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INTRODUCTION

In the middle of the seventeenth century, two essential activities of modern internal medicine--pathological anatomy and clinical correlation--became popular among a group of Oxford trained physiologists led by the physician Thomas Willis (1621-1675). Inspired by the work of William Harvey, they argued that rational medical theory and practice required visual post-mortem inspection of healthy and sick bodies, as well as analysis of clinical outcomes and physiological experiments. Willis and the Oxford physiologists have received considerable attention regarding their place in the development of neuroanatomy and physiology.[1] Their promotion of the study of pathology and clinical correlation as building blocks of a rational medicine, however, has received relatively little notice.[2] Instead, accounts of the development of these practices have emphasized the institution of the urban charity hospital of the later eighteenth and nineteenth centuries.[3] A question arises: In the setting of elite bedside medicine, how did pathological anatomy and clinical correlation develop?

In attempting to answer this question, I shall focus on connections between learned medical thought and the interests of the elite culture which supported it. Although my primary intent is not biographical, for several reasons I concentrate on Willis as a means of exploring these links. His professional life occupied a span roughly halfway between Harvey's and the period in which Sydenham's theories came into vogue. Also, Willis located himself in several networks that included members from the scientific, religious and social elites of England. Most importantly, of the Oxford physiologists active in pathological anatomy and clinical correlation, Willis wrote extensively on the desirability of linking the normal, the pathological, and the therapeutic into a system of rational medicine.

Post-mortem examinations of elite patients depended in part on changes in upper-class attitudes regarding death. Despite their numerical insignificance in the burials of England, these new aristocratic practices merit attention because they buttress an understanding of the voluntarism of elite post-mortem subjects that otherwise would be incomprehensible.[4] The principal historical pictures of relations between English doctors and patients regarding autopsy have been limited to accounts of grave-robbing and the anatomy riots of 1832. [5]

AN EARLY CASE

In 1660 John Locke, then aged thirty-two and a student of Willis's at Oxford, made the following notes from a Willis lecture on epilepsy:

a

> There was a woman in this town who had lost three or four foetuses from epileptic attacks immediately after birth. We dissected the fourth, and found no lesion in its brain except that in the fourth ventricle there was a little clot of extravasated blood perhaps brought on by the violent contraction of the brain and was, therefore, the result rather than the cause, of the epilepsy. (For we often find similar clots in the brains of those who have died of apoplexy, which lead doctors falsely to accuse the extravasated blood as the cause of apoplexy, as will appear later.) It is also clear that those foetuses died from a taint in the blood transmitted to the brain, as in dealing with her next three children, immediately at birth, we had a fontanelle (drain) inserted in the neck and leeches applied behind the ears in order to drain off the impurities from the brain: the result was that they escaped epilepsy and still do to this day. This is a clear proof that this condition had stemmed, not from the ventricles and its corrupt matter, but from impurities in the blood.[6]

An investigative post-mortem on an infant, clinical correlations, aggressive preventive treatments of subsequent infants, and claims of a theory-confirming therapeutic success: What is going on here?

CLIMBING THE GREASY POLE[7]

During the course of his fifty-four year life, Thomas Willis transformed himself from a poor servant/scholar who entered Oxford at age fourteen into a Fellow of the College of Physicians with a landed estate worthy of the gentry. A soldier for the King in the Civil War, Willis maintained a middling medical practice during the Puritan Commonwealth. With the restoration of the monarchy in 1660, however, his medical career began to prosper. Charles II, at the behest of Gilbert Sheldon, Archbishop of Canterbury and friend of Willis, fired the then current occupant of the Sedleian Professorship at Oxford, the Parliamentarian and staunch Presbyterian Joshua Crosse, and installed Willis. Shortly afterward the University granted Willis his M.D. Thus at age thirty-nine, Willis, the 'loyal party man', had both social and academic credentials enabling him to rise to the top. In the 1660's and 1670's, in addition to expanding his practice and occupying his chair, Willis published four major texts on the anatomy and pathology of the nervous system and its therapeutics. At his death in 1675 he was considered England's leading scientific physician as well as its most prosperous learned practitioner.

The contours of Willis' social and financial life suggest he adopted attitudes common to the landed aristocracy.[8] This may be because he spent most of his life from early adolescence on tending to them. Willis spent thirty-one years at Oxford, most of them in or about Christ's Church. It was a boom time at Oxford and Cambridge, where the colleges put up many new buildings to accommodate growing numbers of students from the landed classes. Christ's, in particular, was a favorite of the aristocracy. Indeed, Willis' time at Christ's corresponded with the highest percentage of

aristocratic scions in university from 1600 to 1880.[9] Later, when he moved to London, Willis settled in the aristocratic haunts of St. James's and Pall Mall instead of the merchant settlements of the City. Shortly before his death he acquired an estate of 3,000 acres from the Duke of Buckingham. He was too busy to use it, however, and may have visited the property only once.[10]

Willis was also a devout Anglican. Throughout the Puritan Commonwealth, Willis allowed his Christ Church rooms to be used for meetings of the 'Loyal Assembly', a group whose members celebrated the traditional Anglican service in defiance of Puritan reforms. Both his wives came from notable Anglican families. Mary Fell, his first wife, was the daughter of a Dean of Christ Church, Oxford and the brother of the Bishop of Oxford. In her own right she was revered by Anglicans for physically resisting ejection from Christ Church by Puritan forces in 1648. Willis's second wife, Dame Elizabeth Calley, was both the daughter of a Canon of Westminster and the widow of a squire. Established in London after 1667, Willis displayed continued piety in seeing poor patients for free at his house every day before treating the wealthy.[11] In order to find the time for such charity, he missed customary midday services, and so employed a curate-schoolmaster at twenty pounds a year to read him prayers at six a.m. summers and seven a.m. winters.[12]

Willis, however, was not one to permit his private religious belief from foreclosing professional options. He managed to maintain both Anglican and Royalist ties *and* his university appointment during the years of Puritan domination of Oxford. Although he served the King during the siege of Oxford and welcomed the 'Loyal Assembly' in his Christ Church rooms, he also took the oath of Engagement to the Commonwealth, an act at which many Anglicans balked.[13] Richard Lower, whom Willis

acknowledged as his primary scientific collaborator, was a Puritan whose practice suffered in the Restoration years due to his public outspokenness. Taken together, these facts suggest that Willis was careful to protect his status as an Oxford don. However orthodox his religious and social aspirations may have been in terms of the Anglican upper classes, his public behavior was sufficiently controlled so as to maintain his access to scientific talent and resources. Physically unprepossessing-- "middle stature: dark red haire (like a red pig); stammered much" according to a friendly contemporary--Willis seemed to impress his colleagues as earnest, brilliant, hard-working, and capable of avarice.[14]

On the surface this thumbnail sketch of Willis's career recalls the image of the 'gentleman physician' described by the sociologist Norman Jewson in his influential essays on medical patronage and elite practice in the late seventeenth and eighteenth centuries.[15] Willis would fit Jewson's typos of the "actor" who combined "the peculiar amalgam of ingratiation into the social circles of the nobility and gentry by means of conformity to the norms of upper class life, accompanied by individual struggle for recognition by means of personal display and publicity."[16] Willis, in short, would be nothing so much as a "man of fashion", Jewson's dismissive term for successful English physicians in the period from the Restoration to the end of the eighteenth century.

Jewson's larger point is that men of "fashion" did not produce science because they were "unable to attain that degree of detachment from the opinions of patients which was necessary to foster a scientific approach to theory and practice."[17] Research was "irrelevant" in the era of "bedside medicine", a time when the problems of attracting patients and providing therapies were paramount. According to Jewson, medicine did not become

"scientific" in England until it reached its "hospital and laboratory modes" of the nineteenth century. It was only then that "research workers themselves enjoyed the power to define legitimate standards of intellectual behaviour."[18] In other words, Jewson posited that medicine became scientific only when power resided overwhelmingly with the doctor, not the patient.

Jewson's characterization of elite early modern medicine as a commodity of "fashion" promoted to the gentry by social-climbing physicians depends on the specificity of the patronage system to medicine. Social hustling and the hunger for money were not confined to physicians, however. As a strategy of career advancement, the patronage system was a general social mechanism for the educated and landed classes from the Stuarts through the Georgians. Indeed, as the work of Lawrence Stone on the aristocratic Howard and Cecil families suggested, ingratiation with one's social superiors as a central mode of career and family advancement accelerated in the Tudor and Stuart eras with Crown distribution of monastic lands.[19] Even Isaac Newton lobbied through John Locke for the post of Director of the Mint. (He got it.) Patronage, or the dependence of physicians on their social superiors for a livelihood, no more precluded the development of medical science than it precluded (or caused) the transformation of astrology into astronomy.[20]

Even so, if Willis and his associates were merely physicians-cum-gentlemen, Jewson might have a point. What set Willis and other mid-century Oxford physiologists apart from the general run of their contemporary elite physicians was their serious and self-conscious commitment to experimental and visual investigation of nature. Willis and the other principal Oxford physician/physiologists (Ralph Bathurst, Edmund Dickenson, Nathanial Highmore, John Locke, Richard Lower, John Mayow,

Walter Needham, and William Petty) considered themselves *natural philosophers*. Whatever his social pretensions may have been (and Willis's funeral was considered a scandal of ostentatious display), both he and other physician/philosophers had been actively investigating nature and the body since their student days at Oxford.

MEMBERSHIP IN THE CLUB(S)

Although Willis is best-remembered today (and was most known by his contemporaries) as an anatomist and clinician, he began research as a part-time chemist at age twenty-seven when he joined several others to form the 'Oxford Experimental Philosophical Club' in William Petty's rooms in 1648. He continued to participate in the Club's sub-group of chemists until he moved to London in 1667, where he maintained a private lab until his death. In the Oxford club, each member was expected to organize experiments, the expenses of the laboratory being shared jointly.

Well regarded early on by influential Oxford investigators such as John Wilkins and Robert Boyle, Willis gained an international reputation as a chemical theorist upon the publication in 1659 of his first chemical work, "De fermentatione."[21] Primary to its success was its seeming resolution of a central problem of mid-century English physiology: the origin and nature of animal heat. Harvey's earlier anatomical discoveries about the heart and circulation had elevated the blood as an area of interest. Nathanial Highmore publicly (and Robert Boyle privately) had argued that the structure of the blood was composed of discrete parts and its function traceable to those parts. By the early Restoration this corpuscular-based physiology had become integrated into the Harveian circulation. The pivotal problem of explaining animal heat remained, however. If air, brought into the body by lung action,

served a similar function feeding both ordinary fire and the vital flame, how could one account for the palpable difference between animal heat and combustion?[22]

Willis's promotion of fermentation, with its gentle heat ("the vital flame"), as the central chemical process in the heart filled the conceptual void. Within the ventricles of the heart, he argued, there were "spiritous and sulphurous particles" which mixed with the blood in a "kind of fermentation" that created heat which was imparted to the entire body.[23] Citing the work of Descartes, Gassendi, Ent, and Hooghelande, Willis incorporated elements of their ideas but changed their context. Such sleight of hand, as Robert Frank has noted, incorporated corpuscular agitation as a chemical mechanism and reinforced traditional ideas of the heart as central at the same time it muted the common-sense objection that the heart contained neither a palpable flame nor a visible effervescence.[24]

Willis's reputation as a chemist reinforced his reputation as a clinician and *vice versa* , a professional synergy that gained added resonance in the 1660's with Willis's success as an anatomist and Oxford professor. Although the network of the Oxford physiologists overlapped considerably with the anatomists and physicians, they did not map completely.[25] In the first place, there were separate clubs for chemical and anatomical researches. Additionally, in the 1660's many of the Oxford groups decamped to London, where Restoration society was believed to offer greater opportunity.

This progressive loosening of once tight collectives had important consequences for the public reception of Willis by a learned audience now expanded. By the time of the Royal Society, investigators were becoming specialized as well as geographically dispersed. Unlike Willis, few had the will or skills to stay current in what were becoming proto-disciplines. Such a

commitment would have been quite expensive. In four years at Oxford, Willis contributed twenty-five pounds to maintenance of the joint chemical lab at a time when an Oxford tutor was paid three pounds a year. As with Robert Boyle's air pump, maintenance of chemico-physiological and anatomy researches represented "big science" at the time. Both fragmentation of the Oxford group and paucity of competing research facilities made replication or challenge of Willisian facts difficult.[26]

In the mid-seventeenth century, English science was also a personal activity in which the quality of witnessing (and the witnesses) determined the veracity of new facts.[27] Willis had been known as an earnest, hard-working, and brilliant chemist for two decades before he turned his attention primarily to anatomy and medicine. He was a known quantity who had "proved" himself in the clubs. Also he had become a gentleman, which is to say he had joined the ranks of those whose opinions were "free and unconfin'd"[28] When he began publishing his major texts in the 1660's and 1670's linking the normal, abnormal, and therapeutic in medicine, other gentlemen were inclined to believe him.

