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## THE WISTAR INSTITUTE OF ANATOMY AND BIOLOGY AND ITS ADVISORY BOARD[1]

WE have assembled to-day to celebrate the twentieth anniversary of the organization of the advisory board of The Wistar Institute. It devolves upon me to tell you something of the history of The Wistar Institute and of the origin and purpose of its advisory board.

In a sense, this celebration is a family affair, of our board of managers, our local staff, our advisory board and our journal editors, to which have been invited a few colleagues from other laboratories and a few prominent citizens of Philadelphia who are interested in local institutions. Thus we meet as a social group brought together by a common interest and actuated by a sentiment which has grown with twenty years of effort in our field of science.

In a broader sense, this celebration is not especially to show what The Wistar Institute has accomplished, but rather to record the achievements of a method of procedure. Concentrated and coordinated efforts according to a program, might be our slogan.

To the lay citizens who honor us by their presence, we express our appreciation of the privilege of demonstrating what may be accomplished in biological science by cooperative activity.

To the University of Pennsylvania, under the leadership of Dr. William Pepper, a provost of prophetic vision, is due the credit for having organized the first biological research institute in this country.

General Isaac J. Wistar, by his princely gift to anatomical science, made it possible for the university to incorporate this institute under a charter from the Commonwealth of Pennsylvania on an independent foundation and set it apart from other activities of the university in the pursuit of new and original knowledge.

With an appreciation of the results which may be accomplished by independent initiative, the university and General Wistar agreed that the relations which should exist between the mother institution and its offspring should be those of close cooperation while maintaining strict organic independence. This was accomplished by a law requiring the university to choose six of its board of nine managers, while the

[1] Read at the celebration of the twentieth anniversary of the advisory board of The Wistar Institute, April 13, 1925.

other three are fixed by General Wistar's deeds of trust.

If this celebration should direct the attention of some philanthropic person to the advantages of endowed research institutes, it will have served a double purpose. (For there are other fields of university work equally deserving of independent foundations where research may be pursued without the interruptions incident to undergraduate teaching.)

Let us, for a moment, see what were the circumstances which led to the foundation of this institute.

As early as 1750, private schools of anatomy were opened in Philadelphia. (Dr. Thomas Cadwalader.)

In 1762, Dr. William Shippen began teaching anatomy in his private school in Philadelphia, and, as is well known to Pennsylvania medical men, he and Dr. John Morgan organized the school of medicine of the Pennsylvania College, now the University of Pennsylvania, in 1765.

Shippen and Morgan had both been students of the celebrated English anatomist, John Hunter, and closely associated with him in his surgical practice as well as his anatomical work.

Shippen was chosen as professor of anatomy and surgery in the new medical school. In 1792, Shippen accepted, as his adjunct professor of anatomy, Dr. Caspar Wistar, then a young man of thirty years, who had taken his degree of doctor of medicine in Edinburgh and had availed himself of the opportunities offered by the celebrated teachers of anatomy both in Edinburgh and London.

Wistar's anatomical interests were not alone of the practical kind, for he had devoted much time to the study of comparative anatomy, and was elected to the presidency of the Edinburgh "Society for the Further Investigation of Natural History." He was also honored by election to the presidency of the "Royal Medical Society of Edinburgh."

In 1808, following the death of Dr. William Shippen, Wistar was elected to the professorship of anatomy in the University of Pennsylvania. His desire to perfect his anatomical demonstrations, while adjunct professor, had led him to a keen appreciation of John Hunter's methods, and gradually, during the ten years which followed, he accumulated a most complete series of dissections and preparations useful in the teaching of anatomy. (Many of these preparations may be seen in the institute to-day.)

Wistar continued as professor of anatomy till his death in 1818, during which time he made important anatomical discoveries and wrote the first American text-book of human anatomy—an excellent work which passed through several editions.

The teaching museum which Wistar prepared was presented by his widow to the University of Pennsylvania.

Through the labors and generosity of succeeding incumbents of the chair of anatomy—Physick, Horner and Leidy—this museum was considerably increased in extent and value and was known as the Wistar or Wistar and Horner Museum.

