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CONTENTS:

SOME TIME SINCE, WE REFERRED to the appointment of a commission by the New York City Board of Health for the purpose of formulating a concise statement regarding the contagiousness of tuberculosis and the means of protection therefrom. This commission was formed of Drs. Prudden, Biggs, and Loomis, pathologists to the Board of Health, and in this number we publish their report. In this report the position is taken that consumption is not necessarily an hereditary disease, and that in certain stages its cure is possible. If this dread disease may now be ranked among preventable evils, it is desirable that this should be widely known, and that the means by which this result may be reached may be understood by the public at large. To aid a free discussion of the questions at issue, we print on one of our advertising pages a few questions to which we should be pleased to receive answers.

THE REPORT of the superintendent of health of Providence, a full abstract of which we give in this number, contains many items of interest. The most important of these is the statement that typhoid-fever germs were found in three of the filters in use in that city, in houses where typhoid-fever existed. In this report Dr. Chapin states that the house-filters in common use collect filth and microbes from the water, and act as incubators for the latter. There is no doubt, that, when first put into use, a filter may be of advantage so far as sifting out the grosser particles of suspended matter; but it soon becomes itself filthy, and the constantly accumulating filth furnishes the most favorable nidus for the growth of disease-germs.

THE CELEBRATION OF THE CENTENNIAL of the discovery of oxygen at Priestley's grave at Northumberland, Penn., in 1874, by a gathering of distinguished American chemists, was the occasion for the suggestion of the formation of an American chemical society, with headquarters in New York. This suggestion was due principally to H. Carrington Bolton; but nothing resulted until 1876, when the American Chemical Society was started, with J. W. Draper as president. After him Dr. J. Lawrence Smith, Professor C. H. Chandler, and Dr. James C. Booth filled the presidential chair. The meetings flourished for a time; but, after a little, the more prominent New York members failed to appear with any regularity, and the management of the society fell into the hands of the lesser members, with the result of a languishing condition of affairs ever since. Some two or three years ago the matter was brought up at a meeting of the American Association, and the formation of a national chemical society, with headquarters at Washington, was advocated. This did not, however, meet the views of all; and a proposal is now made that the American Chemical Society shall be resuscitated, and that the meetings shall be held in conjunction with the meetings of the American Association for the advancement of Science. A committee has been appointed to consider this matter at the Toronto meeting, and delegates from the American Chemical Society and from the chemical section of the Franklin Institute have been appointed.

CLARK UNIVERSITY.

CLARK UNIVERSITY was founded by the munificence of a native of Worcester County, whose plans, conceived more than twenty years ago, have gradually grown with his fortune. His affairs have been so arranged as to allow long intervals for travel and study. During eight years thus spent, the leading foreign institutions of learning, old and new, were visited, and their records gathered and read. These studies centred about the means by which the highest culture of one generation is best transmitted to the ablest youths of the next, and especially about the external conditions most favorable for increasing the sum of human knowledge. To the improvement of these means and the enlargement of these conditions, the new university will be devoted.

It is the strong and express desire of the founder that the highest possible academic standards be here forever maintained; that special opportunities and inducements be offered to research; that to this end the instructors be not overburdened with teaching or examinations; that all available experience, both of older countries and our own, be freely utilized; and that new measures, and even innovations, if really helpful to the highest needs of modern science and culture, be no less freely adopted; in fine, that the great opportunities of a new foundation in this land and age be diligently explored and improved.

He has chosen Worcester as the seat of the new foundation after mature deliberation, first, because its location is central among the best colleges of the East, and, by supplementing rather than duplicating their work, he hopes to advance all their interests, and to secure their good will and active support, that together further steps may be taken in the development of superior education in New England; and, second, because he believes the culture of this city will insure that enlightened public opinion indispensable in maintaining these educational standards at their highest, and that its wealth will insure the perpetual increase of revenue required by the rapid progress of science.

