Grafton State Hospital: Supporting Human and Animal Health Care

An Interactive Qualifying Project Report submitted to Cummings School of Veterinary Medicine at Tufts University and the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements of the Degree of Bachelors of Science by

Samantha Bullock

John Davis

Jennifer LaPierre

Artem Kutikov

Alexander Wack

Key Words:
1. Grafton State Hospital
2. Psychiatry
3. Cumming School of Veterinary Medicine at Tufts University

March 6, 2009

Professor Eric W. Overstrom: Advisor

Abstract

During the 20th century, society's approach to addressing the mental health concerns was to confine patients at regional State Hospitals for treatment and rehabilitation. Grafton State Hospital is an example of the application of technology and engineering of the early 1900's to construct facilities that addressed society's need to manage mental health care for about 75 years. In Grafton today, many of these same facilities support animal health education, research and clinical care activities as Tufts Cummings School of Veterinary Medicine. This project explores the technological and engineering basis of these facilities and reveals the repurposing of these historic structures to provide modern veterinary education, research and health care. In order to convey this historical information to a broad modern audience, an interactive media kiosk was developed and implemented.

Acknowledgments

We would like to thank the staff of the Cummings School of Veterinary Medicine at Tufts University. Dean Deborah Kochevar was the main external sponsor for this project and without her the project would not have been so successful. We would also like to thank Joe Chilton, the Director of Facilities, for sharing his infinite knowledge of the campus' history. He was instrumental in our research. Margaret Branschofsky, the Director of Library Services & Information Technology, also assisted the group throughout the entire project, contributing research sources and ideas. We would like to thank the senior staff for their support and for allowing us to display the kiosk, which highlights aspects of our project. The senior staff includes: Dean Deborah Kochevar, Dr. Angie Warner, Dr. Steve Rowell, Dr. Sawkat Anwer, Mr. Joe McManus, Dr. George Saperstein, Dr. John Berg, Dr. Art Donohue-Rolfe, Dr. John Rush, Dr. Patrick Skelly, Ms. Shelley Rodman, Mr. Tom Keppeler, Ms. Lois Colburn, Ms. Margret Branchofsky, Ms. Barbara Berman, and Shira DuLong. In addition, we would like to acknowledge Dr. Nicolas Dodman, Head of the Behavioral Department, for his participation in our project and assistance.

We would like to thank the staff of the Grafton Historical Society and namely Linda Casey for their assistant. The staff of the Grafton Public Library was also endlessly helpful in the research for our project.

Lastly we would like to thank Professor Eric W. Overstrom, Head of the Department of Biology & Biotechnology at WPI and Eileen Dagostino, his administrative assistant. Mrs. Dagostino assisted us in the purchasing of the hardware for the kiosk. Professor Overstrom was the primary advisor of this project. His support and guidance made this project possible.

Authorship Page

Introduction: Samantha Bullock, John Davis, Artem Kutikov, Jennifer LaPierre, Alexander Wack

The Socio-Political History of Mental Health Care: John Davis

The Transition from Restraint to Therapy: Artem Kutikov Grafton State Hospital

- Overview: Samantha Bullock
- Architectural Analysis: Alexander Wack

The National Trend to Close State Mental Hospitals: Samantha Bullock Modern Medical

Treatments for Mental Illness: Samantha Bullock

The Introduction of Psychopharmacology: Jennifer LaPierre

Psychopharmacology in Animal Medicine: Jennifer LaPierre

Treating of Animal Mental Illness: The Prozac Example: Jennifer LaPierre

Present Day Treatment of Animal Mental Illness: Jennifer LaPierre

Conclusion: Samantha Bullock, Artem Kutikov, Jennifer LaPierre, Alexander Wack

Kiosk: Samantha Bullock, John Davis, Artem Kutikov, Jennifer LaPierre, Alexander Wack

Table of Contents

Table of Figures

Introduction

How we define and care for the mentally and physically disabled has changed immensely over the past century. In the early 1700's the mentally ill were rarely acknowledged as full members of society, and relegated to the care of families and occasionally to local communities. Over the next centuries the rights and treatments of the mentally ill began to evolve towards a more liberal dogma (Gray, 2008). Institutions began to be developed in order to create a "perfect" atmosphere, removed from what were viewed as the corrupting aspects of evolving society. Grafton State Hospital opened in 1901, during an emergence of the science and technology of diagnosis and treatment of the mentally ill. Affected individuals were removed from the general population and placed in asylum environments designed to treat their symptoms and possibly cure their underlying conditions.

During the 20th century a gradual reformation of the care and theory behind treating patients took place. When Grafton State Hospital began to treat patients, methods such as hydrotherapy and shock therapy were considered the most effective treatments. However as time progressed forward, the scientific evidence behind these treatments moved backwards. Psychopharmacology was in its infancy and gradually emerged as the prominent treatment of the mentally ill. Fewer patients needed to be restrained and confined; allowing patients to be released back into the general public and treated under the supervision of their families. As the number of patients needing to be confined began to decrease as did the need for mental institutions themselves.

One of the first institutions to shut down was Grafton State Hospital, closing its doors to human patients in the 1970s. Just a couple of years later Tufts University purchased the Grafton

State Campus from the Commonwealth under the stipulation that the campus would be used for the creation of a veterinary school. Over the last 30 years Cummings school of veterinary medicine at Tufts University has made significant changes and additions to the site. Whenever possible Tufts has renovated buildings left over from the Grafton Era to suite the new needs of the veterinary school. Such renovations include the Administration Building, the Auditorium, the Nurse's Dormitories and the Food Service buildings. At the same time, whenever the existing structures could not suite the veterinary school's needs, new buildings have been added to the campus. Some prime examples are the Henry and Lois Foster Hospital for Small Animals and The Equine and Farm Animal Hospital, the Auditorium on the back of the Agnes Varis Campus Center and a multitude of animal barns.

A century after the opening of Grafton State Hospital, buildings originally used to treat and house human patients now serve to treat and rehabilitate animal patients. The Cummings School of Veterinary Medicine at Tufts University is now a leader in the field of veterinary medicine; especially the Animal Behavior Clinic in the Department of Clinical Sciences, which is considered to be a leader in the study of animal behavior. Medicine originally tested in animal models and used for human treatment is now being re-purposed and used to treat mental illness in animals. The treatment of mental illness in animals is still in its infant stages, similar to that of the treatment of mental illness in humans during the time period when Grafton State Hospital was in full operation.

The Socio-Political History of Mental Health Care

Overview

The socio-political history of the treatment of the mentally ill is that of a cycle beginning with familial and local care. Eventually evolving to a state and federal level of care before deinstitutionalization eventually led back to smaller, local care centers. Throughout the Colonial period the common perception was that mental illness was simply another form of poverty; no classifications were developed and no treatments were generally considered. Any care that was provided came from families and was rarely regulated to any significant degree. As social views began to evolve in the beginning of the 19th century, so did the attitudes towards the mentally ill. This prompted an increase in governmental involvement, first in smaller local legislatures and eventually at the state level. Eventually the systems developed by the states, the asylum system, began to collapse due to a number of economic and social factors. This was partially replaced at the turn of the 20th century by centers focusing on treatments or "cures" such as research hospitals. At this point federal government took control of the vast majority of the regulatory responsibility for these systems. However even these systems began to lose support as the number of chronic cases, and therefore patient populations, remained relatively high. Thus the system evolved into what it is today; a small number of research institutions and asylums with limited federal funding. More private local care centers exist now, proportionally to the population, than at any other time in history.

Early Care and Treatment

Specialized care of the mentally ill in the 18th century was virtually non-existent. This was mainly due to two social factors as well as the small rural population. The first factor was the belief in a social order, or more specifically a 'natural hierarchy'. Based on this belief, "poverty and illness were considered to be natural components of the hierarchical social/religious order" (Jenkins, 1992). This belief was influenced by the religious institutions that pervaded every aspect of life during the early colonial period. "Thus, the poor and ill were cared for by family and friends where possible, or by the town when these supports were lacking…" (Jenkins, 1992). The other important sociopolitical factor was that there were no systems of classification in place to separate the mentally ill from the poor. "[The current social attitude] did not differentiate between various types of misfortune but encompasses all under the heading of poverty; it accepted misfortune as part of the natural order and did not attempt to eradicate its causes…but dealt with the problem on a personal and local level" (Grob, 1994). Based on this, communities began to erect poorhouses and almshouses to shelter all citizens who fell under the label of 'poor.'

Due to both of these social factors, no records of care from this period can be found, nor do any important commentaries or descriptions of these methods of care. The poor were simply put somewhere out of the way and kept alive with the barest of necessities because they were not capable of providing for themselves. There was still the question of what to do with those "distracted" persons who had no family or could not contact them (Grob, 1994). Indeed, it was not rare for a "distracted" person to wander into a town and be unable to identify their home or family (Grob 1994). It was for situations such as these that many local

town officials created codes and laws which relegated some of the populous' resources towards the support of such individuals. In 1641, the first legal code adopted in the colonies, on a plantation in Virginia, contained a number of laws in reference to 'idiots' (Grob, 1973). It stated that, "Children, Idiots, Distracted persons, and all that are strangers, or new comers to our plantation, shall have such allowances and dispensations in any Cause whether Criminal or other as religion and reason require" (Grob, 1973). In 1694, a statute was passed in Massachusetts that stated the insane were to be treated as burdens of the community (Grob, 1994). Although these laws may appear to be an increase in state involvement, at this point they were echoing how the poor and insane were treated primarily in the colonies and in local communities. It was out of a religious sense of moral justice that the poor, the destitute, and the insane, had been taken care of by the community at large (Grob, 1994).

Social factors were also responsible for the stagnating attitude towards the evolution of forms of "treatment". Cures for the mentally ill were not generally considered a remote possibility or an important goal. The citizens who thought that cures existed believed that mental illness was not only a physical malady, treatments must involve a strange brew of religion, purging, astrology, and witchcraft. Richard Napier, a preeminent 'expert' in the mental illness field from 1597 and 1634, would often end his treatments with exorcisms or other religious or magic based incantations or ceremonies (MacDonald, 1981). These attitudes held true throughout the majority of the colonial era. However, changes in mental health care occurred rapidly during the end of the colonial era and the early years of the United States. It was thought by many during the time that the causes of insanity were not supernatural, but with certain moral excesses combined with physical illness (Jimenez, 1987). Solomon Williams

states “ignorance and perverse desires of the mind,” were the root causes (Jimenez, 1987). Many factors existed which accounted for this change, specifically a social revolution of rational thought, an expanding population, a transition to urbanization and industrialization, and a fundamental shift in what were regarded as the causes of mental illness (Grob, 1994).

The Rise of the Asylum

The expanding population of the young nation had an interesting effect that cannot be separated from the issues of urbanization and industrialization. As society began to move into increasingly crowded areas, the concentration of citizens with mental illness increased dramatically. Thus the small, local care which had been the mainstay of colonial America was no longer adequate to support the numbers of the insane. Although almshouses had been erected previously (in the mid 1600s) to deal with the poor and the infirm, it was not for over half a century later the first center partially dedicated to the treatment of mentally ill was established (Grob, 1994). In 1752 in Philadelphia, with the strain of a growing populous, a hospital for the care of the poor and the mentally ill was erected with the support of Dr. Thomas Bond and Benjamin Franklin. This and other hospitals of the day were not very similar to their modern day incarnations, but were more similar to almshouses (Franklin, 1754). New York quickly followed with a hospital of its own, and in 1773 the first dedicated mental health hospital was opened in Williamsburg, Virginia (Hening, 1809-1823). Despite this, it was not until the 1800’s that the population expanded to such a degree as to force the entire nation to re-evaluate its methods. There were few hospitals that specialized in the treatment of the mentally ill (Grob, 1994). This began to change with the increasing population of cities. In 1790, 8,000 citizens resided in the countries 8 cities. By 1850, this number had grown dramatically to 25 cities with

populations between 25,000 and 500,000 (U.S. Census, 1975; Weber, 1899). A counterpart to this urbanization was the rapid spread of enlightened ideals throughout the country.

The philosophical revolution which had the largest impact on the care of the mentally ill was called the Enlightenment. This philosophy, which began in Europe, radically altered the populace's view towards such questions as individual rights, reason, common sense, and self-governance. In accordance with these new ideas, people began to believe in the possible improvement of all men.

> The belief that the conquest of disease was only a matter of time, that perennial dilemmas of humanity – poverty, vice, and ignorance – could be minimized if not abolished, became popular. Faith in reason and science and in the ability of humanity to alleviate problems and change its environment slowly began to influence theories of insanity and prevailing practices. (Grob, 1994)

It was a combination of all of these new attitudes that left the largest impact on the care of the mentally ill. For the first time, large numbers of citizens desired to know what the root causes of mental illness were (Grob, 1973). This would allow for treatments to be developed based on probable cause, as opposed to the colonial habit of simply providing basic necessities to those in need (Grob, 1973). This attitude necessitated and precipitated categorization of various types and severities of mental illness in order to determine the best possible course of treatment (Grob, 1973). Several theories were developed, however it was widely believed during this time that the root cause of mental illness was a break from the traditional values of society, perhaps due to religious fanaticism, unrequited love, or extreme disappointment to name a few (Grob, 1994).

These shifting attitudes led towards a single conclusion: the creation of a "perfect" environment removed from the general public in order to evaluate and pursue treatment of the

mentally ill. In 1818, the first true asylum was the 'insane ward' of the Massachusetts General Hospital opened in Charlestown and was separated from the rest of the hospital (Grob, 1994). The most important aspect of this hospital however, was that its development was led (if not entirely funded) by the state as opposed to the community. In 1801, Jedidiah Morse, a conservative minister in Massachusetts, was the first to request the creation of a mental hospital from the General Court (Grob, 1994). His cry was echoed years later by such prominent physicians as John Collins Warren and James Jackson (Grob, 1994). The General Court responded with a challenge: if $100,000.00 could be raised in private donations for the hospital, the court would provide a $20,000.00 private estate, paid for with public funds, for the asylum (Rothman, 1971). The funds were finally raised in1817, and the asylum opened its doors in 1818 (Bowditch, 1872). At the same time Quakers in Philadelphia were fundraising for a similar project, this one based on Quaker asylums that had become popular in England , and opened its own asylum in 1817 (1814). This trend of political organization coupled with private funding continued, with asylums appearing in Connecticut, New York, and Virginia. The process continued, and, "…within several decades a broad consensus had had taken place around the concept that the insane should receive care and treatment in public mental hospitals, and that ability to pay should not be a criterion for admission" (Grob, 1994).

While these attitudes continued to prevail in the mid to late 1800s, there was a significant problem beginning to arise within the system. Too many patients being brought in to the asylums were known as the "chronically insane," that is they would not be cured and released. This lead to a rapid overcrowding of the system, with many of the mentally ill again being placed in almshouses and jails rather than in legitimate institutions. Several figures

emerged with the solution of building more asylums to support the growing population, most notably humanitarian activist Dorothea Dix. Upon seeing the conditions in the prisons and almshouses in Massachusetts, Dix wrote to the legislature in 1843,

> I come to place before the Legislature of Massachusetts the condition of the miserable, the desolate, the outcast. I come as the advocate of helpless, forgotten, insane, idiotic men and women… of beings wretched in our prisons, and more wretched in our almshouses. (Dix, 1843)

With her insistence, Massachusetts expanded the Worcester State Hospital and opened a number of others. Dix continued on to other states, and by the time of her death, she had overseen the enlargement or construction of over 30 mental hospitals (Tiffany, 1890). This strategy was repeated by many other activists, and the problem of overcrowding had been solved for the time being (Grob, 1994).

This upswing in asylum building and expansion illustrated another important aspect of the socio-political attitudes of the mid 18th century. The government of individual states began to take on more important and broader reaching responsibilities. At the same time, public schools, colleges, hospitals, and other large state run institutions were being developed and popularized. Taxes were increasing, and to some degree the legislatures of many states had deep pockets. This was mainly due to the fact that many representatives served only one term in office, and solutions to problems such as mental illness were dealt with on an immediate, short term level with a lack of proper fund allocation or systematic planning (Rothman, 1971).

Another factor which helped to support the rise and continuation of the asylum model was the timely emergence of psychiatry as a legitimate medical practice. Early practitioners in this field were almost exclusively employed in public institutions in the mid 1800s, leading to a sort of symbiotic relationship between the asylums and the science of psychiatry (McGovern,

1985). These men and women worked to provide clearer definitions of insanity and what caused it. Such classifications as mania, dementia, idiocy, monomania, and melancholia were used to describe pathology (Worcester, 1839). However, there were still significant differences among the philosophies of individual practitioners. True classification of mental illness still remained a large problem thanks to the diversity of external symptoms which psychiatrists believed showed evidence of pathology. One of the most influential American psychiatrists, Pliny Earle stated,

> In the present state of our knowledge, no classification of insanity can be erected upon a pathological basis, for the simple reason that, with but slight exceptions, the pathology of the disease is unknown…Hence, for the most apparent, the most clearly defined, and the best understood foundation for a nosological scheme for insanity, we are forced to fall back upon the symptomatology of the disease – the apparent mental condition, as judged from the outward manifestations. (Earl, 1886)

Important to the emergence of the asylum was the idea that particular architecture played a significant role in the enactment and success of the moral treatment model.

Later in the life of the asylum, a new prestige began to emerge among those who owned and operated these institutions. Due to the unifying forces of psychiatry (common goals, scientifically based endeavors etc) many superintendents of these institutions began to develop organizations to enhance communication and the spread of new ideas in treatment and diagnosis. In October of 1844, Philadelphia played host to the first meeting of a truly organized group, the Association of Medical Superintendents of American Institutions for the Insane (AMSAII) (McGovern, 1985). These meeting facilitated the development of the Kirkbride plan, the standard to which the design and operation of virtually every mental institution in the mid 19th century was held. The plan gave detailed expectations of architecture, location, and

logistics of all new asylums. This also helped to show the faith that was placed in the asylum system at the time, such faith that Thomas Kirkbride, the chief architect of the Kirkbride plan, wrote,

> The location of a hospital for the insane, it's general arrangements and official organization, must ever exert so important an influence on the comfort and happiness of all its patients, on the prospects for recovery in those that are curable, and on the mental and physical well-being of those that are incurable, that no apology is required for any one, who having some practical knowledge of the subject, desires a general dissemination of the views and conclusions which have resulted from actual experience among those for whom these institutions are specially intended. (Kirkbride, 1854)

It would not be long before this faith was to be put to the test. As time went on, and the asylum/psychiatry complex continued to remain the best option for the treatment of the insane in the young country, a large unforeseen consequence of institutionalization began to emerge. Asylums were pursued with such vigor originally due to the fact that they promised an ideal environment removed from the general population were cures could be effectively enacted. It was becoming rapidly apparent in the late 1800s that this was not necessarily the case.