The science of anatomy in America from the time of Shippen to that of Leidy had made but little advancement. In most medical schools the chair of anatomy was the stepping-stone to that of surgery. Not so, however, in the case of the chair of anatomy at the University of Pennsylvania, where it had become conspicuous by reason of the eminence of its incumbents.

Along with the great teacher and investigator, Leidy, came Cope, Harrison Allen and Ryder—all engaged in researches in comparative anatomy here at the University of Pennsylvania.

Leidy used the preparations of the Wistar Museum for demonstrations in his lectures to medical students. Gradually the older preparations had become damaged from use and dust. There was need of attention in the museum. Specimens were to be cleaned and mounted.

It was at this stage that the dean of the Medical School, Dr. James Tyson, approached General Isaac J. Wistar, a grand-nephew of Professor Caspar Wistar, for financial assistance to maintain the Wistar Museum.

On July 20, 1891, a trust was created by General Wistar with a fund of approximately $20,000, the income of which was to be used for the care of the Wistar Museum.

General Wistar, whose father was a physician, had always been interested in natural history. This inclination had led him to take active part in the affairs of the Academy of Natural Sciences, of which he was president from 1891 to 1895.

Having vested $20,000 in a trust for the care of the Wistar Museum, his interest was increased, and largely through the influence of Provost Pepper and because the museum bore his family name he determined to do something further for it. Accordingly, in less than a year from the date of the foundation of the original trust, The Wistar Institute of Anatomy and Biology was incorporated (March 8, 1892) and endowed by General Wistar.

The University of Pennsylvania, whose officers had conceived the idea of a new institution for anatomical research, transferred to the newly created Wistar Institute of Anatomy ground for a building and presented the original Wistar Museum.

A museum and laboratory building was erected by General Wistar; the Wistar Museum was transferred from the medical school to the new building, and on May 21, 1894, The Wistar Institute was formally opened.

General Wistar had been impressed by the desirability of a special institute devoted to the promotion of the biological sciences underlying the art of medicine. He had been influenced by Harrison Allen as to the requirements of such an institute, and by John A. Ryder, who had advocated an elaborate synthetic museum of comparative anatomy where, by properly prepared and labeled specimens presenting the developmental stages in each of a series of types selected from the several classes of animals, the student might observe nature's own record of the evolution of organic forms, including man.

Ryder's synthetic anatomical museum was a great conception: no one could doubt its value as a means of demonstrating biological processes or as reference material in morphological research where, instead of depending upon the observations and interpretations of others, reference could readily be made to structures as nature presents them.

If there were criticisms of this method of fostering anatomical research, they were little emphasized at the time. But with the march of years the methods of biological research have been extended and a vast deal of new knowledge, both anatomical and physiological, has been acquired by experimental procedures with living animals. The synthetic museum would be of far less service in most of the present-day experimental research.

While General Wistar was impressed with the advantages of a great anatomical museum as a means of advancing anatomical science, his long experience with men and their various undertakings had left a wisdom of an unusual sort. He knew well that the methods of to-day may not be those of to-morrow, even in research. And so, in the charter of this institute and in General Wistar's trust deeds, the purposes of the institute are defined as follows:

First, the preservation and free exhibition of the Wistar Museum.

Second, extension of the museum to include all objects and preparations useful in advanced biological studies and that bear upon the physical development of man.

Third, the establishment of a system of lectures on biological subjects for postgraduates or advanced students only. All undergraduate teaching is prohibited.

Fourth, the establishment of a publication, periodical or otherwise, of the institute's scientific proceedings and contributions.

Fifth, the institute may originate any other work for the increase of original scientific knowledge of biological or kindred subjects.

In this fifth and last statement of purposes General Wistar, with characteristic astuteness, leaves the way open for any form of biological research.

I have often wondered if he had doubts of the value of the museum for future biological research.

The conditions and limitations of General Wistar's trust deeds (of which there are three) are intricate and exacting and the penalties for infraction severe.

Owing to the emphasis of the museum idea, it was quite natural that the early development of the institute should have been along museum lines.