As the first positive step towards the realization of these long-formed plans, Mr. Clark invited the following gentlemen to constitute with himself a board of trustees: Stephen Salisbury, Charles Devens, George F. Hoar, William W. Rice, Joseph Sargent,[1] John D. Washburn, Frank P. Goulding, and George Swan.

[1] Died Oct. 12, 1888.

A charter was granted early in 1887. Land and other property that had been before secured by the founder was transferred to the board, and the erection of a central building was begun.

In the spring of 1888, G. Stanley Hall, then a professor at the Johns Hopkins University, was invited to the presidency. The official letter conveying this invitation contained the following well-considered and significant expression of the spirit animating the trustees: "They desire to impose on you no trammels; they have no friends for whom they wish to provide at the expense of the interests of the institution, no pet theories to press upon you in derogation of your judgment, no sectarian tests to apply, no guaranties to require save such as are implied by your acceptance of this trust. Their single desire is to fit men for the highest duties of life, and, to that end, that this institution, in whatever branches of sound learning it may find itself engaged, may be a leader and a light."

The president was at once granted one year's leave of absence, with full salary, to visit universities in Europe. This year was diligently improved, and a report of its work will be made later.

The plans of the university have now so far progressed that work will begin in October next, in mathematics, physics, chemistry, biology, and psychology. These departments are provisionally arranged below in the order, not of prominence or completeness with which they will be organized at the opening, but only in the order of fulness with which announcements are now ready.

The president of the university has been appointed temporary professor of psychology, and will continue, so far as other engagements will permit, to direct the work of this department as formerly at the Johns Hopkins University. By instruction or seminaries, or by careful personal conference and guidance to the best literature, and with the aid of Dr. Sanford, attention will be directed to the following topics: the general properties of the nervous substances; the psycho-physiology of each of the special senses and their defects; the perception of time and space; the time-sense; the psycho-physic law; mental images (morbid and normal) and their associations; the leading topics in the psychology of insanity, especially aphasia, illusions and hallucinations, melancholia, neurasthenia, epilepsy, hysteria, mania, and paralysis; instinct; the psychology of language; myth, custom, and belief anthropologically considered; hypnotism, and the psychological side of the history of philosophy, especially the Greek, German, and English systems. Dr. Hall will also direct the work of a few students of Class III. (below) in the history, methods, and organization of education, elementary, intermediate, and superior. On these topics he will give a special course of lectures during a part of the year.

Opportunities in psychology will be supplemented by work in the biological department, and especially by that of Dr. Donaldson. A well-equipped laboratory of apparatus for research in the various departments of experimental psychology will also be opened in October.

Opportunities for prompt publication of meritorious investigations, together with digests of current literature in this department, will be found in *The American Journal of Psychology*, which is published under the editorial care of Dr. Hall.

Henry H. Donaldson has been appointed assistant professor of neurology. Dr. Donaldson was graduated from Yale College in 1879. After spending a year at the Sheffield Scientific School and another at the College of Physicians and Surgeons in New York City, he was appointed a fellow of Johns Hopkins University for two years, receiving the degree of doctor of philosophy there in 1885. A year and a half was then spent in Europe, chiefly with Professors Gudden at Munich, Forel at Zurich, and Golgi at Turin, and on returning he was appointed associate in psychology in the Johns Hopkins University.

Dr. Donaldson will give instruction in the finer anatomy of the central nervous system in man, in the histology of the sense-organs in the vertebrate series, and the localization of function in the brain, together with such other topics as may serve to facilitate study in these lines.

Those desiring further information concerning leading works of reference, or the equipment of the laboratory, can address Dr. Donaldson during the summer at Worcester.

Edmund Clark Sanford, who has been appointed instructor in psychology, was graduated from the University of California in 1883. He has since spent four years at the Johns Hopkins University, where he was appointed fellow in psychology in 1887, and received the degree of doctor of philosophy the following year. The past academic year has been spent as instructor in the undergraduate department of the Johns Hopkins University, and in editing, under Dr. Hall's supervision, *The American Journal of Psychology*.