By the 1660's, Willis's successes were becoming numerous: Sedleian Professorship (1660); *Anatomy of the Brain* (1664); Fellow of College of Physicians (1665), *Pathology of the Brain* (1667). In a sense, the mature Willis's fame went before him. He had become a medical and scientific celebrity[29]. Medical critics, such as Highmore on hysteria, were undermined by Willis's command of anatomy and chemistry, and critics of Willisian physiology were non-plussed by his medical fame and his academic position as Sedleian Professor at Oxford. For instance, although Willisian promotion of fermentation as a local cardiac process embodied in a vital flame was seriously questioned in the 1660's (most notably by John Mayow), it was not

until 1674 that Mayow's references to Willis's work became critical.[30] Even then, Mayow's references to Willis the man remained formally courteous. According to Harold Cook, Willisian views on metabolism as well as the nervous system reached their greatest influence in the College of Physicians in the mid-1670's. [31] Yet by this time non-physician investigators such as Mayow were successfully attacking his chemical and metabolic models as others were attacking his model of nerve transmission[32]

PROFESSIONAL CHALLENGE AND THE NEED FOR METHOD

Willis became Sedleian Professor of Natural Philosophy in 1660 shortly after the Restoration, largely for political reasons.[33] Suddenly this busy clinician and chemical investigator had to lecture on Aristotelian works dealing with the physical sciences and psychology.[34] What principles animated animal life, sense and sensation, memory, sleep and dreams? In principle restricted by the Laudian statutes of the 1630's to lecturing solely from traditional Aristotelian texts, some Oxford lecturers in the 1650's-- Willis's' fellow club members John Wallis and Seth Ward, the Savilian Professors of Astronomy and Geometry-- felt free to "dissent" from Aristotle, "and to declare against him."[35] Willis, too, fashioned his own mandate: "...I should Comment on the offices of the Senses, both external and also internal, and of the Faculties and Affections of the Soul, as also of the Organs and various provisions of all these."[36] It was a mandate Willis claimed from then on. The soul as organism-- or, to put it another way, the connections between mind and body-- became the central concern of Willis, clinician *cum* professional philosopher, for the remainder of his life.

Challenged by his lecturing experiences to dig deeper than "the received Opinions of others", Willis likewise grew to doubt the "suspicions

and guesses of my own mind." Instead, he would believe only "Nature and ocular demonstrations." Immediately after this declaration Willis appended a causal "therefore" and wrote "I betook my Self wholly to the Study of Anatomy....I addicted my Self to the opening of Heads especially, and of every kind..." Instead of producing a "poetical philosophy and physick", which he felt had been a defect of his Sedleian lectures, these "ocular demonstrations" would provide a "firm and stable basis" for both a "more certain Physiologie", but "what I had long thought upon, the Pathologie of the Brain and nervous Stock."[37]

Willis's embrace of "nature and ocular demonstrations' and rejection of Aristotle ("poetical philosophy and physick") were shared by his peers at Oxford. Lecturing at Oxford in 1654 on the "Galenic" subject of respiration, Ralph Bathurst, Willis's colleague and friend, assailed the traditional notion that the lungs moved of their own power or that the motion of the pulmonary blood moved them. Both these points could be proved by experiment ("*in vivorum dissectione*"). According to Bathurst, a "genuine philosophical" explanation of the lungs' behavior could only proceed mechanically, not according to a traditional Aristotelian analysis of faculties and qualities.[38]

In common with many intellectuals in the sixteenth and seventeenth centuries, Willis as a physician *cum* philosopher wanted a medical standard of knowledge "as it were to a Mathematical Rule."[39] As Edwin Burtt pointed out two generations ago, knowledge re-emerged as a major philosophical problem beginning in the sixteenth century in the West.[40] Epistemological premises based on the Christian and scholastic Aristotelianism of the Middle Ages were being challenged not only at Oxford, but across Europe. Indeed, preoccupation with epistemological method and math as a metaphor for true

knowledge were central philosophical concerns from Copernicus to Newton. Galileo's famous dictum--"the Book of Nature is written in math"--and the preoccupation of Bacon and Descartes with method represent perhaps the most well-known general expressions of these sentiments.[41]

By the early 1660's the crux of the matter for Willis as both physician and philosopher was the nature of the soul. What is it, how does one know it, and how does one heal its physical distress? Unlike Boyle, Locke, or Newton, Willis did not publish explicitly religious works separately. Instead, Willis's political, social, and religious themes are embedded in the relatively brief dedicatorys and prefaces to his physiological and medical texts: the *Anatomy* (1664), the *Pathology* (1667), the *Animal Soul* (1667), and the *Rational Therapeutics* (1675). In attempting to answer questions about the soul--and the works cited immediately can be interpreted as one long attempt at answers--Willis the investigative physician found issues of religion and epistemologic method inextricably bound.

Copernicus, Galileo, Descartes, Boyle and Newton, as well as Willis, described themselves (and were received by their audiences) as "philosophers', or "natural philosophers', not "scientists." Throughout the scientific revolution, "science", both as a body of knowledge about the natural world and as a method for producing valid knowledge, had not yet split off and become separate from knowledge gained through faith or divine revelation. The "scientific" aspects of their work were often part of larger intellectual projects that attempted to be comprehensive philosophical and/or religious systems. Similarly, the controversial Hobbes, memorialized by eighteenth century *philosophes* as a political philosopher, devoted a large percentage of his written works to natural subjects.

By the middle decades of the seventeenth century, relations between God and man and God and nature had become problematic. God was most often characterized by natural philosophers as the prime but not efficient mover in the universe. That is to say, He established the laws and provided the original impetus, but He was no longer involved in every action. According to Newton, God reserved the power to intervene in the universe, and his interventions might be interpreted as supernatural events. Occasionally, He might add some more motive force. In general, however, God had so generously and wisely designed nature as a self-regulating machine that it ran by itself.[42]

Willis put the matter this way:

> ....it hath been a long while accounted as a certain Mystery and School-house of Atheism to search into Nature, as if whatever Reasons we grant to Philosophy, should derogate from Religion, and all that should be attributed to second Causes, did take away from the first. But truly, he doth too much abuse the Name of philosophy, who considers the wheels...small pins..and all the provision of a Clock, by which invented Machine the course of time...the flowing and ebbing of the Sea, and other things of that kind, may be exactly known and measured, if that at length...he should not acknowledge the Artist, to whose Labour and Wit he owes all those things.[43]

Willis's characterization of the soul reflected the mechanistic piety noted above. It consisted, he believed, of two parts, an animal ("brute") soul consisting of a corporeal substance--the brain--and a rational soul. The latter was "an incorporeal substance, and therefore Immortal, which is Created mediately by God, and infused into the Body." According to Willis, the two could interact. Disease could cause "spirits" (particles) of the animal soul to take on an "intemperate or Evil Conformation." Therefore, by virtue of some "hurt coming to the brain", the "habit of Reason" could be lost. So it was that

he could "affirm" that the "yoaking of the one Soul with the other" was "consonant to Holy Faith, right Reason, and to the Authority of Divines...." Authority for this position was found not only in Willis's own researches. Willis credited Pierre Gassendi as well as various ancients with the notion of the animal soul. Citing religious authority, Willis noted agreement with his position by Henry Hammond, an eminent Anglican scholar and ally of Gilbert Sheldon.[44]

THEORY AND PRACTICE

Even as he was publishing the *Anatomy of the Brain* in 1664, Willis characterized it not as a definitive work, but as a "firm and stable basis" for what he had "long thought upon , the Pathologie of the Brain and nervous stock..."[45] The anticipated work appeared in 1667 and was entitled *An Essay of the Pathology of the Brain and Nervous Stock In Which Convulsive Diseases Are Treated Of.* Like the *Anatomy* , the *Pathology* was dedicated to Gilbert Sheldon, Archbishop of Canterbury. In 1672 he published *Two Discourses Concerning the Soul of Brutes,* and in 1675, the year of his death, *Rational Therapeutics* appeared. Together these three works represent the bulk of Willis's published statements on pathology and therapy.

In them he tried to integrate his medical theories and clinical experiences. The integration seems to have had a two-fold purpose to Willis. He wanted to advance the science of medicine at the same time he wanted to advance its art: "Anatomical observations declare more aptly the Causes of the Symptoms, and shew the Reasons of Curing, more accommodate to every Disease. But as to the Remedies and Therapeutic Method...we have added many things found out Empirically and Analogically by the Moderns....I

doubt not but that this way may be an help to many for the illustrating the Medical Science, and for the more happy Curing of Cephalick Diseases."[46]

The body, like nature to Bacon, needed to be both interrogated and conquered.[47] As Willis stated in the preface to *Rational Therapeutics,* the goal was to find the "Weapons" whereby the medical "System rightly framed" could conquer the "martial field" of the human body. Drawing on the historical development of math and physics, he noted that just as "experience and practice did first assist the theory of mathematics and "mechanicks", clinical experience was vital for developing a rational therapeutics. The truth of clinical experience was problematic, however. When practiced by "quacking Jugglers and old Women", empiricism was done "as if it were a Mystery into whose Reasons it were not lawful to search." As a consequence, the "unlearned" prescribed "like people shooting at random, rashly and almost fortuitously." As a consequence, it was no wonder that "cynicks" as well as the "vilest scum of the people fling dirt upon Physick."[48]

The challenge was to make the lessons of practice intellectually respectable, for the goal was to place medicine "amongst the noblest of the Sciences." For Willis the answer lay in understanding the interactions between the "Particles of the Medicine" and the "Spirits, Humors, and Solid Parts" of the body. As these interactions for the most part "lye hid from the Senses", it was of the *"greatest moment* " to practice a "more deep Scrutiny of the Intellect." Once one knew what was going on in the patient ("what kind of particles are to be altered or stirred up into Motion"), it would be "no difficult thing" to know "what is required in the Agent." The benefits would be multi-fold: Medicine would "grow to a true Science and be practiced with a certainty not inferior to the Mathematicks." Also, more "efficacious"

medicines would be employed "without any error of the *Physician* or danger of the *Patient*."[49]

In terms of professional differentiation, development of a "rational therapeutics" had obvious appeal to elite doctors facing competition from unlicensed empirics as well as apothecaries.[50] A therapeutics based on claims of *learned* empiricism allowed them to simultaneously claim successful new treatments virtually regardless of their origin and denigrate practitioners without university educations. As one might expect, *Rational Therapeutics* was enthusiastically received by the College of Physicians upon publication.[51] As Harold Cook has noted, among the membership in the College in the 1670's, Willis enjoyed the greatest intellectual influence.[52] The work of Willis, when joined by his Oxford physician colleagues in, essence completed the penetration of the empiric viewpoint into learned English medicine. Whereas Paracelsus and his English adherents had been reviled by official medicine in the late sixteenth and first half of the seventeenth century, many of their ideas, sanitized of spiritual and professional heresy by Willis and the Oxford physiologists, quietly entered its precincts in the second half.[53]

Willis's insistence on a learned medicine that contained both art *and* science may have rested in part on the structure of professional life in the Restoration. Nineteenth (and twentieth) century *investigative* physicians have been institutionally based; Willis was not. He was dependent on his patients both for his livelihood and the operation of his investigative enterprise. Patients participated not only as the objects and subjects of the physician's scientific interest, they participated as the *immediate* consumers of the new knowledge that interest produced. In the nineteenth century charity hospitals of Paris the relation of doctor and patient was quite different. The patient was not well-born but instead poor and existed in the

mass. The scientific knowledge gleaned from the experience of such patients was to be refined and distilled for the benefit first of those who had paid for the hospital, the bourgeoisie.[54] In other words, the immediate patient was not necessarily the final patient; he or she might be only an intermediate knowledge resource.

Willis and his patients did not have the benefit of such intermediate knowledge steps: their association was voluntary and, hence, more intimate. Alienation of his patients would have meant the demise of his research program. The imperative to satisfy patients had its price, however: many of Willis's therapeutic claims do not logically connect to his normal or abnormal anatomical findings or his chemistry. In this sense Willis's "rationality" becomes stretched even thinner upon review of the prescriptives of *Rational Therapeutics*. Let Willis's approach to melancholy serve as an example. In terms of melancholy's morbidity, Willis noted "it is for the most part safe; yet....it is very uncertain: For some quickly grow well, others not of a long time, and others are never cured." Recognizing that the causes of melancholy were diverse and often not medical (e.g. "desperate love"), Willis thought the cure "always difficult and long." For patients who rejected "all medicines" and "lay sick with only imaginary diseases", he thought there was "little or no hope" of cure. For "a young Nobleman" who had become melancholic on a two-year grand tour of the Continent (and consulted physicians in Spain, France, and Holland), Willis directed a complicated regime beginning with several syrups, including "syrup of steel", "senna geronia", "gylliflowers." After sixteen days, he substituted "powder of ivory, pearls, red Coral." In addition, the young man's diet was "only good and easily digested meats", and he was made to be "almost continually employed".[55] The preponderance of minerals in the medicines and protein in

the diet reflect Willis's belief that the physiological aspect of melancholy was "vitiated animal spirits." Thus, substances thought to be strength inducing seemed "rational" components of therapy. "Rational" in this sense, however, means little more than prescriptives based on doctrines of similarities current in Renaissance thought, particularly alchemy. Willis did not mention the young man's fate.