Dr. Harrison Allen, the first director of the institute, was a physician of exceptional attainments in his specialty and with an extensive practice. Notwithstanding this time-consuming occupation, he set aside a certain portion of each day for his studies in zoology and comparative anatomy.

Well do I recall his daily program, for it was my privilege to dissect with him on certain days of each week. The hours were from 6 A. M. until breakfast time. Frequently breakfast was delayed because of his interest in the study on hand and patients waited impatiently in his office for him to arrive.

Dr. Allen's scientific mind, his experience in the practice of medicine and surgery, and his long devotion to research in zoology and comparative anatomy, subjects which he had taught for many years in the auxiliary faculty of medicine of the University of Pennsylvania, gave him unique qualifications to outline the policy of an anatomical institute which had come into being through the efforts and stimulus of medical men. To him the accumulation of a museum of research materials was especially to be desired.

The study of race types was to him important. "Why," said he, "should the negro succumb to pneumonia more readily than the white man?" Dr. Allen emphasized the study of comparative anatomy for the better understanding of man and for the value of such knowledge in alleviating human ills. He was one of the first in Philadelphia to use diphtheria antitoxin, and that on his own daughter.

Dr. Allen's ideals for the development of an anatomical institute were all that could have been expected thirty years ago and were the precursors of those that have followed.

Dr. Allen resigned on July 2, and Dr. Horace Jayne was elected to succeed him on October 3, 1894. Dr. Jayne was also a devotee of comparative anatomy and had been professor of vertebrate morphology in the Biological School of the University of Pennsylvania—a department which he had organized and for which he had built and equipped a building.

Dr. Jayne's enthusiasm for the development of a great museum of comparative anatomy was demon-

strated by his generous contribution of a large series of mammalian osteological and other preparations, by his gift to the library of a valuable collection of about 1,000 volumes of bound periodicals relating to zoological subjects.

An elaborate museum scheme was proposed by Dr. Jayne, setting forth the manner in which a morphological museum would be developed.

This plan contemplated a museum consisting of two parts:

First, the reserve collection for original investigation and exchange.

Second, the educational exhibits, an elaborate series of labels illustrated by preparations.

The educational exhibits were to include the following subjects:

1. Systematic anatomy, treating of the different systems of organs.

2. Topographical and surgical anatomy, treating of the different regions of the body from the surgeon's viewpoint.

3. Embryology, the development of the human body.

4. Teratology, treating of malformations.

5. Morbid anatomy, including changes in structures produced by different general diseases.

6. Physical anthropology, dealing with the races of mankind; and

7. Special subjects, such as artistic anatomy.

In the light of some years' experience, it would seem that any one subdivision of this museum plan would be sufficient for one institution.

The scheme was put into effect to a limited extent in the series of exhibits on the osteology of the human skull.

During the ten years following, a large portion of the institute's resources was expended in devising and constructing museum cases and fittings, porcelain and glass display receptacles for dissections, and mountings for preparations. The metal-glass museum case was the first of its kind to be made in this country and remains yet to be excelled for its purpose.

By gifts and by purchase a large amount of material for the study of comparative anatomy and systematic zoology was accumulated. Among this material are human skeletons, crania and human brains from distinguished individuals; a large collection of zoological materials from Borneo and the Luchu Islands, and mammalian fossils from Florida.

During the ten-year period ending in 1904, more than ten thousand specimens had been added to the museum collection. Dr. Jayne had completed and published the osteological section of his Comparative Anatomy. A number of guests had pursued investigations in the laboratory or used the materials of the museum. No research had been pursued or papers published by any member of the staff during this period.

On December 10, 1904, Dr. Jayne resigned, and on January 11, 1905, I was elected director. During all this early period I had served as assistant director. The first task of the new director was to review the work of the institute since its incorporation and to take stock of assets in their various forms.

The affairs of the institute were summarized about as follows: The institute has a good (museum and laboratory) building with equipment; a modest yet increasing endowment; a museum containing much valuable material. Its independent organization, under protection of the university, would permit it to render a national as well as a local service. Its relations with other institutions, societies, and scientific men have been limited. The research to its credit is unfortunately meager. Its purpose, in the last analysis, is to advance anatomical and biological science.

