became associated with the occult: the disease was listed as a widespread form of witchcraft in a manual for witch hunters (Wack 1992). If a man abandoned a beautiful and virtuous wife for a revolting woman, it was concluded that witchcraft must have been involved (Ceard 1992). During the Renaissance, the use of potions and philters were also considered possible causes of lovesickness (Wack 1992).

### **Lovesickness in Women Versus Men**

Interestingly, the sex of the patient constituted a risk factor for the illness. In medieval times, lovesickness tended to be a male disease, especially since medical writings were composed in monasteries where the illness was looked upon very negatively (Fissell 1999). Eventually, however, a good case of lovesickness became almost a prerequisite for love amongst the well-off: courtly love, where a man completely worships and idolizes a woman as a perfect being even while she scornfully rejects him, became the ideal of love. This form of love was considered ennobling and chaste. In the Renaissance, for the first time, lovesickness became common in women but was considered shameful and debasing. According to medical treatises, women enjoyed intercourse more than men, were more impulsive, and were not rational enough to resist their desires (Beecher and Ciavolella 1990). Because the illness began to be interpreted as a sexual, and not a mental disease, it became attributed to women (Fissell 1999). Medical writers believed lovesickness could be caused by a distended clitoris, or by satyriasis (pain caused by a voracious desire for

sexual intercourse) (Beecher and Ciavolella 1990). An illness known as uterine fury may also have been linked to lovesickness: in this disease, the woman has an inordinate interest in sex and experiences painless burning sensations in her genitals (Beecher and Ciavolella 1990). Uterine fury was usually a disease of overly sensuous, greedy, and gluttonous women. Clearly lovesickness in women during the Renaissance was viewed with much negativity.

## **Treatment**

Treatment options for lovesickness varied depending on the cultural values and the medical beliefs of the time. Greek and Roman physicians often prescribed sexual intercourse for the illness: the famous physician Galen maintained that men should make love for the sake of staying healthy, even if they derived no pleasure from it (Bynum 2001). Similarly, the famous Iranian physician Avicenna recommended sexual intercourse but only if law and religion allowed it (Beecher and Ciavolella 1990). If this was not possible, physicians would attempt to distract their patients with baths, sleep, and exercise. They also hired old women to belittle the object of the patient's affection.

During the medieval period, many people perceived sexual activity in general as capable of corrupting the soul. Consequently, most therapies during this time revolved around distracting the patient from his obsession. Herbal remedies, such as one composed of endive, honeysuckle root, basil, and dandelion, helped rid the body of destructive humors (Solomon 1997). Distracting the patient was a popular approach: this could be done in a number of ways, from sending the patient on a trip to inflicting pain upon him (Solomon 1997). Some believed that scaring the patient into good behaviour was the most effective way of curing the disease: patients were told that sexual activity could lead to blindness, gout, accelerated aging, kidney failure, pulmonary disease, genital sores, baldness, infection, the conception of monstrous children, and even eternal damnation (Solomon 1997). Perhaps the most dramatic of treatments in this time period involved attempting to change the patient's perception of his beloved from adoration to disgust. This was done in many creative ways, such as forcing the patient to stare at a cloth that had been soaked in the woman's urine or menstrual blood, or burning her stool in front of the patient (Solomon 1997).

Cures during the Renaissance tended to be more invasive, with blood letting being a popular choice. The physician bled the patient's arm until the patient fainted or until the patient's heart failed. At this point, the physician would cauterize the front of the patient's head with a searing iron (Beecher and Ciavolella 1990). If a distended clitoris was the origin of the problem, then cutting it could bring about recovery (Beecher and Ciavolella 1990). Pharmacological treatments were also available: opium was used to treat the associated insomnia, and hemlock was used to reduce sexual desire.

Because the Nahua of Mexico believed that the root of the illness was excessive heat from a person's eye, most treatments involved the use of cold water (Chevalier and Bain 2003). Some examples include drinking water from abandoned wells, drinking the saliva or urine from the desired person, or drinking water that had been boiled in the person's underwear.

Having the patient gaze directly into the eyes of the person to eventually satisfy his or her desire was another method of treatment.

### **Lovesickness in Modern Medicine**

Lovesickness has been a common medical entity for hundreds and hundreds of years, and yet it has no mention in modern medical texts at all. It is possible that the disease exists under a different title. As mentioned earlier, many of the symptoms of lovesickness are congruent with symptoms of modern psychiatric disorders. Some examples include obsessive thoughts, rapid mood swings, loss of appetite, insomnia, weeping, compulsions, and violence. In an interesting recent study, Marazziti et al looked at the serotonin levels in people who had very recently fallen in love and compared them to normal controls and patients with obsessive-compulsive disorder. They found that the people in love and the obsessive-compulsive patients both had lower than normal levels of serotonin, suggesting shared psychological elements between the two groups (Marazziti 1999). Many of the symptoms of lovesickness have to do with alternating between depression and mania: perhaps lovesickness in modern medicine is encompassed in bipolar disorder. Erotomania, the delusion where a person is convinced that someone else is in love with them when they clearly are not, may be a contemporary form of lovesickness. One study used functional MRI scanning to show that very specific areas of the brain were activated in patients who were in love (Bartels and Zeki 2000): perhaps a pathological stimulus in these areas of the brain could lead to a form of lovesickness. Tallis makes the point that some of the therapy used on lovesick patients over a thousand years ago is similar to modern cognitive behavioural therapy: the physician Avicenna encouraged distracting the patient from his fixation using physical exercise, trips, and so on (Tallis 2005). Finally, lovesickness may be now known as somatoform disorder, where physical symptoms exist that are not part of another medical condition or mental disorder. These patients may have psychological conflicts that are translated into somatic problems.

### **Conclusion**

Lovesickness was a common disease that persisted throughout centuries and may still endure today as part of several psychiatric disorders. The supposed etiological factors and treatments changed as cultural beliefs evolved and as the understanding of science developed. Many of the symptoms and signs remain constant regardless of what point in time or in what culture they are examined in: this adds to the authenticity of the disease. Many aspects of the disease can be explained by elements of modern psychiatric disorders, which make it likely that there are still many patients suffering from lovesickness even today.

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**THE VISION OF SOUND:  
JOSEF LEOPOLD AUENBRUGGER'S CONTRIBUTION TO MODERN  
ULTRASOUND**

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**Abstract**

While modern medical technology is constantly evolving, doctors are trying to keep up. However, the common thread linking technological advances is their roots in certain fundamental skills that physicians can still employ. While the path of history may get lost and convoluted, contributions of various people to a certain field can no longer seem relevant or direct. Yet, it is a safe assumption that many modern inventions are no longer the result of a single person's completely novel idea. More often than not, they are simply ingenious improvements on existing technologies. This is not to downplay the importance of modern technological improvements. However, in order to move forward it is important to understand and appreciate the contribution that the very first person made to the development of a particular tool. The field of ultrasonography is one such area. The year 2003 was proclaimed as the 50<sup>th</sup> anniversary of echocardiography (Roelandt 2003). The use of noninvasive imaging techniques to examine the heart may be only fifty years old. However, the use of sound as a diagnostic tool is far from that young. Though not always used to form a direct image of the heart, sound has been used for centuries in medicine. Imaging using sound is simply a technological advance on an early and inventive use of sound to elucidate and examine chest contents by percussion. Physicians used early chest percussion to form a mental image of the contents and problems within the thorax. Now, medical imaging technology such as ultrasound is used for this purpose. The use of sound as a diagnostic tool in modern medicine is due to the original contribution of one individual. Though virtually overlooked as one of the fathers of modern ultrasound, Josef Leopold Auenbrugger was the first person to describe the use of chest percussion. He essentially paved the way for modern ultrasound by initiating a cascade of events through his inspired and resourceful use of one of the human senses. Without Auenbrugger, modern medicine would be void of one of its most useful tools. Many historical figures have further developed his idea of visualizing the contents of the body without entry. Modern ultrasound is the result of many expensive technological advances from the early days of Auenbrugger's use of percussion to elucidate chest contents.

“Chest percussion was first described in 1761 by Leopold Auenbrugger, who was born in 1722 in Graz (Austria)” (Yernault and Bohadana 1995). It has been stated that, “Auenbrugger played on the thorax as though it were a set of percussion instruments” (Sakula 1978). Josef Leopold Auenbrugger was well known for his artistic collaboration with composer Antonio Salieri in the opera ‘The Chimney Sweep.’ The music of Salieri was praised, while Auenbrugger’s contribution of the libretto, or words of the opera, was seen as “theatrical nonsense and lack of taste” (Sakula 1978). Despite this lack of critical acclaim, the opera became quite popular, as did Auenbrugger’s fame. The Empress Maria Teresa asked him if he considered writing another opera to which he replied that one opera was sufficient and he had other things to attend to (Lambert and Goodwin 1929, 213). What could be more pressing than honing one’s artistic and operatic skills? He may have felt it necessary to further develop his wonderful contribution to the medical field that he made years earlier. He was the innovative medical mind behind the use of sound as a diagnostic tool.

As well as having promising musical talents, Auenbrugger received his medical training in Vienna. He was a popular well-liked individual. Auenbrugger, at twenty nine years of age, was appointed to the Spanish Military Hospital (Lambert and Goodwin 1929, 211). As a young child, Auenbrugger witnessed his father, an innkeeper, tapping barrels to determine the level of liquid found within them (Yernault and Bohadana 1995). This technique became useful in his practice. Many patients at that time were victims of tuberculosis. This disease was common in patients due to dirty and crowded living conditions. During autopsy analysis, Auenbrugger noted that these patients had fluids in their lungs. Intrigued, he thought of the human chest as a barrel that he could tap to determine the fluid level inside. This would allow physicians to determine the presence of fluid in the lungs before the patient passed away (Tan and Hu 2004). He developed this direct percussion technique for seven years before publishing his findings. His technique involved striking the bare chest with his fingers held together in a leather glove or using bare and closely joined finger tips against clothing. He noted that a healthy thorax has a noticeably resonant sound. “Auenbrugger recognized three categories of sounds: a “sonus altior” (tympanic), a “sonus carnis” (dull) and a “sonus obscurior” of indistinct quality” (Yernault and Bohadana 1995). The thorax was examined for resonance and dullness upon percussion. It was noted that the duller the sound, the greater the severity of the disease. In order to compare the different sounds and find fluid levels within the pleural space, he was known to percuss the thoraces of cadavers which he filled with water (Tan and Hu 2004). Chest percussion was very effective in reducing mortality in Auenbrugger’s time. “The reduction in mortality from tuberculosis of the present day rests largely on the early diagnosis of the disease, and percussion aids the physician in making this diagnosis” (Lambert and Goodwin 1929, 212).

Auenbrugger’s findings and method of percussion in how to detect lung consolidation and pleural effusion were described in his short book ‘Inventum Novum,’ published in 1761 (Sakula 1978). It is surprising how such a small, short publication would later become influential in shaping the future of medical diagnostics. The most ingenious of ideas are essentially quite simple and lack the need for exhaustive explanation. At the time of Auenbrugger’s publication of ‘Inventum Novum,’ the majority of the medical community

disregarded, discredited and ignored his extremely useful and effective tool. This is in spite of his strong belief that sound could be used to determine diseases of the thorax. Direct percussion was even confused by some contemporaries with succussion. This is the ancient Hippocratic technique of shaking a patient while being held under the arms. The sound of splashing is indicative of fluid and air being present within the chest (O'Neal 1998). "The medical community was skeptical that thumping the exterior of the chest could reveal information about its elusive interior, and promptly rejected his discovery" (Tan and Hu 2004). He resigned from his position at the Spanish military hospital. Still, he maintained a strong conviction in his discovery and was readily called upon for illnesses of the chest (Lambert and Goodwin 1929, 213). Auenbrugger had anticipated the rejection and difficult social circumstances that followed the development of his technique. He is quoted as saying, "I have not been unconscious of the dangers I must encounter; since it has always been the fate of those who have illustrated or improved the arts and sciences by their discoveries, to be beset by envy, malice, hatred, detraction, and calumny" (Tan and Hu 2004). It would be years before the medical community as a whole become aware of what wonderful tool Auenbrugger had developed. His percussive technique was effective, cheap, and useful. Auenbrugger never lived to see the extent of his contribution. He was victim of a respiratory illness which claimed his life. It is believed that he predicted the time exact time of his death on May 18, 1809 stating "that when the hand of the clock pointed to two in the afternoon he would be dead, and so it happened" (Sakula 1978).