At other times Willis argued that therapeutic success confirmed a theory of pathophysiology. In the case of the epileptic children mentioned initially in this essay, for example, Thomas Laqueur noted that Willis's claim of a theory-confirming therapeutic success ("clear proof") represented a simple error of logic that should have been noted by Willis and his scholastically educated contemporaries.[56]

What should one make of this epistemologic untidiness regarding therapy? Issues regarding therapeutics need to be placed in an historical context.[57] Reviews and summaries of recipe books make up only one part of the record. Patient expectations and the historical context of 'cures' merit attention as well. "Cure" as employed by Willis and his contemporaries signified interventions in the patient's life that might lead to relief of symptoms for an unspecified period; cure did not necessarily signify permanent freedom from a disease. In addition to referring to his premise of "rational therapeutics", the "curatory method" frequently referred to by Willis regarding treatment of mind/body disorders also included a range of interventions including directives for specific diets, exercise and sleeping patterns. Since Hippocratic times, learned physicians were expected to be knowledgeable about holistic issues of care, and Willis did not neglect this aspect of patient expectations. It was crucial, however, that the physician's approach be grounded in anatomy and a "due weighing of the Reasons by

which Medicines operate." Otherwise, empirical physic was "but casting a Die for a Mans life."[58]

Willis's empiricism was both explicit and broad in scope. Regarding therapies and medicines for nervous disorders, he informed his readers he would include "more choice forms" of medicines "both Simple and Compound, both Old and New, both Dogmatical and Empirical, gathered out of the Physick-books of every Age, as also those chiefly celebrated by Quacks and Nurses." Granting that "this is more than the task of one Man or Generation, to exhibit a compleat Curatory Method...", Willis proffered his lists "not in the name of treatises, but of essays." Many physicians, especially those "intent only on their Practice and Gain" would not be interested, but for the "genuine Sons of Art" the effort might "at least incite them to the Knowledge and serious weighing" of their tasks.[59]

Willis's particular interest was disorders of the brain and nerves. Most of the entities he classified as convulsive disease can be characterized as chronic conditions with acute episodes. During the course of their sufferings (which were also co-terminus with a significant portion of their lives), patients, like the young nobleman mentioned above, routinely consulted a variety of healers. Given the chronicity of their complaints and their freedom to consult a variety of healers, patients sought *management* of their disease (and, hence, their lives). The best physician, in this sense, was the one who could provide the most comprehensive management. Thus Willis could speak sincerely of the "curatory method" of epilepsy, for instance, at the same time he described epilepsy's general prognosis as "grave."

If Willis's researches and speculations were pushing him toward ontological definitions of *disease,* his patients were seeking explanation as well as relief of their *illness.*[60] Through dint of his lecturing and publishing,

as well as his vast clinical experience and success, it is not unreasonable to speculate that Willis would have been received by patients and colleagues as a masterful manager of mind/body disorders. The fact that his explanations borrowed liberally from the rhetoric of natural philosophy may have enhanced their reception by his public at the same time they cloud modern understanding of them. Willis simply had too much at stake as a clinician to have a free opinion regarding the knowledge status of therapeutic outcomes. For example, compared with the limited hypotheses philosophers such as Robert Boyle were willing to make regarding experimental facts, Willis's circular reasoning regarding the pathology and treatment of the epileptic children was egregious.[61] In terms of a patient and professional audience hungry for explanations based on the new natural philosophy, Willis's rhetoric ("by Knife or Microscope we have detected") may have papered over the gap between the "hard" findings of his anatomies and his need as a healer for a grab-bag of treatments.[62]

THE CONUNDRUM OF CONVULSIVE DISEASE

The nosology of convulsive disease provided the framework of Willis's 1667 text *The Pathology of the Brain and Nervous Stock.* Convulsions merited particular attention not only because they were common, but because epilepsy had long carried religious associations which confused its true nature. Were the rantings of epileptics the voice of God (or the Devil) or mere rantings? If interpreted by the populace as the former, the epileptic voice could represent a social threat. According to Willis, people subject to convulsions moved as "by inspiration from the Devil." Indeed, many who were assumed to be "possessed by the Devil in the New Testament were only Epilepticks." Jesus had spent much time curing them in the

Gospels. Like Jesus, the physician could find entrance into the Church "thorow their spittle." Indeed, prayer and the help of "strong medicines" and "our Art" might cause sufferers to lose both their "diseases and errors" and also regain "wisdom." Successful treatments benefitted both the individual patient and society. In terms of the church and nation, the goal was to "take away the darkness from the eyes of the miserable people" and "withdraw the fury from their minds." The benefit would be the "peace" of the Commonwealth and the Church.[63]

Within the category of convulsive disease Willis included several entities, among them scurvy, asthma, and gout, which have subsequently been re-classified as non-neurologic in origin. Most of the *Pathology,* however, was devoted to epilepsy and hysteria, with a lesser emphasis on melancholia and hypochondriasis. When arguing the "true" etiology of epilepsy, Willis acknowledged his reliance on both "case observations" and "anatomical observations". Both kinds of evidence were required because in epilepsy "no marks at all of the Morbifick matter appears, or are so very obscure, that we may have deservedly suspected it to be an inspiration of an evil spirit..."[64]

Traditional Galenic theory held that epileptic convulsions were a consequence of fluid imbalances in the body and brain. Extremes of fullness or emptiness of the animal spirits, the fluid thought to animate the nervous system, could lead to abnormal responses of the nervous system, including convulsions and paralysis. Willis rejected this on *clinical* and *experimental* grounds. All one had to do, he argued, was to observe the muscles and nerves in states of repletion, such as "anasarca" (general body edema), or in wasting states, such as in "the consumption" (probably advanced tuberculosis): no convulsive motions were seen. Furthermore, in dissection

of a living puppy as well as in "almost every man", punctures of the nerves and tendons excited spasms.[65]

Two "modern" opinions had been advanced to explain convulsions. On the surface, each "seemed to have an equal likeliness to Truth." The first placed the cause in a contraction of the meninges, or covering layers of the brain, which in a convulsion compressed the brain and so closed its "pores " as to cause insensibility and progressive peripheral spasm. Willis argued that this theory could be discarded on the grounds of pathological anatomy and clinical experience: Willis had opened an meningeal abscess in a patient. "Stinking matter" was expressed, but no epileptic fits ensued. Also, those whose disease was sufficiently mild so that they retained consciousness during an attack had no perception of the membranes being contracted. These rebuttals cleared the way for Willis to advance his own theory: the "Epileptick Paroxism is stirred up from ...an explosion of the animal spirits...whereby the Brain itself is inflated, and rendered so insensible, and the nerves banging thereto, also pass into Convulsions."[66]

Explosion was a particularly Willisian concept that harked back to his chemical experiments of the 1650's with *aurum fulminans*.[67] In injecting this piece of chemical analogy into medical theory, Willis was concerned lest he displease readers by offering an "explication of unknown things by more unknown things."[68] Admitting that the idea of explosion was "not yet used in Philosophy or Medicine", Willis next reversed himself and argued that the idea was not only "a child of my own brain", but the hypothesis as well of "the famous Gassendi", an endorsement which "will give to it some Authority."[69] The fact that Gassendi had reasoned analogically in likening the small soul and great strength of an elephant to a small amount of gunpowder firing a large canon did not seem to trouble Willis. As he had

indicated in other places, analogic reasoning had its place, at least when employed by him. It was enough for Willis to declare that the "motive function (of the nerves) depends on the Elastick Copula of the animal spirits..." He did, however, immediately add the qualifier "(which we may suppose with very great probability.)"[70]

When it came to the *therapy* of epilepsy, Willis seemed more confident of his methods if not of the prognosis of the typical epileptic. Aggressive preventive treatments were justified in epilepsy because the usual clinical course was grim. Given that the symptoms and expressions of epilepsy could be so "stupendous", the "prognostification of the Disease...is of very difficult cure." Nonetheless, "experience doth testify that Epilepsie is sometimes cured by the help of Medicines." However, the chances of cure were better before the sufferer attained a "ripe age." After that epilepsy "neither can be driven away by the use of Medicines." Instead, it ended "immediately in Death, or is changed into some other Disease, to wit, the Palsie, Stupidity, or Melancholy, for the most part incurable."[71]

Epilepsy might represent a theoretical challenge and furnish the organizing principle of a nosology of nervous disease, but epileptics themselves would have been rare in Restoration consulting rooms. For one thing, epilepsy itself was and is relatively uncommon. For another, by virtue of their disease, epileptics then (as now) would have been relatively poor. As a consequence, elite physicians would have been more concerned with Willis's other convulsive disorders, especially hysteria, melancholia, and hypochondriasis.[72]

When arguing for a new explanation of hysteria, Willis employed anatomical evidence to undermine traditional theories linking symptoms to the wanderings of the uterus and its emission of sick humours. This could

not be so, Willis argued, for autopsies on numbers of hysterical women who had died of other causes revealed that the womb was "of small bulk in widows and virgins," and was "so strictly tied by the neighbouring parts round about, that it cannot of itself be moved."[73]

Rebuttal of the "foul vapour" etiology of hysteria was more complex and depended on clinical experience. Willis's contemporary, "the most learned Highmore", had advanced a version of the latter view: the Hysterical Passion arose from the Blood "most impetuously rushing on the Lungs" from the spastic uterus. Willis responded that "it is almost unlawful for me to dissent from this famous man." Nonetheless, clinical experience showed that Highmore was mistaken: Willis, the practicing physician, had known "young maids" who, by reason of the "green sickness (anemia), as it were without blood, were nonetheless subject to hysteria. Yet they did not develop "peripneumonie or Impostume of the Lungs", which one would expect if the Lungs were in fact inflamed with blood. Besides, "it may be observ'd, that the Lungs are not always afflicted before other parts..." In fact, "the vertigo and Corruscations or sparkling of the eyes begin the fit; to which succeed either weeping, or laughing, or convulsive motions of the Limbs, without any straitness of the Breath.." Therefore hysteria was "chiefly and primarily Convulsive, and chiefly depends on the brain and the nervous stock being affected, and whatever inordination, or irregularity from thence happens, about the motion of the blood, is only secondary, and is made dependingly by the Convulsions of the Bowels."[74]

DEATH INTO LIFE

A striking paradox of Willisian anatomy was its reliance on the bodies of either those of extremely low social status, such as criminals, or deceased

patients from the Anglican upper classes. Ordinary people had little to do with anatomists. Indeed, common law reflected the popular belief that fresh corpses might have sentient properties. At the time of Willis, particularly in the provinces, protocols regarding the burial of suicides directed the staking of their heart and burial under the highway to prevent wandering of their spirits.[75]

Willis sought different types of information from his two groups of bodies. Criminal bodies, a mainstay of English anatomy since the Tudors, were employed by Willis as well as other anatomists primarily to demonstrate *normal* structures to themselves and students.[76] As they arrived absent a clinical history, by definition they could not contribute significantly to the clinical correlation of the normal and the pathologic. The majority of Willis's pathological human anatomical researches, however, were undertaken on the bodies of deceased patients, most of whom had been of the upper classes. In 1667, for instance, he reported autopsy findings on a child of "a nobleman", a "noblewoman", and a "very noblewoman."[77] Indeed, the only post-mortems in which reference to the whole body was noted in the *Pathology of the Brain* involved aristocrats.[78]

In contrast to the *normal* bodies of the criminal and destitute, patient bodies offered the opportunity of correlating a clinical course with normal and abnormal structures. If one was to move toward a rational therapeutics, such correlation was essential. The desire to incorporate facts from patient bodies as a way of improving medical practice did not originate with Willis. Indeed, in this as in much else, Willis and his fellow mid-century Oxford physiologists were working along tracks laid down by William Harvey in the preceding decades. Harvey never attempted to publish, as Willis did, a comprehensive system, but a seventeenth century biographer noted that he

had planned to until he was "plundered of his Papers in our Civil War."[79] Those papers had contained "anatomical histories of his patient sick-bodies", and he confessed to a friend that their loss "twas the greatest crucifying to him that ever he had in all his life."[80] Whereas Harvey made modest use of human post-mortem findings in his published works, they were central to Willis. In that sense Willis 'out Harveyed' Harvey. The illustrations by Christopher Wren of the normal brain in the folio edition of the *Anatomy* and the "case observations" and "anatomical observations" in the *Pathology* and *Rational Therapeutics* each in their way were offered as hard evidence of medical truth.

The fact that Willis's patients' sick bodies had been noble, or at least well-placed, had important ramifications for the reception of his theories as well as his success in practice.[81] Willis was doing in an extended way what had not been done before: establishing the normal nervous structures, and then linking their degradation in disease processes to particular pathological findings on post-mortem. Classic Galenic medicine as well as previously published anatomical texts had concentrated instead on the normal. Vesalius's *de Corpore Humani Fabrica* , for instance, emphasized the ideal human form: the images of the opened body were presented in poses derived from classical sculpture. Exposed ends of peripheral body parts, such as arms, were smoothly finished off, as though the body depicted was a marble statue that had been partly opened up.

Suppose that , instead of the noble, Willis had concentrated instead on the anatomical structures and case histories of the lowest class. How would one know whether his declarations regarding a body's clinical course and structural pathology reflected the ante-mortem disease, the bodily disruption of an execution in the case of the criminal, or the taint of the decedent's base

social position? Furthermore, if one's findings were derived from the bodies of the undesirable, why would prospective elite patients and doctors be inclined to accept them? In contrast, the nobility by definition represented the highest human form. When placed in the context of stable images of the normal nervous structures, their particular clinical stories and pathologies could be presented (and received) as "ideal" disease pictures.

As Willis made clear, his post-mortems on deceased patients were not just investigations of any body. In 1667 he reported on the clinical course and autopsy findings of "a very Noble Lady." She had been "highly imbued with a virtuous disposition of mind and manners." Whenever she was pregnant, however, she became afflicted with "Convulsive Distempers", the onset of which Willis attributed to the restraint of menstruation and the effect of excess "heterogenous Particles" on her brain and nerves. Called to see her during a pregnancy, Willis then noted in detail the patient's convulsions and agonies during the first trimester, after which she miscarried. The fits continued, and Willis instituted "curatory intentions" including bleedings, opiates, herbal baths, and other medicines for the next two weeks, at which time she was "wholly rid of her convulsive fits."

