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BIOGRAPHICAL MEMOIRS  
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BIOGRAPHICAL MEMOIR

OF

JOHN JACOB ABEL

1857-1938

BY

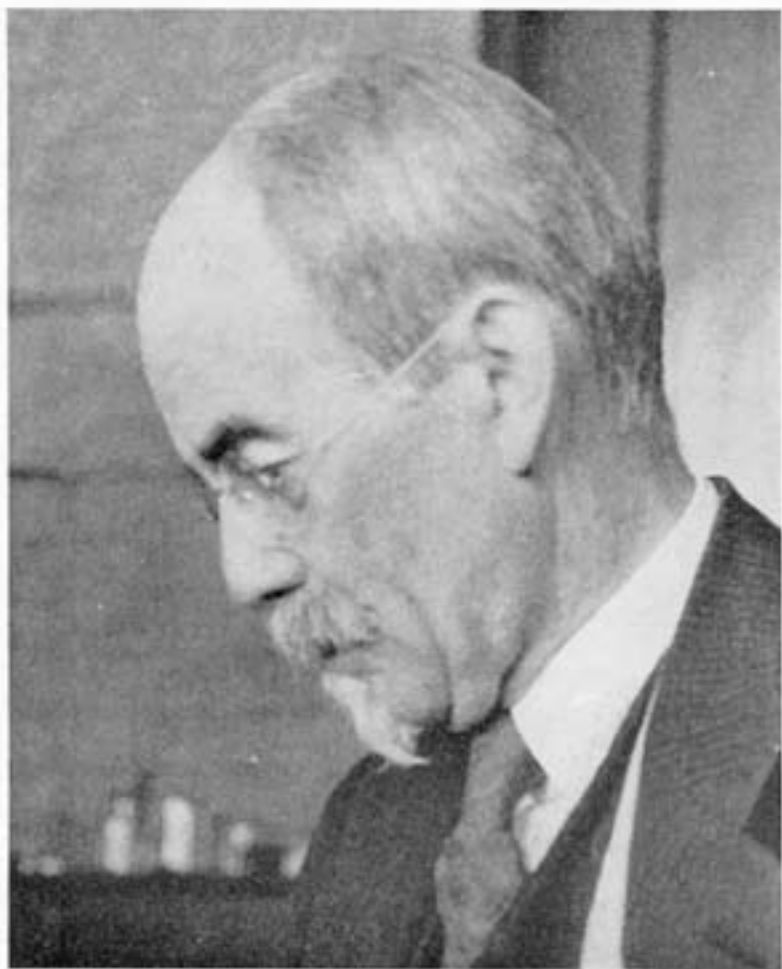
WM. DEB. MACNIDER

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PRESENTED TO THE ACADEMY AT THE ANNUAL MEETING, 1946

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*John J. Abel*

## JOHN JACOB ABEL

1857-1938

BY W. M. DEB. MACNIDER

### PART I

“The value of a man is not measured by the truth he possesses, but rather by his sincere effort to discover truth. For it is not through the possession of truth, but more by search for it that his powers are widened, those powers which conduce to evergrowing perfection. Possession makes for tranquility, laziness and conceit. If God, holding in His right hand the complete embodiment of truth and in His left the unswerving and ever alert search for truth, even though this search be fraught with a constant and unremitting erring, should say to me: ‘Choose!’, I would humbly embrace His left and say ‘Father, give! for real truth is Yours alone’”

. . . Lessing.

Such was the life, the labor and the religion of John Jacob Abel, who was born near Cleveland, Ohio on the 19th of May, 1857 and died in Baltimore at the Johns Hopkins Hospital May 26, 1938. He died as he had lived, acutely conscious of all about him, thoughtful of his medical associates and attendants, with full knowledge of his basic ailment and with a yearning for his laboratory. Only a few hours before his death he discussed and planned in his usual animated fashion with one of his associates a continuation of their work with tetanus toxin. Likely few men in science at the age of 81 have held fast to those characteristics of mind and of spirit that partake of youthfulness and insure a continuation of creative work at a high level of effectiveness.

But little is known of Professor Abel's forebears. His family came from the Rhine Valley of the Palatinate, stock which has given to this country through its sincerity of purpose leaders in industry as well as in science; people with a desire for success dependent upon and assured through toil as a way of life and

as a means to secure specific training for a desired objective. This origin of the Abel family coupled with his years of training under and intimate association with the leading scientific men in Germany in the general field of the biological sciences made it difficult for Professor Abel to accept America's conflict with Germany in World War I.