Much time was spent in visiting other laboratories and consulting prominent zoologists and anatomists whose advice I believed would aid the institute in its endeavor to serve biological science.

Through numerous interviews with active investigators, I was impressed with the fact that there was a growing tendency for cooperation in research. Special institutes were being organized to promote investigations in special fields. The astronomers had led in cooperative investigations.

There was a desire on the part of biologists for central institutes through which studies might be encouraged and correlated. Special societies had been established to discuss problems and stimulate research. Journals had been founded for the publication of results. The question arose: Why should The Wistar Institute not take part in this nation-wide advance in biological science?

The organization of an advisory board of The Wistar Institute, whose members should be chosen from the leading anatomists and zoologists of the country and who should meet at The Wistar Institute periodically to formulate a scientific policy for the institute, appeared to be the most feasible method of placing the institute in active research service and of accomplishing what the University of Pennsylvania and General Wistar had planned. After certain preliminary steps in presenting the plan for approval of the Board of Managers and especially for the approval of General Wistar, it was agreed that the institute should invite ten of the twenty or more anatomists and zoologists, whom I had consulted, to hold a conference at the institute to consider methods

of extending The Wistar Institute's activities and usefulness in biological science.

The anatomists and zoologists invited, and their university connection at that time, were as follows:

1. Professor Lewellys F. Barker, University of Chicago.
2. Professor Edwin G. Conklin, University of Pennsylvania.
3. Professor Henry H. Donaldson, University of Chicago.
4. Professor Simon H. Gage, Cornell University.
5. Professor G. Carl Huber, University of Michigan.
6. Professor George S. Huntington, Columbia University.
7. Professor J. Playfair McMurrich, University of Michigan.
8. Professor Franklin P. Mall, Johns Hopkins University.
9. Professor Charles S. Minot, Harvard University.
10. Professor George A. Piersol, University of Pennsylvania.

On April 11 and 12, 1905, these anatomists and zoologists met at the institute. The conference was opened with an address by General Wistar, who spoke of the foundation of the institute, its resources, and the objects for which it was organized. During the course of the two days' session a scientific policy was outlined and at General Wistar's request the advisory board was established as a permanent feature of the institute.

To-day, twenty years have elapsed since this important event in The Wistar Institute's history, and it is somewhat through sentimental reasons and somewhat because of our belief in the policy of the institute as worthy of emulation that we take pleasure in celebrating this event.

Through all these years this board has met regularly, once each year, to discuss the scientific policy of the institute. The only exceptions were in 1913, when there was no business to transact, and in 1918, when, owing to war conditions, the meeting was not called. Two meetings were held in 1909.

All meetings, excepting two, have been held here at the institute in April. For convenience of its members, one meeting was held on December 28, 1909, at the Harvard Medical School and one on December 28, 1914, at St. Louis, Missouri. Attendance at these meetings has been remarkably full. Seldom has a member been absent.

Seven of the ten original members are still with us. Death has removed three: Dr. Charles S. Minot on November 19, 1914; Dr. Franklin P. Mall on November 17, 1917, and Dr. George A. Piersol on August 7, 1924. I can not pass without expressing my sorrow in the loss of three members to whom I am personally so much indebted for advice and assistance during the early years of my service as director.

There have been added to this board in the order named, Dr. M. J. Greenman; Dr. C. E. McClung, of the University of Pennsylvania; Dr. Ross G. Harrison, of Yale University, and Dr. C. M. Jackson, of the University of Minnesota.

The existence of advisory boards in various enterprises and under various names is not at all new. The operations of this board, however, have been unique, and since its organization similar boards have been created in connection with scientific institutions. The most recent instance is that in the reorganization of the Academy of Natural Sciences of Philadelphia.

An individual may err in the execution of a detail with no special damage to an institution. But the formulation of a general policy of conducting a research institute is a serious matter where the dangers of personal prejudice, personal interest, and unwisdom should be avoided. The activities of a scientific institution should be coordinated with other agencies seeking the same goal. This is where the advisory board functions.