The patient then became sad, a change Willis attributed to "an ill order of Diet" and an "unlucky accident happening within her own Home." The upshot was that she relapsed. Consultations of "many other Physitians" ensued, but the patient became "insensible and speechless" and died. Then "it pleased her Friends, that her dead Carcase, kept long opened for the Funeral, should be dilligently inspected, and so the genuine causes of the Disease and her Death, might be investigated." Willis at once performed a complete autopsy. Her womb was normal, but she had a pear-shaped growth on her mesentery (a thin tissue surrounding portions of the abdominal

organs) and the meninges (the covering layers) of her brain "distended with Blood."[82] Willis interpreted these findings as confirmatory of the neurologic origin of convulsions.

One of the reasons traditional humoral theory was so resistant to effective challenge was its presentation of the body as inherently unstable. The investigator was always open to the charge that his manipulation of the body had so altered its normal function as to obscure it.[83] . With structures as delicate and dynamic as the brain and nervous system, how could one decide? The circumstance that Willis's patients (and/or their loved ones) had *consented* to post-mortems countered potential charges that his findings (particularly those of abnormality) represented not disease pathology, as he claimed, but instead the consequence of pre-mortem protest.[84] By fixing the image of the *normal* brain and nervous system with the aid of Wren's illustrations in the *Anatomy,* Willis could then employ his *abnormal* (but noble) findings in the *Pathology* and *Rational Therapeutics* in ways that suggested statements about the abnormal were on par epistemologically with statements about the normal.

On a prosaic and commercial level, mention of the high station of one's patients was also good for business. Mayerne, Highmore, Charleton and other elite physicians of the period often mentioned the social class of the patient, especially if it was high. Willis may have been only adopting the convention of his professional milieu. I suggest, however, that his promotion of a rational medicine--the normal, the pathological, and the therapeutic--could not have dominated Restoration medical thought had Willis limited his post-mortems to the criminals and destitute who furnished the vast majority of subjects for contemporary autopsy.

How did Willis obtain his bodies? What were the beliefs and practices of upper-class English people regarding death? By way of an answer, let me begin by briefly outlining the general context of upper class death in Tudor and Stuart England. If condemned criminals (including suicides) had no freedom to determine the manner of their post-mortem experiences, a paradox of Elizabethan England was that its most powerful members, the aristocracy, also had highly regulated burials and funerals. Whereas bodies of the condemned were turned over by the Crown to the barber-surgeons (at least in London) for dissection, aristocrats as well as the gentry and clergy with the rank of bishop and above could not be buried without a license obtained from the Crown. Known as heraldic funerals, these burials were closely controlled, either directly by the Queen and her minister Lord Burghley, or through the College of Arms.[85]

The monarch's interest was political: the heraldic funeral, originally a Continental medieval custom, was a tremendous display of aristocratic power. Coaches carrying official mourners would roll across England in funeral processions. Regulation by the central authority of such events served to reinforce the aristocratic social fabric at the same time it reinforced the paramount position of the Crown in the minds of both the general public as well as the aristocracy.

Crown supervision of funerals meant that agents of the College of Arms had to travel from London to the decedent's family seat. Then, too, the corpse often had to be brought home from the death site. Pallbearers had to be of the same sex and rank as the deceased. Thus, if one of the kingdom's twelve dukes died, the funeral could not happen until the remaining eleven arrived. Widows would not walk behind the caskets of their husbands. Weeks could pass from death to official internment. Whereas the medieval

practice of division of the corpse had its antecedent in the Crusaders' need to return the essence (the bones) of a slain comrade to his Christian homeland, the heraldic funeral placed different demands on the corpse. As Clare Gittings pointed out, embalming became a "necessary and inevitable feature of the heraldic funeral ritual."[86]

Embalming was usually carried out by surgeons, though doctors might be present. At the embalming of Sir Nicholas Bacon in 1578, three doctors were present, but two surgeons did the actual work.[87] James Montague, Bishop of Winchester in the late sixteenth century, directed in his will that his body should undergo "no cutting or mangling", but it was to no avail. He was, in fact, embalmed twice, the first effort apparently failing to delay putrefaction sufficiently.[88] The embalmed body was then generally placed in a coffin to await the two or three weeks preparation for the funeral. If the deceased had been of sufficient rank, such as Ludovic Stuart, Duke of Richmond and Lenox (died 1624), the funeral procession would be led by a life-size effigy of the dead man with the coffin to follow.[89]

Aristocratic funeral practices changed considerably in the seventeenth and eighteenth centuries. With the weakening of the central authority under the Stuarts, elite families began burying their dead at night without licenses. Whereas heraldic funerals of the late Elizabethan period had become primarily political statements reinforcing the power of the aristocracy and the crown, the *unlicensed* nocturnal funeral by definition permitted greater individual expression. Since the heralds were not involved, families could choose the place of burial freely. Spouses might walk behind the casket of their deceased mate. By the middle decades of the seventeenth century, night funerals had become popular. At London's Temple Church, for instance, nine of twenty-one funerals in 1641-1642 took place at night. [90]

Importantly, since night funerals took little time to organize, post-mortem manipulation of the corpse was not necessary. The choice of a quick nocturnal funeral was an obvious one for those who did not want to be embalmed or autopsied. Nocturnal burial was most popular with aristocratic women and children. Frances, Duchess of Richmond (and widow of the Ludovic Stuart mentioned above) directed in her will (proved in 1639): "...that I may be speedily buried and not opened for so my sweet Lord out of his tender love commanded me that I should not be opened." [91] Mary, Countess of Northumberland, directed that "...not in any wise to let me be opened after I am dead. I have not loved to be very bold afore women, much more would I be loath to come into the hands of any living man, be he physician or surgeon."[92]

Not surprisingly, the College of Arms objected to nocturnal burials. In 1618 they successfully petitioned James I for new measures regulating aristocratic funerals. In 1635 Charles I prohibited nocturnal burial, but the action had little effect. Despite the protestation by the Earl Marshal against a planned nocturnal burial of a former Lord Mayor of London, the notable was interred at night. Anglican leaders in the Jacobean era objected to nocturnal burial as well. The divine John Chamberlain thought of a 1615 nocturnal funeral that it "...was brought up by papists which serve their turn by it (in) many ways." The heralds played on this fear of "popery" in their attempts to limit the practice. In their petition to the Archbishop of Canterbury in 1618 regarding nocturnal burial they argued "we may seem to draw near unto popery and heathenism."[93]

By the time of Willis, aristocratic people had to make a choice about the handling of their bodies after death. Would they permit or refuse their corpse to be opened? Commonly, they expressed their funeral choices in their wills.

Their language regarding embalming in the late sixteenth and early seventeenth centuries is similar to that their successors employed in the late seventeenth and eighteenth centuries regarding post-mortem examination. Three types of reasons were generally advanced to refuse or permit such post-mortem manipulation. Whether wielded by the surgeon/embalmer or the pathological anatomist, the first cut of the dissecting knife would verify death (and thus prevent live burial). Either process would or would not aid funeral preparation. Either process could or could not yield new knowledge.[94]

Expressions of the latter sentiment took various forms. Writing in 1662 on the death of the Anglican scholar Henry Hammond, his biographer John Fell (Willis's brother-in-law and later Bishop of Oxford) included two pages of autopsy details on the grounds "the Reader cannot want the curiosity to desire to know everything that concerned this great person."[95] A testator in 1712 was both adamant and specific in his decline of autopsy:[96]

> In the first place...I forbid that my body be opened for any reason whatsoever, persuaded as I am that this would not provide any information for the use and benefit of my dear children, whom I love enough to overcome my reluctance if I thought that it would do them the slightest good.

By the middle of the seventeenth century, upper-class English men and women had experienced almost a century during which post-mortem manipulation of the corpse was a common family experience. Whereas embalming had become popular because it was expedient-- the body apparently preserved during a lengthy preparation for an heraldic funeral--submitting to post-mortem investigative autopsy depended on quite a different rationale. Both, however, presumed that one's post-mortem remains had no sentient properties. Thus, several generations before

Descarte's and Willis's formal ruminations on the duality of the soul, the noble dead body was accumulating the status of a *secular resource* for the living.

Willis, and the pathological anatomists who followed him, did not so much convert the corpse from the status of sentient being to scientific subject as transform its resource purpose from political to scientific expediency. The real work--conversion from belief in the sentience of the dead into an appreciation of the value of the dead body to the living--happened slowly under the Tudors. In effect, Willis (and his colleagues and their patients) succeeded in substituting an explicitly scientific rationale for an implicitly political one.

EMPIRES OF REASON

But Know, Physitians have a larger Call,
Apollo and Physic are collateral.
Think not Physitians Atheists, since they do
Profess Divinity, and Practice't too.

J. Hutton, Fellow of New College, Oxford, 1651

If nature was, for Willis, a 'machine', it was also a "table of the Divine Word, and the greater Bible." Within nature, the human brain was the "Chapel of the Deity."[97] As Roy Porter has pointed out, Christianity is unique in the world's great religions by virtue of its simultaneous elevation of the importance of the flesh (e.g. the sacrament of communion) and denigration of the ultimate value of earthly life as compared to the heavenly.[98] Indeed, Christianity depends on its adherents' faith in the paradox of the Resurrection: Christ died so that He (and His followers) could

be reborn. In defending his method of"ocular demonstrations" and the "slaughter of whole Hecatombs of Animals" that it involved, Willis employed a rhetoric redolent of the Resurrection, albeit rhetoric with a classical gloss: "....Minerva was born from the Brain, Vulcan with his Instruments playing the Midwife: For either by this way, viz. by Wounds and Death, by Anatomy, and a Caesarean Birth, Truth will be brought to Light, or for ever lye hid."[99]

Within this theology, Willis portrayed himself as a clinical philosopher in language that emphasized his high purpose at the same time it acknowledged the humble nature of hands-on clinical investigation: He would help the sick (and students of physick) by speaking "not from the Tripos like an Oracle, nor from the Chair, but as one of a low form: I play not the Prophet, or Dictator, but the Philosopher, neither do I plant an Opinion, but propose an Hypothesis...."[100] Willis employed similar high/low phrasing in drawing an explicit parallel between the physician's healing efforts and that of Christ: "...there should be an Entrance into the Church throrow the Spittle; for that it appears, our Saviour to have used almost this method...that the health of the Soul, should take its beginning from the restored health of the Body."[101] Finally, he brought together the parallels of the physician as philosopher and physician/philosopher as Christ-like: By "anatomical observations, firmly stabilized" and "rational" therapeutics "approved by daily experience" Willis hoped to "better solve all the Phenomena of the Sick." Such sick men, driven by an "infirm brain.... from the Communion of Saints, and from the Society of men....growing well, have left both at once their Diseases and Errors, but also should have become wise."[102]

Post-mortem exams on deceased patients, some of them the high-born faithful, were not only medically novel, they were theologically risky as well. In the dedicatory to *Cerebral Anatomy* , Willis acknowledged the problem frankly: "...there is no right Weigher....that can lay to our charge as a fault, that we have studied these Rolls of Nature (the dissected brains), because some Atheists may be made thereby: which may be objected to the studies of Divines in Sacred Letters, that from there provision Hereticks have taken their Arguments and Opinions...and turned them against Godliness..." More reassuring to his sponsor Sheldon, perhaps, than this disclaimer of theological culpability, was Willis' subsequent alignment of faith, reason, and philosophy with orthodox Christianity: "Whoever professes Philosophy...I do judge him not only to have shaken hands with Religion, but also with Reason."

For its own reasons, the Anglican Church was eager to shake hands with natural philosophy in the Restoration era. As with the restoration of the monarch, the return of the Church to official life in 1660 was both fragile and the product of complex Parliamentary negotiations. By 1662, however, Anglicans, under the leadership of Gilbert Sheldon, Bishop of London (and Archbishop of Canterbury after 1664), had not only secured control of church wealth from their Presbyterian and Independent rivals, they had also obtained Parliamentary passage of the Act of Uniformity. Once again, they were the only legal church in England. In order to preach, ministers of any faith had to use the newly revised Book of Common Prayer and swear "unfeigned assent and consent to all and everything prescribed therein."[103]

Supported politically by the Cavalier Parliament of 1662, Anglicans were able to both exploit and augment an increasingly prevalent feeling among the Anglican oligarchy that Puritanism and even Presbyterianism

represented republicanism, rebellion, and chaos.[104] None of this success could have been predicted in 1660. Charles the II was welcomed back to England by Parliament not because he was an Anglican (personally he preferred Catholic liturgy), but because he was felt to be the legitimate ruler and religiously tolerant (he was). Nonetheless, within two years of the Restoration, Sheldon and his allies had simultaneously regained for the Anglicans wealth, outmaneuvered the King, and bested their sectarian rivals.[105]

Among the Anglicans, Sheldon and Hammond in particular had plotted for the restoration of the monarch and their church since the execution of Charles I, to whom they had ministered in his captivity. Sheldon also succeeded in obtaining from the doomed King a written vow to restore church wealth to Anglicans when and if the Stuarts were restored.[106] Going back and forth to France to the exiled court of Charles the II during the Interregnum, they organized an Anglican underground which supplied the exiles with money. Once Charles II had regained the throne for the Stuarts, Sheldon wasted no time in showing the new King his father's vow. Immediately afterward new bishops were consecrated, and Anglicans, too, became restored. In light of this, it is not surprising that the diarist Pepys considered Sheldon "one of the most powerful men in England." He predicted that Sheldon, "being a man of great business" would shortly be made Lord Treasurer.[107] Instead, the King made him Archbishop of Canterbury.