There was in the young Abel that something which as a youth without hereditary example directed him into pathways of understanding through studiousness. Following the usual high school experience Abel entered the University of Michigan and received his Ph.B. degree in 1883. This stay at Michigan was not one of ease and continuity of purpose for during his undergraduate years there was an interim of three years when he served as principal of the high school at La Porte, Indiana. Acting in this capacity he dispensed information in mathematics, Latin, chemistry and physics. Even at this early stage of his career his understanding was of such a diversified order that he was able to give instruction in subjects as widely separated in their disciplines as Latin and chemistry. This breadth of interest in the things of the mind remained with Professor Abel throughout his life. He distrusted abstracts but went to original sources for his information. The Greek language held a lasting charm for him.

While teaching at La Porte, fate was kind enough through chance to have another teacher, Miss Mary Hinman, of New York State, become an instructor in these schools. Likely other than the impelling desire within Professor Abel for intellectual advancement towards perfection, Miss Hinman, "the very sweet, mild, little lady with a great deal of force" had the greatest influence on his life and development and in no small measure made this development possible. These young people were married on July 10, 1883. Their fortunes for life became as one. Their combined savings were for his intellectual yearnings and these desires were of an Old World order of excellence, not one master for specialized instruction but many, both at home and especially abroad, fitted his mind for teaching and for a diversity of research interests. This training resulted in the

development of an order of mental equipment which permitted a research thought to be followed by the use of specialized techniques for its investigation. He was blessed by such thoughts and the ability to test their worthwhileness.

At the University of Michigan, Abel had experienced the power and the inquisitiveness of mind of a group of eminent scholars who relished the instruction of undergraduates as well as those students at a more advanced period of training. This is as it should be. Such a student-teacher relationship not infrequently in the silences precipitates out as a determination the best within a student and both stimulates him to go forward in his training and sustains him in difficult periods of such accomplishment. Likely under the operation of this influence and with the insistence and support of Mrs. Abel, having decided on an educational career, he went to the Johns Hopkins University, the first institution in this country primarily established for graduate study, and spent a year under the guidance in physiology of Newell Martin. From this experience of a graduate order of thought and training Dr. and Mrs. Abel went abroad in order that he might have seven years of such study under the leading masters in the medical and allied sciences in Europe. During the long period of intellectual fellowship with training which would warrant at its culmination the Doctorate in Philosophy, he chose the designation Doctor of Medicine, which degree was awarded him by the University of Strassburg in 1888. There is an element of surprise in such a choice for as one knew Dr. Abel he was idealistically constituted both by disposition and training to teach, to direct and to do research and not to teach or to practice medicine as it was done in America in the early eighteen-nineties. He likely realized the necessity for him to possess the M.D. degree in order by practice to make a living in this country and he likely also determined that should this be his fate he would practice medicine with a scientific order of exactness and participate in investigation of a clinical nature as was the custom by the best clinicians in continental Europe. His medical training was of an exceptionally broad and high order of excellence.

The seven years devoted by Dr. Abel to his studies in Europe must have been of an ideal nature. The hurry and strain of accomplishing a certain designated and regimented curriculum leading to a specified degree at the end of a certain time limit did not exist. He had time for thoughtfulness and an opportunity to ripen in wisdom through unhurried training. He picked with rare judgment those scholars of eminence in the different divisions of understanding in which he desired information and with a certain leisure proceeded with his work which at a very early stage expressed itself in various research undertakings. This character of his work gave him not only guidance by but intimacy with these men of exceptional ability, and quite naturally such associations made for mutual respect and lasting friendships. Even in these early days of 1884, when Abel was only 27 years of age, one of his lasting characteristics was in evidence: the thoughtfulness with which he came to a decision and the modest ease with which he proceeded to live his life. "From 1884 to 1886 he was in Leipsig, studying physiology under Ludwig and von Frey, histology under His, pharmacology under Boehm, pathology under Strümpell and inorganic and organic chemistry under Wislicenus. At this time he completed the basic work on his doctor's dissertation in Ludwig's laboratory. The winter semester of 1886-87 was spent in Strassburg under Kussmaul in internal medicine, and under V. Recklinghausen in pathology and infectious diseases. The following summer semester he studied at Heidelberg with Erb in medicine and Czerney in surgery. During the summer vacation he attended clinics at Würzburg to return to Strassburg in 1887-88 for study under Kussmaul, Naunyn, Hoppe-Seyler and Schmeideberg. It was Schmeideberg who first aroused Abel's interest in pharmacological research, particularly in its chemical aspects." The stimulation of this basic interest by Schmeideberg had much significance for it was to be in this domain of chemistry, tissue chemistry as pharmacology, that a large part of Abel's research life was to be spent. After Abel received his Doctorate in Medicine from Strassburg and likely with the conviction, perhaps against his will, that on his return home he