Dr. Sanford will give the two following special courses: First half-year, the physiological psychology of vision; monocular vision, color-perception, contrast, etc.; binocular vision, stereoscopy, and the horopter; perception of space, nativism, and empiricism. Chief authorities, Helmholtz, Hering, Wundt. The aim will be to demonstrate all the important experiments mentioned in the course, with suitable apparatus. Second half-year, the application of time-measurements to psychology, simple and complicated re-action times, personal equation, association times, and time-sense.

Dr. Sanford will also assist Professor Hall in the work of instruction and in the direction of the psycho-physic laboratory, seminary, etc. It is hoped that fuller opportunities for the study of historical philosophy, logic, and ethics may eventually be offered.

The work of the psychological department is intended for the following classes of students: those who desire to teach philosophy in any or all of its departments; physicians or medical students who wish to become specialists in the treatment of insanity or of diseases with nervous complications; those who desire to study education professionally, and who are advised to give most of their energy to psychology, which is its chief scientific basis, pedagogy being a field of applied psychology.

Some of the special topics into which the work above naturally falls can be attended as a special course by students of other departments. Thus students of biology or pathology may follow the histological course of Dr. Donaldson; students of classics may follow the course in Greek philosophy; of morphology, the lectures on instinct; of astronomy, the lectures on re-action time and the personal equation.

In the department of biology, Warren P. Lombard was appointed assistant professor of physiology in August, 1888. Dr. Lombard was graduated from Harvard College in 1878, and from Harvard Medical School in 1881. In 1881–82 he was prosector and lecturer in the College of Physicians and Surgeons in New York City, and for the next three years, 1882–85, attended lectures and was engaged in research work in Germany, chiefly in the laboratory of Professor Ludwig in Leipzig. The next three years were devoted to research and to the duties of lecturer and assistant in physiology at the College of Physicians and Surgeons, and elsewhere. The present year is being spent in the laboratories of Professors Dastre and Darsonval of Paris, Professor Mosso of Turin, and elsewhere. Work in this department will be conducted with the aid of lectures, laboratory, conferences, etc., and will cover the physiology of digestion, secretion, respiration, circulation, the nerves, muscles, and senses. The laboratory will be well furnished with instruments and other appliances for investigation in each of these special fields.

F. Mall has been appointed adjunct professor of anatomy. Dr. Mall was graduated from the University of Michigan in 1883, where he received the degree of M.D. He studied one year with Professor Kuhne at Heidelberg, and two years with Professors Weigert, His, and Ludwig in the University of Leipzig. Since 1886 he has been successively fellow, instructor, and associate in pathology, in the Johns Hopkins University. Dr. Mall will offer two courses, — one in histology, and one in vertebrate embryology.

Albert A. Michelson has been appointed acting professor of physics. Dr. Michelson was graduated at the United States Naval Academy in 1873, where he afterwards served as instructor in physics and chemistry for four years. He was later attached to the Nautical Almanac Office in Washington. For two years, beginning in 1880, he worked in Europe under Helmholtz, Quincke, Mascart, and Corun. On returning, he resigned his commission of master (now called lieutenant) in the navy, and became professor of physics in the Case School of Science, Cleveland, O., where he has since remained. In 1888 he was awarded the Rumford medals for his researches on the velocity of light. Dr. Michelson

is a member of the American Academy of Science, corresponding member of the British Association, vice-president of the American Association for the Advancement of Science, etc.

Professor Michelson will give a course of illustrated and experimental lectures in physics, extending through two years. These will treat the chief topics in this department, and will be sufficiently advanced for students intending to make physics a specialty, and will be interspersed by examinations and conferences. This course will be supplemented by a series of lectures or readings in theoretical optics, electricity, and magnetism, or in thermodynamics of a more informal nature. Students with a fair knowledge of integral and differential calculus will have no difficulty in following this course.

A graded course of laboratory instruction will be offered for practical acquaintance with special methods. Dr. Michelson will strive, by advice and example, to encourage a spirit of diligent investigation and original research, particularly in those intending to find their life-work in this department.