Nothing was as solid as it pretended, however. The veneer of religious and political unity was thin, and the Civil War fresh in memory. If anything seems characteristic of Restoration high society, it was the slippery nature of success. Partly this reflected the character of Charles II. For an ailment, the

fickle King might as readily consult a learned physician, such as Willis, as an apothecary; on matters religious, a Presbyterian, such as Richard Baxter, instead of his Archbishop Sheldon. Politically active aristocrats, such as Lord Shaftesbury, moved from positions of favor to exile in short order. In broad areas of upper-class life, beliefs and loyalties were contingent. In order to preserve their newly won positions of pre-eminence, both Anglicans and the Crown attempted to claim the center in a continuous debate with Catholic sympathizers and the more democratically inclined (Independents, Puritans, and Presbyterians).

Just as Willis was eager to present himself to his public as both reasonable and religiously orthodox, so too the Anglican Church in the Restoration presented itself as the apotheosis of reason and its rivals as superstitious. Once again enjoying the benefit of exclusive control of the English pulpits and Church wealth, prominent Anglican divines in the 1660's preached often on three related themes: the need for order, the reasonableness of the Anglican religion, and the role of Christ (and the Church and Parliament) as a healer.

Preaching before Parliament shortly after the Restoration, Edward Reynolds, Dean of Christ Church, Oxford, spoke on the "means and methods of God's healing a sick nation." The text was Malachi 4:2,3, interpreted by Reynolds to say "we see here healing promised to those that fear God's name." The nation was "sick" with divisiveness. In order to heal it, Parliament needed to be a great "Council and College of Physitians" and "imitate the example of Christ, who is the Lord that healeth us..." Moreover, the "right honourable patriots" needed to be united, for "the patients will not fall out if the physitians be agreed."[108] Preaching a week later before the House of Peers, Reynolds continued in the same vein: "We have seen

Princes on scaffolds...parliaments broken...Blood on the land...and there is not any degree of order... The way therefore unto Healing is...to keep our differing opinions to ourselves...(so that) the peace of the Church is not endangered thereby."[109]

Reason allowed men to achieve and sustain control over their sensual inclinations, a theme that was developed in several sermons preached to the dissolute King. As Edward Stillingfleet, Chaplain in Ordinary to Charles II (and later Archbishop of Canterbury) declared in a sermon before the King in 1667: "...the difference...between good and bad man is between those who maintain an Empire of reason, assisted by the motives of Religion, over the inferior faculties."[110] Not only was reason essential for personal control, it was a key component of wise pleasure. Preaching on the theme of "Wisdom and Pleasure" to the Court in 1665, Robert South, Chaplain to the Lord High Chancellor (Edward Hyde), declared that, "He that would persuade men to Religion, both with Art and efficacy, must found the persuasion of it upon this, that it interferes not with any rational pleasure, that it bids no body quit the enjoyment of any one thing that his reason can prove him."[111]

Among wise pleasures, philosophy was felt to be the greatest. Philosophers observed and considered, and so learned the principles of wise government. In a sermon dedicated to the Lord High Chancellor upon the consecration of several bishops (Sheldon among them) in 1660, John Sudbury noted: "The Philosopher who said that Kingdoms would then be most happy when Kings were Philosophers or Philosophers were Kings gave this reason for it, that Philosophers above all other men spend their time and pains in observing and considering how God governs the world; and having this pattern so much in their eye, they must needs be so much the fitter to govern under Him."[112]

Of the philosophers, Christ was supreme, for His philosophy could conquer death. Moreover, His method was akin to that of natural philosophy. Preaching in 1670 at the funeral of George, Duke of Albermarle (a Royalist general), the Bishop of Salisbury entitled his sermon "The Christian Victory over Death." Christ, he preached, was not only the "Captain of our Salvation,", but He had also "claimed the principal foundation of a Generous Contempt of Death." He had "assured the world of the truth of this theory...not by giving the world a *set* and *series* of *imaginary principles* of vain *Philosophy* and *Science* falsely so called, engendering strifes and everlasting disputations....but by *evidences plain and convincing,,* by proofs *sensible* and *experimental*..."[113]

Laymen prominent in both Anglican affairs and natural philosophy echoed these sentiments. In his 1661 tract (which may have been written as early as 1648), Robert Boyle published a long letter to his sister, the Countess of Warwick, on "Some Motives and Incentives to the Love of God." He wrote that "When with excellent microscopes...and the help of Anatomical Knives and the light of Chymical Furnaces, I study the Book of Nature....I find myself oftentimes reduced to exclaim with the Psalmists How Manifold are they Works, O Lord, in Wisdom hast thou made them all!"[114]

During the first decade of the Restoration, Catholics represented a minimal threat to Anglican hegemony, and published Anglican sermons reflected limited concern regarding them. In the later Restoration, however, Catholic sympathizers began to rally around the Catholic James, Duke of York. By the later 1670's, sermons reflected this rising tension.[115] Preaching on the subject of schism before the House of Lords in 1680, John Fell, Willis's brother-in-law and Bishop of Oxford, declared that "rebellion is the sin of witchcraft." He went on to add that, "Popery, in its unhappy addition to the

faith....is a Religion made up of superstition and cruelty.....but yet it has not so exhausted the whole nature of ill, but that there are several other Sects pretending to Christianity extremely bad..."[116]

The natural philosophy promoted by Willis provided the Restoration establishment with ammunition for their propaganda efforts to characterize Catholics as reactionary. Primary among these was his definition of the soul as existing in two parts, a corporeal animal soul and an immortal and incorporeal rational soul. In contrast, Catholics continued to maintain the corporeality and unity of the soul. In this sense, Catholic thought continued to reflect an older Christian "general unwillingness to admit that after a person's death the body did not, in some sense, live on..."[117] Politically, Sheldon's endorsement of "ocular demonstrations" permitted the Anglican establishment to claim it was both modern and reasonable compared to Catholics. In this sense, Willisian thought provided fresh support for the long-standing efforts of Tudor and Stuart monarchs to isolate Catholics as "foreign", "popish", and "superstitious."[118] Now they could be lumped with other retrograde social elements, such as those who believed in witchcraft.

Sheldon's endorsement of the Willisian method positioned Anglicans nicely in another important way: it allowed them to appear safe compared to those who argued the virtues of democracy. The radical protestants who decried hierarchy in the church and state also decried hierarchy in medicine. Nicholas Culpepper, a prolific medical popularizer during the century's middle decades, declared that "the liberty of our commonwealth is most impaired by three sorts of men: priests, physicians, lawyers, all of them monopolists."[119] Indeed, the central struggle between Anglicans, led by Sheldon, and Presbyterians in the early Restoration turned on the rights of congregations and ministers to select preachers and texts, respectively.[120] The

Anglicans had won those battles for a top-down control. By providing a basis in natural philosophy for the need for special learning and hierarchy, Willisian thought helped legitimize Anglican retention of a traditional social order.

In essence, both Willis and the Anglican leadership constructed an epistemology that was simultaneously religiously orthodox, congenial to the new natural philosophy, and relatively impervious to theological challenge. Both embraced a cosmology that defined reason in terms that reinforced their newly dominant position and practices. Just as the Church was portrayed as at the head of the "empire of reason" by the divines, Willis portrayed the brain as the "chief mover" in the human body[121] To extend the parallel further: God was the maker of all things in the universe just as the brain was "the origine and fountain of all motions and conceptions" in the body.[122] Willis's neurocentrism mirrored Anglican belief about the Church's position in the English nation at the same time it offered a scientifically validated explanation for hierarchy.

Willis could not have proceeded with his autopsies on deceased patients without the tacit approval of religious authorities. If he had not been able to do that, he could not have posited the links he did between the normal, the pathological, and the therapeutic. In other words, he could not have constructed his system. By the same token, as a system of diagnosis and therapy, Willisian thought medicalized voices that could otherwise prove troublesome to the Anglican oligarchy. In the Willisian schema the rantings of "witches", "epileptics", and radical religious critics were not voices from God (or the Devil), but disorders of the nerves amenable to treatment. To the extent the Church characterized its critics as superstitious and unreasonable, Willisian thought provided a scientific space for unreason at the same time it

stripped it of other potential meanings. "Rational therapeutics" even offered a potential means whereby certain of the unreasonable could be restored to themselves and the orthodox order.

As an issue of strategy, how does one present an innovative procedure such as voluntary pathological anatomy to the intended public? Willis's investigative enterprise depended on "ocular demonstrations' and "case observations" gleaned from the normal and the pathological. In order for it to proceed, the bodies of Willis' patients had to be available as scientific resources. Why should patients consider complying? His conflation of reason, philosophy and religion, and his appendment of autopsy to reason, promoted autopsy as theologically *safe*. The endorsement of Archbishop Sheldon enhanced this Willisian claim to orthodoxy. Equally important, Willis' alignment of his role as a scientific physician with Christ the healer emphasized Willis's Christianity at the same it suggested a beneficial effect of his new clinical knowledge.

CONCLUSION

Thou knewst the wondrous art,
And order of each part,
In the whole lump, how every sense,
Contributes to the health's defense.
The severall, Channels which convey,
The vitall current every way,
Trackst wise Nature everywhere,
In every region, every sphere,
Fathomest the mistery
Of deepe Anatomy.
The unactive carcasse thou hadst preyd upon,
And stript it to a sceleton,

But now alas! the art is gone,
And now on thee,
The crawling Worms experience their Anatomy.

Nathaniel Williams, 1676, from his elegy for Willis.

In terms of the historiography of learned medicine, the shared vision of Willis and his elite patients has significant implications. Both for the European case and the specific English experience, historians and sociologists have argued that the development of scientific medicine (particularly of pathological anatomy and clinical correlation) required the nineteenth century institution of the urban charity hospital. By focusing on the institutional origins of these activities, they seem to have neglected their pre-hospital origins. Defined as a professional activity, medical science may be a nineteenth century development. Nonetheless, the activities of Willis and his colleagues indicate that two of its central activities began their development a century and a half earlier in a private practice setting. My argument has been that their seventeenth century development arose from a convergence of belief between doctors, patients, and religious leaders. To an elite that had lost and then regained its position after decades of political and religious strife, the new medical methods suggested that the human body was capable of being known and ordered by reason. Anxious to heal the body politic in the Restoration, Anglican leaders endorsed Willis in particular because his promotion of a neurocentric body reinforced the Church's presentation of itself as the reasonable 'head' of the nation.

Extensive analysis of the intellectual fate of Willis and the Oxford physiologists lies outside the scope of this study. As Roy Porter noted, "Willis died at the right time."[123] In 1675 the influence of his natural philosophy on

the learned public as well as within the College of Physicians was at its height. Within the next decade, however, England experienced another broad-based crisis. In terms of medical thought, the optimism of Willis and the Oxford physiologists, if not in eclipse, was challenged by the rising influence of Sydenham's empiricism and 'natural history method.'[124] Construction of a comprehensive system of medical theory was no longer felt to be worthwhile. Indeed, when asked for suggestions for approved medical texts, Sydenham suggested the student read *Don Quixote.*[125] This discontinuity in medicine's modern development may be another reason Restoration achievements have been underplayed by recent historians. Willis's books stayed in print, however; on the Continent the *Anatomy* in particular continued to sell through many editions into the nineteenth century.[126]

If pathological anatomy and clinical correlation lost favor among English physicians in the eighteenth century, Willis's promotion of the brain as the prime minister of the body had considerable influence on Enlightenment ideas of the mind and body. As George Rousseau has noted, "A new assumption about the fundamental anatomy of man arose through Willis's deflection of several generations of scientists..." By maintaining that the soul was strictly limited to the brain, Willis also was arguing that the nerves alone were responsible for sensory impressions, and consequently for knowledge. In concert with the work of Willis's student John Locke, these new theories of perception led to a "radically new assumption...about man's essentially nervous nature."[127]

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[1] For the most extensive recent account, see Robert G. Frank, Jr., *Harvey and the Oxford Physiologists*, (Berkeley: University of California Press, 1980).

[2] See, for instance, Norman D. Jewson, "Medical Knowledge and the Patronage System in 18th Century England", *Sociology* 8, 3, (1974) 370-385; and "The Disappearance of the sick-man from medical cosmology, 1770-1870", *Sociology*, 10, 2, (1976), 225-244. According to Jewson, medicine did not become "scientific" in England until it reached its "hospital and laboratory modes" of the nineteenth century. (1976, p. 240)

[3] For accounts of French developments, see Georges Canguilhem, *On the Normal and the Pathological*, translated by Carolyn R. Fawcett. Intro by Michel Foucault (Holland: D. Redel, 1978). According to Canguilhem, "The reform of medicine as theory itself rests on the reform of medicine as practice: in France as also in Austria, it is closely tied to hospital reform." (p. 145). See also Michel Foucault's influential *Birth of the Clinic*, translated by A.M. Sheridan Smith, (New York: Vintage, 1975). Both Canguilhem and Foucault ignore Willis and the Oxford physiologists. For pathological anatomy in eighteenth century France, see Toby Gelfond, *Professionalizing Modern Medicine: Paris Surgeons and Medical Science and Institutions in the 18th Century* (Westport: Greenwood Press, 1980), pp. 131-148.