must practice medicine for a livelihood, he went to Vienna for a year to work with Nothnagel and others in clinical medicine. This was a transitory departure from his laboratory studies, for the period 1889-90 found him a student in the biochemical laboratory of V. Nencki in Berne. Here his time was completely given to biochemical research with the completion of an investigation on the "molecular weight of cholic acid, cholesterol, and hydrobilirubin." It was at Berne that Abel made the acquaintance of and established a lasting friendship with Cushny, who was then a student in Kronecker's laboratory and who was later to follow Abel as Professor of Pharmacology at Michigan. This period at Berne under V. Nencki would appear to have fixed Abel's scientific interest in the domain of biochemistry and pharmacology as much as he may have feared the necessity for his participation in the practice of medicine. With such a desire for basic scientific research it was not only fortunate for him but a blessing to science that in the summer of 1890, upon the recommendation of Schmeideberg to Victor C. Vaughan, the latter offered Abel the chair of *Materia Medica* and Therapeutics at the University of Michigan. This he accepted but before going to his first academic post he spent a period in Ludwig's laboratory working with the eminent biochemist, Drechsel. One may be permitted to visualize the joy and satisfaction which had come to Professor Abel and Mrs. Abel alike to have the opportunity after such a period of carefully planned training to be called to the headship of a scientific department in one of America's great universities and here to be able to create in a modern sense the first Department of Pharmacology in America. Soon after Professor Abel's entering upon his duties at Michigan he wrote a letter to C. W. Edmunds in which he stated that "here at Ann Arbor I was given the opportunity of starting the first professorship in pharmacology in the United States, whose holder should devote himself entirely to giving students the best possible instruction by means of lectures, demonstrations and quizzes in the manner in which my European teachers (Schmeideberg and Boehm) had long carried on their work. All my energy which was not given to this kind of instruction

to students was devoted to research work and to arousing the enthusiasm in others for it. . . . There was no laboratory of any kind at my disposal. There was not a scrap of apparatus, not even a test tube, a flask or a beaker." Such a lack of physical necessities for work was overcome until they were secured by his optimism and enthusiasm which remained with him until the day of his death. He had that which he most cherished, an opportunity to work, and with this spirit he went forward to equip in a meagre fashion a workshop which might be designated laboratory and to proceed with his teaching and research. This course which he pursued, not as a difficulty but as a challenge, should be known and taken to heart by many of the younger experimentalists of the present who would appear to consider apparatus as such to be responsible for research and thought, enterprise and reason on the part of the investigator to be only of secondary importance.

Professor Abel's tenure of the chair of pharmacology at Michigan was of short duration. In the early nineties President Gilman, of the Johns Hopkins University, was busy with his desire to establish at this institution a different order of medical school from that then in operation in this country, a school which would have for one of its characteristics a scientific, research point of view, not only in teaching medical students but as applied in the treatment of disease. The so-called laboratory or preclinical subjects of the medical curriculum were to assume a university order of excellence in their development and operation and the clinical departments were to find themselves through the laboratory and at the bedside and away from didactic teaching. An order of medical instruction first developed in continental Europe was to appear in Baltimore. Such scientific idealism for medicine must have had a strong appeal for Professor Abel, who had experienced in his training this type of inquisitiveness as medical instruction. The result was that, responding to a letter from Osler, Abel accepted the Professorship of Pharmacology at this new order of medical school and assumed his duties in this capacity for the year 1893. At this time it was likely fortunate for biological chemistry that this



subject fell under Professor Abel's care for he was not in favor of such a combination of intellectual interests but had at heart the free development of biological chemistry and pharmacology as entities. This was shown in 1908 by the separation of these two subjects with the creation of two independent departments, with Walter Jones serving as the first professor and head of the department of biological chemistry at the Johns Hopkins Medical School.