Auenbrugger's gift to the medical world was one of simplicity and ingenuity. Unlike modern ultrasound, sound was not used to form a direct image of the chest. Chest percussion was used to infer the pathology within the thorax by comparing the sound attained to that heard when percussing the chest of cadavers. Still, it was essential in determining pathology. During a time when technology was limited, this early form of "imaging" was extremely useful.

One year before Auenbrugger's death, the influential Jean Nicholas Corvisart introduced percussion into French medicine (Lambert and Goodwin 1929, 213). By comparison to the present day, it is almost amusing that, "Corvisart was trained in surgery but could not find a reputable job because he refused to wear a wig" (Tan and Hu 2004). Turning to internal medicine, he was inspired by the use of percussion by such physicians like Dr. Maximilian Stoll, the Spanish military hospital's director who employed Auenbrugger's technique. Corvisart was known to use percussion to assess Napoleon Bonaparte's cough and later, in 1808, translated 'Inventum Novum' into French, expanding it with new details to a much longer book of 440 pages (Tan and Hu 2004). This new edition broadened Auenbrugger's influence. Corvisart's expanded French translation included illustrations and was influenced by his own experiences with percussion. His technique also differed in that he utilized the approximated and extended palmar surfaces of his fingers to percuss (Risse 1971). While Auenbrugger developed direct percussion for seven years, Corvisart had spent twenty years to issue his commentary and his translation, evidently influenced by his clinical experience (O'Neal 1998).



The use of sound waves to study the thorax soon became more technologically developed. In 1819, Laennec had discovered the stethoscope (Van Tiggelen and Freson 1991). There is a historical link between Laennec and Auenbrugger. In 1801, Laennec worked under Corvisart at Charite Hospital (Bedford 1972). Corvisart, of course, was primarily responsible for popularizing and bringing attention to Auenbrugger's idea of percussion. It is thus probable that Auenbrugger had a strong influence on Laennec.

In his practice, Laennec was known to percuss his patient's chest and then apply his ear to the apparently diseased area (Yernault and Bohadana 1995). It is recorded that while examining a young woman with heart problems, he was unable to determine pathology using percussion. Due to the young age of this female patient, he could not apply his ear directly to her heart. He folded a piece of paper into a tube and placed it over her heart and listened at the other end. This resulted in the ability to hear the heart beat with great intensity. Laennec began to make wooden cylinders called stethoscopes for this purpose (Lambert and Goodwin, 1929, 214). It is believed that at the time of his death, Laennec had probably personally manufactured every stethoscope in existence. 'De l'Auscultation Mediate ou Traite du Diagnostic des Maladies des Poumons et du Coeur' was published in 1819. Physicians would arrive in Paris from all parts of Europe to experience the stethoscope. In Corvisart's clinic, Laennec saw limits in percussion and thus favoured the stethoscope over both palpation and percussion. However, he was able to combine auscultation and palpation through the impact exerted by the stethoscope to his ear (Bedford 1972).

The term 'stethoscope' is actually a misnomer as "skopein" means "see." The more accurate name would have been 'stethophone' as "phone" implies "sound" (Roelandt 2003). Perhaps Laennec was overzealous in naming his instrument. The technology needed to actually "see" sound was years away. Auenbrugger's technique of percussion had now evolved from the early days of simple percussion to the use of a stethoscope to now hear the various areas of the thorax. Both auscultation and percussion rely on the use of sound to determine underlying pathology and physiology. The technology of using sound waves as a diagnostic tool was improving and the costs associated with stethoscopes were increasing.

In 1828, a physician named Piorry developed mediate percussion by "tapping either with a small hammer on a piece of ivory placed on the chest wall or with the fingers of one hand upon a finger of the other placed against the chest rather than upon the chest wall directly" (Lambert and Goodwin 1929, 213-214). Piorry was convinced of the superiority of his mediate percussion technique compared to direct tapping to determine physical signs of abnormalities in a sick individual. In this vein, he felt auscultation to be inferior to percussion. He saw percussion, like surgical exploration, to be able to directly reveal the physical characteristics of healthy and diseased internal organs. He argued that auscultation had to rely on respiration and circulation to be able to detect change in function and not those of anatomy. Still, he urged that both techniques should be used as they complement each other (Risse 1971). Piorry was influential. He pioneered topographical percussion and was first to clinically measure the size of the heart. 'Atlas de Plessimetrisme' was published in 1851, in which Piorry described a percussion sound

specific to every organ (Bedford 1971). Piorry drew attention to the faults of direct percussion developed by Auenbrugger and improved upon it through his preference for mediate percussion. For instance, many ill patients found direct percussion painful, it was fatiguing, and as well skin eruptions prevented its use in certain situations. Also, direct percussion would vibrate a large area upon contact with the palms of the hands. This illustrates its general characteristics at the expense of detecting small lesions. Piorry's mediate percussion overcame these problems (Risse 1971).

Piorry became almost obsessed with mediate percussion. A pedant in the truest sense, as mediate percussion developed, Piorry stood by his ivory pleximeter and did not favour those pleximeters constructed using rubber, leather, or cork. Nor did he acknowledge the use of a small percussion hammer to strike with. Piorry also opposed the now commonly used finger to finger percussion, claiming it produces less audible sounds. However, the benefits of having a finger as a pleximeter was valuable during procedures as it allowed for tactile impressions of the patient (Risse 1971). Others prefer finger to finger percussion because "the finger is always available to the physician, who might be embarrassed by the loss of his plessimeter" (Yernault and Bohadana 1995). There are legendary fictional and real anecdotes surrounding Piorry. For instance, Piorry once visited the Royal Palace at the Tuileries and demanded to see the king. When told that the king was not in his reception room, he approached to closed door and began to percuss it using his pleximeter. He then claimed that the king was in fact in the room as he heard a dull sounding area upon percussion of the door (Risse 1971). In all, Piorry was vital to the further development of percussion in the modern day.

Early physicians were quite resourceful in using sound to infer the contents of the body. Without surgical intervention, they could not actually see the internal structure of a living patient. Technology did later develop which changed this. "The event that began it all occurred on November 8, 1895, when Wilhelm Roentgen discovered what he called 'a new kind of light'" (Kevles 1997, 1-2). The X-ray was discovered and has been used ever since to form images of the internal structure of the human body. Medical imaging was soon becoming an essential tool in diagnosis. Doctors no longer had to completely rely on their inferences. Technology now made it possible in many situations for physicians to have a visual representation of the internal structure of the body without surgery. This technology was quickly being developed by many different people. Thomas Alva Edison had a role in medical imaging. He developed the "fluoroscope" which involved real-time imaging using X-rays. This was similar to both the "cryptoscope" which was developed by Professor Salvioni in Italy and the "skiascope" developed by Professor Magie at Princeton. The fluoroscope was easy to use. For instance, as a person moved his hand between the calcium tungstate coated screen and the X-ray tube, another viewer could see the interior of that hand by looking through the eyepiece (Kevles 1997, 35). In 1904, the "Seehear" was proposed by W. Rollins. This instrument would have been beneficial at the time for physical exams as it would allow both simultaneous auscultation of the heart using a stethoscope as well as visualization of it utilizing a fluoroscope. Unfortunately, this device was not used as a diagnostic instrument (Roelandt 2003). Still, one can appreciate the developmental stages leading up to modern ultrasound.

The use of sound as a diagnostic tool had been around for many years when imaging became very popular in the medical community. The technology needed to form actual images using sound was quickly being developed. In 1877, years before Roentgen's discovered X-rays, Jacques and Pierre Curie discovered the piezoelectric effect. Piezoelectricity is a property of crystals that causes them to become mechanically distorted when electricity comes in contact with the faces of the crystals. "The crystals convert electrical to mechanical energy and vice versa. The crystals (which include quartz, tourmaline, calamine, topaz, sugar, and certain ceramics) are called transducers" (Kevles 1997, 232). This mechanical energy was essentially a pressure wave that had a frequency above the normal human auditory range (Leopold 1990). Piezoelectricity was a necessity in the development of ultrasound technology.

Medical imaging using ultrasound is accomplished by using very high-frequency sound waves which travel through the medium depending on the characteristics of that medium of interest. The sound waves bounce off the surface and reflect back to the ultrasound source (Kevles 1997, 232). This is then analyzed to form an image. Sometimes, certain historical events can have a large impact in shaping the future of a seemingly unrelated field of study. In 1912, the Titanic luxury liner sank in the Atlantic Ocean prompting the need for imaging and detection of submerged icebergs, using sound waves and reflection. This technology was also being developed for war-time use. A former student of Pierre Curie, Pierre Langevin, built an ultrasound generator in which he put a quartz transducer into an alternating current causing it to resonate at the same frequency. It was discovered that ultrasound is best used in a uniform fluid medium, like water. Irregularities would stand out because the path of the sound is predictable (Kevles 1997, 232-233). Sound Navigation and Ranging (SONAR) was also used to detect German U-boats (Leopold 1990). This technology was soon perfected for use in water by an engineer named Floyd Firestone. His "Reflectoscope" had the ability to detect sound waves generated by the same machine (Kevles 1997, 233). This device essentially could be compared to an early physician generating mental images to identify irregularities in the human body by listening to the sound produced during percussion of a patient's body. Still, all of the technology developed up till this point did not utilize ultrasound generators to form a picture of the internal structure of the human body. Years of research and development still had to make the leap into the world of medical imaging. Perhaps inspired by X-ray imaging, Friedreich and Karl Dussik were the first to attempt to generate an image using sound waves in 1937. Interested in cranial images, they put the ultrasound source on one side of patient's head and the detector at the other side. The result was a very crude image because the thick skull was detrimental to attaining a clear image (Kevles 1997, 233-234). Edison had in fact attempted to make a radiograph of the human brain in 1896 as requested by William Randolph Hearst, the newspaper baron. However, he was unable to do so because of the impenetrability of the human skull (Kevles 1997, 36). Conversely, sound waves did allow imaging of the brain, hinting at what was to come. 1953 was a pivotal year. This year marked the beginning of the specialty of echocardiography by Helmuth Hertz and Inge Edler. They were able to attain real-time images of the heart using ultrasound. In 1955 at Osaka University, Shigeo Satomura and Yasuharu Nimura utilized the Doppler effect to send ultrasound waves into a blood vessel and to be able to illustrate the speed of the blood on the basis of the frequency of the ultrasound waves

reflected back, relative to those emitted. This would help shed light on the condition of the heart through study of blood's speed through arteries. Doppler ultrasound was a driving force in making ultrasound an indispensable diagnostic tool. In time, computers would aid in incorporating all of the information attained through ultrasound examination (Kevles 1997, 241-243). Finally, technology had come full circle in being able to form actual images of what early physicians, like Auenbrugger, had inferred by way of classical chest percussion.