[4] In his 1696 census, Gregory King counted 960 families headed by baronets or above, and 26 families headed by "spiritual lords." An additional 15,600 families were headed by "Gentlemen, Esquires, or Knights" out of a total English family count of 1,360,586.

[5] For an extended ethnology of British death practices in the eighteenth and nineteenth centuries, see Ruth Richardson, *Death, Dissection and the Destitute.* (London: Routledge and Kegan Paul, 1988). The Introduction emphasizes the differences of belief and practice regarding death between popular and high culture.

[6] Bodleian Library, Ms. Locke, f.19, pp.48-50.

[7] Upon his election as Prime Minister, Benjamen Disraeli reportedly exclaimed: "Aha, at last I've climbed atop the greasy pole!"

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[8]An apt comparison might be Sir Hans Sloane, physician to the Duke of Bedford (and dissector of his infant son). Sloane's collections formed the nucleus of what became the British Museum; he did not purchase landed estates.

[9] See Lawrence Stone, *The Crisis of the Aristocracy,* (Oxford: Oxford University Press: 1976) Chapter 12. Stone emphasizes a peak in the pursuit of the liberal arts by the aristocracy in the 1640's. By the 1680's their sons were more often found studying in the Inns of Court.

[10]Dewhurst, 1980, p. 25.

[11]Robert Pitt, "The Antidote or the Preservation of Health and Life, and the Restorative of Physick", London, 1704, p. 109.

[12]*Biographia Britannica,* (London, 1766). Vol. 6, pt. 2, p. 4293.

[13] The shortest of the many Tudor, Stuart, and Commonwealth loyalty oaths, the Act of Engagement, required of all adult males over the age eighteen, stated: "I do declare and promise, that I will be true and faithful to the Commonwealth of England as it is now established, without a king or House of Lords."

[14]John Aubry, *Brief Lives Chiefly of Contemporaries 1669-1696,* ed. Andrew Clark, (Oxford, 1898). Vol. 1, p. 302-303

[15]Jewson, N.D., "Medical Knowledge and the Patronage System in 18th Century England", *Sociology* 8, 3, (1974) 370-385; and "The Disappearance of the sick-man from medical cosmology, 1770-1870", *Sociology,* 10, 2, (1976), 225-244.

[16]Jewson, 1974, p. 380.

[17]Jewson, 1976. p. 240.

[18]ibid., p. 240.

[19] See Lawrence Stone, *Family and Fortune,* (Oxford: Clarendon Press, 1973).

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[20] For an account of Galileo's relations with the Medici, see Mario Biogioli, "Galileo the Emblem Maker", *ISIS*, 81, 307, 230-259.

[21] See Frank, 1980, p. 164.

[22] ibid. p. 165

[23] ibid. p. 166

[24] See Frank, 1980, pp. 164-169.

[25] For detailed tables of association between Oxford investigators and *virtuosi*, see Frank, 1980.

[26] For an extended discussion of the difficulties of replication of facts in seventeenth century English natural philosophy, see Steven Shapin and Simon Schaffer, "Replication and Its Troubles: Air-Pumps in the 1660's", in Shapin and Schaffer *Leviathan and the Air-Pump*, (Princeton: Princeton University Press, 1985).

[27]This viewpoint is developed emphatically by Steven Shapin in "The House of Experiment in Seventeenth-Century England", *ISIS*, 79, 298, 373-405.

[28] See Thomas Sprat, *History of the Royal Society*, p. 435.

[29]Robert Hooke mentioned that he had seen Willis's head on "Mr. Dwight's English China". See *The Diary of Robert Hooke (1672-1680)*, ed. Henry W. Robinson and Walter Adams, (London, 1935) pp. 86-87. See also Dewhurst, 1980, pp. 23-25.

[30]Frank, 1986, p.273.

[31]Cook, 1986, p. 184.

[32]Frank, 1986, p. 273.

[33] Upon their return to power in 1660, Anglicans under the leadership of Gilbert Sheldon undertook a housecleaning of their Puritan rivals at Oxford. Sheldon recommended Willis to Charles II, who approved the appointment.

[34] I am grateful to Robert G. Frank, Jr. for this insight . See his forthcoming "Thomas Willis and his Circle: Brain and Mind in Seventeenth-Century Medicine" to be published in *Mind and Body in the Enlightenment,* G.S. Rousseau, ed. (Berkeley: University of California Press).

[35] Frank, 1980, p. 186.

[36]Willis, 1664, "Preface to the Reader."

[37]Ibid., "Preface to the Reader."

[38]Frank, 1980, p. 101.

[39] Willis, 1664, "Epistle Dedicatory."

[40] See "Introduction" in Edwin A. Burtt, *The Metaphysical Foundations of Modern Physical Science* (London: Routledge & Kegan Paul Ltd., 1924).

[41]On Galileo see Alexander Koyre, "Galileo and the Scientific Revolution of the Seventeenth Century," *Philosophical Review,* 52 (1943): 333-348.

[42] See Margaret C. Jacob, *The Newtonians and the English Revolution,* 1689-1720. (Ithaca: Cornell University Press, 1976); also Alexander Koyre, *Newtonian Studies,* (London: Chapman & Hall, 1965).

[43] Willis, 1664, "Epistle Dedicatory."

[44]Willis, 1672, pp. 40-42.

[45]Willis, 1664, "Epistle Dedicatory."

[46]Willis, 1675, "Preface to the Reader."

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[47]Willis's Baconianism was profound if implicit. I cannot find any citings by Willis of Bacon in his published works. Nonetheless, Willis often reasoned as Bacon had. See, for instance, Bacon's *New Atlantis*, (Works III,156, (1627): "The End of our Foundation is the Knowledge of Causes and secret motions of things and the enlarging of the bounds of Human Empire to the effecting of all things possible." For a discussion of Bacon and the tensions between rational and empiric medicine, see Harold J. Cook, *The Decline of the Old Medical Regime in Stuart London*, (Ithaca: Cornell University Press, 1986).

[48] ibid., "Preface to the Reader"

[49] ibid., "Preface to the Reader"

[50] Andrew Wear has argued that professional differentiation was virtually the whole point of the appeal of rational medicine to learned physicians. See his ""Medical practice in late seventeenth- and early eighteenth-century England: continuity and union," in Andrew Wear & Roger French eds., *The Medical Revolution of the Seventeenth Century*. (Cambridge: Cambridge University Press, 1989)

[51] From the *Annals* of the Royal College of Physicians 13/4/1674: "It pleased all with none opposing that Dr. Willis should be held in the greatest favour on account of the *Pharmaceutice Rationalis* dedicated to the College."

[52]Cook, op. cit., pp. 184-185.

[53] In addition to Cook, see also Theodore Brown, "Physiology and the Mechanical Philosophy in Mid-Seventeenth Century England.", *Bulletin of the History of Medicine*, 51, 25-54. (1977).

[54] See Foucault ibid.

[55] Willis, 1675, pp. 193-199.

[56] Thomas Laqueur, History of Medicine and Culture Group, University of California, Berkeley/San Francisco 12/90.

[57] For a general discussion of the historiography of therapuetics, see Guenter Risse, "The Historyof Therapeutics", forthcoming in symposia of the Conference on Therapeutics, Wellcome Institute, London. June, 1989.

[58]Willis, 1675. "Preface to the Reader."

[59] Willis, 1675. "Preface to the Reader"

[60] For a sociologist's discussion of tensions in the doctor/patient relationship, see Leon Eisenberg "Disease and Illness: distinctions between professional and popular ideas of sickness." in *Culture, Medicine and Psychiatry 1* (1977) 9-23. (Holland: D. Reidel).

[61] Robert Boyle, *The Sceptical Chymist*, p. 469. (London, 1665). For an extended discussion of mid-century experimental knowledge claims, see Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump* (Princeton: Princeton University Press, 1985).

[62] Willis, 1675, "Preface to the Reader."

[63]Willis, 1667, "Epistle Dedicatory." (to Gilbert Sheldon, Archbishop of Canterbury)

[64] ibid., chapter 1.

[65] Willis, 1660, p. 55.

[66] ibid., chapter 1.

[67] literally "exploding gold". Willis prepared the material according to the recipe of the alchemist Basil Valentine. Gold was dissolved in aqua regis, a combination of nitric and hydrochloric acid, and the subsequent salt precipitated with "salt of tartar." He found the ultimate product, which is akin to nitroglycerine, "an hundredfold" more explosive than gunpowder. Willis, *Five Treatises*, pp. 1-3.

[68]Willis, 1667, chapter 1, p. 2.

[69]ibid., chapter 1., p. 2-3.

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[70] ibid, chapter 1., p. 3.

[71] Willis, 1675, p. 184.

[72] Of the twenty-four women mentioned in Willis's casebook of 1650-51, four were noted to have hysteric problems. Sydenham thought hysteric complaints the commonest medical problems of women. See his "Epistolary Dissertation to Dr. Cole" (1681-1682O. Medical popularizers published extensively on hysteria as well. See, for instance, Nicholas Fontanus, *The Woman's Doctour* (1651), or Nicholas Culpepper's translation of Lazar Riviere (*Practice of Physick* (1655).

[73] Willis, 1664 Oxford lecture. See Kenneth Dewhurst, *Thomas Willis's Oxford Lectures,* (Oxford: Sandford Publications, 1980). p. 87.

[74] Willis, 1667, pp. 69-70.

[75] MacDonald, Michael, "The secularization of suicide in England 1600-1800", *Past and Present* (1986) 111: 50-100.

[76]Willis, Lower and William Petty taught anatomy in the 1650's at Oxford on an extracurricular basis. See Kenneth Dewhurst,*Willis's Oxford Lectures,* (Oxford: Sandford Publications, 1980). pp.12-16.

[77]Willis, 1667.

[78] ibid.,. p. 77.

[79] See Robert G. Frank, Jr., 1980. p. 32.

[80] ibid., p. 32. See also John Aubry.

[81] I am indebted to Jack Pressman for this insight.

[82] Willis, 1667, pp. 75-78.

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[83] Harvey had faced this problem early in the century. For an extended discussion of internalist reasons for the effective resistance of humoral thinking to challenge, see Jerome Bylebyl, "The Medical Side of Harvey's Discovery: The Normal and the Abnormal", in Bylebyl, ed., *William Harvey and his Age*. (Baltimore: Johns Hopkins).

[84] For an extended critique of consent theory and its development in seventeenth century England, see Don Herzog, *Happy Slaves* (Chicago: University of Chicago Press, 1989).

[85]For an extended discussion of Tudor and Stuart upper-class death practice, see Clare Gittings, *Death, Burial and the Individual in Early Modern England*. (London: Routledge, 1988) chapters 8-10.

[86]ibid., p. 166.

[87]ibid., p. 167.

[88]ibid, p. 167.

[89]ibid., p. 167.

[90]ibid., p. 189.

[91]ibid., p. 190.

[92] ibid., p. 191.

[93] ibid., pp. 199-200.

[94] See Phillipe Aries, *The Hour of our Death* (New York: Knopf, 1981) pp. 358-365.

[95] John Fell, *The Life of the most learned reverend and pious Dr. Henry Hammond*. (London: 1662) p. 254. Dr. Williams Library 2003. E.1.

[96]Cited by Philippe Aries, (1981), p. 364.

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[97] Willis, 1664, "Epistle Dedicatory"

[98] Roy Porter in seminar "Religion and Medicine", UCSF History of Health Sciences, Spring 1990.

[99]Willis, 1664, "Epistle Dedicatory."

[100]Willis, 1672, "Preface to the Reader".

[101]Willis, 1667, "Epistle Dedicatory."

[102]ibid.

[103]Literature on Sheldon and the Anglicans during the period 1640-1660 is scarce. See Victor D. Sutch, *Gilbert Sheldon, Architect of Anglican Survival, 1640-1675.* (The Hague: Martinus Niijhoff, 1973). p. 84..

[104] ibid, p. 88.

[105] For a detailed narrative, see "The Restoration" in ibid.

[106]"I do here...solemnly vow...if it shall please his divine Majesty...to restore me...in my throne...I will wholly give back to his Church...any land so ever I now...enjoy which hath been taken away...." Lambeth MSS, #943.

[107] *The Diary of Samuel Pepys* (1633-1703) I, 322. (London, 1825).

[108] Edward Reynolds, "The author and subject of Healing in the Church" 25/04/1660 (Wellcome Institute, London #43779/B).

[109] Edward Reynolds 30/04/1660, p. 6 (Wellcome Institute, London. #43779/B).

[110]Edward Stillingfleet, 13/03/1667 p. 18. (Lambeth #5133).

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[111]Robert South, "Wisdom and Pleasure", 1665. (Lambeth #5133).

[112]John Sudbury, 28/10/1660, pp. 32-33. (Dr. Williams Library, London. #12.55.12(4)).

[113]Seth, Lord Bishop of Salisbury, "The Christian Victory over Death", 30/04/1670 p. 17 (Wellcome Institute, London. #34023/B/1.)

[114] op. cit. , p. 263.

[115]James II reigned 1685-1688.

[116]John Fell 22/12/1680. pp. 3, 13. (Dr. Williams Library, London; #12.55.12.(4).

[117] See E.A.R. Brown, op. cit., p. 267.

[118] See Herzog, op. cit., pp. 186-189.

[119] Cited by Christopher Hill, "The Medical Profession and Its Radical Critics", *Change and Continuity in Seventeenth Century England* (London, 1974). p.160.

[120] See Sutch, op. cit., "The Restoration."

[121]Willis, 1664, p. 91.