The organization of no department will probably be more complete in October than that of chemistry. A large laboratory of about fifty rooms will be ready for occupation, and the names of some of the instructors can be very soon announced. Appliances for the department of mathematics are also liberally ordered. The names of instructors will soon be announced.

The organization of all the above and other departments will be gradual, and the foundation period of the university will cover some years. Apparatus is being extensively ordered of the best makers in this country and in Europe, chiefly from those who devote themselves to the special class of apparatus in which they excel.

Besides field-work, excursions to institutions public and private, coaching and cram classes, examinations, conferences, and other modes by which knowledge now seems best imparted and retained, the following educational methods will probably be prominent: —

Seminaries. — These are stated, perhaps weekly, meetings, often in a department library, for joint, systematic, but conversational work, under the personal direction of the professor, in some special chapter of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded; and the efficiency of universities, especially in Germany, where seminaries were first generally introduced, has been greatly increased.

Laboratory Work. — For beginners, this was from the first the best of all forms of apprenticeship, bringing student and professor to a far closer and mutually stimulating relation. Here the manipulation of apparatus is learned, each well-chosen piece of which is an obvious epitome of long lines of research, processes are criticised, results obtained by other investigators are tested, methods are discussed and perfected. The modern laboratory has thus become an unexcelled school of logical mental discipline, from which is developed, as its best product, that rare independence in research which is the consummation of scientific culture.

Lectures. — The trustees desire that each instructor, of however few students, should prepare and deliver regular lectures, with diagrams, illustrative apparatus, and references to standard text-books and the best current literature upon each topic. Advanced students and instructors will also be encouraged to supplement the work of the professors by giving special lectures and courses. Public lectures will from time to time be given.

The following classes of students will be admitted: —

I. *Independent Students.* — This class will include those who have already taken the doctorate or other academic degrees in this country or abroad, and others of sufficient training who have time that may be devoted to particular lines of study or research. For competent men of this class, individual arrangements may be made and an independent room, and even special apparatus and books, provided, that they may pursue their investigations, either alone or with the aid and counsel of the instructors, to the best advantage. Conditions under which a few of the most advanced students of this class can be granted the *venia docendi*, as lecturers or docents, are under careful consideration. It is hoped that some of the permanent instructors of the university may be recruited from this class. It is probable that a few of these mature students can be received, not only in the five departments named above, but in others soon to be organized, and in the development of which they may co-operate.

II. *Candidates for the Degree of Doctor of Philosophy.* — Those qualifying for this degree will be matriculated early in the fall, after suitable tests, which will also aid in determining when they can be admitted to the final examination. The full course provided for this class of students will be three years, but admission to advanced standing at the outset is possible; and those found to be qualified may be allowed to take the doctor's examination in two years, or even one. It is to the needs of these students that the lectures, seminaries, laboratories, and collections of books and apparatus will be especially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the fellowships and scholarships are primarily intended, although any of these honors may be awarded to students in Classes I. or III.

III. *Special Students not Candidates for a Degree.* — This class includes those who may desire to devote themselves exclusively to one or more of the special branches, — mathematics, physics, chemistry, biology, or psychology, — but who do not care to matriculate, or become candidates for a degree. These students, provided they satisfy the heads of departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners, in other subjects), may be allowed entire freedom in their choice and combination of studies, and, as special students, may enjoy all the privileges of the university.

IV. *Medical Students.* — The university offers special facilities in those fundamental disciplines upon which the study of medicine in all its departments now rests. Thus, students of sufficient preliminary training can be admitted in the departments of chemistry, biology, anatomy, physiology, and neurology, and receive here the purely scientific part of a medical education.

V. *Preliminary Candidates or Undergraduates.* — Non-university students of less special or less advanced standing than the above four classes, who are nearly but not quite qualified to become candidates for the degree of doctor of philosophy, may also be received. Students of this class must for the present have completed the work of the first three, or at least of the first two, years of a regular undergraduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the university that they can proceed to the degree of A.B. in one year, and contemplate advancing to a higher degree. The privileges and status of these students will be more fully defined later. They may be elected to scholarships, but not to fellowships.