During these two decades the advisory board has considered and made recommendations to the board of managers on all major undertakings of this institute. It has suggested the type and field of research which the institute could most effectively follow; it has suggested the personnel of the scientific staff; it has brought the institute into close cooperation with the American Association of Anatomists and the American Society of Zoologists—the two societies which send official representatives to attend this celebration.

Through its efforts and suggestions, the several publications issued by the institute have been brought together under one management.

There is another side to the conduct of a scientific institution, namely, the proper administration of the business of the institution. Here the abilities of the man of affairs is essential.

There are financial questions to consider, mechanical problems to deal with, legal matters to be settled. Here the board of managers, comprised as it is of lawyers, business men, engineers, doctors, as well as scientific men, plays a very important part in the conduct of this institution. With them rests the final authority in all matters of conduct of the institute.

The board of managers of this institute has followed the recommendations of the advisory board as closely as finances and other conditions would permit. Only by this harmonious cooperation has success been possible.

Time and space permit me to indicate only the most conspicuous achievements during the twenty-year period just closing.

If I contrast the results of the institute's activities during its first eleven years of work under what we may call a museum administration (1894–1905) with those of the past twenty years under what we may call a research administration (1905–1925), it will not be for the purpose of minimizing the genesis of the institute, but rather to demonstrate what may be accomplished by concentration and cooperation and with very modest expenditures.

In 1905 the personnel of the institute consisted of eleven individuals. In 1925 there are forty-five persons engaged in work of the institute.

During the first eleven years of the institute's corporate existence, two guests pursued investigations in the laboratory and published ten contributions—a total of 631 pages credited to the institute—while a number of investigators used the materials of the museum for taxonomic work or for investigations not credited to the institute. During this period the staff of the institute published no research.

During the twenty-year period just terminated there have been published from the laboratories of this institute 277 papers containing 6,134 pages—an average of a little more than one paper per month—by members of the staff and by guests who have found it advantageous to spend time, varying from a few months to three years, in the pursuit of advanced work in anatomy in the institute's laboratories. In addition, cooperative research has been pursued with thirty-seven individuals.

Concerning the research, you will hear from Dr. Donaldson of the work that has been accomplished. To his wisdom and ability to direct research the institute owes its achievements in this field of its activities.

While the museum has received much less attention during the past twenty years, at the same time, as a result of laboratory research, there have accumulated many unique preparations useful for future investigations. A striking example of such material is the collection of opossum embryos made by Dr. Carl Hartman and Dr. C. H. Heuser in Texas and used for their embryological researches.

During the early or museum period of the institute's history no periodicals were issued. Early in the beginning of our twenty-year period (1908) five zoological periodicals of national importance were brought together under one publishing management at the institute.

These journals have been expanded and their distribution widely extended. To this number have been added a monograph series, appearing irregularly, and a bibliographic service, which issues authors' abstracts of papers well in advance of their appearance in the journals. During this period the institute has published 80,445 pages in these several journals, issued bibliographic service cards for 2,706 papers, published five books, and issued three numbers of the *Tohoku Journal of Experimental Medicine,* and one number of *Science Reports* for the Tohoku Imperial University at Sendai, Japan.

The Japanese journals were issued temporarily, at the request of the Japanese government, until presses destroyed in the earthquake of September 1, 1923, could be replaced. You will learn from others concerning the work and influence of The Wistar Institute publications. I should like to say in passing that through the advisory board the publication enterprise has developed as an important factor in the promotion of American biological science. The journals published by the institute reach practically every laboratory in the world where similar work is pursued.

Turning now to the business aspect of these two periods. The expense of operating the institute during 1904 was $21,516.90, the endowment income at that time was $23,893.71; twenty years later this expense has increased to $132,547.46. The endowment income is about $48,000.00 at the present time. It is needless to say that we have sought and secured funds from numerous other sources during the past twenty years.

The most liberal contributor to the work of the institute has been Mr. Samuel S. Fels, of Philadelphia, whose generous contributions have made it possible not only to extend the research, but also to provide additional facilities.

In this connection I would like to commend the peculiar wisdom of extending the field of research of an existing institution rather than establishing a new one, and thus avoid the duplication of the inevitable overhead charges which every institution must carry. There have been a few striking examples of such economy quite recently.