Challenges to the Asylum Model

Statistician Edward Jarvis undertook the massive task of conducting a census of all Massachusetts asylums in 1854. His shocking results revealed a population in asylums of 2,632 with only 435 being recorded as curable. The vast majority of the institutionalized population was reported as chronic patients (Jarvis, 1855). Because of this, many institutions were forced to discharge chronic patients back into the general population. These patients generally ended up in jail or in the poor houses that pervaded at the time. Debate was rampant about how to reform the institutional system to account for the problem of chronic patients, although it was halted for many years during the Civil War. The general consensus amongst most states was

that separate institutions had to be established to deal with the chronically insane, although this attitude was at odds with the initial founding beliefs of the asylum movement. These founding beliefs were based upon the idea that every case is curable with a singular correct treatment program and institutional atmosphere (Grob, 1994). The meeting of AMSAII in 1866 saw a change in policy that reflected these problems, with a resolution passing that raised the standard for an ideal hospital from a population of 250 to 600 patients (American Journal of Insanity, 1866). These trends continued, although it would take another kind of crisis to initiate true institutional reform.

An aging population of institutionalized patients caused a crisis to precipitate. As the institutions aged, so too did the chronic patients within it. Soon the proportion of elderly residents began to spike dramatically (U.S. Bureau of the Census, 1914). This was detrimental in a number of ways, not the least of which was an increased cost of care per patient.) The superintendent of Binghamton State Hospital, Dr. Charles Wagner stated in 1900,

> We are receiving every year a large number of old people, some of them very old, who are simply suffering from the mental decay incident to extreme old age. A little mental confusion, forgetfulness and garrulity are sometimes the only symptoms exhibited, but the patient is duly certified to us as insane and has no one at home capable or possessed of means to care for him. We are unable to refuse these patients without creating ill-feeling in the community where they reside, nor are we able to assert that they are not insane within the meaning of the statute, for many of them, judged by ordinary standards of sanity, cannot be regarded as entirely sane. (New York State Commission in Lunacy, 1900)

The original ideals of curing the sick and improving patients began to fall by the wayside, and asylums were increasingly viewed as nothing more than “surrogate old age homes” (Grob, 1994). This was also the beginning of the, “…further strengthening of the mental hospital’s

custodial character and a corresponding decline in its therapeutic functions" (Grob, 1994). A new public stereotype of institutionalization which focused on hopelessness, depression, and abuse developed. Morale inside asylums began to decline and psychiatrists, who had developed a close relationship with asylums, became discredited. The asylum and hospital system came under more and more intense scrutiny, particularly from the scientific community. Researchers began to develop new treatment courses and diagnostic theories.

This criticism was the catalyst for a number of younger psychiatrists to speak out against the current system and to pursue a new course of action. In 1892, AMSAII changed their name to the American Medico-Psychological Association (AMPA). By that point AMPA had extended their membership to assistant physicians in order to facilitate a change of concentration from managerial skills (asylum superintendents) to medical treatments. These attitudes became known as "new psychology." In 1895, Dr. Edward Cowles stated

> The alienist, as a psychologist, is a general physician who is a student of neurology, and uses its anatomy and physiology; but he does a great deal more, for he must include all the bodily organs… He is being aided by the more promising contributions from organic chemistry, and bacteriology… Thus it is that psychiatry is shown, more than ever before, to be dependent upon general medicine. (*Ibid.* 1895)

This was the beginning of the downfall of institutionalization. The system prevailed in the short term, however more challenges to the asylum model lay ahead.

The populations of asylums and hospitals continued a steady rise in the mid 20th century (U.S. Bureau of the Census, 1914). Several states experimented with alternative programs such as boarding outside of institutions in the years leading up to WWII. These never made it out of the experimental phase. In fact in Massachusetts, the state with the highest involvement in alternative programs never rose above 2% of the total institutionalized

population (Grob, 1994). Due to this, the use of asylums remained constant up until the time of the Great Depression. This catastrophic economic meltdown did not cause a lack of supplies to currently built institutions, but it did prohibit the construction of new asylums. Thus, in the years following the depression overcrowding again became a problem for asylums. Health care historian Gerald Grob stated that, "In 1938, the average daily population of state hospitals exceeded capacity by 10.6 percent. In three states corresponding rates exceeded 40 percent, and in ten others the range was from 22 to 23 percent" (Grob, 1994). As soon as the depression was over, and without a chance to recover, the system faced its next large challenge. WWII brought with it an attitude of neglect to institutions; the war was simply too great an issue to allow any other considerations to take the stage. Not only that, but the outflow of personnel to the military and wartime industries such as ironworking and shipbuilding caused a dramatic staffing crisis. It was not uncommon for a hospital to be staffed with as few as a third of its non-wartime compliment (Deming, 1943). After the war, conditions did not change quickly. Critics became appalled by what they saw; John Gessell stated, upon visiting several asylums,

> One notices, among others, a middle-aged man whose teeth are falling out because of a severe gum infection. There has been no dentist at the institution for some years. Several patients legs are covered with suppurating ulcers…often left raw by the restlessly fidgeting patients themselves. One old man's arm is a crooked, useless appendage. It was broken by an attendant years ago and was never set.
> A lovable old man who has become a child again is crawling about the floor or sitting in his own filth, since there is seldom anyone to help him keep himself clean.
> All too often one finds every sort and condition of patients locked together in the same ward, milling about and bruising one another. The noise and filth, the crying, swearing, laughter and inarticulate mumbling drive the depressed into deeper chasms of oblivion and the maniacs up ever more dizzy precipices of exaltation. Few are ever helped to break out of the fog of illusion that envelops them and to grasp some little part of reality which might lead toward mental health again. (Gessell, 1946)

Albert Deutsch, a prominent medical reporter, published a series of graphic articles relating to the deplorable state of care in institutions throughout the country. Mary Jane Ward's *The Snake Pit* (1946) was a popular book, magazine article, and eventually a motion picture. It further exposed the state of the mental health care industry. Similar reports began proliferating American culture, until a new stereotype had begun to emerge (the abusive, dirty, overcrowded mental hospital) and the issue was brought to the attention of both the populous and politicians alike (Ward, 1946; Grob 1991).

Despite this neglect, WWII did catalyze a dramatic change in the field of psychology which then reflected back and changed attitudes towards the care of the mentally ill. The first major shift occurred when psychiatrists began to notice the staggering number of soldiers who began to develop psychotic symptoms after prolonged bouts of service or exposure to incredibly stressful combat situations. These same psychiatrists had been in charge of administering screening tests to drafted men in order to evaluate their mental fitness for combat. This was an immediate signal that the methods and assumptions which these screens relied on were fundamentally flawed, and that stress, and moreover environment, was a common precipitator of psychotic episodes. This helped to discredit the theory that mental health issues only arose in those predisposed in some manner. In order to deal with these episodes, methods had to be developed to catch symptoms early and provide relief. Treatments focused on the relieving of environmental stress and forging and strengthening of interpersonal relationships, and they seemed to be far more effective than was to be expected (Grob, 1994). Thus psychiatrists began preaching a return to some of the values of the 18th and early 19th centuries: local, community oriented care in place of large, distant, impersonal

institutions. This change in the attitude of psychiatrists was paramount in the decline of the institution system, as much of the asylums credibility had been inexorably linked with the support of prominent psychiatrists. “From the 1940s through the 1960s psychodynamic and psychoanalytic psychiatrists – few of whom opted for careers in traditional public mental hospitals – worked assiduously to apply wartime lessons and move the locus of practice from the asylum to the community” (Grob, 1973).

Community Mental Health Care

The challenge at this point was to persuade the states to dissolve their systems of care and treatment and replace them with local, community based centers. The only viable option to initiate such an overwhelming change was to involve the federal government to a level which had never before been conceived of. This process began with the passage of the National Mental Health act on July 3, 1946 (Grob, 1991). The act gave the federal government the authority to undertake five important tasks. First, states were to be given grant money for establishing local clinics and research centers and for conducting studies into effective treatments. Secondly, grants were to be given to schools in order to train students in mental health studies and treatments. Third, the government would provide general support for research into the causes and effective treatments for mental illness. The act also established two important institutions, a National Mental Health Advisory council and the National Institute of Mental Health. It is important to note that the act did not include any mention of federal funds to be used for the support of the nations crumbling institution system (Chapter 538, 1946). The NIMH quickly developed a program of “collective health” which emphasized, “…[helping] the individual by helping the community; to make mental health a part of the

community's total health program, to the end that all individuals will have greater assurance of an emotionally and physically healthy and satisfying life for themselves and their families" (Felix, 1949). This attitude bridged the desire for accountability through federal control and the new attitudes of local community care espoused by the preeminent psychiatrists of the time. The NIMH was also charged with distributing federal funds and keeping close eyes on the state governments spending. There were two ultimate goals the NIMH had in mind: to create broad community based programs that emphasized early detection and community treatment options for the mentally ill, and to provide federal funding for multidisciplinary institutions researching the causes and possible treatments for mental illness.

The result of federal funding and oversight was a rapid increase in professionals working in the field of mental health. Also, there was emergence of the mental health centered research hospital and a renewed belief in the medical sciences application to the mentally ill. In general, this left citizens with a feeling that many conditions once thought incurable could be tackled, and that nothing involving mental health was beyond human comprehension and attenuation.

As a result of these factors, the mid 20th century was a period of great change in the scientific, medical, and political arenas over issue of mental illness. A great deal of institutional care, which had never really vanished, underwent drastic changes. Many adopted open door policies, allowing patients to leave and return at their own free will, while others ran programs during the day and allowed patients to return home at night (Grob, 1994). This coincided with the increasing emphasis on community care. However, the most exciting advances came in the form of psychotropic drugs. These drugs were the first truly effective medicinal treatments for

patients with disorders such as schizophrenia, manic depression, and depression. This in turn led to further restructuring of the asylum environment, with less emphasis on physical restraint and isolation. This was the missing link between medical science and psychology, and proof that psychological symptoms are controlled, at least in part, by physical manifestations of illness. In the political arena, President Kennedy created his own Task Force to create a viable plan for a federally funded and controlled mental health system as well as to evaluate policy suggestions from other groups such as the NIMH. The Task Force accepted the principles of the NIMHs plan (Grob, 1991). The recommendation to the president would include the construction of 2000 community centers which would function as, "… a multi-purpose community facility designed to provide early diagnosis and treatment of mental illness, both on an inpatient and outpatient basis, and serve as a locus for aftercare of discharged hospital patients" (Foley, 1975). The chair of the Task Force, in his final proposal to President Kennedy, stated,

> Such centers, replacing the traditional institutions, should be the foci of future mental health activities. They would be close to the patients home, and would provide preventative, early diagnostic, and outpatient and inpatient treatment, and transitional and rehabilitation services. They would include psychiatric units in general hospitals, thereby providing the patient with the opportunity of being treated within his community environment. These facilities would be conveniently located in population centers and could provide patients with a continuity of care not now available. As his needs change, the patient in such a center could move quickly to appropriate services such as those for diagnosis, treatment, and rehabilitation; inpatient, outpatient, day or night programs; foster care, sheltered workshop, and industry. (Celebrezze, Wirtz, and Gleason to John F. Kennedy, November 30, 1962. White House Central Files, Box 338. Folder HE 1-1, Kennedy Library)

Kennedy embraced this program in a speech to Congress in 1963, claiming that a "bold new approach" was needed, and on October 31, with little opposition and only a few minor changes, a bill based on the community center approach was signed into law (Grob, 1994). The

remaining opposition (mostly from the AMA) was finally defeated in 1965, when legislation passed that relegated federal funding to community center staffing.

For all the optimism given to these ideas, the initial results of this new system were not promising. By 1980, only 754 centers had been established; far short the original goal of 2,000 (Grob, 1994). The centers goals had not been clearly defined, which led to a growing number of people who lacked a true mental illness taking advantage of these few centers for treating things such as "stress" and emotional troubles (Grob 1994). This was coupled by an increase in consumerism of all types of products and services in the U.S., which excluded from treatment many of the more needy and ill. A lack of oversight from the federal government led to centers which varied wildly in their clients and methods of diagnosis and treatment (Grob, 1991). Integration with the institutions still under state control was virtually non-existent (Grob, 1991). The system had one more fatal flaw: it drastically overlooked the needs of the severely mentally ill; Community centers simply did not have the resources or direction to help these individuals. Putting State pressure on these centers to improve was not an option, due to the legislation passed in the 1960s which put the power into the hands of the federal government, and the federal government didn't possess the regulatory manpower or fund allocation. Small changes were made to the centers and the requirements for federal funding over the next 15 to 20 years, but political bickering and other distractions kept the system largely intact up until the election of Ronald Reagan.

Almost immediately after assuming the presidency, Reagan and Congress passed the Omnibus Budget Reconciliation Act. This one piece of legislation drastically altered the mental health care landscape. It reduced and deregulated federal funding, but more importantly it

almost completely overturned every aspect of the Mental Health Systems Act. This effectively dissolved federal authority over mental health care and gave the power back to the states. At the same time, state run institutions had begun to discharge chronically ill patients after very short stays to make up for a lack of funding and new federal regulations. The results of all of this was an increase in the number of homeless mentally ill and a sharp rise in the use of the general hospital for mental health issues (these institutions received more money from Medicaid) (Kiesler and Sibulkin, 1987). Despite all this, state mental hospitals did not become entirely obsolete. There was still a small core group of individuals so distressed that no other care options were viable (Goldman, Adams, and Taube, 1983).

In recent years, the system has not changed very much. General hospitals and community treatment options still pervade the mental health landscape, and the largest debates have been over the amount of funding to dedicate to the treatment of the mentally ill through programs such as Medicare and Medicaid. Institutionalization is all but gone, and there are a large number of mentally ill citizens who cannot find or afford the care they need. However, much of the power has been put back into the hands of communities, completing a cycle that began with communal treatment some centuries ago. Along with the socio-political evolution of mental health care, there were concurrent advances in treatment and technology.

The Transition from Restraint to Therapy

The End of Physical Restraint

Throughout the history of Grafton State Hospital (1901 to 1973) institutional psychiatry underwent an evolution of technology and scientific analysis. At a time when many mental disorders were thought untreatable, with patients living in institutions such as Grafton State Hospital for years, each new therapy was claimed to be a cure for mental disease. While many of the Grafton era therapies have faded out of use, a few are experiencing resurgence today. The evolution in psychiatric care that occurred during the early 20th century still has an impact on modern medical practice.

Until the later part of the eighteenth century the treatment of the mentally ill involved chaining them in cells, and sometimes even with criminals. In 1809 Dr. Philippe Pinel of France published *Traité médico-philosophique sur l'aliénation mentale* which called for the humane treatment of the mentally ill. Dr. Pinel, head of the Paris Asylum for Incurables, advocated friendly contact and communication with patients rather than restraint (Britannica, 2009). In 1856, Dr. John Conolly published *Treatment of the Insane Without Mechanical Restraints* spreading the practice of humane treatment to the United States. "The major arguments of those supporting the use of restraints are impracticability and economy in personnel and salaries. The demoralizing influence of mechanical restraints and the practicability of total non-restraint are the arguments of those favoring non-restraint" (Meyer, 1945). Though the topic was debated in the 19th century, by the 20th century most physicians agreed that restraint had no therapeutic value (Braslow, 1997).

In 1911, Dr. Vernon Briggs proposed restraint legislation in Massachusetts. Legislation was passed that limited the use of mechanical restraint and ensured that it was permitted only with written order from a physician (Meyer, 1945). By the time Grafton State Hospital was opened, crude restraint was unpopular with the public and physicians. While crude restrains such as chains and box-cribs fell out of practice, physicians still made use of restraint devices considered 'humane' at the time, such as the straitjacket. However, doctors still based the effectiveness of new 'treatments' or devices on how they compared to crude-restraint (Braslow, 1997). At the turn of the twentieth century the times of restraint were ending and a new array of 'therapeutic' devices began to enter the mental institution. The treatments of the early 20th century were somatic therapies, defined as, "any of a group of treatments presumed to act on biological factors leading to mental illness" (Somatic Therapy n.d.). Somatic therapies used to this day include drugs such as antidepressants and anxiety reducing drugs, anxiolytics (Psychiatry, 2006).

Hydrotherapy

In many cultures water has been used for centuries as a treatment for various physical conditions. The Greek physician Hippocrates first documented the 'water cure' in 5th century B.C. and used it extensively to treat various ailments (Moore, 2008). Public baths were very common in Roman times and hot water springs were acknowledged to have beneficial health effects (Baths, 1911). A number of books where published in the early 18th century that brought up the merits of the Roman baths but the therapeutic use of water or 'hydrotherapy' gained broader acceptance in 1786 through the work of a number of physicians. In the early

nineteenth century, Vincent Priessnitz used cold water applications to treat physical ailments. Priessnitz inadvertently discovered the medicinal effects of water after he treated his crushed ribs following a wagon accident by soaking in cold water (Kloss, 1939). Priessnitz's treatment was expanded in 1861 when Ernst Brand advocated the merits of hydrotherapy in the treatment of typhoid fever (Simpson, 1903). After reviewing statistics from 19,017 cases of typhoid fever, Brand found a reduction of the mortality rate from 21.8 to 7.8 percent (Abbott, 1911). Following Brand's work, in late 19th century Europe, there was renewed interest in water as a treatment for disease. From 1865 to 1898, neurologist Wilhelm Winternitz of Vienna worked to define hydrotherapy based on its physiological effects and developed new applications. Doctor's Simon Baruch and John Harvey Kellogg, both pupils of Winternitz, helped to spread hydrotherapy throughout the United States (Wright, 1932).

Unlike crude treatments of the past, hydrotherapy was based on a foundation of scientific data and clinical experiments. Though a number of studies where published on the effectiveness of hydrotherapy, the randomized clinical trial was not in use at the time, which detracts from the credibility of their results. Researchers gathered large amounts of data on the physiological effects of hydrotherapy including measurements of blood pressure, pulse, respiratory rate and blood count. This empirical data helped reinforce the therapeutic value of hydrotherapy to skeptical physicians (Braslow, 2000). Hydrotherapy was administered using a number of specific scientific procedures (Braslow, 2000). Factors such as the temperature of the water, variation of hot and cold and method of application were prescribed in detail and altered based on the patient's condition.

For some, the basis of hydrotherapy was not the healing effects of the water itself but water's high specific heat capacity. Edward B. Angell, vice-president of the medical society of the State of New York published an article in 1909 explaining the physiological basis of hydrotherapy. Angell wrote, "Let it be well understood that it is through the modification of the heat of the body primarily that we secure the therapeutic result" (Angell, 1903). Hot, cold and neutral (body temperature) applications of water where thought to have different physiological effects on the body. "A body of research based on precise measurement of parameters such as blood pressure, pulse, respiratory rate, and differential blood count lent support to this science" (Braslow, 1997). Cold applications were shown to have "powerful sedative and hypnotic" effects because cutaneous nerves, nerves supplying the skin, and nerve centers are soothed by the surface warmth produced (Wright, 1932). Sudden heat was thought to produce excitant effects on the nerve centers while moderate heat soothed peripheral nerves (Wright, 1932). Other physicians and scientists believed that hydrotherapies beneficial effects where based on the waters ability to leach out toxic impurities through the skin or through the relief of 'cerebral congestion' (Braslow, 1997).