It would take many more years of research and development until ultrasound was commercially viable. However the result, after years of research, is simply the use of expensive technology to form an image using sound waves. This is very similar, though admittedly more sophisticated, than percussion of a patient's chest to form a mental image. With ultrasound, physicians no longer had to use their imagination in thoracic examination of disease. Expensive technology and years of research now permit immediate and accessible imaging. Still, ultrasound essentially accomplishes the same goal as chest percussion. They both use sound waves to elucidate the contents of the chest. Ultrasound provides a visual image while chest percussion and auscultation provides a mental image. Though different, the results are quite similar. Sound is effectively used as a diagnostic tool. Ultrasound devices are expensive and not easily accessible by many physicians and patients. Chest percussion is a classical tool that is cheap and simple to employ. In most books dealing with the history of medical imaging, Auenbrugger's contribution to modern ultrasound may be overlooked. However, when tracing the historical path of any invention, the true genius behind any development would be the first individual who initiated the cascade of events that led to modern day. Josef Leopold Auenbrugger was the first person to utilize chest percussion as a diagnostic tool. Every physician and researcher that followed simply made progressive improvements upon his idea. They incorporated technology and research from other fields to produce a far more advanced and expensive tool. There are no real technical costs associated with using classical chest percussion. However, the wealth of knowledge attained using it is priceless. Many physicians are still using classical examination techniques. Yet, the most popular method to improve diagnostic abilities, especially in the younger generation of cardiologists, is through the use of echo/Doppler instrumentation. The result is a decrease in examination abilities compared to the "golden era" of clinical exams and physical diagnoses (Roelandt 2003). One must appreciate the contributions of the physicians that came before them. In order to move forward, physicians should supplement their skills with technology rather than having technology replace their skills. This is how early physicians, like Auenbrugger, developed new techniques. A properly trained and experienced physician can identify when certain technological instrumentation is providing incorrect information. It is improper to become solely dependent upon these instruments as errors can be rampant. The practice of medicine is far richer now as a result of Auenbrugger's inspired and resourceful use of one of the human senses to aid in disease diagnosis. Auenbrugger should rightfully take his place as one of the true fathers of modern ultrasound. He was the first physician to truly grasp his potential to develop the vision of sound.

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# **THE BIRTH OF DEFIBRILLATION: A SLOW MARCH TOWARDS TREATING SUDDEN DEATH**

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## **Abstract**

Recent years have seen the rapid fine-tuning of external cardiac defibrillation for the treatment of cardiac arrest. However, this rapid advancement conceals the slow march of physiologists over several centuries to address this life threatening state. Frequently, accounts of defibrillation research begin with the turn of the 20<sup>th</sup> century. However, the birth of the field was rooted millennia earlier, and became the object of scientific investigation a full 150 years before Einthoven received the Nobel Prize for his work developing the electrocardiograph.

Early accounts of resuscitation demonstrated an understanding of the necessity of respiration for life, as well as the correlation of respiratory and cardiac function. The eminent danger posed by ventricular fibrillation was noted by the Egyptians as early as 3500 BC, when it was observed that “When the heart trembles, has little power and sinks, the disease is advancing and death is near.”

However, it was the discovery of electricity that proved critical to research into heart function, and ultimately, defibrillation. In the mid 18<sup>th</sup> century, Luigi Galvani made the classic observation that an electrical impulse could cause a frog’s leg to twitch “as though it were seized with tetanus at the very moment when the sparks were discharged.” The excitement generated from Galvani’s experiments led to the almost instantaneous application of electricity to the treatment of cardiac arrest. However, it would take a number of innovative physicians, in roles spanning from basic researchers to public educators, to bring defibrillation from a baseless practice attempted out of desperation, to a scientifically validated, reliable, and widely available procedure. It is the objective of this report to highlight a number of these innovative individuals, and to detail the research that provides a foundation for the rapid advancements in cardiac care seen today.

## **Introduction**

Recent years have seen the rapid fine tuning of external cardiac defibrillation for the treatment of cardiac arrest, first through the development of semi-automatic units now found in every ambulance, and most recently through the proliferation of fully automatic units suitable for lay-person use in airplanes, shopping malls – and even at home. The

recent announcement of the Phillips HeartStart Home Defibrillator as one of Fortune Magazine's "25 Best Products of 2004" (Phillips Electronics 2004) can be seen not only as a testament to medicine's growing response to one of society's greatest health risks, but also as the culmination of several centuries of discovery in cardiac electrophysiology.

While our ability to respond effectively to sudden death has greatly improved in recent years, it comes as no surprise that the desire to do so is as old as antiquity itself. Countless instances of sudden death exist in early texts and mythologies – perhaps because, for many people, few events are more dramatic than seeing an apparently healthy individual die with no external sign of injury. Similarly, the ability to revive someone apparently dead is just as dramatic, and has been written about for over two thousand years. One of the earliest written depictions of resuscitation can be found in the Bible, where Elisha was detailed on more than one occasion to raise the apparently dead:

"And when Elisha was come into the house, behold, the child was dead .... And he went up, and lay upon the child, and put his mouth upon his mouth, and his eyes upon his eyes, and his hands upon his hands: and stretched himself upon the child; and the flesh of the child waxed warm .... And the child sneezed seven times, and the child opened his eyes." (2 Kings 4:32-35).

It was perhaps no surprise that breathing into another person could aid in resuscitation. In many cultures, breath is synonymous with life itself. Further, it wasn't until 1774 and Priestly's famous sealed-jar experiments on mice and plants that the concept of "used air" not suitable for respiration came about (Stelter and Saurez 2005). For this reason, and for the fact that the mechanism of breathing was more apparent than the mechanism of circulation, resuscitation attempts largely centered around artificial respiration until the discovery of electricity many centuries later.

In the meantime, techniques for regaining an airway and providing ventilations were developed. Obstructed breathing was remedied by Egyptians as early as 2000 BC by inserting reeds through the skin to create artificial access to the trachea (Adgey 2002). Mouth to mouth resuscitation, though clearly suggested in the Bible passage noted above, did not receive significant support, perhaps for reasons of hygiene. Attempts to ventilate using fireplace bellows have been documented as early as 1530, when Paracelsus first used the household device on an apnoeic patient rescued from a coal mine, and later on drowning victims (Davies et al. 2000). While fireplace bellows were of dubious efficacy, they nonetheless could be viewed as a step in the right direction, certainly when compared to other techniques popular at the time, including insufflation of tobacco smoke into the rectum (Chamberlain 2004).

It is important to note that in most cases, attempts to restore respiration were initially reported as instances of cardiac resuscitation. In the earliest days of medicine it is likely that weak pulses accompanying respiratory arrest were simply not observed – and as such individuals suffering from respiratory arrest with cardiac function were inaccurately assumed to be dead (Acierno 1994). Functionally, in most cases this did not make any

difference, as without the discovery of adequate means of ventilating the patient shortly progressed to cardiac arrest, a condition in which no treatment existed as yet.

The distinction is nonetheless important, as it sheds light on why the word asphyxia, originally meaning “without a pulse”, gradually transformed itself into a term referring to an absence of oxygen. It is likely that, as artificial respiration techniques improved, that patients described as asphyxiated (but in fact with a weak pulse), were successfully resuscitated by providing oxygenated air (Acierno 1994).

While techniques to aid in true cardiac arrest did not begin to emerge until the 18<sup>th</sup> century, knowledge of ventricular fibrillation – the most common cause of sudden cardiac death – existed as early as 3500 BC. At that time, it was written in the Ebers Papyrus that “When the heart trembles, has little power and sinks, the disease is advancing and death is near...” (Brewer 1983). The link between trembling (fibrillation), little power (poor circulation), and death, was again described by Vesalius as “worm-like” motions of the heart. Vesalius added to this description in 1543, by also noting the correlation between respiration and cardiac function:

“...Indeed, with a slight breath in the case of this living animal the lung will swell to the full extent of the thoracic cavity, and the heart become strong and exhibits a wondrous variety of motions.... And as I ... take care that the lung is inflated at intervals, the motion of the heart and arteries does not stop...” (Vallejo-Manzur et al. 2003)

## **Electricity**

It was the discovery of electricity that proved critical to research into heart function, and ultimately, defibrillation. In the mid 18<sup>th</sup> century, Luigi Galvani began experimenting with electricity, and made the classic observation in that an electrical impulse could cause a frog’s leg to twitch “as though it were seized with tetanus at the very moment when the sparks were discharged” (as translated in Bing 1992). This account of “animal electricity” quickly caught the interest of seemingly every scientist in Europe, leading some historians wondering how the common frog managed to avoid extinction... It was only one year later that Volta questioned Galvani’s claim to “animal electricity”, by showing that in fact electricity was not generated by the animal itself, as is the case in the electric eel or torpedo fish, but that the frog’s nerve simply carried the electrical signal generated by the scientists (Bing 1992). Regardless, the field of electrophysiology was born, and with this discovery in place, research into the electrical origin of cardiac function could begin.

## **Early Discoveries In Cardiac Arrest And Defibrillation**

The excitement generated from Galvani’s experiments, and the countless experiments that followed, led to the almost instantaneous application of electricity to the treatment of cardiac arrest. While it wouldn’t be until Prevost and Battelli’s work in the turn of the 20<sup>th</sup> century that true defibrillation would be depicted scientifically (Prevost and Battelli 1899), the first case report describing successful resuscitation using electrical shock was made in 1774, when a young woman fell out a second-story window and was believed by



all accounts to be dead (Acierno 1994). After approximately twenty minutes, a doctor was summoned, who after exhausting all conventional techniques, attempted to apply electricity “to various parts of the body in vain; but upon transmitting a few shocks through the thorax, he perceived a small pulsation’ in a few minutes the child began to breathe with great difficulty, and after some time she vomited.” This account, and many others, were recorded in the register of Royal Humane Society of London, an organization established the very same year to promote resuscitation as a means of saving otherwise healthy people – victims most often of falls, drowning, mining accidents, and lightning (Acierno 1994).

While doctors across Europe, and very soon after in North America began using electricity as experimental treatment for sudden death, the first report of scientific investigation into this practice was not conducted until a year after the first recorded “save”. In 1775, Dr. Peter Abilgaard, a medical doctor also trained in veterinary medicine, published his observations on shock and countershock. A full 124 years before Provost and Battelli’s documentation of ventricular fibrillation and defibrillation, Abilgaard observed that electrical stimuli could, when applied anywhere across the body of a hen, in particular the head, render his animal specimen lifeless, and when applied again across the thorax, restarted the heart: “With a shock to the head, the animal was rendered lifeless, and arose with a second shock to the chest; however, after the experiment was repeated rather often, the hen was completely stunned, walked with some difficulty, and did not eat for a day and night; then later it was very well and even laid an egg.” (Driscoll et al. 1975). Surprisingly, given the importance of Abilgaard’s observations, few references were made to it in the literature of the time. Today, some controversy exists as to whether or not Abilgaard truly induced fibrillation and defibrillation. While his depiction suggests that he did, the fact that his work preceded the invention of electrocardiography by a full century will forever leave some element of doubt.