Along with its development as a scientific institution came increased endowment provided by General Wistar. In his will General Wistar left to this institute his entire estate save for some modest bequests to his immediate family.

General Wistar's gifts to the institute were so arranged that funds become available as he thought they might be needed. He believed in the gradual evolution of an institution and made provision accordingly. The institute during the past twenty years has developed much more rapidly than he had perhaps expected. Its total endowment to-day is $1,166,818.35 and there is yet to be added a residuary estate which will add about two millions to the present endowment.

The present endowment is inadequate to carry on the work of the institute. Not that the institute is

ever living beyond its means, but philanthropic individuals have encouraged us to extend the work and have provided the funds for such extension. During the past twenty years a very considerable additional equipment, in buildings, machinery and apparatus, has been added.

For the better safeguarding of the present buildings and to provide for future development, the institute purchased in 1902, from the city of Philadelphia, the old police station property at the intersection of Spruce Street and Woodland Avenue. This property was deeded to the Girard Trust Company for the uses of The Wistar Institute subject to all the conditions and limitations of General Wistar's trust deeds. It was remodeled in 1913, and is now used for purposes of the institute.

The necessity of a special building for the breeding and care of albino rats for research purposes became very urgent, owing to the irregular results obtained with animals not raised under the most favorable conditions. In 1921, through the generosity of Mr. Fels, a unique building, designed especially for this purpose, was erected and put into service the following year at a cost of some $43,000.

From this colony many laboratories and individuals are now supplied with clean, healthy stock for research purposes. The success of this unique animal colony is due to the exacting methods of its curator, Miss F. Louise Duhring. In 1924, the nucleus of a colony of Wistar Institute albino rats was sent to London to supply investigators in Great Britain with the same strain of animals that has furnished most of the records now existing on the albino rat.

Early in 1924, a complete press equipment was installed and put into operation for printing the six journals issued by the institute. This was done primarily to reduce the deficit in publishing the journals, which during some years had reached a maximum of nearly $12,000.

During 1924 the income from journal subscriptions and sales was sufficient to meet all expenses. This was the first time in the sixteen years' publication experience that there has been no deficit to meet.

Not only has The Wistar Institute Press been an advantageous investment, but it has also presented certain other unexpected advantages, such as the production of cleaner proof, the making of last-minute changes or corrections, and the production of better illustrations when done under the supervision of those who know what an anatomical illustration is expected to show.

To complete the present equipment, the last addition to the institute's buildings was a boiler house and new boiler, which will make it possible for the institute to use all its available working space at all seasons of the year.

In preparing this sketchy outline of the institute's history, I am reminded of many struggles which beset our way, especially in the early days of inexperience. The institute was and still is a relatively small institution, its endowment income was originally very modest, hardly more than enough to maintain the building with its museum.

There were insufficient funds to provide assistance of the various kinds required, and it fell to our lot to become familiar with many phases of the process of building, equipping, and maintaining an institute. Perhaps we gained wisdom through labor and persistent effort to build an institution worthy of its name. Be that as it may, it is a pleasure to make acknowledgment on behalf of the institute to those who have aided in this task, including members of the advisory board, who took valuable time of busy lives to come and counsel with us; to members of our board of managers, who have always been enthusiastic and willing to carry out the plans presented, and to the members of the staff who have worked together as a unit to add to human knowledge each truth revealed by the patient, persistent method of the laboratory.

One of the chief functions of the institute, while pursuing a well-defined program of research, is to furnish opportunity for younger investigators to establish themselves in their chosen field of study. They are the men and women of originality and of initiative.

Untrammeled by rules or regulations, they pursue their quest with unmitigated zeal. To them the institute is literally never closed.

During this twenty-year period, eight members of the scientific staff (six men and two women) have been called to fill important positions in other institutions; six of these positions were of professorial rank.

Nine guests in the laboratory (seven men and two women) have passed on to important positions in other institutions, and this number does not include the Japanese guests.

Sixteen Japanese advanced students have pursued researches in the laboratories. With one or two exceptions, these men were selected students sent by the Japanese government. They are, without exception, men of unusual ability, earnestly devoted to their work.