It was published in the 1936 *Psychiatric Quarterly* that, "It must be borne in mind that improvement in physical health at times leads to improvement in a mental state, hence any agent that helps to accomplish this purpose must surely be considered as a therapeutic agent- and certainly hydrotherapy increases the sense of well-being of the individual" (Black, 1936). This argument for hydrotherapy hinges on the idea that calming or sedating the body allows the mind a chance to repair itself (Black, 1936). It was acknowledged that little was known about

the mechanism of hydrotherapy and that information is “general in character, or refers to certain detail only” (Davidson, 1937).

This lack of knowledge was not due to a shortage of research on the subject but rather that little was known about the conditions hydrotherapy was supposed to treat. “It is obviously very difficult to speak of the mechanism of hydrotherapy in excitement for the reason that very little is known about the origin of excitement; moreover, hydrotherapy is a physical method, while our approach to excitement is psychological” (Davidson, 1937). Though the scientific reasoning behind hydrotherapy was inconsistent, the common perception was that it had some beneficial effects. Hydrotherapy was prescribed for a number of common conditions and used widely in mental institutions. Rebekah Wright, a hydrotherapist at the Massachusetts Department of Mental Diseases, wrote, "The conditions affecting persons who have mental diseases that may be partly or wholly relieved by hydrotherapy are (1) delirium, (2) psychomotor excitement, (3) agitation, (4) insomnia, (5) cerebral congestion…(15) inanition" (Wright, 1932). While hydrotherapy was claimed to be the end of physical restraint, for some patients, it was seen as physical restraint without the straitjacket.

The Wet Sheet Pack

The wet sheet pack is an example of a ‘therapeutic’ restraint. The wet sheet pack involved wrapping the patient from head to toe in several layers of cloth, wrung out, at a prescribed temperature. The sheet pack “hampers the patient’s movements but does not prevent him from turning over and moving himself into comfortable positions” (Hubbard, 1927). A cold sheet pack, “acts as a tonic to the circulatory system much as in the case of a cold plunge though not as severe” (Hubbard, 1927). When the pack is first applied it delivers a cold

shock to stimulate the patient. The cold pack is then warmed by the patient's body heat and following the initial cold shock "the patient experiences a warm and comforting glow which often induces sleep" (Hubbard, 1927). A warm sheet pack loses the 'tonic' or stimulant effect and is used solely for its sedative properties (Hubbard, 1927). At times a rubber sheet would be wrapped around the patient to enhance heating effects. The wet sheet pack came with the danger of the patient overheating thus requiring a skilled nurse to manage the pack and check vital signs (Wright, 1932).

While the sheet pack was supposed to be different from the straitjacket, it was prescribed for the same reasons; to sedate excited or violent patients. If the sheet pack alone was not effective in sedating the patient or the patient struggled, a 'sheet restraint' would be applied for thirty to forty-five minutes while the patient awaited sedation. This involved placing another sheet on the patient and securing it to the bed (Braslow, 1997). While physicians claimed the sheet pack was a therapy, the patients who arrived at the hospital thought of the pack as a punishment. This notion was solidified because sheet packs would be given to patients immediately after violent or disturbed periods and 'poorly trained' attendants contributed to the patients fears by threatening them with ice packs (Wright, 1932).

Although the sheet pack was a relatively inexpensive and accessible treatment, mental hospitals of the early to mid-twentieth century made significant investments into more complex hydrotherapeutic devices. Many hospitals built hydrotherapy suites that incorporated a number of specialized baths and showers. Common hydrotherapeutic devices included the sheet pack, needle spray, continuous bath and vapor bath (Wright, 1932). A session of hydrotherapy typically required the patient to undergo a series of treatments, in some cases

conducted daily 'until toxic effects are overcome' (Black, 1936). Following this initial session of treatment the patient would receive two or three treatments a week with an average length of treatment lasting two months (Black, 1936).

A tour of Grafton State Hospital's male violent ward, now Building #18 on the Cummings School of Veterinary Medicine at Tufts University campus, reveals a 'Hydriatic and Rest Room'. Though Grafton State Hospital closed over thirty five years ago, this large tiled room still bears some evidence of the considerable use and investment in hydrotherapy at state mental institutions. Vapor rooms and continuous bath tubs are a few of the relics that remain in this abandoned building, the history and application of which gives a greater insight into hydrotherapy's significance in the mental hospital.

Figure 1. The Hydriatic and Rest Room at Grafton State Hospital

The Vapor Room

In the corner of the Hydriatic suite is a tiled glass block enclosure, similar to a steam sauna, called a vapor or Russian bath. "The vapor bath is the exposure of the skin covering all of the

body, except the head, to vapor" (Wright, 1932). The vapor bath contains a marble 'bed' that extends past a hole in the wall. This allows a patient to lie in the vapor bath with their head outside the room, unaffected. The patient is covered by a rubber or cloth blanket and a cool wet towel is applied to the patients head.

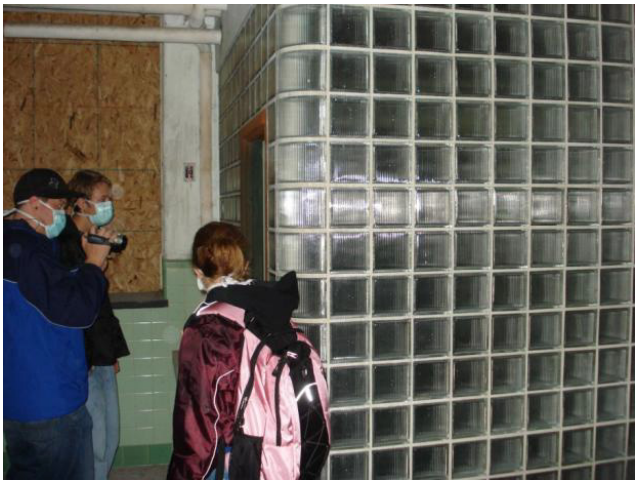

Figure 2. Outside the Vapor Bath at Grafton State Hospital

Under the marble bed are perforated pipes that allow low pressure steam to enter the room. "Sometimes the vapor is impregnated with substances thought to possess therapeutic value, as sulphur, mercury or camphor" (Wright, 1932).

Figure 3: Interior and Exterior of Vapor bath in basement of Violent Ward of Grafton State Hospital taken in 2008

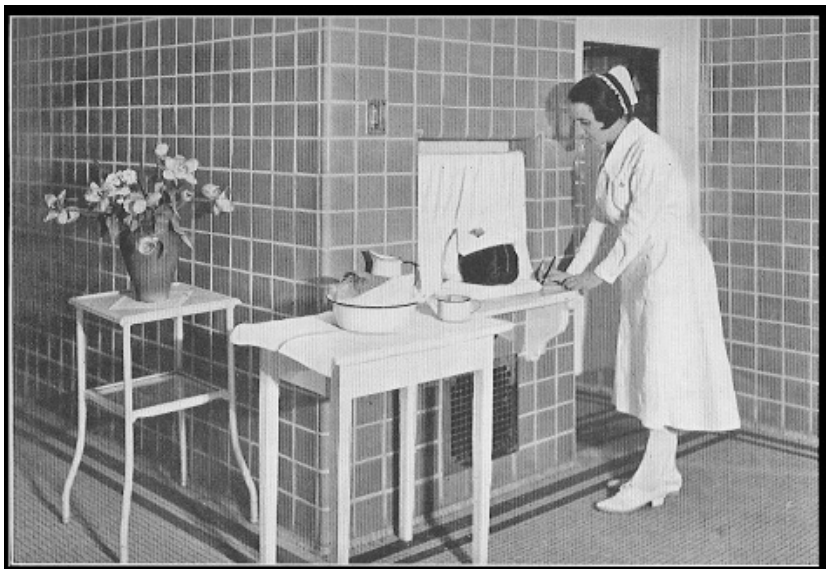

Figure 4: Nurse administering a vapor bath
Wright, Rebekah. (1932). *Caring for a patient in a reclining vapor bath* [photograph]. Hydrotherapy in Hospitals for Mental Diseases. Boston, MA.: The Tudor Press, Inc. 145.

The vapor room would be heated to between 115 and 140 degrees Fahrenheit thus causing the patient's body temperature to rise and heavy perspiration ensues (Wright, 1932). It was thought that perspiration removes waste products from the body and was beneficial to the skin thus it was valuable to the therapeutic worth of the vapor bath as well (Kellogg, 1903). The body warmth produced by the vapor bath also served to calm agitated patients. The vapor bath was prescribed to treat a number of physical ailments including diabetes, obesity, skin disorders, and arthritis (Kellogg, 1903). The applications of the vapor bath in mental hospitals were varied as well. "The vapor bath is used in the treatment of the psychoneuroses and the following psychoses: with syphilis; the cerebral arteriosclerosis; alcoholic, manic depressive, dementia praecox." (Wright, 1932) The principle danger of the vapor bath was overheating the patient. It was recommended that the vapor bath be avoided in cases of "cardiac weakness" (Kellogg, 1903). "In some states of the system, when excessive perspiration is not easily excited, the condensation of the vapor on the skin is liable to be mistaken for it, and when this

occurs the increased temperature of the body that results from such exposure is fraught with danger" (Bell, 1904). Throughout the therapy nurses had to pay careful attention to the patient's vital signs and provide water. As with the other forms of hydrotherapy, the vapor bath was labor intensive, time intensive and potentially dangerous.

The Continuous Bath Tub

The continuous bath was a 'sedative' hydrotherapeutic treatment where the patient would be submerged in a bath of flowing water at a prescribed temperature (90 to 100 degrees) for hours, days, weeks or even months. A 1910 report on the practices of hydrotherapy at Manhattan State Hospital states, "The patients treated by these baths are restless, delirious, and violently disturbed cases. They are kept in the tub usually for the entire twenty-four hours without removal except for cleaning the tubs, and for a sufficiently long period to allay their excitement, varying from a day to two or three months" (Manhattan State Hospital, 1910). The patients would eat, drink and sleep in the tubs (Wright, 1932).

Figure 5. Continuous bath tub remaining at Grafton State Hospital.

The rationale for the continuous bath's therapeutic effects was based on its effects on the patient's circulation time and body temperature. Studies found differences in the baseline physical properties of disturbed patients (notably with schizophrenia) and healthy patients. "It has been shown by a number of investigators that heat production in the schizophrenic is reduced…the schizophrenic has an abnormally slow circulation time…blood volume and ability of blood regeneration is greater in the manic-depressive cases than in schizophrenia" (Davidson, 1937). The continuous bath was believed to normalize these physical properties in the disturbed patient. The patients were isolated during the bath and nurses where instructed not to communicate with them. "Another helpful factor is the isolation of the patient during treatment which allows only a minimum of external stimulation, thus giving a rest to the hyper-sensitized nervous system" (Davidson, 1937). While restraint and isolation where frowned upon by the psychiatric community, in this 'therapeutic' setting, they were considered beneficial.

The continuous bath tubs had an inlet for hot water and an outlet for water. Near the middle of the tubs were large rubber stoppers that could be removed to empty the tub of excreta (Manhattan Hospital, 1910). The bath was fitted with a canvas hammock upon which the patient would lie. The length of the tub would be covered with stretched sheets thus securing and covering the patient (Manhattan Hospital, 1910). Patients would often object to the continuous bath and had to be restrained either with the canvas sheet or camisole. These restraints posed some danger; the danger of scalding the patient to death (White, 1916). This could occur if the nurse left the room, while there was a sudden rise in water temperature. In 1916, William A. White, the superintendent of the Government Hospital for the Insane, wrote,

"Devices for securing even temperatures of water are apt to get out of order and cause the water suddenly to heat...under no circumstances is a patient to be fastened in the continuous bath" (White, 1916). While White stressed that restraint should not be used during the treatment, he found a "universal practice of fastening the disturbed patient in the tub" (White, 1916).

A nurse would take measurements and record temperature, adjust water flow, and care for the patients. "A large control console festooned with dials, knobs, and gauges allowed the attendant to manipulate temperature and water flow as specified by the psychiatrist" (Braslow, 1997). The nurses were instructed to observe the patient closely for shock and take their pulse every half-hour (Cook County Hospital, 1929). Patients who were kept in the bath for long periods of time would need to be taken out and oiled periodically to prevent skin irritation. The continuous bath process required a large amount of labor, thus each nurse would only have two patients during an eight hour shift (Manhattan State Hospital, 1910). It was recommended that the patient be removed from the tub if chilled or if there was a change in the patient's pulse or respiration rate. Following removal from the tub the patient would receive a cleansing bath and a dry rub or dry sheet pack (MacPherson, 1922).

It is important to note that hydrotherapy was not universally used throughout mental institutions. Patients would be treated with a combination of occupational therapy, psychotherapy and drugs. Only the most 'excited' or 'disturbed' patients, on which other methods were not effective, would be subjected to hydrotherapeutic procedures. Doctors and nurses at the time were not in the 'dark ages', but did have limited methods of dealing with agitated or unruly patients aside from restraint (Braslow, 2000).

The Convulsive Therapies

In the 1930's, hydrotherapy was on the decline due to the introduction of shock therapy. The use of electroshock therapy in the 1940's and chlorpromazine in the early 1950's significantly diminished the importance of hydrotherapy (Braslow, 1997). Unlike the lengthy and labor intensive hydrotherapeutic treatments, shock therapies delivered a rapid approach to 'treating' the disturbed patients.

While presently shock therapy usually refers to electroshock, in the mid-nineteenth century it referred to any method that induced convulsions or unconsciousness in the patient for the treatment of mental disorder (Dictionary.com, 2009). Shock therapies tested and used at the time included insulin, Metrazol, and electroconvulsive therapy. Unlike the treatments of the past which were forced onto unruly patients; the era of the shock therapies required patients' legal consent for these medical procedures. If the patient could not give consent then a 'legally responsible person' could give consent on the patient's behalf (Shorter, 1997).

Insulin Coma Therapy

Shortly after the discovery of insulin in 1922, Dr. Manfred Sakel, of Berlin, began experimenting with the effects of insulin on patients undergoing opiate withdrawal (Fink, 2002). Sakel found that with low doses of insulin patients would become more calm and cooperative. When Sakel accidently gave patients a high dose, they would go into a stupor, a hypoglycemic shock, after which they would become less hostile and aggressive. During Sakel's stay at the University of Vienna he discovered insulin as a possible treatment for dementia praecox (schizophrenia), a previously incurable mental disorder. Sakel found that after the patients came out of the coma they "lost their psychotic thoughts" (Fink, 2002). In 1933 Dr.

Sakel announced his findings to the Vienna Society of Physicians and by 1936 insulin shock therapy was being performed at Worcester State Hospital (Cameron & Hoskins, 1937). By 1941 93.8 percent of state hospitals and 79.4 percent of federal hospitals reported the use of insulin shock therapy (Kolb & Vogel, 1942).

Insulin shock therapy initially faced sharp criticism from the medical community because Dr. Sakel was not a trained psychiatrist and could provide no concrete rationale for why the treatment worked. Sakel proposed mechanisms of the insulin therapy that included: changes in the carbohydrate metabolism of the cells of the brain, cutting short circuits in the brain, and jolting the brain back to normal. The advent of insulin shock therapy brought with it the first large scale clinical studies to test Sakel's findings. While initially small studies of under 100 cases where performed, in 1938 Benjamin Malzberg conducted a study of insulin shock therapy on one thousand patients. Mazlberg found that 65 percent of patients showed some degree of improvement. (Malzberg, 1938) Other clinical studies provided excellent reports of insulin's effectiveness. "Those from European clinics show that 75 percent of the patients ill less than a year are completely recovered and that more than 69 percent of those ill less than a year and a half are able to resume work. Spontaneous remissions without this form of therapy occur in from 10 to 15 percent." (Drake, 1938) Initially these trials created extravagant assertions of insulin therapy as a "cure for common mental disease (Science News-Letter, 1937). Later scrutiny of these clinical trials showed deficiencies in the controls used and spurred an increased concern for controlled clinical trials (Braslow, 1997).

Insulin therapy was found to work best on patients in the early stages of schizophrenia. Schizophrenia still cannot be diagnosed by a lab test, but is diagnosed by a psychiatric analysis.

An accurate diagnosis, particularly of early schizophrenia is difficult, even today. Diagnosis of schizophrenia is complicated because it can be similar to other brain disorders such as depression or bipolar disorder (schizophrenia.com, 2004). A course of insulin therapy involved daily muscular injections of insulin until a coma state can be produced (Drake, 1938). Insulin is a hormone that allows cells in the body to take in glucose from the blood. With a large dose of insulin (shock) the concentration of glucose in the blood drops and the patient enters a hypoglycemic coma. After the patient has been in the coma for an hour to an hour and a half, sugar is administered to terminate the shock (Drake, 1938).

Sakel recommended that the patient undergo four phases of treatment. The treatment begins with the patient feeling drowsy and sweating profusely. In the first phase the patient feels intensely hungry and may become violent. In the second or "shock" phase the patient enters a deep coma and "generalized" convulsions may occur. After the patient is brought out of the coma it is noted, "As a rule there is an interval after each shock treatment in which the patient is free from his psychosis. This lasts about two to three hours and then there is a return to his former psychotic state" (Drake, 1938). The third of Sakel's phases is the rest phase, where the patient is given one to several days of observation and no insulin. The fourth phase of the treatment is "polarization" or where the patient is given small doses of insulin three times a day to produce a mild shock or "prehypoglycemia". "If further treatment is found to be necessary the same procedure is repeated. If, however, satisfactory progress has apparently been made, the treatment is concluded by Phase 4" (Drake, 1938). A typical course of treatment entailed fifty to sixty days of the coma phase (Braslow, 1997).

Insulin shock therapy required close attention by the nurse and doctor to prevent the patient from entering an irreversible coma state. A typical treatment lasted 3 to 4 hours and required constant supervision (Braslow, 1997). Determining proper amounts of insulin to administer and the state of hypoglycemic shock was difficult due to patients varied reactions. "The reaction is faster in some patients and slower in others, but the picture is never the same even for the same person. The reaction may proceed to any stage up to coma (or shock), which is the last stage before changes become irreversible" (Scharmer, 1941). One explanation for the wide variation in patient reactions is the impurity of the insulin itself. Until the advent of genetically-engineered human insulin in 1978, the insulin came from animal sources typically bovine (Teuscher, 2007). Ineffective purification methods and natural variance in biologic activity led to a wide range of potency and adverse reactions. Also the patient's recovery from the coma was traumatic and required constant supervision from the doctors. "The patients retched and choked. They uttered terrifying, animal-like sounds. Some vomited the vital sugar. In such cases a doctor and nurse came swiftly with syringe and hypodermic needle. Lightning-fast the tourniquet was tied around the arm, the needle plunged into the vein and more sugar solution injected. Delay of even a minute might mean death" (Stafford, 1938). Following the coma sheet restraints would need to be applied to the patient to prevent the patient from falling out of bed due to convulsions. Even with close monitoring, insulin therapy had a relatively high mortality rate of 1 to 2 percent (Braslow, 1997).