## **A True Beginning**

While the study by Abilgaard and the numerous case reports from the Royal Humane Society suggested an early beginning to cardiac arrest research, it was not until the beginning of the 19<sup>th</sup> century that work began in earnest. By 1851, chloroform had gained considerable popularity in operating theatres across the world, and numerous cases of sudden death left surgeons hesitant to use the anesthetic (Eisenberg 1997). Dr. Green, a British surgeon, was one of the first to fully endorse electrical stimulation as a means of reversing chloroform-induced sudden death, and reported six successful resuscitations amongst the first seven patients to arrest during surgery in 1872. However, similar success rates were not reported elsewhere (Chamberlain 2004). Around the same time, and also in response to the considerable risk anesthesia could pose to cardiac function, Dr. Steiner conducted an extensive investigation into the effects of, and electrical treatment for, chloroform and ether induced cardiac arrest. Current was applied directly to the heart via a needle inserted through the chest. As evidence to Steiner’s thorough approach to research, he published accounts of successful ventricular pacing in 10 dogs, 14 cats, 6 rabbits, and 1 donkey. Unfortunately, his one attempt at resuscitating a patient was

unsuccessful (Chamberlain 2004). Clearly science needed to push ahead with research into cardiac arrest.

The mechanism of cardiac arrest began to be elucidated by Ludwig and Hoffa, who in 1850 were the first to physiologically describe fibrillation in animals, while also noting that electrical shocks can reliably induce the phenomenon (Acierno 1994). Surprisingly, Ludwig is perhaps best known for his work developing kymographs – the original method for translating physiological data into visual form – and yet there is no record of any attempt to map visually the electrical patterns of the heart (Eisenberg 1997).

Work on fibrillation continued by many physiologists in the later half of the 19<sup>th</sup> century, aided by advances in knowledge of cardiac function and the technology to observe it. John McWilliam made several significant observations about ventricular fibrillation through a series of reports in 1887 (McWilliam 1887). Of particular importance was the conclusion that ventricular fibrillation should, and likely does occur in humankind. Until this point, and in fact for a number of years after, ventricular fibrillation had only been clearly observed in animals. The absence of any observation of human ventricular fibrillation was enough for many physicians to believe it simply did not occur in mankind; that cardiac arrest only occurred as direct asystole (Acierno 1994). McWilliam, however, demonstrated ventricular fibrillation in a number of animal species, and further, he demonstrated that it occurs with greater frequency and severity in larger mammal species. McWilliam furthered his claim in this regard, suggesting quite reasonably that the reason ventricular fibrillation had not been clearly identified in a patient was simply that most cases of cardiac arrest occurred out of hospital, where the amount of time elapsing before anyone could observe the heart directly surpassed the length of time cardiac muscle fibrillates (McWilliam 1887).

Around the same time, two other physiologists were studying fibrillation, and through a methodical approach of applying varying amounts of current to a number of species, using a number of different anatomical placements for the electrodes, made some significant discoveries. The focus of Prevost and Battelli's report was not unlike the conclusions made by McWilliam: the heart's ventricles could be made to fibrillate with a small amount – as little as 40 Volts – of electricity delivered across the chest wall (Prevost and Battelli 1899). What was not the focus of this report, but would become the focus of countless reports in the next hundred years was the casual observation that a second, larger shock (between 240 and 4800 Volts) could often defibrillate the heart. While it is likely that Prevost and Battelli realized the importance of their observation for the animals they studied, noting “one can – if a high voltage current is applied in time – stop the tremulation caused by the low voltage current. A dog which had been lost due to paralysis of the heart can be saved in this way” (Prevost and Battelli 1899, as translated by Chamberlain 2004), they must not have been aware of McWilliams suggestion that ventricular fibrillation is likely a major cause of sudden cardiac arrest in mankind. Similarly, it seems that no active physiologist at the time correlated the work of Prevost and Battelli with McWilliams, for little research on defibrillation occurred for almost 10 years after Prevost and Battelli's work was published. Thus, with what could be the understatement of their professional careers, Prevost and Battelli helped electrophysiology

conclude the 19<sup>th</sup> century with a solid background in ventricular fibrillation and defibrillation – in animals only – setting the stage for rapid advancement in the 20<sup>th</sup> century.

## **20<sup>TH</sup> Century – Development Of Defibrillation**

While cardiac arrest due to early application of anesthesia prompted research early in the 19<sup>th</sup> century, the advent of public electricity in the early 20<sup>th</sup> century prompted further development of the field of cardiac electrophysiology. Spurred by a growing number of employee accidents, electrical companies began to fund research into resuscitation (Acierno 1994). A breakthrough in defibrillation would occur when, in 1926, the Consolidated Electric Company of New York City funded a collaboration to be conducted at John Hopkins between Orthello Langworthy and Donald Hooker, both physicians, and William Kouwenhoven, an electrical engineer. By 1933 the trio had published a summary of their initial research, expanding upon the findings made 30 years earlier made by Prevost and Battelli. Specifically, the group noted that for defibrillation to be successful, the shock must be applied within a few minutes of arrest if no other intervention is made: 99% of cardiac arrests defibrillated after 30 seconds were successfully resuscitated, but after one, two and four minutes the success rates dropped to 90, 27, and zero percent, respectively (Eisenberg 1997). They also noted that the amount of time in cardiac arrest could be extended if open-chest cardiac massage was conducted prior to shock delivery, but that this only expanded the window of opportunity by a few minutes. This observation would pave the way for open-chest massage as a standard component of cardiac resuscitation, and provide the basic concept that later would lead to the chest compressions used today in CPR.

Around the same time that Kouwenhoven and colleagues were developing clinically usable defibrillation techniques, a man who would later be cited as one of the most influential individuals in cardiac resuscitation was completing his internship. During his internship in Cleveland, Ohio, Claude Beck witnessed a number of cardiac arrests during surgery, and stood back with amazement as the surgeon would request that the local fire department be summoned to administer oxygen in an attempt at resuscitation, leaving him feeling, quite fairly, that “we were not doing our best for the patient” (Eisenberg 1997). He went on to construct his own defibrillator, based on the work by Kouwenhoven, and developed the first in-house cardiac resuscitation team – the precursor to the crash cart team (Eisenberg 1997). Finally, in 1947, approximately 27 years after observing the fire department rescue, Beck achieved the first clearly documented defibrillation. The patient was a young boy receiving surgery for a congenital form of funnel chest. Surprisingly, upon noticing ventricular fibrillation, Beck maintained manual heart massage for over 30 minutes before he had an electrocardiograph confirm ventricular fibrillation and then delivered a shock directly to the heart. The first shock was unsuccessful, so procaine was administered to improve the heart’s susceptibility to electricity, and upon a second shock normal sinus rhythm was restored.

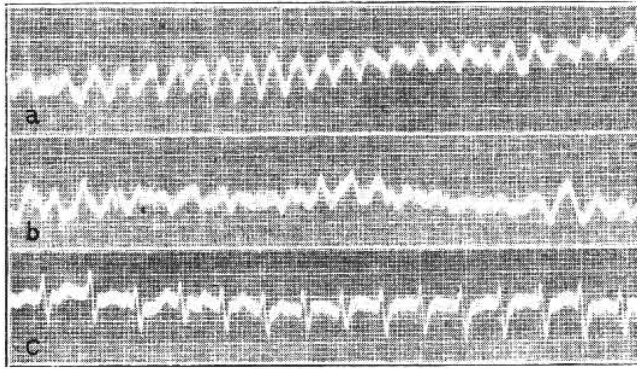


Figure 1: Electrocardiogram recorded by Dr. Claude Beck detailing the first documented successful defibrillation of a human. The three tracings demonstrate: a) ventricular fibrillation, b) ventricular fibrillation still present after first shock, c) supraventricular tachycardia following procaine administration and successful second shot. (Beck 1947, provided electronically by the Heart Rhythm Society, 2005)

Beck went on to fine-tune his device, and in the interest of promoting defibrillation, promising to “furnish this apparatus to anyone who would like to have it for the cost of the various parts” (Eisenberg 1997). Beck also attempted to automate manual cardiac massage, by building into his devices a pair of suction cups that, when applied to the heart, would manually expand the heart to promote circulation. In 1950 Beck began to educate others in his protocol, and established a course, based out of Cleveland, that trained surgeons, anesthetists, nurses, and dentists from around the world in his protocol. His program became the basis of today’s CPR and ACLS courses (Acierno 1994 and Eisenberg 1997). By 1961, the advantages of closed chest cardiac massage (chest compressions), and external defibrillation, first suggested by Kouwenhoven 30 years before, were proven clinically by Dr. Paul Zoll (Eisenberg 1997). Beck capitalized on the development of external defibrillation as an opportunity to expand his training to the lay public, establishing the Resuscitators of America program to train members of the public in CPR using the now ubiquitous CPR mannequins. Unfortunately, Beck was unable to secure funding for his program from important sources – the American Heart Association included – and as a result the program was lost. Another lay-public education program would not re-emerge in the United States until 1972 (Eisenberg 1997).

Research continued from the early models designed by Kouwenhoven, Beck and Zoll, refining the amount and type of electricity, the method of delivery, as well as improvements in safety and automation. The advances in cardiac treatment witnessed in just this last generation are substantial, and reveal a history of scientific research spanning over 300 years, and a history of curiosity in the heart’s operation spanning over 3000 years. What will be the future of cardiac resuscitation? The Phillips HeartStart Home Defibrillator is likely just the beginning. When Abilgaard conducted his initial research into “countershock” in 1775, science and society were not ready to appreciate the importance of his work in the context of improving patient care. Perhaps with time we too will find modern research deemed insignificant today shedding light on significant issues of tomorrow.

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# **RTH Laënnec and Auscultation**

By

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*Fig1: RTH Laennec*

*Illustration by Venita Jay, MD, FRCPC (Arch Pathol Lab Med, Oct 2000.)*

## **Abstract**

**René-Théophile-Hyacinthe Laënnec was a revolutionary physician because of his invention: the stethoscope. He invented the stethoscope in 1816 while trying to examine a young female suspected of having a heart problem. Its creation allowed for the diagnosis of disease and inclusion of objectivity within clinical medicine.**

**Around the time that the stethoscope was invented, physicians were struggling to combine pathology (identified on autopsies) with clinical symptoms described by a patient. Up until now the patient's subjective description was the only scale used to identify and diagnose an illness.**

**The stethoscope helped bridge this gap. It connected anatomy with clinical medicine. It gave the physician an objective view of pathology inside the body. It allowed them to incorporate physical findings into their disease descriptions and classifications. As**

well, it gave them the chance to identify illnesses that had not yet produced symptoms, thereby revolutionizing the direction medicine would take.

To Laennec, his invention would also help further the study of physiology. In that direction, he used the stethoscope to study the lung and heart. This paper will give an overview of his biography and look at his work on these two organs. It will also look at the methodology used to identify some of the physical signs we now take for granted, such as egophony, rales, pectoriloquy, and bronchophony. It will reflect on the way he miscalculated cardiac auscultation but contributed a lot to respiratory physiology and pathology. Albeit many considered him to be obsessed with his invention (“cylinderomaniac”), he was the first to advocate listening to both the patient’s story and the objective findings of the stethoscope.

## Biography

René-Théophile-Hyacinthe Laennec was born on 17<sup>th</sup> February 1781 at Quimper, an inland port at the western tip of Brittany. He was the first born to a respectable family whose ancestors included lawyers, writers, poets and mayors of Quimper. He had 2 other siblings, about whose childhood not much is known. After his mother’s death in 1786 due to TB, his brother and he were sent to live with his paternal uncle, Michel Laennec, a priest living a few km from Quimper. However after 2 years they were sent back to their father, only to be sent to Guillaume-Francois Laennec. He was a physician at Nantes and became a second father to them both. He was to have positive influence in his life and childhood (Daniel, 2004)

Under his uncle’s care, he was given the finest education, with the revolution as his background. By his uncle’s influence, and during the revolution, he was able to get a job as a medical aide at the age of 14 within the army. Through his services he became acquainted with clinical work, surgical dressing, dissections and treatment of patients. By 1799 he had done 34 months of service and had decided upon medicine as a career. Lastly, by working in the army he had also gained social acceptance, since many physicians of that time trained in the military for a few years before becoming physicians (Duffin, 1998).