Professor Abel's tenure of posts at the Johns Hopkins Medical School lasted over a period of forty-five years. From 1893 to 1908 he was responsible for both pharmacology and biological chemistry. From 1908 to 1932 the chair of pharmacology held his undivided attention. At the age of 75 he retired from this professorship, which was filled by his eminent pupil, Professor E. K. Marshall, Jr., in order that Professor Abel as Director of Endocrinological Research might spend his entire time in investigations in this area of understanding. He held this position with great interest and activity at the time of his death.

In this brief account of the life of Professor Abel no attempt will be made to discuss in any detail of an analytical order his research interests and accomplishments. This has in large measure been done by one of his former pupils and associates, Dr. Carl Voegtlin of the National Institute of Health. From his statement I have drawn freely. As one studies these contributions, commencing with his dissertation at Strassburg in 1888 to his final paper dealing with his new interest in the method of the transmission of tetanus toxin to the central nervous system which appeared in 1938, one is impressed by his abiding interest in the chemical manipulations of animal tissues, his impelling desire to understand such mechanisms, not only as processes of life but his desire to obtain in pure form those chemical bodies responsible for tissue activity, especially the activity of the endocrine glands. From his early paper on the isolation of ethyl sulfide from the normal urine of dogs, or as was the case in his work with Drechsel in Ludwig's laboratory, on the occurrence of carbamic acid in alkaline horse urine through the years of work on the suprarenal medulla, the isolation of

amino acids from blood by vividiffusion and the period of work on the pituitary, the same basic order of thought shows itself; to understand the chemical constitution of tissues and the interplay of such bodies in the living organism as an expression of a normal, balanced and related life. With few exceptions he did not become experimentally concerned with the chemical constitution of substances foreign to the animal organism. Notable exceptions to this statement are his work with Rowntree on the trypanocidal action of certain antimony-arsenic compounds, the fate and elimination of the phthaleins in animal tissues and his final work with Firor and Chalian on tetanus. Perhaps he saw an ultimate day for pharmacology when tissue imbalances of function as the symptoms of disease, as departures from the balanced normal life and tissue disintegrations as chemical alterations would be modified back towards the established normal by a replacement of those chemical bodies, normal for various tissues which had been altered or depleted by the strain of tissues to cope with a too severely changed environment.

Even a cursory review of Professor Abel's papers would leave no doubt in the mind of anyone that his dominant interest was the isolation in pure form of the hormones of several of the glands of internal secretion. As early as 1895 this interest manifested itself in his studies on the active element in the thyroid gland. In 1894 Oliver and Schafer had discussed the blood pressure raising power of adrenal extracts. It was at about this date that Abel turned his attention for over a period of ten years to an attempt to isolate the hormone of the adrenal medulla and it was this work even though not carried to complete fulfilment that gave him an international reputation of the first order. A somewhat detailed account of this work is appropriate in the present biographical record on account of various interpretations made concerning it which were very fortunately set at rest by a statement made at a later date by Professor Abel. His first paper on this subject was published with Crawford in 1897, in which he described the isolation of a benzoyl derivative of the active principle. The actual isolation of the active principle as such and the determination of its chemical

structure are questions of much biochemical and historical significance for they are concerned with the first isolation of such a body from an endocrine gland, and are here recorded in Professor Abel's own words as stated in his Willard Gibbs Lecture of 1927. "On decomposing this benzoyl derivative with hot dilute sulfuric acid in an autoclave we obtained the active principle in the form of a sulfate which possessed the characteristic physiological activities of suprarenal extracts and reacted, furthermore, with a series of chemical reagents in a manner that is quite specific for such extracts and limited to them. The principle as obtained by saponification of the benzoyl derivative was thrown out of its solution by means of ammonia in the amorphous state and was shown to be a weak base. A picrate, a bisulfate and other salts of it were prepared, all of which were shown to possess a high degree of physiological activity. An acetyl derivative, a phenylcarbamic ester and other derivatives were also prepared and certain degradation products of the base were isolated and studied. . . . The elementary composition of the base was established by analysis of several derivatives, including the sulfate, and was stated to be represented by the formula  $C_{17}H_{15}NO_4$ . After I had completed the above described investigation and while I was still endeavoring to improve my processes, I was visited one day by the Japanese chemist, J. Takamine, who examined with great interest the various compounds and salts of epinephrine that were placed before him. He inquired particularly whether I did not think it possible that my salts of epinephrine could be prepared by a simpler process than mine, more especially without the trouble and in this case wasteful process of benzoylating extracts of an animal tissue. He remarked in this connection that he loved to plant a seed and see it grow in the technical field. I told Takamine that I was quite of his opinion and that the process could no doubt be improved and simplified. At this very time, also, V. Fürth had just prepared an amorphous, highly active, indigo-colored compound of the active principle which he named suprarenin, but no analytical data were given and no empirical formula for his principle was established. Takamine prepared supra-