Insulin coma therapy became deeply ingrained in mental hospital practice. The structure of the hospital was modified to allow for an 'Insulin Unit' where the treatments took place (Doroshow, 2007). The layout and atmosphere of the insulin unit was designed to be a

peaceful, quiet and well ventilated environment, separated from the chaotic nature of the asylum (Doroshow, 2007). The patient undergoing insulin therapy would have close contact with specially trained nurses and 'therapeutic relationships' would form (Braun & Gilmore, 1960). Insulin therapy was a common practice in mental institutions until the 1970's (Doroshow, 2007). While insulin coma therapy had a great impact on the asylum it was not the only new somatic therapy. As Dr. Sakel was announcing his insulin therapy in Vienna (1933), convulsive therapy was being discovered Hungary.

Metrazol Convulsive Therapy

The Hungarian neuropathologist, Ladislas von Meduna, is credited with being the originator of convulsive therapy. Through observation under a microscope, Meduna noticed the brains of epileptic and schizophrenic patients were different. The brains of epileptic patients had excessive glia cell growth (a support cell in the brain) in epileptic patients but a lack of these cells was noted in schizophrenic patients. Thus Meduna developed the idea of an antagonism between epilepsy and schizophrenia (Shorter & Healy, 2007). In 1929 several scholars reported that epileptic patients who developed schizophrenia seemed to experience milder epilepsy (Shorter, 1997). We know now that this correlation is not scientifically factual and that in fact many schizophrenic patients were misdiagnosed with epilepsy (Szasz, 2007). Meduna hypothesized that the symptoms of schizophrenia can be improved by inducing epileptic fits (Shorter, 1997). In 1933 Meduna began experimenting with various substances to produce convulsions in guinea pigs. After using substance such as caffeine and absinthe, he found that camphor oil was the least toxic agent (Stepansky, 1999).

On January 23, 1934 Meduna injected camphor into a patient suffering from catatonia and delusions. After 45 minutes the patient underwent 60 seconds of convulsions and was unaffected. Meduna gave the patient a series of five injections of the course of the next two weeks. Two days after the fifth injection the patient got out of bed and talked for the first time in four years (Shorter & Healy, 2007). The next day the patient relapsed into the catatonic state and Meduna continued injections of camphor until the patient recovered. After being cured of his condition, the patient escaped the mental institution and went home to find his cousin living with his wife (Shorter, 1997). As with insulin therapy, the mechanism of the treatment was unknown. One explanation was that the shocks caused by Metrazol damage old and sick nerve endings in the brain and healthy nerve endings replace them (Science News-Letter, 1939). Even without a clear reason as to why the shocks worked, Meduna went on to treat 26 patients with camphor oil, with half of them improving (Stepansky, 1999).

The use of camphor did pose a number of problems for Meduna's therapy. Camphor caused the patient to become anxious before the 'shock' and noxious. Also the intramuscular injections of large quantities of camphor (about a fluid ounce) caused pain at the injection site. Another disadvantage was that the convulsions produced where unpredictable and the intensity could not be controlled. "It occurred anywhere from one-half hour to three hours after injection so that protection of the patient was difficult, particularly as walking about was essential to the absorption of the drug" (Schwoerer, 1938). In 1934 Meduna began using Metrazol (pentylenetetrazol) because it could be given intravenously and produced convulsions more rapidly. Metrazol is a low-dose circulatory stimulant but in high doses acts as a convulsive agent (Schwoerer, 1938). Metrazol is classified as an antagonist of the inhibitory

nuerotransmitter Gamma-Aminobutyric (GABA) and was produced by Knoll Laboratories in both the United States and Europe (NCBI, 2009). Though Metrazol had advantages over camphor, it was still not an ideal convulsive agent. "The patients lay there waiting to convulse, they were often overcome with dreadful feelings of anxiety. Also, the drugs frequently caused cerebral hyper-excitability, triggering distracting spontaneous seizers later in the day, or week" (Shorter & Healy, 2007). Though later clinical studies of Metrazol shock (that made use of a control group) found that the treatment had negligible effects on recovery, it was noted that a signifcant percentage of cases showed some sort of clinical imporovement (Harris, 1938). As any improvement in someone suffering for a previously untreatable mental condition is extrordinary, Metrazol became a common treatment option in mental hospitals.

A Metrazol treatment consisted of a rapid intravenous injection of 0.4 - 0.5 grams of a 10 percent solution (Zeifert, 1941). If a convulsion did not occur then the amount of Metrazol used would increase. The patient would receive injections of Metrazol three times a week and undergo 'a high average' of thirty convulsions each treatment (Zeifert, 1941). If the patient showed improvement the treatment would continue 'to consolidate the gains made'. The patient would undergo a seizure rapidly after injection, sometimes before the needle can be removed. The patient's reactions to the Metrazol treatment are very severe.

> The first signs observed are cough, pallor or, rarely, flushing of the face. The facial muscles suddenly become frozen in an expression of fear and bewilderment. Next, the patient being unconscious, clonic movements appear or movements of the hands and feet suggesting self protection or flight from danger. The patient may try to sit up, but the tonic phase immediately setting in, produces a marked generalized muscular hyperextension which causes him to fall back. Rigidity occurs…the mouth opens widely and a soft gag is inserted to pre-vent biting of the tongue. (Schwoerer, 1938)

Following the convulsions the patient would appear exhausted and fall asleep (Schwoerer, 1938). The patients are often confused after the convulsion and are unaware that the injection had occurred. Patients would also get injuries during the seizers such as stretched ligaments, fractures and dislocation of the jaw and limbs (Graves & Pignataro, 1940). Patients were fearful of the treatment and would reject repeating it (Fink, 2001). While the fear of the patients could be dealt with by administering Metrazol while the patient is in an insulin induced coma, the fractures and dislocations due to the violent convulsions could be controlled (Messinger, 1941). Though the insulin and Metrazol therapies where severe, they represented a hope that schizophrenia and other debilitating mental disorders can be cured. The promise of convulsive therapy sparked a search for other means to induce convulsions in an easier and safer way.

Electroconvulsive Therapy

Aware of the success of Metrazol, and having watched pigs being anesthesitized with electroshock before slaughter, Italian neurologist Ugo Cerletti began experiments with electroshock on animals (Sabbatini, 1997). Initially Cerletti experimented with shocking dogs by placing one electrode in the animal's mouth and the other in the anus. This method of shocking the animal caused the heart to stop in half of the experiments. Cerletti's assistant, Lucio Bini, discovered that the animals could be safely shocked by applying electrodes to the temples (Shorter, 1997). In April 1938, Ugo Cerletti and Lucio Bini electrically induced convulsions in a schizophrenic patient. Following the shock the patient was unaware that the treatment has been performed. After the patient was shocked eleven more times he lost his hallucinations and was able to leave the clinic a month later (Meyers, 2007).

With the help of a number of physicians and researchers, by 1940 electroshock therapy had spread to the United States. The safety and ease of administration of electroshock caused insulin and Metrazol therapy to fade away. "Electric shock is preferable to other convulsive therapies, because the patient has less discomfort and needs less care after treatment. The accompanying amnesia lessens fear of treatment. Finally, a larger number of treatments can be given in a shorter time with smaller personnel" (Bennett, 1945). As with the other convulsive therapies, initial reports of electroshock where enthusiastic accounts of it curing schizophrenia; later studies showed that electroshock is not effective in treatment of the disease. It was found that electroshock is effective in the treatment of depression with early studies reporting 80% to 90% response rate (American Psychiatric Association, 2001). By the current standards of the double-blind clinical trial electroshock is considered an effective treatment (Gregory, Shawcross & Gill, 1985). A 2003 study performed analysis on depressive symptoms and cognitive function obtained from a number of randomized controlled trails. The study found, "ECT is an effective short-term treatment for depression, and is probably more effective than drug therapy. Bilateral ECT is moderately more effective than unilateral ECT, and high dose ECT is more effective than low dose" (Group, 2003). Though we still don't know why convulsive therapy works, electroconvulsive therapy is used to this day on patients that are unresponsive to antidepressant drugs and psychotherapy (Dahl, 2008).

Early electroshock machines where simple devices that served to regulate the current strength and duration. The electroshock treatment was a relatively simple procedure, especially compared to shock treatments of the past. First an electrode paste is rubbed into the patients temples and the electrodes are applied. The resistance of the patients head to the

current varies depending on the physical properties of the patient; thus an initial resistance reading of the patients head must be taken. This is done by applying a small current and testing the resistance using an ohmmeter. If the resistance is within the required range (500 to 1,000 ohms) then the current is passing through the skull rather than bridging across the forehead (Schnidler, 1942). Three nurses hold down the patient and a gag is placed in the patient's mouth to prevent injury. The physician presses the button on the machine and a shock is delivered.

> If the shock does not produce a complete grand mal-like reaction, a second shock with a slightly higher setting is given at once; if necessary, even a third shock is given. The desired reaction is a tonic spasm sometimes preceded by outcries. The trunk, arms, legs, and hands are in half-flexed spasms...The patient then passes into a generalized clonic phase of more or less violence for a minute or two during which there may be frothing at the mouth and sometimes loss of sphincter control; the reaction resembles a typical grand mal seizure in all respects. (Schnidler, 1942)

Today's use of electroconvulsive therapy (ECT) is quite different than the early approaches. Cerlliti encountered that patients would often injure themselves (similar to Metrazol) during the convulsions. Today the physical damage can be controlled by administering muscle relaxants and anesthetics prior to the procedure (Comer, 2003). Throughout the treatment the patient's physiologic signals including EEG, cardiovascular and oximetry are monitored; making ECT a relatively safe procedure with a death rate of 1 in 10,000 (Luster, 2002). The issue of the seizures having debilitating effects on the brain such as confusion, memory loss and learning problems continue to be an issue with modern ECT.

Early reports of electroconvulsive therapy acknowledged that the patients had a loss of memory following the treatment. "The patient loses all memory from the moment the button is pressed until full consciousness is regained. How complete the amnesia is may be illustrated

by the fact that a number of patients accused the doctors and nurses of staging a hoax. However, most of the patients 'just went to sleep'" (Schnidler, 1942). The full side effects of ECT are still being uncovered in recent studies. "Adverse cognitive effects were detected 6 months following the acute treatment course. Cognitive outcomes varied across treatment facilities and differences in ECT technique largely accounted for these differences. Sine wave stimulation and BL electrode placement resulted in more severe and persistent deficits" (Sackeim, Prudic, Fuller, Keilp, Lavori & Olfson, 2007). The effects of ECT on memory have created controversy in today's psychiatric community. Groups of patients have formed anti-ECT advocacy groups, such as the Committee for Truth in Psychiatry, and have filed class action law suits against hospitals (Fink, 2006). Even with these issues, approximately 100,000 patients in the United States and one million people worldwide receive ECT treatment each year (MGH Hotline, 2006).

The American Psychiatric Association (APA) has guidelines for the administration of ECT but the standards are voluntary and not all facilities follow them. "There are no minimal, federally approved standards governing the education, training and privileging of medical practitioners of ECT. Further, there are no federally approved standards for required protocols to ensure the safety and efficacy of ECT" (Luster, 2002). Disagreement also exists over the best course of ECT treatment (intensity, duration of seizures). The disagreement over the best course of ECT is apparent in studies that conclude the FDA restrictions on electrical output (576 millicoulombs) limit the treatments effectiveness (Krystal, et al., 2000). The U.S. Food and Drug Administration (FDA) regulates ECT devices as Class III devices; the most stringent regulatory category. "Class III devices are those for which insufficient information exists to assure safety

and effectiveness solely through general or special controls" (U.S. Food and Drug Administration, 2002). Though much uncertainty about electroconvulsive therapy remains, its use as a drug alternative is on the rise in the United States.

Lobotomy

Two years before Cerletti and Bini shocked their first patient, a Portuguese neurologist Egas Moniz introduced a surgical procedure for the 'insane'. At the 1935 International Neurological Congress, which Egas Moniz attended, Dr. Carlyle Jacobsen and John F. Fulton presented their research on the bilateral removal of the forepart of the frontal lobes in two chimpanzees. Following this surgery the chimpanzees lost their "anxiety and frustrational behavior" (Fulton, 1951). Following this presentation Dr. Moniz asked Fulton whether anxiety states in human beings could not be relieved by a similar procedure (Fulton, 1951). A year after the conference Moniz and his assistant Almeida Lima published their report on performing lobotomy on twenty schizophrenic patients. A rationale for lobotomy was, "Prefrontal lobotomy is presumed to benefit the schizophrenic patient by destroying circuits involved in the maintenance of this morbid eddy or resonance and permitting him more effectively to integrate and use what he has left" (Jenkins, Holsopple, & Lorr, 1954). While first Moniz performed the surgery by injecting alcohol into the white matter of the frontal lobes, Moniz refined the procedure by designing a "leucotome". A leucotome is composed of a narrow shaft with a retractable wire loop or metal band at the end. Once the leucotome is inserted into the brain the wire is extended and the instrument is rotated to cut a core of brain matter (Jansson, 1998). Shortly after Moniz's announcement lobotomy experiments where being undertaken in the United States and Europe.

The work of Dr. Walter Freeman brought lobotomy to mental hospitals in the United States. Dr. Freeman wanted to turn the lobotomy in a simple and quick procedure that can be performed routinely in the over-crowed, under-staffed mental institutions of the times. Rather than having to drill into the skull, in 1946 Freeman developed a small sharp "ice pick" that could be inserted through the eye socket and into the brain. "The instrument is then swung through an arc of 30 degrees and withdrawn. The same operation is performed on both sides" (10-Minute Brain Operation, 1948). The patient was rendered unconscious by two electroshock convulsions and the operation performed without the need of an anesthetic. Dr. Freeman claimed that the operation should succeed "in patients who have been sick less than one year and in the hospital less than six months…In illnesses longer than on year's duration, transorbital lobotomy should be looked on as a test, not a last resort." (10-Minute Brain Operation, 1948) The ease of this "10-Minute Brain Operation" caused lobotomy to be widely used in United States mental institutions, with as many as 20,000 operations performed by 1948 (Eimas). In 1949 Moniz received a Nobel Prize for his work but by the mid-1950's his procedure was largely replaced by anti-psychotic drugs such as chlorpromazine (Tierney, 2000).

The lobotomy created a number of documented mental disturbances in affected patients. "Prefrontal lobotomy has the effects of a surgically induced childhood…he presents an altered personality which is not at first a healthy personality" (Psychosurgery: The Nursing Problem, 1947). At times it was necessary to "retrain the operated individual." Other side-effects included apathy, passivity, poor concentration and decreased emotional responses (Encylopaedia Britannica, 2009). Though rare, lobotomy is still used to this day as a last resort when other treatments have failed.

During the 20th century, treatments such as hydrotherapy and convulsive therapy were used extensively in mental institutions such as Grafton State Hospital. In order to most efficiently treat large numbers of patients, the hospitals needed to be built with specific structure-function relationship in mind.

Grafton State Hospital

Overview

Grafton State Hospital was founded as a satellite campus of Worcester State Hospital. The hospital's many buildings were scattered over the 1,000 acre campus and many were connected by tree-lined internal roadways and underground tunnels. This allowed for direct transportation of food and access to the patients. The patients were classified into three different groups: excited, violent, and quiet (1856.org, 2009). Buildings were clustered by function and the colonies were separated by class of patients in their respective areas (1856.org, 2009). Each colony housed a separate class of patients and were named according to the type of tree prevalent in the surrounding locations; Elms, Pines, Oaks, and Willows (1856.org, 2009). Elms buildings were constructed of masonry to account for the "excited" male patients, while Pines was specifically for the "excited" female patients (1856.org). Oaks and Willows served the same functions and housed male patients who were considered trustworthy and industrious (1856.org, 2009).

The Oaks and Willows colonies housed men that worked on the farm routinely while the hospital was in operation (1856.org, 2009). This institution was intended to be self-sufficient, and in 1906 the farm expanded it's the dairy operation as part of the Oaks colony which was supplying the entire campus with milk. By 1912 there was an extensive poultry plant as well as a pig farm (1856.org, 2009). Eventually the women were allowed to work in the flower and vegetable gardens, but the heavy work was left to the male patients (1856.org, 2009).

Figure 6: Female patient harvesting cucumbers during the Grafton Era circa ~1940 (courtesy of J. Chilton)

A reservoir was completed in 1914, on 113 acres of land bought by the hospital in 1909, to supply the campus with the 150,000 gallons of water the campus used daily (1856.org, 2009). In 1929 Grafton State Hospital supplied over thirteen million pounds of milk and fifty-one thousand pounds of poultry to the patients, staff, and surrounding towns (1856.org, 2009). By 1945 the state hospital had grown to occupy 1,200 acres and supplied the campus, as well as surrounding towns and other institutions, with sufficient amounts of poultry, eggs, milk and vegetables (1856.org, 2009).

Architectural Analysis

Architecturally the Grafton State campus is a remarkably unique site because of how it blends red-brick institutional style buildings with the lush green countryside it resides in. Like many farming hospitals of the time in Massachusetts, Grafton state was broken up into four colonies. These colonies were named after trees prevalent in the surrounding area; they were The Elms, Pines, Oaks, and Willows. For the purposes of this paper, we will be focusing

specifically on the Elm's colony as it is the colony where Tuft's Veterinary school now primarily resides.

Administration Building

The first key building that will be discussed is the Administration Building, whose construction heralded Grafton States' independence. Built in 1913 and designed architects Fuller and Delano, the opening of the Administration building truly marked the separation of the Grafton Campus from its parent institution in Worcester (Jenkins, 1993). This building housed primarily the administration offices and was also probably the first building many of the patients and their families experienced at the hospital. It is for this reason that the Administration building had to exude both the serenity of the rural countryside all around it, but also establish a tone of dominance and control which symbolized the Hospitals care over its patients. This is likely why the building was built in the craftsman style.

Figure 7: Administration Building Circa ~1940 (Grafton Era)

The Administration Building especially emphasized the natural countryside around it while still exemplifying elements of a more classical and controlled style of architecture. The

Administration building is built upon a foundation of fit and stacked fieldstone; this stone foundation serves to connect with the farm land surrounding the building, looking almost identical to the many fieldstone walls built in the areas around the campus.

From its foundation the large red brick building stretches two stories tall, and features a slate hip roof. Out of the roof extend a number of chimneys and dormers, serving both their functional purposes and an aesthetic purpose of breaking up the monotony of the slate roof.