Throughout his early life, his primary contact with his father was mainly to acquire funds for his education, and even though he got along well with his father, it wasn’t until he was 20 that he finally received some assistance to fund his medical education in Paris. However this kindness was not to last for long either. During his stay in Paris with his brother, they often ran out of money and relied on their uncle or friends for assistance. The revolution had closed the medical faculty in Nantes, pushing him to pursue medicine in Paris (Duffin, 1999).

When he came to Paris, he enrolled in the École de Sante, which under Napoleon, received a huge boost for surgical studies. He had already gained some clinical skills during his army days, but he was able to sharpen these and broaden his knowledge in the Parisian school. He studied under some of the best, including Jean Nicolas Corvisart des

Marets, who was to become Napoleon's personal physician, and Jean-Noel Halle, a professor of hygiene and Laennec's mentor, whose position he would take over after his death (Duffin, 1998). Laennec's work with Corvisart would turn out to have future implications on his study of the chest and invention of the stethoscope.

Laennec around this time was interested in the new science of pathological anatomy. Like many of his peers, he was interested in basing the foundation of medicine on anatomical lesions. He wanted to connect the patient presentation with the physiological and often pathological processes (Lachmund, 1999). He is claimed to have written about 400 case reports during the first few years of his time in Paris. Some of his reports included important information on peritonitis, amenorrhea and liver disease (Jay, 2000). He eventually transferred to École Pratique de Dissection in 1802 and started doing research with Duputryen. Laennec also started working closely with Gaspard-Laurent Bayle, his close friend, and wrote multiple papers with him.

In 1803, he received first prize in surgery and runner up in medicine from the Grandes Écoles of Paris. He was the first to win two awards in one year. This acknowledged his skill as a precise surgeon. He was working in Duputryen's lab with Bayle during that year and started Société Anatomique with them. Even though Duputryen had not yet graduated, he was teaching anatomy with Laennec's assistance. Hoping to make more money and use his own method of organization of pathological anatomy, Laennec started his own class at the age of 22. This created considerable friction in their relationship. He was also working as a ghostwriter on many medical texts, but stopped when remuneration was scarce (Duffin, 1998).

In July 1804 he successfully defended his thesis on Hippocrates and his support of pathological anatomy. By successfully defending his thesis he had become part of the Société de l'École, to whose journals he made many contributions. He was still actively involved as editor, contributor and reviewer in the '*Journal de médecine*', which he had been publishing in as a student.

As a student, Laennec identified many anatomical structures: he discovered the visceral membranes of the abdominal organs, internal arachnoid membrane, and bursa on the shoulder. He could also identify whether it was murderous or suicidal intent with which a throat was slit with a razor (Duffin, 1998). He managed to accomplish so much at such a young age. He had hoped that his research, impressive publications and prizes would garner him a position; but such was not the case. This is because of his scant political influence: he was a devout catholic and proud royalist at the time when Napoleon was taking over. It would take another decade before that dream would be realized in 1816.

Following his graduation he pursued work in many different specialties, such as parasitology, pathological anatomy, nosology (classification of disease) and philology (study of ancient texts and authors). He also wrote a two part treatise on pathological anatomy that never got published. But its classification was discussed in a paper he read for the Société de l'École in 1804. Unfortunately this led to a dispute over copyright ownership with Duputryen and subsequent dissolution of their friendship and Société



Anatomique in 1809. His classification is important because his future work relied on this framework. In his classification, he tried to distinguish between benign and malignant tissue growth, without describing the process behind their production (Duffin, 1998).

In 1810, he applied for the chair of Hippocratic medicine after its previous owner died. However the chair was dissolved in 1811 and he subsequently decided to focus his practice on clinical medicine. He was also beginning to show the first signs of TB (he did not acknowledge it until the end) and felt a change of work style would do him good. As well, he found most of his income was coming from taking care of patients. It is believed that he acquired TB while performing an autopsy in 1803. In his letters he states a 'tubercle' grew where he cut himself with the autopsy saw (Daniel, 2004)

He carried on his practice in Paris for a few years and took care of such prominent figures as Cardinal Joseph Fesch, Napoleon's uncle, before accepting a position at the Necker Hospital in Paris in 1816. His most important contribution to medicine, i.e. inventing the stethoscope, would be realized here.

In 1819, Laënnec published the first edition of his book, entitled at the time *De l'Auscultation Médiate*. Two years later it was translated into English, reorganized, and published by John Forbes under the title *A Treatise on Disease of the Chest* (Daniel, 2004). These books described in exquisite details the many diseases within the lungs, especially tuberculosis. He went on to write a second edition with many additions in 1826.

In 1819, a few months after the book release, due to failing health he returned to his native Brittany and there restored his grandfather's estate at Ploaré. His health improved, and he came back to receive much fame and accolades. He subsequently became a professor in medicine at the College de France and was put in charge of Hopital Charite in 1822. In 1824, he was made Chevalier of the Legion of Honor of France and married Jacquemine Guichard Argou. In April 1826 he relapsed and returned to Brittany, only to pass away in August 1826. It is believed that his physician used his own invention to diagnose him, but kept the diagnosis from him until the end (Duffin, 1999)

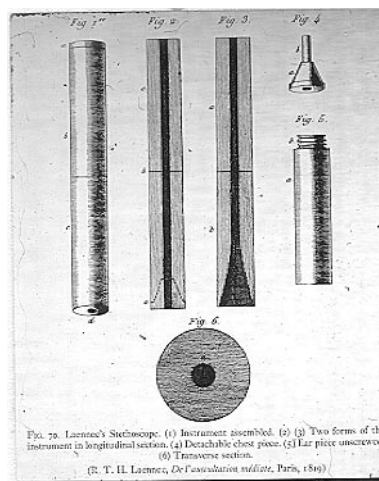


Fig2: Laennec's stethoscopes (UManitoba website)

## Auscultation

With the introduction of pathological anatomy, a move to describe and classify disease processes using autopsy findings was occurring (Lachmund, 1999). Laennec, like many other physicians of his time, wanted to bridge what they found on autopsy with the presentation of the patient. In those times, French doctors believed that diseased organs could be examined during life (Daniel, 2004). Physical examination therefore was a new and exciting realm of medicine.

Given that Laennec's mother, uncle (Michel), brother and intimate friend Bayle succumbed to TB, he found himself doing a lot of his work and research on chest medicine. During his early days with Corvisart, he learnt of percussion, which the latter was trying to re-introduce into medical practice. Percussion was initially introduced by Leopold Auenbrugger in 1761. The son of an innkeeper, Auenbrugger had seen his father tap a barrel to see if it was empty or full (Jay, 2000). He transferred this knowledge to the thorax and surmised that a normal thorax would resonate, but one filled with secretions would sound low-pitched.

Corvisart used his physical exam findings of percussion to predict the postmortem findings even before the patient died. He transferred these findings to the heart and he could often tell when a heart was enlarged. He could also discern a thrill, which was important since it led him to believe 'the palpitations of the heart are sometimes so intense that the sound of the heart can be heard beating against the chest wall' (Duffin, 1998).

Other than percussion, the other technique used was direct auscultation, i.e., listening to the chest sounds and heart beat by pressing an ear to the chest wall (fig3). This was known to Hippocrates and extensively used in ancient Greece. Robert Hooke believed that it may be possible to discover the motions of the internal parts of bodies by the sound they make (Jay, 2000). However, it was hard to perform this act on obese or heavily endowed females. Not only because it was socially unacceptable and unhygienic, but because the sounds would often be muffled and hard to interpret.

With such a background it was a matter of time before the stethoscope would have been invented. There are many glorified tales of how Laennec came to create it, and movies have been made on this too. But overall it is agreed upon that in 1816, he had been asked to see a young female presenting with generalized symptoms of heart disease. He felt socially uncomfortable in performing direct auscultation, so he rolled a paper notebook into a tight roll, applied one end to the chest, and listened to the heart via the other end. He felt that overall he could hear the heart more clearly than if he had used direct auscultation. And he came to use his famous double entendre (*J'entends*-which means I hear and I understand). He named the instrument the stethoscope, putting two Greek words together "to explore the chest"(Duffin, 1998).



*Fig3: Laennec at the bedside performing direct auscultation (UManitoba website)*

Overall Laennec needed a very good ear and wide vocabulary to create the kind of classification he did for his stethoscopic findings. He needed to be able to describe to his colleagues what he heard and how it sounded to him. As well, what those sounds represented to the field of medicine in a pathological/physiological sense that could then be used and understood by everyone: a common vocabulary for communication. To that end, Laennec relied on imagination and the common sounds in nature to describe what he heard. Examples include animal voices and pitch, music, and urban life (Lachmund, 1999).

To identify what kind of criteria he used to accept or reject something as a stethoscopic sign, I will defer to Duffin's (1998) reasoning and clarification of his methodology. She relied on sensitivity and specificity to describe this. Specificity refers to the sound being present only with one lesion. If it's a sign for multiple lesions, it's a false positive. Laennec called this '*pathognomonique*' and refused to consider a sign if it was a false positive. Sensitivity referred to the sign being present every time the lesion was discovered. If a sign was not sensitive, there may be cases where the lesion occurs without the sign, and are called false negatives. As an example, heart murmurs were sensitive to valve changes, but the sign was not specific because it could occur without any valvular changes (muscle spasm, pregnancy, anemia, etc.). Similarly, pericarditis can occur without friction rub, therefore making it not sensitive.

He subsequently used this invention to identify many pathological lesions within the heart and the lungs. He is mostly well known for his pulmonary theories rather than his cardiac theories. But overall the invention of the stethoscope allowed him to bridge pathological findings with the living human being. And to this day we still use those classifications and words he coined in 1800.

### **Pulmonary Signs**

It was necessary for someone to translate what was heard through the stethoscope into meaningful signs of physiology or pathology. Laennec having discovered the stethoscope

and having done quite an extensive amount of research in pathological anatomy, set up the first categorization of these auditory findings. No such effort had been taken with direct auscultation. As mentioned, his classification style relied on defining disease by its presentation in the organ on autopsy. For instance, in his time tuberculosis was defined based on the symptoms the patient presented with. But for Laennec, tuberculosis was the presence of lung caverns (tubercles) on autopsy (Lachmund, 1999). The stethoscope bridged clinical manifestation with the anatomical lesion. It helped to diagnose patients at an earlier time, without waiting for late stage symptomology to give the official diagnosis.

Laennec believed in a direct relationship between the sound heard and pathology a patient presented with. To him, one type of sound related to one disease, and this sign was therefore ‘pathognomonic’ to it. For example, he considered *pectoriloquy*, a change in the patient’s voice heard with a stethoscope, to be indicative of tubercles, i.e. TB (Lachmund, 1999). He went on to say that even if the patient did not present with the symptoms, if pectoriloquy was heard, the patient undeniably had TB (Duffin, 1998). Through the use of percussion and auscultation, Laennec was able to identify the physiology behind the production of the cavitary lesions: He believed there was a change in tuberculous ‘matter’ from grey to yellow, which then liquefied (caseation) and was later expelled through the airways, leaving a cavity (often calcified) on autopsy (Duffin, 1998). He would also be the first physician to use his stethoscope to identify TB in patients who did not present with signs and symptoms (latent TB), but had the anatomic defects.