Of this number thirteen have already received their advanced or higher degrees in Japan by reason of their work at The Wistar Institute and now occupy prominent positions in their native land. Thus, of

sixty guests, including all grades, thirty-one have established themselves in their special fields of research and have been called to advanced positions. The admission of guests of this type has now become a well-established practice.

During the twenty-year period we have lost by death one member of our staff, Dr. J. M. Stotsenburg, a loyal friend of the institute, who passed to his reward on January 2, 1922.

Of the original staff of 1905 only three remain: Miss Clara N. Perine, who was secretary and clinical assistant to Dr. Harrison Allen when The Wistar Institute was incorporated, and familiar with many of the confidential conferences and influences which led to the organization of this institute. Miss Perine came to The Wistar Institute in February, 1903, and while her official duties are those of librarian, duties which she performs with efficiency, at the same time her capacity to handle financial details has brought to her an important responsibility, and during all these years her assistance in the institute's business office has been invaluable; Dr. Donaldson, whose long-time program of intensive research in a limited field has earned the generous recognition of the entire zoological world and who with his coworkers has laid the foundations for mammalian anatomical and physiological investigations for generations to come, was elected to the staff on December 18, 1905.

And as the third of this surviving triumvirate, I record my own presence as one who has watched the development of the institute from September 1, 1893.

If I might be permitted to use the anthropologists' method of stating age, I would say that The Wistar Institute has three ages, the chronological age (of 117 years), dating from 1808, when Caspar Wistar began the preparation of the first museum specimens; the intellectual age (of 32 years), dating from 1893, when the University of Pennsylvania realized what might be accomplished by creating a biological research institute, and finally the biological age (of 20 years), dating from 1905, when the institute organized its advisory board and began its productive existence.

MILTON J. GREENMAN

THE WISTAR INSTITUTE OF ANATOMY AND BIOLOGY, PHILADELPHIA, PA.

## RESEARCH AT THE WISTAR INSTITUTE, 1905–1925[1]

IT is my privilege to give an account of the research work at the institute during the past nineteen years, and in this connection the history of our research program should be considered. As the present occasion admits of certain intimacies, I shall, in this consideration, venture on some personal reminiscences, confident that you will not misinterpret the intent.

In 1890 I made an anatomical study of the brain of the blind deaf-mute, Laura Bridgman. Laura was a normal child up to the end of her second year. At this age she was attacked by scarlet fever, which destroyed all the organs of special sense and left her a pathetically distinguished figure for the remaining fifty-eight years of her life. To interpret the changes in her brain it was important to know the phase of its development just before her illness. For reasons easy to understand, it was not possible at that time to get young brains by which to determine this, so I turned for help to the literature. No help was forthcoming. The search of the literature revealed, moreover, but scanty information concerning the growth of the human nervous system between birth and maturity. Here was a gap—a gap covering the period of the development of the mind. It caught my attention, and the desire to help in closing this gap dominated my subsequent work.

The meager information gathered from the literature was put in a small book, "The Growth of the Brain," published in 1895. The preparation of this book helped to clarify my ideas and also it helped in formulating the problems needing solution, if a fairly complete account of the growth changes in the nervous system was to be obtained. Quantitative work on the nervous system was largely lacking at that time, and to meet this lack it was planned to use, so far as possible, the quantitative methods of weighing, measuring and counting, in addition to those usually employed. Further, as it is always necessary to work with preserved material, a systematic effort was made to determine to what degree the methods of preservation modified the weight and dimension of the nerve tissues. Such was the platform from which our problems were regarded.

Dr. Adolph Meyer in 1893 gave a course on the anatomy of the nervous system in the neurological laboratory at Chicago. For this course he used the albino rat, and thus this animal was brought to our attention. The surviving rats were left in the laboratory and further used, so that gradually those working with them grew to appreciate the fact that for many purposes, and especially for the study of growth changes in the nervous system, the albino rat was an ideal animal. Although the information sought was especially desired for man, yet it had been strongly impressed upon me that the human nervous system was hardly attainable for growth studies, and, when obtained, rarely in proper con-

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