The building's façade is composed of fourteen bay windows placed around an entry pavilion in the center. The window surrounds add to the craftsman, rustic style with their limestone keystones at the tops of the windows, and the limestone sills at the bottom. The central entry pavilion features a Tuscan porch with three-part windows. Originally, the roof of this entrance porch extended far beyond the foundation of the building and formed a canopy over the circular drive in the front of the building. This section featured classical columns, further adding to the classical style and the overall controlled aesthetic of the building. However this jutting entrance canopy has since been removed, likely to create more space for cars along the drive.

Figure 8: Administration Building in 2009 (Tufts Era)

One of the most important features of this building, both aesthetically and for the first impression of visitors is the view that the Administration building possess. The front of the building faces southward over Westborough Road, surveying the majority of the now Tufts and then Grafton Campus. The land behind the building drops away very sharply, providing gorgeous views of the surrounding woodland and farms (Jenkins, 1993). This was an essential aspect, as one of the ideas behind the farm campus was that it provided patients treatment in serene, uncluttered natural space, providing the fewest amount of distractions as possible. Visitors to the administration building cannot help but be impressed by the gorgeous wide-spanning land surrounding the building.

When Tufts took over the campus, the administration building was renamed to the Jean Mayer administration building, and serves many of the same purposes as it did during the Grafton State hospital age. Today it is home to offices of the administration, including the Dean of the Veterinary school, meeting rooms, reception, and the office of admissions. New students

visiting the school likely have many of the same positive impressions of the area when entering the administration building as patients and their families did back in the early 20th century. The gorgeous open fields and pristine woodlands are still attracting new residents nearly 100 years later.

Auditorium/Franklin M. Leow Veterinary Education Center

Located directly west of the Jean Mayer administration building is the Franklin M. Leow Veterinary Education Center, or the Auditorium as it was known during the Grafton State Era. Constructed in 1931 the Auditorium was one of the later additions to the campus, and is one of the few buildings on the site that feature a classical derived style that is so prevalent elsewhere in the Massachusetts state hospitals. Likely designed by Desmond and Ward, architects active throughout the facility during the 1930's, this classical revival style building is the most internally altered of all the buildings taken over by the Cumming's school of veterinary science at Tufts University. From the outside however there aren't many noticeable visual changes from when it was initially constructed.

Figure 9: Auditorium during Grafton State Era Circa ~1940 (Grafton Era) (courtesy of J. Chilton)

From its brick foundation the Auditorium raises two red-brick-stories to a cast stone cornice and brick parapet. Its front façade features a three bay entry pavilion framed by four massive cast stone pilasters which truly set the classical tone of the structure as it overlooks a semi-circular drive. To either side of the entry pavilion there are huge arched windows featuring impost blocks and cast stone keystones. This building is composed of a front section made up of a five by three bay and two story construction. The back portion of the building features a six bay wing with two alternate entries toward the end of the bays. It also featured high vaulted ceilings which formed a large space for an auditorium. These windows in the back section closely resemble the two arched windows from the front façade and work to closely tie the front portion of the building to the back portion.

Figure 10: Interior of Auditorium during Grafton Era circa ~1940 (Grafton Era) (courtesy of J. Chilton)

When ownership of the campus was transferred to Tufts University, the Auditorium was chosen as the location for School's library. In 1993 the building was massively renovated by the architects Finegold Alexander & Associates, Inc. of Boston. When the building opened for the fall semester of 1993, it was renamed The Franklin M. Loew Veterinary Medical Education

Center in recognition of Franklin Loew, DVM, PhD, who served as the second Dean of the Tufts Veterinary School from 1982 to 1995 (Cummings School of Veterinary Medicine, 2009). The most significant addition during the renovations was the addition of one large lecture hall on the second floor of the front portion of the building. This lecture hall contains seating for 170 students, and a divider so that it can be converted into two 85 seat lecture halls.

Figure 11: Franklin M. Loew Veterinary Education Center in 2008 (Tufts Era)

The basement of the Loew Center contains a number of various rooms, including a student lounge, a locker area, bathrooms, and a seminar room. The largest room in the basement is a teaching wet- laboratory with space for 76 students.

The large back half of the building was masterfully converted into library and computer lab space. Where there once was one large auditorium room with a high vaulted ceiling, the architects behind the renovation were able to create another floor of space for bookshelves and studying while still preserving the buildings wide open feel. This was achieved by creating a

second floor which does not span the entire area of the auditorium section. Instead this second floor covers only the middle portion of the building, leaving either side of it open to the light of the bay windows and a view of the first floor below. The area is quite impressive because while most libraries suffer from a cluttered almost claustrophobic feeling, this library offers a polar opposite use of space with open walk ways, massive amounts of natural light, and a tall spacious ceiling.

This renovation and rehabilitation was so impressive that it was noticed by the Worcester Area Chamber of Commerce. In 1994 it was a recipient of the Chamber of Commerce's Silver Hammer Award, which recognizes "construction and renovation projects that have made an 'extraordinary visual and aesthetic impact on the physical landscape of the community'" (Worcester Area Chamber of Commerce, 1994).

Elms Nurses' Dormitory/Agnes Varis Campus Center

The Elms Nurses' Dormitory was constructed in 1913 and was built directly across Westborough road from the Administration building. This large Craftsman-style brick building faces East across the lawn and parking lot and was the first large staff residence built at the State Hospital (Jenkins, 1993). Up until the creation of the Nurses' dorm staff resided in either one of the two smaller wood-frame staff cottages or in their own rooms in one of the patient's wards.

Figure 12: Agnes Varis Campus Center in fall 2008 (Tufts Era)

The building is built with a thirteen by three brick bay plan and closely resembles the façade of the Administration building. Like the Administration building, the Dormitory sits on a field-stone foundation with a cast-stone water table. From the foundation the building raises two stories to a slate hop roof which extends beyond the building's footprint on carved rafters. The building's façade is perfectly symmetrical; a three window wide open brick portico sits in the center of two five-window wide wings on either side. Each of these narrow windows features splayed brick lintels with keystones and cast stone sills.

During the Grafton era each of the five-window wings contained 10 separate rooms to house staff. Each room featured one window and was hardly as wide as two of these windows put together. Linda M. Casey, currently at the Grafton Historical Society, spent a summer working at the hospital and living in this building and provides a first-hand description of the Nurses' dormitory,

> The nurse's dormitory provided the smallest of rooms. Each room was not very much bigger than a modern closet. It held a twin sized bed on one wall, in my

> room it was on the right. On the opposite wall was a built in desk with a chair. Walk space separated the bed and desk. A small closet was the only other thing in the room and was located just inside the entrance on the left. (L. Casey, Personal Communication, February 3, 2009)

Though this building was built to house staff, none of the staff residence rooms were at all significantly larger than those in the patient wards.

In July 2007 Cummings School of Veterinary Medicine began the transformation of the Nurses' Dormitory into the Agnes Varis Campus Center. Designed by Finegold Alexander and Associates Inc. of Boston, renovation of the main building was completed in fall 2008 and was dedicated on September 23, 2008 as the Agnes Varis Campus Center in recognition of Ms. Varis' philanthropic contributions that supported the extensive renovation (Cummings School of Veterinary Medicine, 2009). The Varis Campus Center is now home to a full scale dining facility, several student activities rooms, and faculty offices.

The ground floor has been renovated into gym space, currently housing a 1,000 sq foot exercise room with machines and free-weights. The first floor has had a large deck area added outside of the front entrance for outdoor dining, and the inside has been turned into a cafeteria and large dining area. The second floor is devoted exclusively to student activities, and features space for student organizations to meet as well as a bookstore. There are two 1,000 sq foot student lounges on either side of the central student rooms on this floor. Each is a completely open room and contains couches, televisions and table games for students (J. Chilton, Personal Communication, 2009). These side lounges were renovated from staff rooms, each containing 10 rooms in only 1,000 sq feet of space.

Currently still under-construction, and connected to the Campus Center from behind is a 150-seat lecture hall/auditorium to be known as the Agnes Varis Auditorium. The Varis Auditorium is scheduled for completion in March 2009 (Cummings School of Veterinary Medicine, 2009).

Elms Building A/Violent Ward/ Building #18

Sitting in the center of the Cumming's School's campus, Building 18 formally was the ward for violent, or "excited", male patients and is the only un-occupied building on the campus discussed in this paper. Constructed in 1905, Elm's building A was designed specifically for "excited" male patients, being constructed as a masonry building for specifically this reason (Jenkins, 1993). Though it was the first ward built in the Elm's colony, it is by far the largest. Like most of the Elm's buildings, the Ward is Craftsman-style, set on a fieldstone foundation with a limestone water table and raises two stories from the ground level. This building, more than any of the other patient wards harkens back to the Kirkbride style buildings, with its hilltop setting, large scale and both projecting and set back wings. The building's façade faces west and features a five bay section in the center framed by three-bay projecting pavilions on either side. These three-bay pavilions are then in turn framed by a three and four bay set-back wings.

Figure 13: Elms Building A during Grafton Era circa ~1940 (Grafton Era) (courtesy of J. Chilton)

This design formed a floor layout with 5 sections, the two outer-most and the central section contained patients' rooms, which unlike other wards featured large metal grating over the windows. The two sections between these patient halls were common room's, large open spaces with chairs and tables for sitting, as well as basketball hoops and sporting equipment so the patients could get exercise without having to be let out of the hospital. This floor plan makes up the first and second floors of the building, while the basement contained an entirely different set of rooms. The basement housed a number of rooms, mostly for various therapies and machine rooms providing the basis for the building's infrastructure. Still in existence today are rooms filled with bath-tubs used for hydrotherapy, a room for vapor-bath therapy, ventilation system machinery and a passage way to the kitchen.

The ventilation system was quite basic by today's standards; essentially each room contained two large holes which lead to the machinery –fan room in the basement. One of

these holes served as an exhaust while the other formed an intake. This allowed the building to receive fresh-supplies of air without providing openings to the outside which make the interior susceptible to the elements (J. Chilton, personal communication, 2008).

This passage way to the kitchen was featured in both Elm's B and Elm's C and is essentially a series of underground tunnels leading from the ward buildings directly to the kitchen. Though still in existence today, these halls, like the building itself, are no longer in use.

Figure 14: Building 18 in fall 2008 (Tufts Era)

Elms C/Building 20/Veterinary Diagnostic Building

The southernmost portion of the Cumming's campus features a semi-secluded grass and tree filled quadrangle with three buildings forming a perimeter around the eastern, southern and western sides of the quad. Elms C sits on the southern portion of this quad and faces north over it, serving as the centerpiece for this section of campus. Like Elms A and B, Elms C served

as a patient dormitory during the Grafton State era, and just like the other two buildings is connected via a tunnel system to the kitchen (J. Chilton, personal communication, 2008).

Figure 15: Veterinary Diagnostic Building in fall 2008 (Tufts Era)

Elms C was built in 1913 and like most buildings in the Elms colony is of the Craftsman-style. This red brick building with stone trim is set on a fieldstone foundation from which it raises two stories to a slate hip roof. The building's façade is easily the most interesting of any of the three buildings on the quadrangle; it is composed of 17 bays with a projecting centerpiece three bays wide. This centerpiece is boxed on either side by two bay sections, with semi-hexagonal bows and a four bay section at either end. The center section is then framed by the two entrances on both sides which feature a hip roof hood over the doors and long, arched stairwell windows. Some of the other windows feature cast stone keystones and sills with splayed brick lintels, prominently displaying the building's Craftsman-style.

In 1993 Elms C was rehabilitated by Tufts for use as Diagnostics and laboratory space, including the space and infrastructure for a BL3 Lab. This rehabilitation presented an interesting challenge to its designers, how do you fit lab space and all the components and tools that go with it into a building constructed in 1913 as a mental hospital. Then even beyond this how do

you fit and design the air-filtration and sterilization equipment needed for bio-safety level 3 laboratories? From the façade it may not look like this is much of a challenge, but when one takes into account how cramped the buildings were when they served as patient housing, and the fact that the building is a mere three-bays deep, this rehabilitation gets significantly more complicated.

One large addition Tufts made to the building was adding a one-story steel addition to the basement level of the building. This small support building, though not visible from the front of the building, serves as laboratory support and houses much of the mechanical infrastructure necessary to run a modern lab building.

With the large mechanical support components relegated to the back of the building, Tufts was now faced with the fitting laboratories into this narrow building. One solution to this problem was essentially breaking up the traditional lab space to take advantage of the whole floor-plan. Traditionally laboratories feature space for actual lab benches as well as refrigerators and storage. The strategy Tufts used was to separate these large components, placing all of the laboratories into the wing sections of the building and putting refrigerators and storage into the hallways. Though this makes the hallways far narrower it freed up significant space within the labs and allowed them to be placed into spaces normally too small to fit a laboratory.

Even once all the equipment, machinery and tools were in place and the lab was in use, this building still suffered from unique problems not normally prevalent in lab buildings. One example of this is the installation and replacement of the Autoclave machine. The autoclave is a

very heavy piece of machinery used to sterilize lab equipment, too heavy to simply place in the building. To accommodate its weight when it was placed, a long support frame was built down the hallway of the building with railroad like tracks. To support its weight contractors supported the basement ceiling with jacks so that basement ceiling could hold up to the tremendous weight of the autoclave. The autoclave was then placed on the tracks at the West end of the building, and pushed down them to its resting place in the Eastern end of the building (J. Chilton, personal communication, 2009).

Ten years later, this autoclave broke down and needed to be replaced. Joe Chilton, Director of Campus Facilities at the Cumming's school describes the process of replacing the autoclave;

> When the autoclave died we would have needed the same RR track framework to move the autoclave out and the new unit in. This would have put the now busy research building out of business for two weeks (move research out of the way, setup, move out, move in, take down, move research back). Instead I had the existing window behind the autoclave removed and a set of double doors installed, and we also installed two steel beams extending out onto the flat mechanical room roof. When the new autoclave arrived we opened the doors, rolled the old unit old on the steel beams, picked it off the roof with a crane, put the new autoclave on the steel beams the same way, and rolled the new unit in place. The autoclave people said they never had it so easy. (J.Chilton, Personal Communication, January 26, 2009)

Rehabilitating an old building to be used for modern biomedical research is no easy undertaking; however Tufts took this risk and has overwhelmingly succeeded. Though one may think that during the initial renovations the most difficult challenges would arrive, but as evidenced by Joe Chilton's work, rehabilitation of old buildings is a job that just gets more complicated as time progresses.

Building 19/Elms Food Service/Amelia Peabody Pavilion

Located on the Eastern side of the grass quadrangle and facing West across is it is building #19 and the Amelia Peabody Pavilion. Built in 1913, the Food Service Building, now known as Building 19 was the original home of the Grafton State Hospital's kitchen. Building 19 is another Craftsman style building, starting from a fieldstone foundation and raises two stories in the middle section and one on the sides. The red brick building features a six-bay central section which goes up two stories. This central section is then flanked by single story four bay wings on either side. The building's front entrance is shaded by a vaulted overhang and is topped by a tall arched window. This window, along with all the others along the façade features a cast stone sill.

Figure 16: West face of Building 19 in fall 2008 (Tufts Era)

During the Grafton Era, up until the early 1950's this building was used as the food service building and contained a kitchen to prepare all the food for the Elm's colony. As mentioned before, this building connects to Elms Buildings A, B, and C through an underground tunnel system. The purpose of this system was to allow staff members to more easily transport food to bedridden patients living in these three Elms wards (Jenkins, 1993).

In early 1950 the food service building suffered a major fire but, rather than repair the building, the state decided to build a new kitchen building with dining hall. So, in 1957 The Peabody Pavilion was built by the state to replace the fire-damaged Elms Food Service building as well as provide a dining hall (J. Chilton, personal communication, 2009).

Named after the primary contributor, Amelia Peabody, the Peabody Pavilion is a modern looking rectangular red brick building that, despite its modern style, is still able to blend in with the Craftsman style buildings around it. The building façade faces South over a parking lot, and is attached to the Food Service Building on its Western side. From its foundation the Peabody raises only one story over the majority of the building, however towards the middle it shoots up two stories.

Figure 17: East face of Building 19 and Amelia Peabody Pavilion in fall 2008 (Tufts Era)

During its use by the Grafton State hospital this two story section was actually just a room with a high ceiling. Likely this was to compensate for the addition heat of the kitchen

which the state was weary of after the fire in the first kitchen. With this new kitchen, the State was able to convert the old Service building into rooms for storage and office space.

When Tufts first established the veterinary school on the Grafton campus, the Large Animal Hospital was still being built. So, to accommodate for this the Peabody Pavilion was used as the Large Animal Hospital until its permanent residence could be completed. In the fall of 1982 the Large Animal Hospital building was complete, and the Large Animal Hospital moved into its new building. At this point Tufts renovated the Peabody building into animal housing and research labs. The kitchen room with the high ceiling was split in half, and a second floor of research laboratories was added. Today the state of the art animal housing area is located where the dining hall was and the Service building is still used as storage and office space.

Henry and Lois Foster Hospital for Small Animals and The Equine and Farm Animal Hospital

Easily the largest and most pronounced of any of the Modern buildings on campus, the Large and Small Animal Hospital has taken its place as the focal point of the Tufts campus. Located almost directly south across Westborough road from the administration building, the Animal hospital is a large modern red brick structure. Like the Peabody Pavilion, despite this buildings modern style and large stature it still fits in well with the older, smaller and more Craftsman style buildings that make up the majority of the campus.

Figure 18: The Equine and Farm animal hopsital in fall 2008 (Tufts Era)

The Animal Hospitals were completed over the span of 25 years in sections. The Large Animal Hospital section was the first to be completed in 1980, and was designed by Warnecke/Ehrenkrantz/Desmond & Lord of NY, NY. Four years later, with significant philanthropic support from the Dr. Hank Foster family, founder of Charles River Laboratories, the Henry and Lois Foster Hospital for Small Animals was constructed as a major addition to the West aspect of the Large Animal Hospital. This state-of-the-art clinical facility was designed by Warnecke Cannnon of NY, NY. In 1996 the need for an Oncology center led to the creation of the Oncology wing which was designed by DTS Shaw of Boston. After five years the Foster Small Animal Hospital was getting more use than its space could easily accommodate so its wards were expanded. This expansion was designed by Mark Hafen of Boulder CO. Finally, in 2006 the need for an MRI was met when Greg O'Connor & Associates of Worcester, MA designed and added the MRI wing (J. Chilton, personal communication, 2009).

Figure 19: Henry and Lois Foster Hospital for Small Animals in fall 2008 (Tufts Era)

Though being the most modern and most recently constructed of all the prominent buildings already mentioned, the Small and Large Animal Hospital is also the building which has changed the most noticeably over time. Though this period of change was short, the appearance and foot print of the building have changed almost as much as the Campus Center will when its renovation is completed in March 2009.The renovation and re-purposing of mental hospitals has become a common response to the dismantling of the asylum system. The Grafton State Hospital was the first mental institution in Massachusetts to close in 1973 (1856.org, 2009).

The National Trend to Close State Mental Hospitals

At the time of its closing, Grafton State Hospital housed only 641 patients as compared to the 1,730 housed in 1945 (1856.org, 2009). At this time other mental institutions were overcrowded and filthy, which exacerbated the closing of the mental institutions all across Massachusetts (New York Times, 1987).