However, Laennec soon realized that all cavities may result in pectoriloquy, not the other way around. By 1817 he thought that bronchiectasis (dilatation of the airways) and the second stage of pneumonia (hepatization) also resulted in a sound like pectoriloquy. To stick with his one lesion equals one diagnosis rule, he changed the name of the sound (heard in the latter two lesions) so that pectoriloquy would go unchallenged (Duffin, 1998). He labeled it *bronchophony*. But his acceptance of this was not immediate. It would not be identified until his second edition in 1826.

In 1819, he claimed *egophony* was a variant of pectoriloquy but sounded like the bleating of a goat, therefore making it a separate entity. Like many other signs, he believed this to be synonymous with acute pleural effusion and refused to have this correlation disputed. This is ironic given he admitted having troubles differentiating between pectoriloquy and egophony (Duffin, 1998). Similarly, he believed *rales* (bubbling or silent respiration) was pathognomonic for bronchitis (1816-17), *metallic clinking* for pneumothorax with small quantity of fluid, and decreased breath sounds for emphysema (1818). He also acknowledged the various sounds of rales, but characterized those with differing presentation of sputum color, quantity and texture. In today’s age this might be synonymous with viral and bacterial pathogens (Duffin, 1998).

According to Duffin (1998), his invention also helped him to put physiology into practice. The first time he heard “puerile respiration”, he thought it was a physiologic response to increased demand for oxygen in adults, and normal breath sounds in children. He later realized it was also a sign for asthma. However, on autopsy of asthmatic patients, he realized it was a lesion-less disease. He relied on physiology to explain the clinical

presentation of shortness of breath. In those patients that did not present with clinical signs of asthma, it was hyperventilation secondary to 'white coat effect' that led to their auscultation findings. But in asthmatics, he believed that the constriction of the bronchiolar muscles was separate from costal and diaphragmatic respiratory movements. This led to decreased air entering the bronchioles, reducing the oxygen delivered. Physiologically the patient had to increase their breathing rate to increase oxygen input.

Much of what we use today comes from the work Laennec did in the three years immediately following his discovery.

### **Cardiac signs**

It was for the study of the heart that Laennec rolled up the paper notebook in 1816. It is also believed that Laennec wanted to follow in his teacher Corvisart's step and use his invention towards understanding the heart. However, unlike the lung, much of what he learnt about the heart was inadequate or grossly wrong. The main problem arose in his erroneous interpretations of the heart sounds, which made his further interpretations of no value.

As in respiratory medicine, direct auscultation and percussion were the two main methods to diagnose physical changes in the heart. Limited symptoms were known that suggested cardiac causes (e.g. chest pain, palpitations). Corvisart had done a great deal to reintroduce percussion, and he also identified a palpable thrill for mitral stenosis. However with regards to etiology, many still believed that the psyche was more involved than physiology (Duffin, 1998).

When auscultating the heart, Laennec believed there were two sounds created by contractions of the muscular chambers of the heart: the first by ventricles and the second by the atria. He felt the first sound occurred at the apex of the heart with a rise in the pulse of the carotid artery, and assumed this to be due to the ventricles. He therefore assumed that the second sound was from the atria, and he found it more audible at the sternum. In keeping with his focus on muscle contraction, he used his stethoscope to listen to cardiac contractions since some suggestions claimed skeletal muscle contraction were audible. However the manuscript describing his findings could not be found (Duffin, 1998). He continued to place emphasis on the myocardium and believed that organic changes in here caused variations in the quality and intensity of the heart sounds, rather than being due to valvular or arterial causes. He realized that cardiac hypertrophy led to softer sounds and dilatation to louder sounds.

Heart murmurs were the puerile respiration of cardiac physiology. Initially, in 1819, Laennec believed them to be due to valvular disease. But by 1823, he believed them to also be due to muscle spasms. Similarly, he declared angina as a lesion-less disease that was due to nervousness localized to the heart. This is because he could never identify any auscultatory signs or anatomical lesions for the pain patients presented with. It seemed with this case that one patient not having the lesion was enough to convince Laennec against coronary ossification as a likely cause of angina (Duffin, 1998).

Ironically even though he invented the stethoscope, he cautioned his readers not to place too much confidence in it to diagnose the heart (Duffin, 1998). Seems befitting given how erroneous his findings turned out to be.

## Conclusion

The stethoscope made it possible to reveal physical changes before the patient died. It reaffirmed the theory that anatomical lesions were not the cause of the disease, but that they were the byproduct of physiological insults our bodies endured. The work that Laennec did was indisputably amazing and accurate for his times.

The auscultation of the thorax led to defining diseases and lesions, which eventually led to a frenzied search for pathognomonic signs in other parts of the body (e.g. abdominal). The stethoscope allowed physicians to detect those people that were feeling fine but had a lesion on auscultation. It shifted the focus of medicine away from the sick people to the disease. It also introduced objectivity and consistency to medicine.

Laennec refused to endorse a narrow view of medicine, which relied on physical changes to describe the disease. He believed patient presentation and symptoms were just as important a consideration when it came to diagnosing a person with a disease. He was a strong proponent of considering the person's mental state when it came to a disease process (Duffin, 1999). Even though the stethoscope added objectivity to medicine, Laennec was the first to advocate listening to the patient. Even when the stethoscope did not tell him anything, he continued to believe in the possibility of the disease, and paid his patient due respect.

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# **A COMPARISON OF THE SOCIAL CONSTRUCTIONS OF BLACK LUNG AND CRAB LUNG**

By

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Preceptor: None

## **Abstract**

**Black lung (coal workers' pneumoconiosis) and crab lung (occupational asthma among crab plant workers, otherwise known as crab asthma) are two occupational respiratory ailments affecting workers in primary resource extraction jobs. Black lung came to be recognized as a public health crisis in North America in the mid-20<sup>th</sup> century, with subsequent support for disabled workers and their families. Crab lung has much higher prevalence than black lung (15% compared to 2%), however, in some North American jurisdictions, relatively little awareness exists of this occupational health ailment and little has been done to prevent its occurrence. Under-reporting continues to be a problem with crab lung. The presentation compares the history of the social production of these two diseases with the goal of contributing to our understanding of the conditions under which occupational diseases become recognized as public problems.**

## **Black Lung**

Not many occupational diseases can boast a 2000-year medical history, but miner's asthma is one of them. Pliny (23-79 A.D.) described devices used by refiners to reduce inhalation of what he called "fatal dust"; Renaissance physicians – notably Georgius Agricola in 1556 – were also familiar with the disease, noting that miners often suffered shortness of breath and died prematurely (Pendergrass et al. 1972, 835).

Today, medical literature describes coal workers' pneumoconiosis (CWP) as a lung disease caused by the inhalation and retention of mineral particles and fibres within the lung (Singh and Davis 2002, 121). Dust entering the lungs is phagocytosed by macrophages which then "silt" up the air sacs of the lungs where gas exchange takes place, leading to an increased production of collagen and, in extreme cases, to progressive massive fibrosis and reduced lung capacity (Gross et al. 1972, 155). The symptoms of CWP include a sputum-producing cough and breathlessness on effort; it is exacerbated by cigarette smoking, but even in non-smokers it is often associated with chronic bronchitis, chronic airflow limitation and emphysema (Ross and Murray 2002, 306-7) as well as systemic diseases of the connective tissues (De Vuyst and Camus 2000, 152). A worker's risk of contracting CWP depends on both his length of exposure and the mineral

composition of the dust he breathes, but is generally higher for rock formations which produce higher-carbon coals (i.e. anthracite vs. bitumen) and which contain silica.

While the clinical description of black lung is both interesting and necessary for its treatment, of at least equal interest is the long battle behind how black lung came to be understood as an occupational disease. Derickson's (1998) Black Lung: Anatomy of a Public Health Disaster provides an excellent overview of the social construction of black lung as a disease in North America; we will attempt a brief summary here.

By the late 19<sup>th</sup> century, doctors in the northeastern United States coalfields were describing cases of miners who coughed up sputum black as ink. (Many claimed to have written entire sentences with it.) Medical textbooks began including entries on pneumoconiosis, reflecting the influence of British pathologists' post-mortem inspections of coal miners' lungs which demonstrated physical damage done by the dust. Concerned doctors compared the situation for miners to that of soldiers: in war, as many casualties are due to exposure, bad food and exhaustion as are due to battle; in coal mining, as many men succumbed to chronic respiratory disease as those who did to fiery explosions.

Reflecting this concern, the Pennsylvania State Board of Health and Vital Statistics in 1885 called for a careful investigation into the sanitary conditions of mining populations. However, the investigation failed to include the work environment, and instead focused on unhygienic personal habits of mine employees and the lack of certain community infrastructure, such as sewer lines. While today this seems like a staggering oversight, industrial hygiene as a medical and academic discipline in North America was still waiting to be born. Various explanations have been given as to why research and practice in workers' health in late-19<sup>th</sup> century America lagged so far behind Europe, where the first volume on occupational hygiene was already 100 years old. Sellers (1997), for example, argues the problem was one of limited imagination: the minds of American doctors were simply dwarfed by the massive geography of disease in their country, so whereas Welsh or Italian miners might be considered a knowable unit, America was simply too huge and variable for its workers to have diseases with common causes and cures. According to Sellers, the doctors' minds began to open to occupational medicine only in the first decade of the 20<sup>th</sup> century when publications began a small number of academics began describing workplaces as "massive natural experiments," laboratory-based medicine writ large. Add to this the effects of a world war that killed off able-bodied workers and reduced unemployment to less than 2%, such that the costs of losing workers to disease became significant, and Sellers argues it wasn't until the 1920s and 1930s that industrial hygiene coalesced as an academic and medical entity.

Therefore, back at the end of the 19<sup>th</sup> century, coal-workers' pneumoconiosis existed as a clinical entity (Derickson 1998), but not as an epidemiological one. Doctors were left to advise miners to quit work when they began to show signs of the illness; with precious few other alternatives, rare was the miner who took this advice. Instead, many calmed themselves with home remedies which were said to "bring up the dust": a shot of whiskey with a beer chaser after work, or even morning bitters (whiskey with snakeroot, gold seal and/or calamus root, sweetened with rock candy). Drug companies got in on the action, too, with advertising campaigns such as, "There's no excuse for being sick," thereby



placing the responsibility of pneumoconiosis firmly in the lap of the individual miner. In 1902, the owner of the Philadelphia and Reading Coal and Iron Company took it one step further with his charge that digging coal was “more than ordinarily healthful.”

This belief – that a little coal dust was good for you – soon earned a certain panache among researchers who came to argue that coal dust was protective in some way against tuberculosis, a disease of which every sentient person at the time was rightly terrified. Perhaps the sulphur had antiseptic properties. Perhaps fibrosis brought on by coal dust prevented the bacilli from gaining a foothold. Whatever the mechanism, coal mines began to be regarded – at least by owners and some allied medical personnel – as something akin to underground sanatoria. Such people alleged that the prevalence of pneumoconiosis was something less than one in several thousand; others on the other side of the partisan fence argued rates more along the lines of one in two. In the absence of epidemiological data, neither claim (equally hyperbolic in all likelihood) could be disproved.

Meanwhile, the Depression had begun, petroleum was vying for King Coal’s crown, and increased mechanization made mining jobs even less dependable. Membership of the United Mine Workers of America, formerly the largest trade union in the US, had withered to 100,000, robbing the organization of its former lobby power; in the 1930s, it didn’t even have staff in occupational health. The union came to embrace the idea that instead of the companies paying for the harm their workers suffered, the state ought to care for “worn-out veterans of the industry.” Many states had legislation to give benefits to miners disabled by pneumoconiosis, but no federal standards existed. Many miners quit when they became disabled, disqualifying them for unemployment insurance, yet leaving them too young to receive an old-age pension. Furthermore, as America began to boom in the 1940s, and while occupational medicine was in its infancy, new public health bodies began turning their attention away from disorders specific to a single industry and toward the new spectres of cancer and heart disease. It began to look as though pneumoconiosis might never be formally recognized as an industrial disease.