To no form of educational gift or bequest have probably so many people contributed as to the various forms of individual aid to meritorious students. Under the names of bursaries, stipends, exhibitions, prizes, benefices, etc., as well as of scholarships and fellowships, the revenues of foundations established by and bearing the names of sometimes hundreds of donors in a single university, are annually distributed.

Sometimes these funds were given by men or women themselves not far removed from need, and are appointed to furnish a student with firewood, a room, a bed, one daily meal, or a coat each year, etc., and sometimes yielding one or two thousand dollars to a single holder. Often many students were provided by a single donor, and some of these European foundations, even the smallest, are centuries old, so sacredly are they guarded, and others are even now being established. The more advanced the education, the more such aids are needed, and the more numerous and substantial do they in fact become in Europe.

So great is now the need of bringing the best intellects to fullest maturity, and so increasingly necessary for the highest scientific attainment are now the leisure, tranquillity, books, and apparatus thus best supplied, that the demand is strong for still more and greater aids of this kind for advanced and competent students.

Several of the wisest governments in Europe, recognizing that the modern world and its rulers are ruled by experts thus best trained, vie with private munificence in supplying such aids. With a deep sense of the peculiar needs of our country in this respect,

the founder of this university, and his wife, have provided such opportunity and incentive here as follows: —

In addition to all previous gifts of the donor, and apart from the permanent funds of the university, full tuition of two hundred dollars each for thirty meritorious students will be paid into the treasury. For eight of these students, thus freed from tuition, Mr. Clark has also established fellowships yielding each holder four hundred dollars per annum, and eight more fellowships yielding each holder two hundred dollars per annum. These, with eight free scholarships as above provided, will be known as the "Jonas G. Clark Scholarships and Fellowships" respectively. Mrs. Clark has established two fellowships yielding four hundred dollars each, and two fellowships yielding two hundred dollars each, per annum. These, with the two remaining scholarships, will be known as the "Mrs. Jonas G. Clark Fellowships and Scholarships" respectively. These six latter are especially provided for the department of psychology, while the twenty-four presented by Mr. Clark are to be distributed among the other four departments at the discretion of the president and faculty.

The founder and his wife unite with the trustees and president in inviting sympathy and practical co-operation in the multiplication of such aids, large or small, temporary or permanent, here at the outset. Both scholarships and fellowships are open only to students in one or more of the five departments announced, and are renewable annually. They are designed to encourage promising young men, graduates of colleges and others, who have developed a preference for particular lines of study in which they desire to attain still further proficiency.

While intended to remove pecuniary hinderances in the way of such students, both scholarships and fellowships are primarily honors, awarded without reference to pecuniary needs. Thus, those desiring to do so may relinquish the emolument, and retain the title of scholar and fellow.

A plain, substantial, and well-appointed central building, 204 by 114 feet, four stories high, and with superior facilities for heating, lighting, and ventilation, has been constructed of brick and granite, and finished throughout in oak. A chemical laboratory, designed after consulting many experts and plans of recent European buildings, and containing about fifty rooms, is nearly completed. The foundations of a still larger department building are laid.

The work of instruction will begin in the five departments above announced, on Wednesday, Oct. 2, 1889.

TO PREVENT CONSUMPTION.

DRS. PRUDDEN, BIGGS, AND LOOMIS, pathologists to the Board of Health of the city of New York, having been requested to formulate a brief and comprehensive statement regarding the contagiousness of tuberculosis and the means of protection therefrom, have submitted the following: —

The disease known as tuberculosis, and, when affecting the lungs, as pulmonary tuberculosis (consumption), is very common in the human being, and in certain of the domestic animals, especially cattle. About one-fourth of all deaths occurring in the human being during adult life are caused by it, and nearly one-half of the entire population at some time in life acquires it. The disease is the same in nature in animals and in man, and has the same cause.