One institution in Massachusetts that was overcrowded at this time was the Metropolitan State Hospital (New York Times, 1987). The Metropolitan State Hospital was located in Lexington, Belmont, and Waltham and was very similar to the Grafton State Hospital in style and function. At the Metropolitan State Hospital, rooms meant to house two patients were actually housing four. Many of them had no privacy, and during the day the patients were found watching television or sleeping on hard benches covered in urine (New York Time, 1987). Dozens of people shared one bathroom, and the buildings needed renovation (New York Time, 1987).

The state mental hospitals mentioned above, like Grafton State Hospital, housed and treated adults, but institutions similar to these existed to treat and house children. The Willowbrook State School, located in Staten Island New York, was a campus setting much like the state hospital previously mentioned but they treated children. Children as young as three or four years of age were residents of Willowbrook (Dugger, 1993). At Willowbrook the housing conditions were just as bad as many of the other state hospitals during this time. The children were found naked, untended in locked wards, covered in urine and malnourished (Dugger, 1993). The moans and cries of the filthy, starving children could be heard echoing throughout the establishment (Dugger, 1993). Willowbrook closed their doors in 1987 but many of the

released patients were left homeless or not provided with appropriate housing until 1992 when the children and their families were supplied with housing (Dugger, 1993).

In 1985 a five-year plan was instituted by the Massachusetts Governor Michael Dukakis to provide a secure, safe and humane environment with professional treatment for the mentally ill (New York Times, 1987). By this time period it had become popular to transition away from large mental institutions and into smaller mental health treatment and residential facilities (Preer, 2007).

By the early 1980's, people realized that it would be more beneficial to house patients separately based on their own specific treatment plan. Before this time, treatment plans were unspecific to the individual and patients were lumped into different categories of treatment.

It is important to point out that the transition from state hospitals to smaller group facilities was still not complete in Massachusetts until the mid-1990's. During the 1980's hospitals such as Danvers State Hospital, Metropolitan State Hospital, Lakeville State Hospital, and Northampton State Hospital were still fully functioning (Preer, 2007).

Schools for the mentally and physically disabled began forming all over the United States at this time as well. Schools like the Evergreen Center, located in Milford, Massachusetts, began replacing State Hospitals, for people with mental retardation and developmental disabilities.

The Evergreen Center opened in 1983, is a residential program for children ages six through twenty-two (evergreenctr.org, 2009). Programs of this nature for adults also began flourishing, like the Lower Mills Day Supports Program (evergreenctr.org, 2009). People who

were deemed critically insane would go to mental hospitals which were now part of many medical hospitals across the United States.

As the transition occurred from state hospital to small group homes, the public began to realize that people who were physically and mentally challenged could stay within the community and serve a contributing role in society. Residential programs like the Evergreen Center and Lower Mills Day Supports Program are still fully functioning today, and they are an integral part of society. Vocational programs as well as community involvement have grown rapidly. The Evergreen Center has a School to Work Program where children learn life skills and can apply them to jobs throughout the community (evergreenctr.org, 2009). The adult support residential programs do many of the same things. They try to integrate the adult patients into the community as much as possible. People with developmental and physical disabilities are also taught life skills through these residential programs (evergreenctr.org, 2009). Patients learn to take care of themselves by learning essential life skills. Higher Function students at the center learn how to read, as well as simple math (evergreenctr.org, 2009). Both the children and adult program staff take their patients, or students, out into the community for field trips and extra-curricular activities. This is done to socialize and integrate them with other children and adults who share the same passions. Many of the girls at The Evergreen Center participate in dance class, and they regularly take trips to the movies or shopping trips at the local malls (evergreenctr.org, 2009).

Over the years both public and private schools have created programs for challenged students. These classes move at a slower pace when teaching, do not fully cover what other classrooms do, but are still located in the same facilities as other students, which was unheard

of in the early 1900's. Individual Education Plans, or IEPs, are specific plans set up for each student that targets what they need to learn and create specific goals for them to meet. People that are disabled are no longer lumped together in large groups and cast out from society. They have their own education plans, medical treatment, and exercise routines (evergreenctr.org, 2009).

Modern Medical Treatments for Mental Illness

Medical research has led to the development of medications that are effective for treating different types of mental disorders and diseases to the extent that in many cases, patients can still lead a normal life (Stephanie Buccacio, Personal Communication, January 12, 2008). Medications such as Ativan, Kolonpin, and Topomax treat anxiety and seizures, whereas Depakote and Celexa treat mood disorders (Stephanie Buccacio, Personal Communication, January 12, 2008). Overall 44 million people in the United States are affected by mood disorders each year, and 14 million of those are affected by depression alone (SAMHSA, 2006). Mood disorders have now become a part of everyday life, they are diagnosed more frequently, and many are curable with the use of proper medication (Stephanie Buccacio, Personal Communication, January 12, 2008). People with disorders, like the ones mentioned above, can lead normal lives without everyone knowing their medical history (Stephanie Buccacio, Personal Communication, January 12, 2008). Student patients at The Evergreen Center and Lower Mills Day Supports Program are prescribed these medications on a daily basis (Stephanie Buccacio, Personal Communication, January 12, 2008). The more things shared by society and patients in residential programs and local hospitals, the more everyone becomes integrated

with each other. IEPs are now common in elementary schools, as well as residential programs, and many of these children in both atmospheres share many of the same medications. Society has recognized that there is a huge difference between the mentally and physically challenged people. Most of society no longer tolerates the use of derogatory classifications such "insane" or "retards" to describe these people anymore. It is now politically correct to use terms like "disabled", or "mentally ill." Society has come a long way from the era of state hospitals whereby individuals with mental disabilities are now generally afforded respect and understanding as would be expected for everyone else in society. Psychopharmacology has become a major contributor to society's acceptance of the mentally ill by altering the patients' ability to associate with society in a less obtrusive way.

The Introduction of Psychopharmacology

Psychopharmacology is the study of pharmaceuticals effects on the behavior of an individual. Psychopharmacology is a relatively new discipline in modern medicine (the last two decades) and its development is closely related to the understanding of mental illness (Claridge, 1970). Before psychopharmacology could arrive as a type of medicinal practice, biochemistry, neurobiology, and psychology all had to reach a modern level of understanding of the human brain at the cellular and molecular level. Many of the early studies were conducted on patients not in main stream society, such as patients with damage to their brains by disease or accident (Claridge, 1970). The practice of neurobiology advanced quickly so that drugs being used to effect behavior could be evaluated properly with regard to where a drug acts in the brain (Claridge, 1970). Initially these kinds of experiments where done in animal models where electrodes were placed in the brain and therefore a particular drug effect could be monitored

by the responsive neuronal activity (Claridge, 1970). However, the study of chemical agents and their effects on behavior is not a new concept (Claridge, 1970). Tea, opium, tobacco, coffee, alcohol, and other recreational drugs have been around for hundreds and in some cases thousands of years (Hamilton, 1994). These drugs have affected many parts of cultures of the past and today. Leonard Hamilton, in his article "Psychopharmacology," states,

> "The substances were valued by each culture for the effects that they had on behaviour, but each culture also developed written or unwritten guidelines to regulate the use of the substances. Some of these have been borrowed directly from folk medicine and simply represent the modern processing and reformulation of a drug application that may be centuries old. Others have been discovered by accident when a chemical reaction has gone awry or when a drug has been administered to treat one malady and it ends up being effective for some totally different problem." (Hamilton, 1994)

Records of the Greeks and Romans state that excessive alcohol can cause many social problems. The first tobacco seeds were brought to Europe from America by Andre Thevet and tobacco was first used by Dr. Jean Nicot as a type of medicine for sicknesses involving the patients' lungs (Boeree, 2008). Morphine was derived from opium (which is obtained from the sap of immature pods of opium poppy seeds) in 1803 (Boeree, 2008). Cocaine was isolated in 1859 from coca plants by Dr. Pablo Mantegazzo and was used as an anethetic and restorative (Boeree, 2008). In 1874, heroin was derived from opium (Boeree, 2008). Karl Schroff, in 1868, determined that hyoscyamus (a genus containing eleven different species of plants all with similar medicinal properties) can be used as a sedative and hypnotic, and within 20 years institutions used "hyoscyamine cocktails" (Shorter, 1977). According to Edward Shorter in A History of Psychiatry, "This represented the true beginning of asylum psychopharmacology" (Shorter 1996). Later, in 1880, hyoscine was isolated from hyoscyamus and was used on manic depressives (Shorter, 1996).

In 1869, Otto Liebreich began to use a compound called chloral, or trichloroacetaldehyde, to treat insomnia and depressed patients; Chloral is created by adding chlorine to ethanol (Shorter, 1996). This drug is referenced in earlier literature as a "the heroine being drugged before being robbed of her virtue" by usage of chloral (Shorter, 1996). Shorter states that,

> It remained for decades the workhorse of asylum pharmacology and enjoyed wide popularity- and abuse- as a drug that middle-class patients could take at home to avoid the asylum…Women in particular often became choral addicts for this reason, treated at home for psychotic symptoms because the family was too embarrassed to have them committed. (Shorter 1996)

The first synthetic drugs were Amphetamines and were discovered in 1887; they were initially used as a stimulant for soldiers in World War II (Boeree, 2008). In the early part of the century, Barbiturates were extensively investigated (Dodman, 1998). Barbiturates are derivatives of barbituric acid and are used as central nervous system depressants. With their discovery, doctors could now anesthesitize their patient (Dodman, 1998). In 1938, Albert Hofman discovered a derivative ergot, lysergic acid diethylamide or LSD (Boeree, 2008). The effects on behavior are extreme and effect perception, emotion, and many other areas of normal brain function; often the effects are noted as being most closely similar to the schizophrenia (Claridge, 1970). Phencyclidine, or PCP, was discovered in 1956 as a derivative of arylcyclohexylamine (Boeree, 2008).

Gordon Claridge, in Drugs and Human Behavior states, "In the early fifties the drug chlorpromazine, which has previously found application mainly in general medicine and surgery, was observed to have powerful tranquilizing properties. It was subsequently adopted as the first major drug that could satisfactorily control the symptoms of the acutely disturbed

psychotic patient" (Claridge, 1970). Jean Delya dn Pierre Deniker, among the first to use chlorpromazine on psychotic patients wrote in 1955 that "chlorpromazine has truly changed the atmosphere of the psychiatric wards for agitated patients and has eliminated the need for methods of restraint" (Bradslo,w 1997). In 1957, the discovery of Prozac (Fluoxetine) was published (Dodman, 1998). Valium was discovered in 1963 and is considered the second most successful drug of psychoactive drugs in history second to Prozac (Shorter, 1996). As of 1993, half of all visits conducted to psychiatric institutions were to discuss "mood disorders" (Shorter, 1996).

In the beginnings of psychopharmacology, all pharmaceuticals or drugs were split into three categories: stimulants, depressants, and hallucinogens (Hamilton, 1994). Stimulants cause excesses wakefulness and energy; Depressants cause calm, relaxation, or sleep; Hallucinogens cause distorted perception of reality (Hamilton, 1994). Presently all psychotropic drugs are classified into six categories; sedatives, stimulants, major tranquilizers, minor tranquilizers, antidepressants, and pychotomimetics (Claridge, 1970). Sedative or Hypnotics lower mental and physical activity and induce sleep; some examples are Phenobarbital, barbiturates, and alcohol (Claridge, 1970). Stimulants increase mental and physical activity; some examples are amphetamines and caffeine (Claridge, 1970). Major tranquillizers have an extreme calming effect; and a key example is chlorpromazine (Claridge, 1970). Minor tranquillizers cause a decrease in anxiety and tension; an example is meprobamate (Claridge, 1970). Anti depressives stimulate behavioral activity and decrease depression; examples include imipramine and phenelzine (Claridge, 1970). Psychotomimetics distort mood, perception, and thought processes and have been known to stimulate pyschotic episodes;

some examples are LSD and mescaline (Claridge, 1970). Currently the main interest of the psychopharmalogical field is endogenous small molecules (already produced in the body) such as the neurotransmitters adrenaline, epinephrine, and serotonin (Claridge, 1970). Drugs that stimulate or down regulate these hormones are of increasing interest.

Pharmaceuticals in the field of psychopharmacology have reached the point where it is common place to routinely prescribe mood-modulating drugs to patients over extended periods of treatment. The most common of these drugs are administered orally once a day but also can in some instances be administered subcutaneously, transversally, intramuscularly, by inhalation, intra-arterially, intravenously, intracranial, or intrathecally (Hamilton, 1994). The route by which drugs are administered are dependent pharmacokinetics and on the desired time/duration of the effect on the patient (Hamilton, 1994). While the field of psychopharmacology has for the greater part of a century affected human health care, veterinary medicine is far less advanced.

Psychopharmacology in Animal Medicine

Veterinary psychopharmacology tends to mimic that of human psychopharmacology, yet there are some particular species-specific differences that must be taken into account. Barbiturates were first used in the 1950's as a type of anesthesia and the treatment of epilepsy in many domestic animals including dogs, cats, and horses (Dodman, 1998). The phenothiazines (chlorpromazine) were used in the 1950's to allow veterinarians the ability to manage patients without using anesthesia (Dodman, 1998). In the 1960's acepromazine and Phenobarbital began to be used as a sedative and hypnotic and benzodiazepines were used later in the century as sedative, hypnotics, and muscle relaxants (diazepam, etc) (Dodman,

1998). Opiod antagonists began to be used in the 1980s in horses and were safe with limited side effects. Buspirone followed and is used today to treat many common issues such as anxiety and if often used as an alternative to benzodiazepines because of the decreased number of side effects (Dodman, 1994). Selective serotonin reuptake inhibitors began to be used with the introduction of Fluoxetine (Prozac) in 1989 and in 1991 clomipramine (Dodman, 1998). The use of drugs to alter a patient's behavior and in many cases allow them to be more manageable by the attending doctors has had a great an impact on the veterinary field and human medicine. The field of psychopharmacology will expand as the fields of neurobiology, biochemistry, and psychology advance our understanding of the molecular and cellular mechanisms that are affected by psycho pharmaceuticals.

SRI's or Serotonin Reuptake Inhibitors are one of the major drug types beginning to gain attention during the 1970's, in which many state hospitals were closed. The use of SRI's and other drugs to calm patients and treat mental illness enabled many patients to manage their own issues or allowed them to be manageable for their families. Fluoxetine, or Prozac, is one of the newer and more controversial of these drugs. Prozac was one of the first antidepressants that was specifically engineered to treat depression (O'Donnell, 2008). Peter Kramer termed "cosmetic pharmacology" in regards to the use of Prozac (Shorter, 1996). Basically this term is used to refer to any drug that is used to increase the mental capacity of the "normal" individual and not to treat a mental illness (Shorter, 1996). SRI's highlight a relevant dichotomy to our project; that many drugs and procedures are first tested in animals, then are used to treat illnesses in humans, and then revert back to treat illness in animals. Many pets and other animals are just beginning to be evaluated and treated for many mental diseases.

Treating of Animal Mental Illness: The Prozac Example

Fluoxetine, or Prozac, is a Specific Serotonin Reuptake Inhibitor and was FDA approved in 1987 for the treatment of depression. Since then it has been used to treat obsessive-compulsive disorders, premenstrual dysphonic disorder, ADHD, and many other disorders (O'Donnell, 2008). The primary way in which Fluoxetine and other SRIs work is that they block the mechanism for serotonin uptake in the presynaptic cleft and thereby preventing the normal reuptake of serotonin by the presynaptic neuron (Dodman, 1998). Serotonin is a molecule that has a calming effect and can induce a state of euphoria (O'Donnell 2008). Therefore, a depressed or anxious patient will be calmed and euphoric because of an increased level of serotonin in their blood stream. In Nicholas Dodman's book Psychopharmacology of Animal Behavior Disorders, he states that because of Fluoxetine's unique chemical structure and specific engineering, there are fewer side effects, such as sedation and hypertension, than that of many other medications used to treat depression and other mental illness (Dodman, 1998).

Fluoxetine is a relatively simple small molecule with a molecular weight of 345.8 and one chiral center (O'Donnell, 2008). Both of the enantiomers (or one molecule with two stereo chemistries that are mirror images of each other and not super imposable) are biologically active in the treated patient (O'Donnell, 2008). Fluoxetine is eliminated slowly from the body and is metabolized by the liver into norfluoxetine, which is also a SRI (O'Donnell, 2008). Fluoxetine is chemically similar to Benadryl (diphenhydramine) (Melman, 1995). The dosage of Fluoxetine for animals and humans is 1 mg per kg body weight administered orally once daily (Melman, 1995).

In the article, “Pharmacologic Effects in Man of a Specific Serotonin-Reuptake Inhibitor” written in 1978, the authors state, “Fluoxetine caused a 63 percent inhibition of [^{3}H] serotonin uptake into platelets obtained from normal volunteers to whom the drug was administered daily for 7 days. This dose had no effect on the usual pressor response produced by injections of norepinephrine or tyamine” (Lemberger, 1978). Pressor response is the measure of systolic blood pressure and an increase can cause severe migraines and hypertension (Lemberger, 1978). The experimental treatment was: Four subjects received placebo medication for 7 days and then they received 7 days of 30 mg Fluoxetine (Lemberger, 1978). On day 1, 4, 7, 8, and 12 the subjects were injected with an intravenous bolus of tyramine and then followed by infusions of nor epinephrine (Lemberger, 1978). These dosages were adjusted to increase each individual’s blood pressure to 25 to 30 mm-Hg (Lemberger, 1978). Blood was then collected and the platelets were evaluated for the concentration of serotonin (Lemberger, 1978). The results of the experiment demonstrated that Fluoxetine increases the concentration of serotonin in the blood cells of treated subjects (Lemberger, 1978) and confirms that Fluoxetine is effective in raising blood serotonin levels.

Many mental illnesses are now being diagnosed in domestic and wild animals. Dr. Nicholas Dodman, head of the Animal Behavior Clinic at Cummings School of Veterinary Medicine at Tufts University, was kind enough to assist us in our project. In Psychopharmacology of Animal Behavior Disorders Dodman states, “Several SRIs have begun to find a place in veterinary medicine for a variety of applications, including the treatment of anxiety (29), compulsive behaviors (30), and aggression (15, 31). Clomipramine and Fluoxetine are probably the most widely employed drugs of this type, though other SRIs, such as sertraline

and paroxetine, are probably equally effective" (Dodman, 1998). Diagnosis of animals requires a thorough evaluation of the daily life of the animal in question. Dodman stated that cases that are referred to him fall into three categories: a medical illness that was missed by the previous veterinarian, the behavior in question is actually caused by a training issue, or the animal in question really is in fact mentally ill.