[122]Ibid., p. 91.

[123] Roy Porter, seminar on "Religion and Medicine". UCSF History of Health Sciences, spring 1990.

[124] Having said this, I should note Dewhurst's statement that *Rational Therapeutics* outsold Sydenham's *Observationes Medicae* until long after the latter's death in 1689. See Kenneth Dewhurst, *Dr. Thomas Sydenham,* (Berkeley: University of California Press, 1966). p. 58.

[125] Richard Blackmore, *A Treatise upon the Smallpox* (1723), p. xi.

[126] After 1676 there were nine editions of Willis's *Opera Omnia* published, as well as inexpensive small-format editions of his various works, printed mainly in the Netherlands. Nine editions of *Cerebri Anatome* were published. Pordage's English editions of Willis's works were published in 1681 and 1684. (see "Bibliographic Survey" in the McGill University Press tercentary edition of *Cerebri Anatome* (1975)).

[127] See G.S. Rousseau, "Nerves, Spirits, and Fibres: Towards Defining the Origins of Sensibility," *Studies in the Eighteenth Century v. 3* (Canberra, Australian National University Press, 1976) pp. 146, 150-151.

CHRONOLOGY OF WILLIS' PUBLISHED WORKS

All of the text citations are to Pordage's 1684 English translation of Willis's works (See below).

1650-1652 *Oxford Casebook,* translated and edited by Kenneth Dewhurst (Oxford: Sandford Publications, 1981).

1659 *Diabribae duae medicophilosophicae.*

1664 *Cerebri Anatome* (London). illustrated by Christopher Wren
Oxford Lectures, transcribed by Richard Lower and John Locke,translated and edited from their Latin by Kenneth Dewhurst (Oxford: Sandford Publications, 1980)

1667 *Pathologiae Cerebri et Nervosi Generis Specimen* (London).

1670 *Affectionum Quae Dicuntur Hystericae et Hypochondriacae Exercitationes Medico-Physicae Duae...De Sanguinis Accesione, DeMotu Musculari. (London).*

1672 *De Anima Brutorum* (London)

1674 *Pharmaceutice Rationalis* (first part)

1675 *Pharmaceutice Rationalis* (second part) published posthumously by his brother-in-law, Bishop John Fell D.D.

1684 Samuel Pordage published his translation of Willis' collected works as *Dr. Willis's Practice of Physick, being the whole Works of that Reknowned and Famous Physician: containing These Eleven Several Treatises, viz. I. Of Fermentation. II.Of Feavers. III. Of Urines. IV. Of the Accension of the Blood. V. Of Musculary Motion. VI. Of the Anatomy of the Brain. VII. Of the Description and Use of the Nerves. VIII. Of Convulsive Diseases. IX. Pharamaceutice Rationalis, the First and Second Part. X. Of the Scurvy. XI. Two Discourses concerning the Soul of Brutes.* (London, printed for T. Dring, C. Harper, and J. Leigh).

BIBLIOGRAPHY

Biographical Sources:

Dewhurst, Kenneth, "Thomas Willis and the Foundations of British Neurology" in *Historical Aspects of the Neurosciences* ed. F. Clifford Rose and W.F. Bynum (New York: Raven Press, 1982)

----------"Thomas Willis as a Physician" Los Angeles, William Andrews Clark Mem. Library Seminar Paper, 1964

Fox Bourne, H.R., *The Life of John Locke* (London: Henry S. King & Co. , 1876, 2 vol.)

Frank, Robert G., "Thomas Willis", entry in*Dictionary of Scientific Biography*

Isler, Hansreudi, *Thomas Willis 1621-1675* (New York: Hafner, 1968)

Oxford in the Seventeenth Century:

Cope, Jackson L. "Evelyn, Boyle and Dr. Wilkinson's Mathematicao-Chymico-Mechanical School", *Isis* , 1957, 50:30-32

Frank, Robert G., Jr. *Harvey and the Oxford Physiologists: A Study of Scientific Ideas*. (Berkeley: UC Press, 1985)

----------"John Aubrey FRS, John Lydall, and Science at Commonwealth Oxford," *Notes Rec. R. Soc. London*, Vol. 27 (1973), pp. 193-217

---------- "The John Ward Diaries: Mirror of 17th-Century Science and Medicine," *J. His. Med* 29 (1974), 147-179

----------"Thomas Willis and his Cirlcle: Brain and Mind in Seventeenth-Century Medicine," (to be pulished in: Mind and Body in the Enlightenment (Berkeley: U of California Press) G.S. Rousseau, ed.

Hargreaves-Mawdsley, W.N., *Oxford in the Age of John Locke,* (Norman:University of Oklahoma Press, 1973)

Shapin, Steven and Shaffer, Simon, *Leviathan & the Air Pump* (Princeton: Princeton U. Press, 1985)

Shapiro, Barbara, John Wilkins 1614-1672. (Berkeley: University of California Press, 1969)

Sinclair, H.M., "Oxford Medicine", *Medicine in Seventeenth Century England* , ed. by Allen Debus (Berkeley: UC 1974)

Webster, Charles, *The Great Instauration* (London: Duckhorn, 1975)

Wood, Anthony. *Athenae Oxoniensis: An exact history of all the writers and bishops sho have had their education in the Univeristy of Oxford,* new ed., philip Bliss (London: Rivington, 1813-1820).

Primary Sources (in addition to the works of Thomas Willis listed above):

Anonymous, *Commonplace Books from 1660's*, Wellcome Mss. 1744, 1742, 1741, 1740.
----------"Post Mortem on First Earl Stair (John Dalrymple 1648-1707)", (London: Royal College of Physicians, Mss 108/44, 1707.

Bacon, Francis, *The Advancement of Learning* (1605), (London: World Classics Edition, 1951)
---------- , *The Great Instauration*
----------, *The New Atlantis*

Burton, Robert, *The Anatomy of Melancholy*, (Oxford, 1621)

Charleton, Walter, "Doctor in Physick & M.D. to Charles II", *The Darkness of Atheism dispelled by the light of Nature, a physico-theological treatise*, (London, 1652) Wellcome Institute.

Culpepper, Nicholas, *A Directory for Midwives or a Guide for Women*, (London, 1651: Wellcome 19311/A; 8vo.)
----------(translator) *Galen's Art of Physick*, (London, 1652: Wellcome 23859/A; 8vo.)
----------(translated from Latin with Abdiah Cole, M.D., & Wm. Rowland, Physitian), *Practice of Physick of Lazar Riviere*, (London, 1655) Note: title page says 15,000 copies in print) Wellcome 44145/C.
----------(translated from Latin), *A New Method of Physick, or a short view of Paracelsus & Galen's Practice in three treatises by Simeon Partilicius* (Simon Partliz)

Fontanus, Nicholas, *The woman's Doctour, or an exact and distinct explanation of all such Diseases as are peculiar to that Sex with Choice and Experimentall Remedies against the same.* (London, 1652) Wellcome 22842/A. 8vo.

Griswold, J. (printer), *A New Almanack*, (London, 1665) Royal College of Physicians Mss 643; 8vo.

Harvey, William, *De Motu Cordis et Sanguinis*, (London, 1628)
---------- *Anatomical Exercitations concerning the generation of Living Creatures*, (London: James Young, printer, 1653) Wellcome 27836/B/1.

Highmore, Nathanial, *History of Generation*, examining the several opinions oof diverse authors especially that of Sir Kennelm Digby in his Ciscourses on Bodies with a general Relation of the manner of Generation as well as Plants as animals...to which is joined a Discourse on the cure of wounds by sympathy. (London, 1651) dedicated to Robert Boyle.
----------*De Hysterica et Hypochondriaca Passione*, (London: Robert Clavel, 1670). translated by Richard Trapp, Chair, Department of Classics, San Francisco State University, 1989 (unpublished). title translated as, *Concerning Hysterical and Hypochondriacal Disease, an Epistolary Response to Doctor Willis the Celebrated London Physician.*

Hutton, John "and others", "Report on Dissection William III", (London: Royal College of Physicians, Mss 108/43) 1702.

Jordan, Edward, M.D., *A Brief Discourse of a Disease Called the Suffocation of the Mother*, (London, 1603) Lambeth Palace Library.

Mayerne, Thomas (Sir Theodore Turquet, 1573-1655) *Casenotes* (in Latin), London: Royal College of Physicians Mss 444. 406pp.

Philosophical Transactions of the Royal Society (vol. 1-7)

Royal College of Physicians *Annals* 1659-1680.

Sloane, Sir Hans & Wm. Cowper, "Post-Mortem Marquess of Tavistock, age 19 weeks. infant sone of second Duke of Bedford." (London: Royal College of Physicians Mss 108/1.2)

Ward, John, *Diaries*, 1647-1673. 16 notebooks 5" X 3" approx. Typescript & transcription by Sir D'Arcy Power for Medical Society of London 1920. Originals in Folger Library, Washington, D.C. Typescript in Wellcome Institute, London.

Warner, Walter, "Notes on Physiology" (in English), (London: Royal College of Physicians, Mss 108/46.)

Secondary Sources:

Aylmer, G.E. "Unbelief in Seventeenth-Century England," in *Puritans and Revolutionaries: Essays in Seventeenth-Century History Presented to Christopher Hill*, ed. Donald Pennington and Keith Thomas, pp. 22-46 (Oxfrod: Clarendon Press, 1978)

Bates, Don G. "Thomas Willis and the Fevers Literature of the Seventeenth Century", *Medical History*, Supplement No. 1, 1981:45-70

Boss, Jeffrey M.N. "The seventeenth-century transformation of the hysteric affection, and Sydenham's Baconian medicine", *Psychological Medicine*, 1979, 9, 221-234.

---------- "The Relation of clinical to non-clinical medicine according to Thomas Sydenham (1624-1689)" in Vol. 21, *History of Physiology*, ed. E. Schultheisz (Budapest: Pergamon Press, 1980: proceedings of the 28th International Congress of Physiological Sciences.)

Brain, The Rt. Hon Lord. "The concept of hysteria in the time of William Harvey", *Proceedings Royal Society of Medicine*, vol. 56, April, 1963: 317-324

Brazier, Mary A.B., *History of Neurophysiology in the 17th* and *18th Centuries*, ((New York: Raven Press, 1984)

Brown, Theodore M., "Physiology and the mechanical philosophy in mid-seventeenth century England", *Bull. Hist. Med.*, 51:25-54

----------"The College of Physicians and the acceptance of iatromechanism in England, 1665-1695", *Bull. Hist. Med.*, 46:13-30

----------"Descartes, dualism, and psychosomatic medicine", in *Mind-Forged Manacles*, ed. Roy Porter, (Cambridge, Mass: Harvard University Press, 1987).

Burke, John. *Uses of Science in the Age of Newton* (Berkeley: U.C. Press, 1983)

Burtt, Edwin Arthur, *The Metaphysical Foundations of Modern Physical Science,* (London:Routledge & Kegan Paul Ltd., 1924)

Butterfield, Herbert, Origins of Modern Science, (London: Bell, 1957)
---------- "The history of science and the study of history", *Harvard Library Bulletin,* (1959), 329-347.

Bynum, W.F. and Rose, F.C., ed., *Historical Aspects of the Neurosciences* (New York: Raven Press, 1982)
---------"Anatomical Method, Natural Theology and Function of the Brain", *ISIS,* 1973:64, 445-468
---------and Porter, Roy, eds., *William Hunter and the Eighteenth-Century Medical World,* (Cambridge: Cambridge University Press, 1985)

Cohen, L. Jonathan, "Some historical remarks on the Baconian conception of probability", *J. of the History of Ideas,* 41: 219-247

Clarke, Edwin, and O'Malley, C.D. *The Human Brain and Spinal Cord* (Berkeley: UC Press, 1968)

Conant, James Bryant. *On Understanding Science: An historical Approach.* (Oxford: Oxford University Press, 1947)

Cook, Harold J. *The Decline of the Old Medical Regime in Stuart London.* (Ithaca: Cornell University Press, 1986)

Cooke. A.M., "Sir Hans Sloane and the Philosophical Transactions", *J. of the Royal College of Physicians of London,* vol. 18, no. 3: 170-171.

Cranefield, Paul F., "A seventeenth century view of mental deficiency and schizophrenia: Thomas Willis on "Stupidity or Foolishness"", *Bull. Hist. Med.,* 35: 4: 291-317.

Davis, Audrey B., *Circulation Physiology and Medical Chemistry in England 1650-1680,* (Coronado Press, 1973)

Debus, Allen G., *The Chemical Philosophy: Paracelsian Science and Medicine in the Sixteenth and Seventeenth Centuries,* 2 vols. (New York: Science History Publications, 1977)
----------*The English Paracelsians.* (London: Oldbourne, 1965)
----------*Man and Nature in the Renaissance,* (Cambridge:Cambridge University Press, 1978).

Farrington, Benjamin. *The Philosophy of Francis Bacon.* (Liverpool: Liverpool University Press, 1970)

French, Roger and Wear, Andrew, eds., *The Medical Revolution of the Seventeenth Century,* (Cambridge: Cambridge University Press, 1989)

Frost, Kate, "Prescription and devotion: the Reverend Doctor Donne and the learned Doctor Mayerne--two seventeenth-century records of epidemic typhus fever", *Medical History,* 1978, 22:408-416.

Gibson, Alexander George, *The Physician's Art: an attempt to expand John Locke's fragment De Arte Medica,* (Oxford: Clarendon Press, 1933).