It has been proved beyond a doubt that a living germ, called the "tubercle bacillus," is the cause, and the only cause, of tuberculosis. It does not seem necessary to state the facts upon which this assertion is based, for the observation first made by Robert Koch in 1882 has been confirmed so often and so completely that it now constitutes one of the most absolutely demonstrated facts in medicine.

Tuberculosis may affect any organ of the body, but most frequently first involves the lungs. When the living germs find their way into the body, they multiply there, if favorable conditions for their growth exist, and produce small new growths or nodules (tubercles), which tend to soften. The discharges from these softened tubercles, containing the living germs, are thrown off from the body. In pulmonary tuberculosis these discharges constitute, in part, the expectoration. The germs thus thrown off do not grow outside the living human or animal body, except under artificial conditions, although they may retain their vitality and virulence for long periods of time, even when thoroughly dried. As tuberculosis can only result from the action of these germs, it follows, from what has just been said, that, when the disease is acquired, it must result from receiving into the body the living germs that have come from some other human being or animal affected with the disease.

It has been abundantly established that the disease may be transmitted by meat or milk from the tubercular animal. The milk-glands in milch cows often become affected with the disease when their lungs are involved, and the milk from such animals may contain the living germs, and is capable of producing the disease. Among stall-fed dairy cows, 20 per cent or 30 per cent are sometimes found to be affected with the disease. Tubercular animals are also frequently killed for food, their flesh sometimes containing the germs, and, if not thoroughly cooked, it is capable of transmitting the disease. Boiling the milk, or thoroughly cooking the meat, destroys the germs. Although the meat and milk from tubercular animals constitute actual and important sources of danger, the disease is acquired, as a rule, through its communication from man to man.

Tuberculosis is commonly produced in the lungs (which are the organs most frequently affected) by breathing air in which the living germs are suspended as dust. The material which is coughed up, sometimes in large quantities, by persons suffering from consumption, contains these germs, often in enormous numbers. This material, when expectorated, frequently lodges in places where it afterward dries, as on the streets, floors, carpets, clothing, handkerchiefs, etc. After drying, in one way or another, it is very apt to become pulverized, and float in the air as dust.

It has been shown experimentally that dust collected from the most varied points in hospital wards, asylums, prisons, private houses, etc., where consumptive patients are present, is capable of producing tuberculosis in animals when used for their inoculation. Such dust may retain for weeks its power of producing the disease. On the other hand, dust collected from rooms in institutions or houses that have not been occupied by tubercular patients does not produce the disease when used for the inoculation of animals.

These observations show, that, where there are cases of pulmonary tuberculosis, under ordinary conditions the dust surrounding them often contains the "tubercle bacilli," and persons inhaling the air in which this dust is suspended may be taking in the living germs. It should, however, be distinctly understood that the breath of tubercular patients, and the moist sputum, received in proper cups, are not elements of danger, but only the dried and pulverized sputum. The breath and moist sputum are free from danger, because the germs are not dislodged from moist surfaces by currents of air. If all discharges were destroyed at the time of exit from the body, the greatest danger of communication from man to man would be removed.

It then follows, from what has been said, that tuberculosis is a distinctly preventable disease. It is a well-known fact that some persons, and especially the members of certain families, are particularly liable to tuberculosis; and this liability can be transmitted from parents to children. So marked and so frequent is this liability, and so frequent is the development of the disease in particular families, that the affection has long been considered hereditary. We now know that tuberculosis can only be caused by the entrance of the germ into the body, and that this transmitted liability simply renders the individual a more easy prey to the living germs when once they have gained entrance.

The frequent occurrence of several cases of pulmonary tuberculosis in a family is, then, to be explained, not on the supposition that the disease itself has been inherited, but that it has been produced after birth by transmission directly from some affected individual. Where the parents are affected with tuberculosis, the children, from the earliest moments of life, are exposed to the disease under the most favorable conditions for its transmission; for not only is the dust of the house likely to contain the bacilli, but the relationship also between parents and children, especially between the mother and child, is of that close and intimate nature especially favorable for the transmission by direct contact.