There is an extensive list of uses for Prozac in animals. In dogs, Prozac has been shown to treat most obsessive-compulsive behaviors, mutilation disorders, separation anxiety, attention seeking, training enhancement, obesity, eating disorders, aggressive disorders, inappropriate urination, etc (Melman, 1995). In cats, Prozac has been used to treat psychogenic dermatitis, psychogenic alopecia, inappropriate urination, aggression, howling, marking, etc (Melman, 1995). In horses, Prozac has been shown to be effective in treat cribbing, a compulsive behavior, and to enhance racing, breaking, and training efforts (Melman, 1995). In zoo animals, Prozac has been used to treat excessive pacing and other stereotypical behaviors (Melman, 1995). Prozac has been used effectively to treat feather plucking disorders and trichotillomania in birds (Melman, 1995). One of the greatest reasons for the growing success of Prozac in veterinary medicine is that there are few side effects (Melman, 1995). While in humans Prozac can increase incidence of aggression, thoughts of suicide, and other harmful side effects, in animals there are no serious or harmful behavioral side effects (Melman, 1995). An important aspect of Prozac use is that in 54.8% percent of cases where the animal is prescribe Prozac the animal's dependency on prednisone is lowered (Melman, 1995). Prednisone is a powerful anti-inflammatory steroidal compound that has many harmful side effects when prescribed for long term (Melman, 1995).

A great advance in the practice of veterinary behavioral medicine is the creation of Reconcile™, a canine antidepressant containing Fluoxetine that is in a chewable, beef flavored form that is taken once daily (Reconcile, 2008). It is currently approved by the FDA to "manage separation anxiety and improves your pet's receptivity to a simple training plan…The four-step BOND™ training plan focuses on reinforcing positive behavior" (Reconcile, 2008). The BOND TM training system stands for, "Be positive, Only Reward calm behavior, No more drama when you come and go, Develop your dog's independence" (Reconcile, 2008). Separation anxiety (SA) is "the second most frequently recorded behavioral disorder (after aggression) reported in dogs presented to referral behavioral practices" and "behavioral problems, including those related to SA, represent the most common reason given for pet relinquishment at humane shelters"(Effects of Reconcile (Fluoxetine) Chewable Tablets Plus Behavior Management of Canine Separation Anxiety, 2007). Separation Anxiety affects 10.7 million dogs in the United States (17% of dogs) and veterinarians estimate that 60% of cases are undiagnosed (Reconcile, 2008). The most apparent and relevant cause of separation anxiety occurrences in dogs is the fact that dogs are pack animals and therefore in the absence of a canine pack, dogs will form a pack with humans (Reconcile, 2008). Therefore dogs can become extremely distraught and destructive when separated from their "pack" (Reconcile, 2008). The types of separation anxiety that Reconcile™ claims to treat are destructive chewing, barking or whining, inappropriate defecation and urination, drooling, pacing, trembling, and vomiting (Reconcile, 2008). Veterinary behaviorist Daniel Mills states that

> Prozac and other psychiatric drugs have been used successfully in treating animals for many years, as the clinical features of depression are very similar in humans and dogs. The only difference with the new drug is that it has been formulated for canine use with the appropriate dosage and beef flavor. It would

> only form part of the treatment package, which often requires owners to change their behavior. Drugs cut the length of the treatment programmed, so the owners keep trying and are more likely to succeed. (Bonner 2007)

Drugs can cut the length of time it takes for an animal to be trained a wanted behavior and this allows owners to not lose interest in training their pets. Side effects reported during clinical trials are "calm or lethargy, reduced appetite, vomiting, shaking, diarrhea, restlessness, excessive vocalization, aggression, and, in infrequent cases, seizures" (Reconcile, 2008).

An extensive animal trial has been preformed to measure the effectiveness of the medication in improving the animals overall severity score for separation anxiety behaviors and secondly to measure the palpability (or a measure of whether the dog will consider the medication to taste appealing) of the medication (Effects of Reconcile (Fluoxetine) Chewable Tablets Plus Behavior Management of Canine Separation Anxiety, 2007). The results of the palatability test are that on average the dog would freely eat the medication within 3 minutes 85.4% of the time for the placebo chewable and 70.5% of the time for the Reconcile chewable (Effects of Reconcile (Fluoxetine) Chewable Tablets Plus Behavior Management of Canine Separation Anxiety, 2007). For any owner who has tried to administer a pill to an incompliant animal this percentage is highly encouraging. The makers of ReconcileTM report that ""within 8 weeks, 73% of dogs treated with Reconcile ™ showed significant improvement are compared to behavior modification alone (51%). 42% of dogs receiving Reconcile ™ showed significant improvement within the 1st week, which was significantly greater than with behavior modification alone (18%)" (Reconcile, 2008). The makers of Reconcile conclude that Reconcile ™ increases the ability of a dog to be trained, treats separation anxiety, and is "tasty."

The release and license of Reconcile has caused controversy similar to that of the

original release of Prozac for the treatment of human mental illness in 1978. The Royal Society for the Prevention of Animal Cruelty to Animals and many other animal rights organizations have protested and expressed concern about the license of Reconcile by the United States Food and Drug Administration (Bonner, 2007). The organizations and veterinarians all over the world are concerned about the substitution for training and exercise that Reconcile and other medications may cause. Scientist Penny Hawkins stated to New Scientist Magazine, "Pet owners have a duty of care towards their animals. Pharmaceuticals should not be used to help sustain an unsustainable lifestyle by addressing problems that should be dealt with by other means, such as more exercise" (Bonner, 2007). However, about a quarter of euthanized animals by veterinary practices are because of behavioral issues and therefore any chance of preventing and curing these problems should be explored in depth by owners experiencing behavioral issues (Bonner, 2007).

There is a major dichotomy between the medical and psychological care in humans and animals. In the beginnings of human psychiatric care, many people who suffered with mental illness were abandoned by their families and left to live on the streets or find a "poor house" to live in. One can draw a direct analogy to the abandonment of animals to shelters because of behavioral issues. With the introduction of pharmaceuticals that could allow patients, both human and animal, to be managed effectively by their families, the numbers of patients released to hospitals and shelters decrease correspondingly. This is seen during the end of the state hospital era in human medicine and in the present time in veterinary medicine with the introduction of drugs that allow owners to keep and re train their animals.

Present Day Treatment of Animal Mental Illness

Present day animal medical treatment is a vast field, ranging from large to small animal practices, to hospital practice and clinical practice. However, the field of animal mental diagnosis and treatment is much newer and relevant to this project. Cummings School of Veterinary Medicine at Tufts University is a leader in this field operating a full service Animal Behavior Clinic in the Department of Clinical Sciences. The staff currently includes Dr. Nicholas Dodman (Director), Dr. Alice Moon-Fanelli, Dr. Niwako Ogata, and Dr. Kathryn Wrubel. The clinic has many diverse ways in which they can be of use to pet owners and referring veterinarians. These include in-person clinic appointments, PetFax, VetFax, and Telephone Consultation (The Behavioral Clinic, 2008). In addition, several research programs are ongoing that involve many of the clinic's doctors (The Behavioral Clinic, 2008).

Dr. Nicholas Dodman, BVMS, MRCVS, founded the program in 1986 and it was one of the first of its kind (The Behavioral Clinic, 2008). Dodman is one of the world's most distinguished animal behaviorists and holds ten patents for behavior modification treatments in the United States (The Behavioral Clinic, 2008). He has written many books such as: The Dog Who Loved Too Much (1995), Psychopharmacology of Animal Behavior Disorders (1998), The Well Adjusted Dog: Dr. Dodman's Seven Steps to Lifelong Health and Happiness for Your Bestfriend (2008) and many others. Dodman has also written hundreds of articles in the field of behavioral medicine and made many contributions to the field. He is also sought after by many television programs and has appeared on shows such as The Today Show, Oprah, Good Morning America, Animal Planet, and the Discovery Channel (The Behavioral Clinic, 2008). We were fortunate to have met with Dodman in regards to his input into this project.

Dr. Alice Moon-Fanelli holds a Ph. D in animal behavior and behavior genetics. She is also a distinguished behavioral veterinarian and is an active advisor of many veterinarians and breeders. She is the lead veterinarian in charge of the PetFax program. Dr. Niwako Ogata holds a Ph. D. in Ethology and has a D.V.M. She is involved in in clinic consultations and the VetFax program. Dr. Kathryn Wrubel holds a Ph. D. in behavioral neuroscience and holds a B. S. in behavioral psychology . She assists in the PetFax service and in clinic appointments

The programs offered by the Behavioral Department are set up to allow all pet owners and their pets to have a behavioral consultation. The In-Person Clinic Appointments are ninety minutes with Dr. Dodman and Dr. Moon-Fanelli and involve "diagnosis, behavioral explanation, prognosis, and treatment plan" (The Behavioral Clinic, 2008). The consult includes a six month follow up. For patients that are located a distance from the Cummings School there is the option of PetFax. PetFax is a consultation process in which the patient's owner faxes the behavioral history which is then reviewed by the doctors (The Behavioral Clinic, 2008). The veterinarian then sends the owner a fax with information regarding the diagnosis and treatment plan (The Behavioral Clinic, 2008). PetFax includes a six month telephone consultation with the veterinarian (The Behavioral Clinic, 2008).

The third option is VetFax. This option is a veterinarian to veterinarian consultation; the referring veterinarian relays a history of the patient's behavioral condition (The Behavioral Clinic, 2008). Dr. Dodman then sends his consultation response to the referring veterinarian. The last option is a telephone consultation. The consultation is by phone in which the owner discusses the history and the treatment plan over the telephone with Dr. Moon-Faniella (The Behavioral Clinic, 2008). The four different consultation options allow for the consultation to

be performed in many ways and to satisfy the needs of many owners and pets.

There are many current animal behavior research studies occurring at Cummings School of Veterinary Medicine at Tufts University. The Canine Thyroid-Aggression Study is a study that is looking at the correlation between canines that are aggressive towards their owners (snarl, bite, or growl at least 4-5 times a week) and also have thyroid problems (must not be currently treated for their thyroid problem) (The Behavioral Clinic, 2008). Half of the dogs received hormone supplements and the other half received a placebo (The Behavioral Clinic, 2008). The study is conducted over eight weeks with the first two weeks being base line where the owner counts the number of aggressive episodes (The Behavioral Clinic, 2008). The next six weeks are monitored after the dog gets the supplement (The Behavioral Clinic, 2008). The study is currently being in progress at Cummings School of Veterinary Medicine at Tufts University.

Under the supervision of Dr. Alice Moon-Fanelli a clinical trial termed "Clinical Aspects and Genetics of Obsessive Compulsive Disorder" is now being conducted (The Behavioral Clinic, 2008). The study is collaborative, both UMASS Medical School and Cummings School of Veterinary Medicine at Tufts University, and is using subjects that are canines, felines, and equines (The Behavioral Clinic, 2008). UMASS Medical School is studying the genetic basis of OCD and Cummings School of Veterinary Medicine at Tufts University is studying the clinical manifestations of OCD (The Behavioral Clinic, 2008). The study has evaluated Doberman Pinchers that suffer from "flank sucking, blanket sucking, or acral lick dermatitis" and also are Bull Terriers that suffer from obsessive tail chasing (The Behavioral Clinic, 2008). The study also is looking to evaluate Siamese cats who suffer from "wool suckers" and horses that suffer from "cribbing, wind sucking, pawing, or figuring eighting" (The Behavioral Clinic, 2008).

Currently diagnostic approaches for evaluating animal behavior require extensive evaluation of environment, the animals training or discipline, and an extensive physical evaluation. Many behaviors that are often mistaken for a mental issue (examples are excessive barking, biting, stealing, destructive scratching, inappropriate urination, plant eating, etc) can be corrected by corrective measures made by the owner or can be explained by a medical condition (The Behavioral Clinic, 2008). Proper training, exercise and environmental enrichment, neutering or spaying, weight management, and social interaction can all be used to correct many issues (The Behavioral Clinic, 2008). For example, destructive scratching should be seen not as merely an issue but as a way in which a cat marks their territory and removes pieces of nail (The Behavioral Clinic, 2008). Inappropriate urination is often the sign of urinary tract infection (The Behavioral Clinic, 2008). Urinary outside of the litter box can be the sign of a less than appealing location of the litter box (cats prefer a secluded area that is away from people and their food) (The Behavioral Clinic, 2008).

As human mental diagnostics and treatments advance, so do those associated with animal behavioral medicine. In fact, these areas of medical research to converge as the human and animal mind are seen to be increasingly similar. One example of this is that book Neurobiology of the Parental Brain by Dr. Robert Bridges, head of Reproductive Biology Section at Cummings School of Veterinary Medicine at Tufts University (The Behavioral Clinic, 2008). Bridges evaluates "topics ranging from mood disorders in pregnancy and post-partum depression to "The Monogamous Male Brain"" (The Behavioral Clinic, 2008). Other topics in Neurobiology of the Parental Brain include "the neural network of motherhood; fundamental and functional MRI studies of parental care-from rodents to humans", "Parenting strategies and

priorities of raising young", "Maternal defense- the neurobiology of maternal protection", and "the neurobiology of fatherhood- an evolutionary and biological perspective on parental behavior" (The Behavioral Clinic, 2008). He states, "Maternal aggression, post-partum depression, even how and why mothers bond with their babies- these are all topics we hear plenty about in the media, but we scientists are just beginning to understand their origins" (The Behavioral Clinic, 2008). By understanding the animal model for these topics we can better understand the instincts that all humans have and do not fully understand. Not only by studying animals can we understand the human condition but we can also understand the animal condition, for example, acts that we dismiss as random or aggressive but in reality have other instinctual causes.

Conclusion

From the community based care of the mentally disabled to the asylum era, the care and types of treatment of the mental ill evolved greatly. The asylum allowed for the seclusion of the mentally ill and with the introduction of new treatments such as shock therapy and psychopharmacology, this seclusion was no longer necessary as many of these patients could be reintegrated back into society. Grafton State Hospital (1901-1973) opened during an emergence of science and technology in the diagnosis and treatment of mental disease and closed during transition in care and psychology. Grafton State Hospital treated patients using a variety of methods. Psychopharmacology although at the time was in its beginning stages, is now the prominent treatment of the mentally ill.

Grafton State Hospital was closed in 1973 and now the buildings used to treat humans are now used to treat and rehabilitate animals. The dichotomy of animal models used to develop human treatments and the same treatments being used to treat animal diseases is similar to the transition to the Grafton Campus. Treatments originally designed for humans are being adapted to treat animal mental illnesses, just as the campus originally designed for the care of humans has been adapted to care for animals.

Kiosk

In order to convey this information to a wider audience, a plan was undertaken to design and implement an informational, interactive kiosk system to provide users with a sense of the history of both the campus and grounds. The final design was developed after a number of initial phases, designs, and plans. The first idea was that of a touch-screen podium style kiosk, which would have the advantage of being easily relocated later on as needed. Due to financial, spatial, and aesthetic constraints this design was converted to a single wall mountable screen. Given the limited floor space in building all over the campus, a wall-mounted touch-screen was the most viable option.

While deciding on the design of the kiosk, we moved on to selecting a location to mount it. Locations proposed were ones that were likely to have a lot of visitors passing by, so that we could share our presentation with the most people possible. Initial ideas were the waiting room in the Foster Hospital for Small Animals, the waiting room of the Equine and Farm Animal Hospital, on a pillar in the campus center, and on a wall in the campus center (see figures 17 and 18). After consulting Dean Kochevar and the senior staff of the veterinary school, the Campus Center wall was selected as the final location.

Figure 20: Mock up of kiosk on the wall in the Agnes Varis Campus Center

Figure 21: Mock up of kiosk on the wall in the waiting room of the Foster Small Animal Hosptial

The interface itself was designed with the following considerations: visual appeal, information conveyance, and ease of use. In order to attain these goals, the design features a large interactive map of the campus along with a timeline. The map of campus shows several of the most important buildings, which link to an informational page about their design and uses. The timeline links to pages which list important developments in the history of Cummings

School of Veterinary medicine and the treatment of mental illness in general. These are presented in a large, clear font with many photos in order to attract and hold the user's interest.

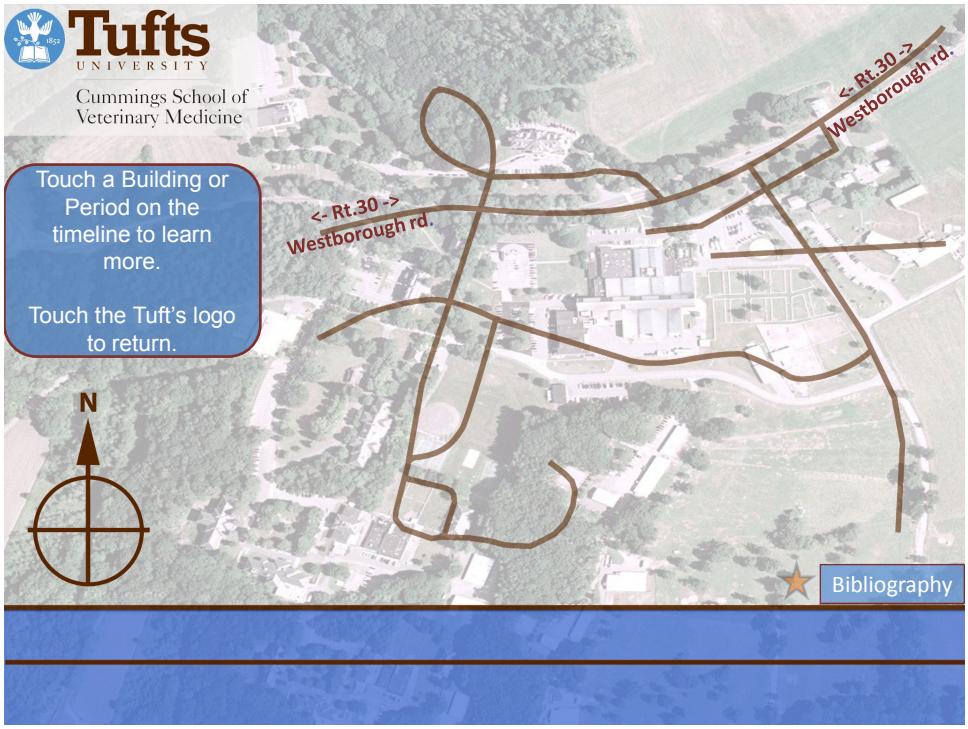

Figure 22: Kiosk Interface

In addition to the actual layout of the interface, consideration was taken into what platform the presentation would be made in. Initially we planned to create the presentation in Macromedia Flash, as it would be possible to create appealing and technical presentations while keeping the file size small. After considering time restraints and maintain the ability for Tufts to update and make additions/changes later, we decided on using Microsoft Powerpoint to create the presentation.

When the initial versions of the presentation and kiosk were presented to the members of the senior staff at Cummings School of Veterinary Science at Tufts University, only one

concern was voiced; that they wish we could create multiple kiosks so that more people could be exposed to our display.