Gillespie, Neal C., "Natural History, Natural Philosophy & Social Order: John Ray & "Newtonian Idealogy", *J. Hist Biol.* 1987; 20:1-49

Gittings, Clare. *Death, Burial and the Individual in Early Modern England.* (London: Croome Helm, 1984)

Hall, A. Rupert., *The Revolution in Science 1500-1750.* (London: Longman, 1983)
----------, "On the historical singularity of the scientific revolution of the seventeenth century", in *The Diversity of History: Essays in honour of Sir Herbert Butterfield,* ed, J.H. Elliott & H.G. Konigsburg, (London, 1970)

Hall, Marie Boas. "The Establishment of the Mechanical Philosophy," *Osiris* 10 (1952), 412-541
----------*Robert Boyle and Seventeenth Century Chemistry.* (Cambridge: Cambridge University Press, 1958)
----------"Solomon's House Emergent" The Early Royal Society and Cooperative Research," in *The Analytic Spirit: Essays in the History of Science in Honor of Henry Guerlac,* ed. Harry Woolf, pp. 177-194. (Ithaca: Cornell University Press, 1981)

Herzog, Don. *Happy Slaves: a critique of consent theory.* (Chicago: University of Chicago Press, 1989)

Hill, Christopher. *Intellectual Origins of the English Revolution.* (Oxford: Oxford University Press, 1965)
----------*Change and Continuity in Seventeenth-Century England* (Cambridge, Mass: Harvard University Press., 1975)

Hunter, Michael. "Ancients, Moderns, Philogists, and Scientists," *Ann. Sci.* 39 (1982), 187-192
----------"The Debate over Science," in *The Restored Monarchy, 1660-1688,* ed. J.R. Jones, pp. 176-195 (London: Macmillan, 1979)
----------*The Royal Society and Its Fellows 1660-1700: the Morphology of an Early Scientific Institution.* (Chalfont St. Giles: British Society for the History of Science, 1982)
----------*Science and Society in Restoration England.* (Cambridge: Cambridge University Press, 1981)
----------"Reconstructing Restoration science: problems and pitfalls in institutional history", *Social Studies of Science,* Vol. 12 (1982), 451-466.

Hutchison, Keith. "Supernaturalism and the Mechanical Philosophy," *Hist. Sci.* 231 (1983), 297-333

Isler, Hansreudi, "Thomas Willis's two chapters on Headache of 1672: a first attempt to apply the "new science" to this topic", *Headache,* 1986, Feb. 26 (2):95-98

Jacob, Margaret C. *The Newtonians and the English Revolution, 1689-1720.* (Ithaca: Cornell University Press, 1976)

Jardine, Lisa. *Francis Bacon: Discovery and the Art of Discourse.* (Cambridge: Cambridge University Press, 1974)

Jewson, Norman D., "Medical Knowledge and the Patronage System in 18th Century England", *Sociology* 8, 3, (1974) 370-385.

----------"The Disappearance of the sick-man from medical cosmology, 1770-1870", *Sociology*, 10,2, (1976), 225-244.

Kaplan, Barbara, *Medical Writings of Robert Boyle: Medical Philosophy in Mid-Seventeenth Century England*, (Baltimore: U. of Maryland, 1979)

Koyre, Alexander, "Galileo & Plato", *J. Hist. Ideas*, 4 (1943): 400-428.

---------- "Galileo's treatise De Motu Gravium: the use and abuse of imaginary experiment", *Revue d'Histoire des Sciences 13* (1960): 197-245.

----------*Newtonian Studies*, (London: Chapman & Hall, 1965).

---------- "Galileo & the Scientific Revolution of the seventeenth century", *Philosophical Review*, 52 (1943): 333-348

Kuhn. Thomas S., *The Copernican Revolution*. (Cambridge, Mass: Harvard University Press, 1957.)

Lokhorst, G.J., "The oldest printed text on hemispheric specialization.", *Neurology*, 1982:Jul: 32 (7):762

Macdonald, Michael. "Religion, Social Change and Psychological Healing in England," *Stud. Church Hist.* 19 (1982), 101-126

Meier, R.Y., ""Sympathy" in the Neurophysiology of Thomas Willis", *Clio Med*, 1982 Dec., 17(2-3):95-111

---------""Sympathy as a Concept in early Neurophysiology", Ph.D. thesis, U. of Chicago, 1979

Mendelsohn, Everett, "The changing nature of physiological explanation in the seventeenth century", in *L'Aventure de la Science*, (Paris, 1964, vol. 1, 368-386)

Merton, Robert K., "Science, Technology and Society in Seventeenth Century England", *Osiris* IV, 1938: 360-567.

Meyer, Alfred and Hierons, Raymond, "On Thomas Willlis's Concepts of Neurophysiology", *Medical History* 9 (1965)

Miles, M.L., "Psychophysical Union: the problem of person in Descartes", *(Canada)* 1983; 22:23-46

Mulligan, Lotte and Glenn, "Reconstructing Restoration science: styles of leadership and social composition of the early Royal Society", *Social Studies of Science*, Vol. 11 (1981), 327-364

Nakai, Hisao, "The European witch-craze as viewed by an Asian psychiatrist", in *History of Psychiatry*, ed. Teizo Ogawa, (Japan: Taniguchi Foundation, 1979, pp.47-63)

Ohashi, Hiroshi, ""Psychiatry" of Paracelsus", in *History of Psychiatry*, ed. Teizo Ogawa, (Japan: Taniguchi Foundation, 1979, pp. 27-45)

Osler, Margaret J., and Farger, Paul Lawrence Farber, *Religion, science, and worldview: essays in honor of Richard S. Westfall,* (Cambridge: Cambridge University Press, 1985)

Pagel, Walter, "Medieval and Renaissance Contributions to Knowledge of the Brain and Its Foundations, " in F.N.L. Poynter, ed., *The Brain and Its Functions* (Oxford: Blackwell, 1958)

--------"Van Helmont's Concept of Disease: To Be or Not To Be," *Bull. Hist. Med.,* 1972, 46:419-454

---------"William Harvey's conception of the heart as a pump," *Bull. Hist. Med.* 39 (1965) 508-511

Petryszak, Nicholas G., "Tabula Rasa--its origins and implications", *J. of the Behavioral Sciences,* 17 (1981): 15-27.

Porter, Roy, ed,, *Mind-Forged Manacles,* (Cambridge: Harvard University Press, 1987)

----------see also texts edited with W.F. Bynum, G.S. Rousseau, and A. Wear listed separately.

Rather, L.J., "Pathology at mid-century: a reassessment of Thomas Willis and Thomas Sydenham", in *Medicine in Seventeenth Century England,* ed. by Allen Debus, (Berkeley: U. of California Press, 1974).

Reeves, Joan Wynn, *Body and Mind in Western Thought,* (Middlesex, England: Penguin, 1958)

Richardson, Ruth. *Death, Dissection and the Destitute.* (London: Routledge & Kegan Paul, 1988)

Risse, Guenter, *Hospital Life in Enlightenment Scotland,* (Cambridge: Cambridge University Press, 1986)

---------- "Hysteria at the Edinburgh Infirmary: the construction and treatment of a disease, 1770-1800", *Medical History,* 1988, 32: 1-22.

----------"History of Therapeutics", Wellcome Conference on the History of Therapeutics, London, 1989.

Roberts, R.S., "The personnel and practice of medicine in Tudor and Stuart England", *Medical History,* 1962, 6: 363-382.

Rogers, G.A.J. "Descartes and the Method of English Science," *Ann. Sci.* 29 (1972), 237-255

Rousseau, G.S., "Nerves, Spirits, and Fibres: Towards Defining the Origins of Sensibility", *Studies in the Eighteenth Century,* v.3, Brissendan and Eade (eds) (Canberra: Australian National Univ. Press, 1976)

---------- and Porter, Roy, eds., *The Ferment of Knowledge: studies in the historiography of eighteenth-century science,* (Cambridge: Cambridge University Press, 1980)

Shapiro, Barbara. *John Wilkins 1614-1672.* (Berkeley: University of California Press, 1969)

---------- *Probability and Certainty in Seventeenth-Century England: A Study of the Relationships between Natural Science, Religion, History, Law, and Literature.* (Princeton: Princeton University Press, 1983).

Spillane, John D., *The Doctrine of the Nerves*, (Oxford: Oxford University Press, 1981)

Stone, Lawrence. *Social Change and Revolution in England 1540-1640.* (London: Longman, 1965, 1980)

---------- *The Causes of the English Revolution 1529-1642.* (London: Routledge & Kegan Paul Ltd., 1972)

---------- and Jeanne Fawtier Stone. *An Open Elite? England 1540-1880.* (Oxford: Clarendon Press, 1984)

Thomas, Keith. *Religion and the Decline of Magic.* (Harmondsworth: Penguin, 1973)

Tomaselli, S., "The first person: Descartes, Locke & Mind-Body Dualism" *His Sci* 1984; 22 (pt 2) 185-205

Webster, Charles, *The Great Instauration* (London: Duckworth, 1975)

----------"English Medical Reformers of the Puritan Revolution: A Background to the Society of Chymical Physitians'," *Ambix* 14 (1967), 16-41

---------- editor, *The Intellectual Revolution of the Seventeenth Century,* (London: Routledge & Kegan Paul, 1974)

----------"The College of Physicians: "Solomon's House" in Commonwealth England", *Bull. Hist. Med.* 1967, 41:393-412.

Wear, Andrew., "Perception of Pain in 17th Century England", *Soc. Soc. Hist Med Bull* (London) 1985 Jun 36:7-9

----------, R.K. French & I.M. Malone (eds.), *The Medical Renaissance of the Sixteenth Century,* (Cambridge: Cambridge University Press, 1985).

----------, R.K. French, (eds.), *The Medical Revolution of the Seventeenth Century.* (Cambridge: Cambridge University Press, 1989).

Westfall, Richard, *Construction of Modern Science,* (New York: Wiley, 1971)

Zilsel, Edgar, "Genesis of the Concept of Physical Law", *Philosophical Review,* 51 (1942): 245-275.

ANGLICAN SERMONS, GUIDES TO PREACHING & RELIGIOUS TEXTS

Primary Sources:

Boyle, Robert, *Some Motives and Incentives to the Love of God,* (London: 2nd ed. 1661) Wellcome 14987/A

Casaubon, Meric, D.D., *A Treatise Concerning Enthusiasme as an Effect of Nature but is mistaken by many for either Divine Inspiration, or Diabolical Possession,* (London, 1656) Wellcome 16942/A

Charles II, *Directive from Charles II Concerning Preachers,* 14/10/1662. (Lambeth Palace Library)

Fell, John (Bishop of Oxford and brother-in-law of Willis), *The Life & Death of The Reverend Divine & excellent historian Dr. Thomas Fuller*, (Oxford, 1662) Dr. Williams Library 12.50.1 (16)

---------, *The Life of the most learned reverend & pious Dr. H. Hammond* (1605-1662), (London, 1662) Dr. Williams Library 2003. E. 1.

---------Sermon before the House of Peers 22/12/1680 on the evils of schism. (Oxford, 1680) Dr. Williams Library 12.55.12 (4).

Lamb, John M.A., Sermon before Lord Mayor London on Palm Sunday, 23/3/1673. Purpose: "to fix this truth...that Christianity is highly reasonable." (Lambeth Palace Library 5133/919)

Reynolds, Edward D.D. (Dean of Christ Church, Oxford), Sermon before Parliament at St. Margaret/s Church, Westminster 25/04/1660. "The Author and subject of Healing in the Church." (London, 1660) Wellcome 43779/B.

Seppens, R., Rex Theologus. *The Preacher's Guard & Guide in the Didactical Part of his Duty or A vindication.....*, (London, 1664) Lambeth Palace Library GH 210. S3.

Seth, Lord Bishop of Salisbury, "The Christian Victory over Death, a sermon at the Funeral of the most Honourable George, Duke of Albermarle" delivered 30/04/1670 at Collegiate Church of St. Peter's, Westminster. (London, 1670, J. Collin printer) Wellcome 34023/B/1.

South, Robert, (Chaplain to Lord High Chancellor) "Wisdom & Pleasure", a sermon preached at Oxford before the Court in 1665. (Lambeth Palace Library H 5 133 919)

Stillingfleet, Ed., (Chaplain in ordinary to Charles II) Sermon preached before his Majesty 13/03/1667. (Lambeth Palace Library H5133 919)

Sudbury, John, "A Sermon preached at the concsecration of Right Reverend Father in God Gilbert Sheldon, Lord Bishop, Humphrey, Bishop of Salisbury, George, Bishop of Worcester, Robert, Bishop of Lindolne, George, Bishop of St. Asaph". delivered 28/10/1660 at St. Peter's, Westminster. Dr. Williams Library 12.55.12 (4).

Wilkins, John (Bishop of Chester), *Ecclesiastes, or a Discourse concerning Gift of Preaching*, (London, 5th ed., 1669) Lambeth Palace Library G4210.

Secondary Sources:

Richardson, Caroline Frances, *English Preachers & Preaching 1640-1670*, (London: Society for Promoting Christian Knowledge, 1928)

Sutch, Victor D., *Gilbert Sheldon, Architect of Anglican Survival, 1640-1675.* (The Hague: Martinus Nijhoff, 1973)

ADDITIONAL:

Abbott, Andrew. *The System of the Professions.* (Chicago: University of Chicago Press, 1988)

King, Gregory. "Natural and Political Observations and Conclusions upon the State and Condition of England", (London, 1696)

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