renal extracts more concentrated than mine and without first attempting to separate the hormone from its numerous concomitants by benzoylating or otherwise, simply added ammonia—the reagent that I had so long employed—to his concentrated extracts, whereupon he immediately obtained the native base in the form of burr-like clusters of minute prisms in place of my amorphous base. I have often been asked why I had not myself attempted to solve the problem in this very simple fashion. The truth is that I had tried to do so but always found that the dilute extract tested simply turned pink in a short time on the addition of ammonia without depositing the base either crystalline or amorphous. Inasmuch as very dilute solutions of the salts obtained by me on saponifying the benzol derivatives always gave a precipitate with ammonia, I fell back on the hypothesis that other constituents of the impure extracts prevented its precipitation by ammonia from my dilute native extracts—an erroneous assumption. Takamine's success was due to the employment of ammonia on very highly concentrated, though impure extracts. . . . The efforts of years on my part in this once mysterious field of suprarenal, medullary biochemistry, marred by blunders as they were, eventuated, then, in the isolation of the hormone not in the form of the free base but in that of its monobenzoyl derivative." This extremely important and frank statement of the chemical birth of a new era in the understanding of tissue activity portrays as no words could the industry persisted in to the point of physical exhaustion, the frankness, the complete honesty untouched by jealousy or recrimination of a nobleman in the domain of science. Such a statement would however be only a part truth if mention were not made of the great disappointment at times almost of an incapacitating character experienced by Professor Abel in not having actually carried the epinephrine work to its final point by obtaining the crystals and determining their structural formula. The indomitable spirit of the man overcame this disappointment to go forward for years to a variety of important discoveries which culminated in his isolation with the aid of Geiling of crystalline insulin.

Between the epinephrine and insulin periods of Professor Abel's investigations a wide variety of laboratory adventures were undertaken. Such a diversity of interests and accomplishments were made possible by the broad, and at the same time thorough, training to which he had subjected himself in the days of his studies in Europe. In 1907 Abel and Ford published their paper on the poisonous principles in *Amanita phalloides* and in 1909 the first of a series of communications appeared by Abel and Rowntree of their studies on the phthaleins from which work sprang the now universally used test for renal function as developed by Rowntree and Geraghty and the more recently developed test for liver function by Rosenthal. It was also at this period of his investigations that Abel and Rowntree became interested in chemotherapy with the production and experimental use of an antimony and also antimony-arsenic compounds in the treatment of trypanosome infections, granuloma inguinale and *Bilharzia* infections. Somewhat later than this Abel and Barbour and Abel and Turner commenced their studies on the ability of acid fuchsin to produce tetanus in the frog and of the influence of various procedures such as fatigue and of ablation of different areas of the frog brain on the rapidity of development and the severity of such seizures. This work led to their proof of the influence of the lymph hearts in a cardiectomized frog in distributing such agents to the central nervous system. In 1912 there appeared extensive studies by Abel and Macht on the isolation of epinephrine in pure form from the secretion of the parotid gland of the tropical toad, *Bufo agui* and shortly thereafter a second crystalline body, Bufagin, with a digitalis-like action was obtained from the same secretion. Such researches as important and as significant as they were came rather as an interlude in Abel's basic interests in the chemistry as such or as pharmacology of bodies normal for animal tissues. This interest and his inventiveness were now expressed by his development of an apparatus consisting of a series of celloidin tubes supported in a glass container and surrounded by a dialyzing fluid which could be introduced into the circulation of an animal so that hirudinized arterial blood would enter at one