Up until our project, little research had been compiled on the pivotal transition of Grafton State Hospital to the Cummings School of Veterinary Medicine at Tufts University. Through the use of digital presentation on a touch-screen monitor we were able to convey this information to all future students, staff, and visitors of the veterinary school.

Bibliography

10-Minute Brain Operation. (1948). *The Science News-Letter , 53* (22), 338.

Account of the Rise and Progress of the Asylum, Proposed to be Established, near Philadelphia, for the Relief of Persons Deprived of the Use of Their Reason. (Philadelphia, 1814).

American Journal of Insanity. 23 (1866): 147-250.

American Psychiatric Association Committee on Electroconvulsive Therapy, American Psychiatric Association, Richard D. Weiner. (2001). *The Practice of Electroconvulsive Therapy: Recommendations for Treatment, Training, and Privileging : a Task Force Report of the American Psychiatric Association.* American Psychiatric Pub.

Bachrach, Leona. (1986) *The Future of the State Mental Hospital*. Hospital of Community Psychiatry. 37, 467-474.

Bachrach, Leona. (1997) *The State of the State Mental Hospital.* Psychiatr Serv, Jan 48(1):99

The Behavioral Clinic. (2008). *Cumming's School of Veterinary Medicine at Tufts University.* Retreived on 11 November 2008 from, http://www.tufts.edu/vet/behavior/.

Bell, A. (1904). Our Homes and Ourselves. *The Sanitarian* (410), 11.

Benjamin, M. (1943). Dementia Pracox and Insulin. *The Journal of Nervous and Mental Disease* , 720.

Bennett, A. (1945). An evaluation of the shock therapies. *Psychiatric quarterly , 19* (3), 465-477.

Black, N. D. (1936). The value and application of hydrotherapy in a mental hospital. *Psychiatric quarterly* , 34-44.

Bonner, John. (2007). Problem Pets can now pop Prozac. *New Scientist Magazine.* 2602:18.

Boeree, Dr. C. George. (2001). Retrieved on October 10, 2008. A Brief History of Psychopharmacology. *My Homepage.* http://www.webspace.ship.edu/cgboer/psychopharm.html.

Bowditch, Nathaniel. (1872) *A History of the Massachusetts General Hospital*, 2nd ed. Boston.

Braslow, J. (1997). *Mental Ills and Bodily Cures.* Berkeley and Los Angeles: University of California Press.

Braslow, J. T. (2000). *A History of Somatic Therapies*. Retrieved 01 19, 2009, from Mental Illness Research, Education & Clinical Center (MIRECC): http://www.desertpacific.mirecc.va.gov/mindview-archive/History-of-Somatic-Therapies-archive.shtml#hydrotherapy

Braun, Manfred & Gimore, Ellen. (1960). Advances in Insulin Coma Therapy. *The American Journal of Nursing,* 60 (11), 1626-1628.

Britannica, E. (2009). *Philippe Pinel.* Retrieved 01 15, 2009, from http://www.britannica.com/EBchecked/topic/460995/Philippe-Pinel

Cameron, D. E., & Hoskins, R. G. (1937). Experiences in Insulin-Hypoglycemia Treatment of Schizophrenia. *The Journal of Nervous and Mental Disease* , 731.

Chapter 538. (1946) *U.S. Statutes at Large.* 60: 421-426.

Claridge, Gordon. (1970). *Drugs and Human Behaviour.* Praeger Publishers: New York.

Comer, R. J. (2003). *Abnormal Psychology* (5 ed.). Macmillan.

Continous Bath: As Given at the Cook County Hospital, Chicago. (1929). *The American Journal of Nursing , 29* (2), 147-148.

Cummings School of Veterinary Medicine at Tufts University. (2009). Retrieved on February 10, 2009. http://www.tufts.edu/vet/

Dahl, M. (2008, August 6). Shock therapy makes a quiet comeback. *msnbc.com* .

Davidson, G. (1937). The mechanism of continuous bath therapy in excitement. *Psychaitric quarterly* , 424-435.

Deming, Dorothy. (1943). *Mental Institutions in Wartime.* American Journal of Nursing, 43: 1013-1017.

Dodman, Nicholas. (1998). *Psychopharamacology of Animal Disorders.* New York: Blackwell Science.

Dix, Dorothea. "Memorial to the Legislature of Massachusetts 1843," *Old South Leaflets*, 6, No. 148 (Boston, n.d.).

Drake, R. J. (1938). Insulin Shock Therapy in the Psychoses. *Transacations of the Kansas Academy of Science (1903-) , 41*, 253-255.

Dugger, Celia. (1993). *Big Day for Ex-Residents of the Center for the Retarded* The New York Times. Retrieved on January 2, 2009 from nytimes.com: http://query.nytimes.com/

Edward B. Angell, M. (1903). The Physiological Basis of Hydrotherapy. *The American Journal of Nursing* , 600-606.

Eimas, R. (n.d.). *Psychosurgery: A Dark Chapter in 20th Century Medicine.* Retrieved February 9, 2009, from International Society for the History of Medicine: http://www.ishm2006.hu/abstracts/files/ishmpaper_205.doc

Effects of Reconcile (Fluoxetine) Chewable Tablets Plus Behavior Management of Canine Separation Anxiety. (2007). *Veterinary Therapeutics*. 8.1 (2007): 18-31.

Electroconvulsive therapy discussion hosted at the MGH. (2006, October 13). Retrieved 02 07, 2009, from MGH Hotline Online: http://www2.massgeneral.org/pubaffairs/issues2006/101306ect.htm

Encylopaedia Britannica. (2009). *lobotomy.* Retrieved February 08, 2009, from Encyclopedia Britannica Online: http://www.britannica.com/EBchecked/topic/345502/lobotomy

The Evergreen Center. (1998) Retrieved on January 3, 2009 from evergreenctr.org: http://evergreenctr.org/

Felix. (1949). *Mental Disorders as a Public Health Problem.* American Journal of Psychiatry. 106: 401-406.

Fink, M. (2001). Convulsive therapy: a review of the first 55 years. *Journal of Affective Disorders , 63*, 1-15.

Fink, M. (2002). *Primary Sources: Insulin Coma Therapy.* Retrieved February 04, 2009, from PBS: American Experience - A Brilliant Madness: http://www.pbs.org/wgbh/amex/nash/filmmore/ps_ict.html

Fink, M. (2006). The Camelford Hysteria: A Lesson for ECT? *Psychiatric Times , 23* (11).

Foley. (1975). *Community Mental Health Legislation*. 29-41.

Franklin, Benjamin. (1754) *Some Account of the Pennsylvania Hospital: From its First Rise, to…May 1754*. Philadelphia.

Fulton, J. F. (1951). The Physiological Basis of Psychosurgery. *Proceedings of the American Philosophical Society , 95* (5), 538-541.

Gessell, John. (1946) *State Hospital Scandal.* Christian Century. 63: 1245.

Goldman, Howard, Adams, N., and Taube, C. (1983). *Deinstitutionalization: The Data Demythologized*. Hospital and Community Psychiatry, 34: 129-134.

Grafton State Hospital (2008) Retrieved on September 18, 2008 from 1856.org: State Hospitals of Massachusetts: http://1856.org/grafton/grafton.html

Graves, C.C., Pignataro, F.P. (1940). Injuries sustained during the course of Metrazol shock therapy. *Psychiatric Quarterly ,* 14 (1): 128-134

Gray, Diane (2008) "Mental Illness and the Early Insane Asylums - A Shameful Past." Retrieved on 20 Jan 2009 from ezinearticles.com: http://EzineArticles.com/?expert=Diane_Gray

Gregory, S., Shawcross, C. R., & Gill, D. (1985). The Nottingham ECT Study. A double-blind comparison of bilateral, unilateral and simulated ECT in depressive illness. *The British Journal of Psychiatry , 146*, 520-524.

Grob, Gerald. (1991) *From Asylum to Community: Mental Health Policy in Modern America*. Princeton: 76-77.

Grob, Gerald. (1983) *Mental Illness and American Society, 1875-1940*. Princeton.

Grob, Gerald. (1973) *Mental Institutions in America: Social Policy to 1875.* New York.

Grob, Gerald. (1994). *The Mad Among Us: A History of the care of Americas Mentally Ill*. New York.

Group, U. E. (2003). Efficacy and safety of electroconvulsive therapy in depressive disorders: a systematic review and meta-analysis. *The Lancet , 361* (9360), 799-808.

Hamilton, Leonard W and Robin Timmons. (1994). Psychopharmacology. *Companion Encyclopedia of Psychology, Vol. 1.*

Harris, Arthur (1938). Cardiazol Treatment of Schizophrenia. *Journal of Mental Science,* 84: 735-775.

Hening, William. (1809-1823). *The Statutes at Large: Being a Collection of All the Laws of Virginia From the First Session of the Legislature in the 1619* (Vol. 8). Richmond.

Hubbard, L. (1927). Hydrotherapy in the Mental Hospital. *The American Journal of Nursing, Vol. 27, No. 8* , 642-644.

Hydrotherapy as Practiced in the Manhattan State Hospital. (1910). *The American Journal of Nursing , 10* (4), 239-243.

Hydrotherapy as Practiced in the Manhattan State Hospital. (1910). *The American Journal of Nursing , 10* (4), 239-243.

Insulin Promises Cure for Common Mental Disease. (1937). *The Science News-Letter , 33* (21), 323-324.

Jansson, B. (1998, October 29). *Controversial Psychosurgery Resulted in a Nobel Prize*. Retrieved February 8, 2009, from Nobelprize.org: http://nobelprize.org/nobel_prizes/medicine/articles/moniz/index.html

Jarvis, Edward. (1855). *Report on Insanity and Idiocy in Massachusetts by the Commission on Lunacy Under Resolve of the Legislature of 1854. (Mass. House Document No. 144*). Boston.

Jenkins, R., Holsopple, J., & Lorr, M. (1954). Effects of Prefrontal Lobotomy on Patients With Severe Chronic Schizophrenia. *The American Journal of Psychiatry* , 84-90.

Jenkins, Candace. (1992). *Historical Overview of Mental Hospitals.* Boston.

Jenkins, Candace. (1993). *Grafton State Hospital Draft National Register nomination: State Hospital and School System.* Boston

Jimenez, Mary Ann. (1987) *Changing Faces of Madness: Early American attitudes and treatment of the Insane*. Hanover.

Kellogg, J. (1903). *Rational Hydrotherapy.* Philadelphia: F.A. Davis Company.

Kiesler, Charles and Sibulkin, A. (1987). *Mental Hospitalization: Myths and Facts About a National Crisis*. Newbury Park, Ca: Chapter 3.

Kirkbride. (1854) *On the Construction, Organization, and General Arrangements of Hospitals for the Insane*. Boston.

Kolb, L. M., & Vogel, V. H. (1942). The Use of Shock Therapy in 305 Mental Hospitals. *American Journal of Psychiatry , 99*, 90-100.

Krystal, A. D., Margaret, D. D., Weiner, R. D., Tramontozzi, L. A., Connor, K. M., Lindahl, V. H., et al. (2000). ECT Stimulus Intensity: Are Present ECT Devices Too Limited? *American Journal of Psychiatry , 157*, 963-967.

Lemberger, Louis and Howard Rowe, Ralph Carmichael, Samuel Oldham, Jong S. Horng, Frank P. Bymaster, and David T. Wong. (1978). Pharmacologic Effects in Man of a Specific Serotonin-Reuptake Inhibitor. *Science.* 199, 4327 (1978): 436-437.

Luster, M. A. (2002). *Report on Electroconvulsive Therapy.* New York State Assembly, Committee on Mental Health, New York.

MacDonald, Michael. (1981) *Mystical Bedlam: Madness, Anxiety, and Healing in Seventeenth-Century England*. New York.

MacPherson, A. L. (1922). The Prolonged or Continuous Bath for Sedative Purposes. *The American Journal of Nursin , 22* (4), 259.

Malzberg, Benjamin (1938). Outcome of insulin treatment of one thousand patients with dementia praecox. *Psychiatric quarterly,* 12 (3), 528-553.

McGovern, Constance. (1985). *Masters of Madness: Social Origins of the American Psychiatric Profession.* Hanover.

Melman, Steven A. (1995). *Use of Prozac in Animals for Selected Dermatological and Behavioral Conditions.* Veterinary Forum.

Message from the President of the United States Relative to Mental Illness and Mental Retardation. 88-1 Congress. House Document #58.

Messinger, E. (1941). Pharmacologic Shock Treatment for Mental Disease. *The Scientific Monthly , 53* (2), 155-164.

Metrazol Treatments Cure by "New Deal of Nerve Ends". (1939). *The Science News-Letter , 36* (22), 339-340.

Meyer, L. A. (1945). Restraint in the Care of Psychiatric Patients. *The American Journal of Nursing* , 445-450.

Meyers, M. A. (2007). *Happy Accidents.* Arcade Publishing.

National Center for Biotechnology Information (NCBI). (2009). "Pentylenetetrazole." Retrieved on March 3, 2009 from *MeSH*: http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=mesh&dopt=Full&list_uids=68010433

New York State Commission in Lunacy. (1900). *Annual Report 12:* 17-20*.*

New York State Commission in Lunacy. (1900). *Annual Report*. *12*: 22-36.

New York Times. (1987) Massachusetts Planning New Aid for Mentally Ill (1987). Retrieved on January 26,2009 from nytimes.com: http://query.nytimes.com

O'Donnell, E. and C. Shultx. (2005). "Fluoxetine Hydrochloride." Retreived on October 10, 2008 from *Nitrogenorder.com*: http://www.nitrogenorder.org/molweek/sep2005/04 sep05.shtml#note3.

Pliny Earle to Clark Bell (copy). April 16, 1886, Earl Papers, American Antiquarian Society, Worcester, Mass.

Preer, Robert. (2007) *Spectators of old state hospitals vanish as new users take Shape.* The Boston Globe. Retrieved on September 18, 2008 from boston.com: http://www.boston.com/

Psychiatry. (2006). Retrieved 01 26, 2009, from a2zpsychology.com: http://www.a2zpsychology.com/ARTICLES/psychiatry.htm

Psychosurgery: The Nursing Problem. (1947). *The American Journal of Nursing , 47* (4), 210-213.

Reconcile. (2006). *Eli Lilly and Company*. Retrieved on 8 Dec. 2008 from, http://www.reconcile.com/default.aspx

Rothman, David. (1971) *The Discovery of the Asylum; Social Order and Disorder in the New Republic*. Boston.

Rothman, David. (1980) *Conscience and Convenience : The Asylum and its Alternatives in Progressive America.* Boston.

Sabbatini, R. M. (1997, August/September). *Ugo Cerletti: A Brief Biography*. Retrieved 02 3, 2009, from The History of Shock Therapy in Psychiatry: http://www.cerebromente.org.br/n04/historia/cerletti_i.htm

Sackeim, H. A., Prudic, J., Fuller, R., Keilp, J., Lavori, P., & Olfson, M. (2007). The Cognitive Effects of Electroconvulsive Therapy in Community Settings. *Neuropsychopharmacology , 32*, 244-254.

Scharmer, B. (1941). Insulin Shock Therapy. *The American Journal of Nursing , 41* (10), 1154-1156.

Schizophrenia Symptoms. (2004). Retrieved February 3, 2009, from schizophrenia.com: http://www.schizophrenia.com/diag.php#diagnosis

Schnidler, F. H. (1942). Nursing in Electro-Shock Therapy. *The American Journal of Nursing , 42* (8), 858-861.

Schwoerer, O. J. (1938). Convulsive Therapy in Schizophrenia. *The American Journal of Nursing , 38* (8), 875-878.

shock therapy. (n.d.). (n.d.). Retrieved February 03, 2009, from Dictoinary.com: http://dictionary.reference.com/browse/shock therapy

Shorter, E. (1997). *A History of Psychiatry.* John Wiley & Sons Inc.

Shorter, E., & Healy, D. (2007). *Shock Therapy: A History of Electroconvulsive Treatment in Mental Illness.* Rutgers University Press.

Simpson, E. (1903). The Bath as Healing Agent. *The American Journal of Nursing , 3* (5), 333-337.

SAMHSA(Substance Abuse and Mental Health Services Administration.) (2006) *Mood Disorders* Retrieved on March 2, 2009 from mentalhealth.samhsa.org: http://mentalhealth.samhsa.gov/publications/allpubs/ken98-0049/default.asp

somatic therapy n.d. (n.d.). Retrieved 01 26, 2009, from Dictionary.com Unabridged (v 1.1): http://dictionary.reference.com/browse/somatic therapy

Stafford, J. (1938). The Shock That Cures. *The Science News-Letter , 33* (21), 334-3337.

Stepansky, P. E. (1999). *Freud, Surgery, and the Surgeons.* Routledge.

Szasz, T. (2007). *Coercion as Cure.* Aldine Transaction.

Teuscher, A. (2007), Insulin – A Voice for Choice. *Basel, Krager* , 10-13.

The minutes of the APA Council and JCMIH Papers in the APA Archives in Washington, D.C., reveal the diversity of views on the recommendations of *Action for Mental Health*.

Tierney, A. J. (2000). Egas Moniz and the Origins of Psychosurgery: A Review Commemorating the 50th Anniversary of Moniz's Nobel Prize. *Journal of the History of Neurosciences , 9* (1), 22-36.

Tiffany, Francis. (1890). *Life of Dorothea Lynde Dix*. Boston.

U.S. Food and Drug Administration. (2002, November 21). *Device Classes.* Retrieved February 8, 2009, from Center for Devices and Radiological Health: http://www.fda.gov/CDRH/devadvice/3132.html#class_3

U.S. Bureau of the Census. (1914) *Insane and Feeble-Minded in Institutions 1910.* Washington, D.C.: 22.

U.S. Bureau of the Census. (1914) *Insane and Feeble-Minded in Hospitals and Institutions 1904.* Washington, D.C.

U.S. Census. (1975) *Historical Statistics of the United States, Colonial Times to 1970 (*Vol. 1). Washington, D.C.

Utica State Lunatic Hospital. (1843). *Annual Report*. New York.

Ward, Mary. (1946). *The Snake Pit*. New York.

Weber, Adna F. (1899) *The Growth of Cities in the Nineteenth Century*. New York.

White, W. A. (1916). Dangers of the Continuous Bath. *The American journal of insanity , 72* (3), 481-484.

Worcester Area Chamber of Commerce. (1994, November 14). *120th Annual Banquet* pamphlet. Worcester, MA.

Worcester State Lunatic Hospital. (1839-1845). *Annual Report* 7. Worcester: 72; *Annual Report 9*. Worcester: 40-41.

Wright, Rebekah M. (1932). *Hydrotherapy in Hospitals for Mental Diseases.* Boston: The Tudor Press, Inc.

Yip, Kam-shing. (2006). *A suggested push model for interpreting the dilemmas of institutional care, community care and family care of mental-health consumers.* International Social Work. (49), 805-817.

Zeifert, Mark. Results obtained from the administration of 12,000 doses of Metrazol to mental patients. *Psychiatric quarterly,* 15 (4) , 772-778