Enter Dr. Louis Friedman, an independent specialist in pulmonary medicine. In 1945, Friedman began to diagnose cases of pneumoconiosis, then he started appearing as expert witness in suits against companies. The union agreed to pay for what would have otherwise been Friedman’s prohibitively costly diagnoses, and miners began to win in court. Not all scientists were convinced, however. Some, standing in lock-jawed defiance of the fact that Britain had been compensating pneumoconiotic miners for at least two decades, maintained coal miners became breathless because of emotional responses to work or home life. Nonetheless, American coal companies found themselves paying out thousands of dollars in compensation.

Finally, in 1962, more than half a century after pneumoconiosis was first recorded as a significant occupational disease, the US Public Health Services proposed a three-year prevalence study. Remarkably, the first report failed to indicate the total number of cases, but at conferences and meetings that followed, the authors settled on a figure of 125,000 current and former miners suffering from pneumoconiosis. Still, it was far from given that a man suffering a chronic respiratory disorder as a result of mining would be

compensated. Depending on the state where he was employed, and who employed him, a disabled workers might face such humiliating obstacles as being asked to prove the chemical composition and concentration of dust he inhaled 20 and 30 years earlier.

But if one views history as a punctuated equilibrium, then 1968 represents a rapid stagger forward, owing to a rare alignment of personality, polemics and an explosion that rocked a nation.

In 1968, a flamboyant cardiologist from Charleston by the name of Dr. Isidore Buff began speaking out on the topic of pneumoconiosis, and became the *de facto* leader of a movement already begun in West Virginia, where disabled miners and widows who had been dropped by the union had begun to lobby the federal government for financial support. Buff gave pneumoconiosis its moniker *black lung* which was a graphic and poetic term that struck a chord with non-medical people. While he was known to exaggerate – he claimed 80 per cent of West Virginia’s miners had black lung, and was known to scream into crowds of miners, “You’re all gonna die!” – he managed to get other physicians on board. His public meetings soon became rallies.

Later that year, Buff’s movement received a macabre, though fortuitous, boost. On November 20<sup>th</sup>, an explosion in the Consolidation Coal Company mine in Farmington, West Virginia killed 78 workers. Reporters at the scene, while waiting for the miners to be freed, began to look around for other stories. Isidore Buff was only too willing to oblige. Black lung was suddenly on televisions and newspapers across the country. Communities already agitated began to revolt. A wildcat strike erupted in southern West Virginia and soon spread to neighbouring states. By the end of three weeks, tens of thousands of picketing workers had created the largest work stoppage caused primarily by an occupational health issue in American history. Washington relented. On December 29<sup>th</sup>, 1969, seven Farmington widows visited President Nixon to sign the Federal Coal Mine Health and Safety Act, which included a black lung compensation package and recommendations that companies provide work environments sufficiently free of respirable dust (providing a double benefit to companies, as coal dust has also been the cause of many a bloody and expensive explosion). By the late 1970s, half a million miners and widows were receiving black lung benefits.

The issue of pneumoconiosis is far from over today. Though coal represents an ever-smaller share of the energy market, and modern occupational hygiene standards offer protection to underground workers such that prevalence of CWP among American miners is now estimated at less than 2% (Ross and Murray 2002, 306), between 1968-2000, pneumoconiosis took nearly 125,000 lives in the US (CDC 2004).

We believe at least two lessons may be learned from this half-century of denial of pneumoconiosis. The first is that controversy over etiology may wrest attention away from the larger context of disease. As Smith (1981) explains, this time of denial corresponds to a period of scientific history when germ theory was taking medicine by storm. Medical researchers came to understand that diseases are caused by a specific agent, such as a bacterium or virus, and while germ theory allowed rapid advances in terms of drug

therapies and vaccines, it also led to a conflagration of the microscopic agent of the disease with the cause of a disease. To wit, the *agent* of black lung may be coal dust, but the *cause* is prolonged exposure to dusty working conditions, or even the economics of low-diversity resource extraction. This observation was mirrored by Rosner and Markowitz (2003) much more recently:

*Before the acceptance of germ theory, practitioners and laypersons alike understood disease in highly personal and situational terms. Much of medical therapeutics rested on the belief that disease reflected an individual's particular social, personal, hereditary, and economic circumstances...Robert Koch's discovery of the tuberculosis bacillus and the development of the germ theory of disease in the 1880s were enormous breakthroughs for medical science. Many leading medical researchers and educators, flushed with confidence as a result, simply equated consumption with a bacterial disease and looked inward to the laboratory and science for its diagnosis and treatment... For the new public health practitioners, the specificity of the bacterial agent was paramount, and accordingly they regarded the older generation's emphasis on cleaning up the general environment as misdirected and inefficient.*

A second lesson coming from the black lung story is one of humility, summed up eloquently in 1972 by a Dr. Gaensler, who addressed a meeting of the New York Academy of Sciences on pneumoconiosis in this way (Morgan 1972, 657-8):

*I think in a way it is unfortunate that there were two totally different subjects considered at this meeting, and they tend to somehow get confused. One is the terribly interesting problem of what is called coal workers' pneumoconiosis... The other problem has to do with disability. It would seem to me that from that standpoint, what caused the disability, as far as the miner is concerned, is really of no interest whatsoever... whether a person is disabled because he has a black lung or a because he has a white lung or because he fell down stairs and broke his leg, I think all of us would agree that if he is unable to have gainful employment because of some disease, then it is up to society to support him."*

Thus, in one sense, the needless deaths and suffering from black lung is a black mark on the history of public health in North America. But this history of how black lung came to be recognized as a medical and social reality may offer best practices for an important emerging occupational disease in Newfoundland and Labrador: occupational asthma among crab plant workers.

### **Crab Lung: occupational allergy and asthma among snow crab processing workers**

In contrast to the 2000 year-old medical history of miners' asthma, respiratory problems associated with crab processing as a recognized medical entity is a relatively new

phenomenon. Furthermore, the social history of crab lung is still being researched and written. The story we tell here pieces together some of the results of that research to date. The world's first published research on breathing problems among snow crab processing workers originated in Newfoundland in the 1970s (Edstrom et al. 1979). In the 1970s, Dr. Harry Edstrom headed up a task force of health professionals formed to investigate the cause of respiratory complaints among workers in a small crab plant following an accidental chlorine gas poisoning. No one was seriously hurt, but in the same way the coal mine explosion in Farmington helped bring black lung to the public attention, this chlorine gas incident helped uncover the true and more chronic dangers of the crab-processing industry.

Of the 61 original workers the task force examined, 35 were suffering from the acute episode of chlorine poisoning. But 17 also seemed to have asthma and rhinitis. Some had a history of allergies, but not all. Some had a positive reaction to skin testing using a crab extract, but others didn't. For some, symptoms were worse at the (poorly-ventilated) plant, but improved after the season ended.

Edstrom knew they were dealing with an allergic reaction to shellfish, although it was not clear whether the allergies were pre-existing or were the result of sensitization in the work environment. He spoke with people in crab-processing parts of New Brunswick, and with local doctors in Carbonear, Newfoundland. "Everybody seemed to have a problem," he said, "but nobody knew what the problem really was. They wondered if there was something toxic on the shell of the crab ... Nobody knew [what], except everybody knew there was a problem there." Physicians from Carbonear were telling their patients the plant was a dangerous place to work, but couldn't tell them why or how dangerous it was. Furthermore, because most crab workers were seasonal and non-unionized, much discussion about the illness focussed on whether this was a real illness or some modification of "10-42 Syndrome" with workers using symptoms in order to leave the workforce after they qualified for unemployment insurance benefits.

Edstrom's task force was only expected to identify the problem for area physicians and the Workers Compensation Board, so they could get people back to work while making sure they received necessary care. But this proved difficult. "People drift in and out of the industry," he said. "A number of these people were allergic to crab [but] there was no prior documentation of the problem, although everybody seemed to know there was a problem there." With the permission of the Workers' Compensation Board, he made the results public and presented them to the American College of Chest Physicians. Edstrom did not follow up with this plant (or any others) to monitor whether the investigation of his task force had in fact reduced exposures or risk. But a researcher in Quebec became interested, and was soon leading the way in Canada trying to describe and define this mysterious illness.

In the early 1980s, Dr. André Cartier headed up a study of allergy and respiratory problems among snow crab processing workers on the Magdalene Islands. In plants operating for three years, with little ventilation and where cooks were not enclosed and separately ventilated, 16% of workers showed symptoms of rhinorrhea, coughing, and

dyspnea (Cartier et al. 1984, 165). The Quebec researchers identified the health problems experienced by workers as a form of occupational asthma (OA) caused by sensitization to an allergen aerosolized during the cooking and possibly other manipulation of the snow crab during processing. Occupational asthma is defined as “variable airflow limitation or bronchial hyper-responsiveness caused by materials in a particular work environment, and not to stimuli encountered outside the workplace” (Singh and Davis 2002, 118). Cartier’s team developed a protocol for diagnosing snow crab occupational asthma using medical histories, prick skin tests to common respiratory allergens, meat and cooking water crab extracts, spirometry, bronchial provocation test (histamine) and peak flow monitoring prior to and after return to work. The Quebec data led researchers to believe the source of the allergens responsible for snow crab asthma was the steam producing cooking and cooling the crab. The research resulted in recommendations to enclose and separately ventilate cooking areas and to cool the cooked crab prior to processing (Neis 1995).

Current consensus is that occupational asthma among crab plant workers is the result of an allergic reaction to aerosolized high-molecular weight crab proteins which results in IgE antibody production (Jeebhay et al. 2001, 556). Around the world, occupational asthma accounts for 1 in 10 cases of adult-onset asthma (Singh and Davis 2002, 118). The prevalence of occupational asthma due to seafood varies from 7 to 36 per 100 workers; although occupational asthma has been reported among oyster shuckers, laboratory technicians, jewelry polishers, restaurant chefs, fish sellers and fishers, clearly the most affected group of workers is those who work in crab plants (Jeebhay et al. 2001, 554). Many studies indicate symptoms are more prevalent among crackers (people who break the legs from the body of the crab before cooking) and/or boilers, than among people who work elsewhere in a plant (Jeebhay et al. 2001, 554; Ortega et al. 2001, 598-9). But there may be more going on here, as a recent study has found lower levels of exposure, allergy, and asthma among workers with a history of handling raw crab than among those with a history of handling cooked crab, especially in poorly ventilated areas (Neis et al. submitted).

As we said earlier, academics and doctors are sometimes guilty of getting lost on the long swerve into etiology and natural history of disease, while losing sight of the true cause of illness. But speaking at a conference in St. John’s in 2001, Dr. Edstrom fingered the ultimate cause of crab asthma: “Frequently there are no additional jobs in the community. [Workers with crab asthma] can modify the symptoms so they are able to work, by the use of appropriate medications, antihistamines and steroids. But many of these workers are not unionized and have no mechanism for obtaining these drugs.” Witness the unfortunate triad: workers can work and have symptoms; or they can take medication and have fewer symptoms using some of their work income to pay for the medications; or they can leave work, have few symptoms, but have financial problems instead. “[M]ost drug plans exclude people with prior illness...These medications can cost you a \$100-200 a month. This is a major problem for somebody to try to sort out.”

Prevention of occupational asthma in the workplace presents new challenges compared to pneumoconiosis. Pneumoconiosis generally shows a linear dose-response curve, such that increasing dust burden in the lungs is associated with more serious symptoms; however,

traditional dose-response curves often do not apply to occupational asthma because very low concentrations of antigens can have extremely serious effects in some workers and have no effects in others (Singh and Davis 2002, 123). This presents a difficult paradox: setting threshold limit values for an allergen is next to impossible, yet primary prevention (e.g. elimination, substitution, enclosure, ventilation, etc.) is utterly necessary because sensitization is irreversible. A technique for quantifying airborne allergens in snow crab processing plants was developed in the 1990s. Since the development of this technique, samples have been taken in a wide variety of different snow crab processing environments including vessel-based and onshore processing. Based on this sampling technique, relatively low allergen levels (<100ng/cubic meter) appear to have been achieved in some plants in Quebec but even these may not be low enough to prevent sensitization or for sensitized workers to remain at their jobs without risk.

However, in Quebec, once the diagnosis of occupational asthma is confirmed, workers are advised to leave work as soon as possible. According to Cartier, the worker also needs to be assessed for disability "because they are disabled" and they should be moved to a different job or plant where they will not be exposed to cooking crab or handling crab. "Once you are sensitized," he says, "the problem is not the same. If you are sick, you have OA, you can be sick with little exposure... the ideal is no exposure at all." To this end, industrial hygienists in Quebec have been visiting and monitoring plants for problems with steam production for twenty years. Quebec's workers' compensation system pays the costs of travel and tests associated with the diagnosis.

This contrasts sharply with the situation in Newfoundland.

While one study showed a prevalence rate of almost certain/highly probable occupational asthma and allergy of 16% in four crab plants in Newfoundland and Labrador in 2003 (the figure varied from 9 to 50%, depending on the history of the plant and the quality of the ventilation (Cartier et al. 2003, 335)), there is evidence to suggest many cases of crab asthma go undiagnosed and compensated. In Newfoundland and Labrador, as recently as 2001, there was no category for shellfish occupational asthma and allergy in the workers' compensation statistics, making it difficult to identify claims. At a workshop on crab asthma and allergy, Dr. Graham Cook, the Director of Work Services for the Workplace Health Safety and Compensation Commission, presented the results of a review of claims for the period 1997-1999. There had been 50 claims in two relevant fish-processing categories: lung/respiratory body part injured and allergic reaction. Of those 50 claims, 16 had been compensated (60% of those compensated worked with crab, 35% with shrimp and 5% (1) with sea urchins) (Cook Presentation, Neis and Grzetic 2000).

In response to this presentation, the wife of a former worker has this to say:

*My husband left the plant in 1995. The last week that he worked in the crab plant he was on 4 inhalers and he was taking [36 steroids]. He was told by the doctor to give up his job. You make a choice, what's more important to you, your life or your paycheck? My husband walked away. He was told, and I was told, there is no workers' compensation for you. This spring we invested in a boat; a \$150,000 boat. He went a hundred*

*miles offshore and set his crab pots and hauled them back. They hauled back 25 pots, and before they could do any more, they had to turn around and bring him back to the clinic. They told him then to tie up the boat and walk away from it. We were told again this spring there was no workers' compensation. So where is the fairness? You tell me. Who is it that is lying? Is it the doctors and the nurses in the clinics on the Labrador coast or is the workers' compensation?*

Until recently, there was no formal protocol in place for the diagnosis of crab asthma and allergy. This meant that some of the few claims submitted to the WHSCC had been accepted with relatively little supporting information. Since 2001 a protocol has been implemented based on the model in use in Quebec. Unfortunately, it is elaborate, challenging, and requires costly travel and substantial support for the workers from appropriately trained health care professionals who are less available in Newfoundland and Labrador than in Quebec.

This brings us back to perhaps the most important reason for under-reporting: Dr. Harry Edstrom's observations about income and associated social support for these workers. Crab has become increasingly important since the closure of the Newfoundland and Labrador groundfish fisheries in the early 1990s. In 2003, snow crab alone was responsible for half the annual landed value of the fishery (<http://www.economics.gov.nf.ca/bulletins/fish.asp>; accessed 11/21/04) and was processed in 40 plants across the province (Jong et al. 2003, 337), an increase from 18 in 1994. In the past, workers who became allergic to crab moved on to cod. The cod moratorium of 1992 removed that option. Crab stocks themselves appear to be declining ([http://www.dfo-mpo.gc.ca/media/backgrou/2003/snowcrab\\_e.htm](http://www.dfo-mpo.gc.ca/media/backgrou/2003/snowcrab_e.htm); accessed 22/12/04), while more of the processing of Newfoundland crab appears to be moved offshore to countries such as China. In 2002, half of the jobs in the province's fishery were in processing, and more than two-thirds of processors made less than \$20,000 per year (<http://www.economics.gov.nf.ca/E2003/fishery.asp>; accessed 11/21/04). By 2002, somewhere between 5,000 and 6,000 seasonal workers depended on shellfish processing for their livelihoods. Many face steep competition for their increasingly seasonal and uncertain jobs, and recent quota cuts in some areas threaten the future of their very communities.

Further, the gender division of labour in these plants means that in snow crab processing, in contrast to mining, those most at risk appear to be women (Neis 1995, 18-9; Howse et al. submitted): women tend to be segregated in parts of the plant most intimately related to processing, away from the fresher air in unloading, storage or butchering areas (Neis 1994, 7-8), and therefore show higher rates of cumulative exposure to antigens (Neis et al. 2004, 43-44). Compensation, as we've seen, is difficult to access, and can interfere with their access to Employment Insurance. Therefore, particularly for the older, primarily female, workers most at risk of occupational asthma and allergy, few other jobs, and those that do tend to be more poorly paid than crab processing.

Current medical opinion is that once the diagnosis of occupational asthma has been established, the employee should be removed from the environment for two years and placed on asthma medication before her lung function is reassessed to determine the degree of her disability (Singh and Davis 2002, 119). Remaining at work places the worker at risk of serious breathing problems triggered by multiple triggers including cigarette smoke, cold air, exercise, and heavy dependence on costly asthma medications. But with high rates of unemployment and the seasonal nature of the fishery, tremendous pressure exists to keep working at a job that makes one ill, or even makes one fear becoming ill.

In the past, some Newfoundland and Labrador doctors have told workers they had to leave their jobs because of their work-related respiratory problems without doing a careful diagnosis and without suggesting that they file for compensation, perhaps because the system could be described as breeding a sense of powerlessness. One physician described a worker who presented with respiratory problems in the early 1990s (Neis and Grzetic 2000). He believed she has occupational shellfish asthma but she never went for testing because she and her husband have worked at the plant all their adult lives, she is now middle-aged, and has no other training or work experience. In response to his suggestion that she ought to have her occupational asthma confirmed, she indicated that she had to work, that there was no other work available for her, and that she feared she might be dropped from the workforce or moved to the bottom of the seniority list, and then would not be able to get enough work to survive. The physician also indicated that workers' compensation informed him the onus was on him to prove his patient had occupational asthma. In 2001, he consulted with other physicians in his region (which has a large catchment area containing several crab plants) and found none had any patients who had received compensation for occupational asthma at that time, their regional hospital did not have a fully staffed pulmonary function lab and had only two respiratory therapists for the whole region. If his patient had to travel to St. John's for tests, she should have ideally done this during the crab-processing season, which would mean missing work, and she may not have had her costs reimbursed by compensation. He also did not have enough information to explain clearly to her what she might be eligible for should she file a successful claim. Finally, he addressed the linked problems of physician training related to occupational health risks of this kind and physician turnover in these rural areas, which, taken together, can also interfere with the diagnosis and effective treatment of crab asthma.

### **Lessons from history**

In spite of accumulating evidence of its impacts on individual workers and their families (Neis et al. 2004, 46-47), it seems crab asthma has not yet become the public health issue that black lung did in the 20<sup>th</sup> century. The WHSCC of Newfoundland and Labrador says it is currently receiving no claims for occupational asthma. Clearly, workers are suffering from the disease, so their failure to report must indicate their fear of losing their livelihood, even at (potentially fatal) risk to their health. Doctors are complicit here, too, as they have been aware of the sick workers' unenviable positions for years but have been



slow to pressure government, the WHSCC, and employers to improve prevention, diagnostic infrastructure and compensation.

Simply put, crab plant workers in Newfoundland and Labrador are under tremendous pressure to shut up about occupational asthma. It seems as though crab plant workers face a situation similar to that faced by miners with black lung in the early part of the 20<sup>th</sup> century: companies and the state have avoided responsibility at tremendous cost to the workers and their families. And the insidious nature of both diseases can not be overlooked: both diseases a worker acquires slowly every minute as he or she performs the intimate act of taking air into his lungs. The offending agents are invisible. Their levels in the air can only be controlled by managers. Both are typically suffered by workers in one-job towns. Both are regarded fatalistically, as necessary evils of the profession.

In 1972, a US Public Health Service employee, Henry Doyle, declared that rates of CWP among miners in Pennsylvania and West Virginia (around 40%, four times the national average) were a crisis and an epidemic. How, he asked a conference of the New York Academy of Sciences, could such a situation have developed? He offered the following suggestions:

1. *To a large extent, everyone concerned ignored danger signals.*
2. *The pneumoconiosis problem was not viewed in a scientific manner; instead, excuses were sought for the ill health of miners, so that responsibility would be evaded.*
3. *Responsible, positive leadership was not apparent in areas where it should have been exercised.*
4. *Insufficient research was conducted both by government and industry.*

A quarter of a century later, a similar diagnosis regarding the problems with prevention, diagnosis, treatment and compensation of crab asthma in Newfoundland and Labrador has begun to emerge from the research. Perhaps this is where history may offer a lesson so that battles fought once are not fought again.

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## NOTES

The following students presented a paper at the conference but did not submit a formal manuscript for publication.

Marching Legions, Marching Healers.....	Reta Blakely, UofC
Paleo-Oncology: Cancer in the Ancient World.....	Jonathan Beekhoud, UWO
Healthy Balance: An Introduction to Ayurvedic Medicine.....	Sunita Chacko, UofC
The South Pole: The End of a Journey .....	Katherine Chow, UofC
How Doctors Make People Fat: The Body Mass Index and the Medicalization of Obesity .....	Bryan Chung, UofC
The Image of Insanity .....	Sheila Curran, UofC
Lla Conservateur Du Sang Humain": A Primer on Bloodletting Circa 1766.....	Karmon Helmle, UofC
The Sinning Sick.....	Benjamin Kaasa, UofC
Arsenic: New Life for an Old Poison .....	Melissa Kallsa, UofC
Minor Details: A Story of the Oxford English Dictionary .....	Jeremy LaMothe, UofC
Tukisiumaniqarniq.....	Kathleen Lumb, UofC
Phiddipides: A Tragic Death Spawns a Sport's Interest.....	Jennifer Matthews, UofC
Cardiac Pacemakers – When Every Beat Counts.....	Paul McBeth, UofC
From Texas to China: Saving the Heathen .....	Sheona Mitchell, UofC
"Thou Speak'st Like a Physician" – Medical Matters in Shakespeare.....	Meghan Newcombe, UofC
A Split Decision: Treating Epilepsy With Surgery.....	Catherine O'Brien, UofC
Call Me Crazy: The Ever-Changing Face of Mental Illness.....	Jaime Schachar UofC
Bestill My Beating Heart: The Arresting Story of Cardiac Surgery .....	Heather Smith, UofC

Light as a Feather, Stiff as a Board:  
The Evolution of Tetanus ..... Nerissa Tyson, UofC

Living History: Medical Alumni as Teachers,  
Mentors and Historians ..... Michell Zec, UofC