connection and return after dialysis through an appropriate venous connection. Such a vividdiffusion apparatus, the so-called artificial kidney, was developed by Abel, Rowntree and Turner and first demonstrated at the Physiological Congress in Groningen in 1914. By the use of this mechanism several bodies such as ethyl-sulfide, urea, lactic and B- oxybutyric acids were obtained from dog blood. Of the greatest importance was the first isolation by the use of this apparatus of an amino acid from blood. This order of investigation quite naturally led to the studies of Abel, Rowntree and Turner on plasmapheresis, very early work on the regeneration of plasma proteins and in association with Pincoffs and Rouiller and later with Geiling to the study of various bodies of protein structure and also histamine-like bodies in blood. From such studies the question presented itself as to whether or not the active principle of the posterior lobe of the pituitary was a specific entity in the form of a hormone or whether it was an albumose-like substance common for many tissues. The investigations of the posterior pituitary which were to follow brought Abel back to his great fundamental interest in the chemistry of tissue products. These investigations which centered around the posterior pituitary lasted for a number of years and were to be followed by his clean-cut major research contribution accomplished with Geiling in 1927 on the isolation of crystalline insulin and the proof that the insulin effect was dependent on the action of the crystalline body and not to a hormone adsorbed to the crystals.

In 1932, at the age of 75, Professor Abel retired from the chair of pharmacology at the Johns Hopkins Medical School and became Director of the Laboratory for Endocrine Research. At this age, with a brilliant mind, a charm of spirit but with a weakened body, he proceeded with youthful enthusiasm to commence his research in an entirely new domain of investigation, the transmission to and localization of tetanus toxin in the central nervous system.

From this sketch of the major research activities of Professor Abel's laboratory one may inquire as to his fondness for and ability to teach undergraduates and to direct that constant flow

of inquiring minds of a more advanced order of learning that came to his laboratory. He was a great teacher but not in the usual sense accepted for the successful teacher in this country. His laboratory was not pedagogically regimented and likely not until the days of Lamson was it adequately equipped in a mechanical fashion for satisfactory medical student instruction, but over and above such a requirement this laboratory experienced through Professor Abel his abiding interest in students, his enthusiasm for understanding and his suggestiveness as to how chemical bodies might influence tissues. There were no didactic, dogmatic statements but in such young people he registered the spirit of inquiry and a desire for proof which lasted with them and carried such minds to original sources for information and to animals for experimental verification. These men and women left his laboratory with thoughtful inquiring minds and not with crania packed by detached unverified statements.

Professor Abel was opposed to specialized academic degrees in the medical sciences as the doctorate in pharmacology. He did not hold a seminar in this subject. He did much more in an intimate, personal fashion. The informal gatherings for lunch with his laboratory staff, advanced students and those guests working in his laboratory with or without his guidance was the hour, the high-noon for suggestion, criticism, reply and encouragement when ideas were freely exchanged and plans developed for the investigation of various problems. At such informal gatherings eminent scientists from at home or abroad were often present and such breakers of bread at this table of thoughtfulness found themselves on the fine and common level of brothers in science. Thus Professor Abel's instruction to graduates and also undergraduates was not formalized. He imparted a yearning for understanding by his precept, by his faith in toil, by suggestion as to procedure which came from his broad understanding of biological phenomena, especially of a chemical order. Such a guide into the unknown with a sincere interest in and a kindly consideration for others brought an unusually large number of students to his laboratory either

for training in order to become pharmacologists or as part-time assistants. Ranking next to Professor Abel's research contributions is this influence which he exerted in the development of a number of departments of pharmacology in this country and abroad and through his students in divisions of understanding other than pharmacology. The names of Crawford, Aldrich, Hunt, Voegtlin, Loevenhardt, Halsey, Brown, Amberg, Rown-tree, Keith, Chen, Pincoffs, Rouiller, Turner, Barbour, Lamson, Macht, duVigneaud, Evans, Marshall, Beiter and Geiling are only a few of the individuals who came under the influence of Abel's laboratory.

Professor Abel was first and foremost a student gaining information through experimentation. His time was spent in the laboratory and was not to any extent complicated by attendance at a variety of scientific gatherings and yet one of his main contributions to science was through his ability to organize such societies and establish journals connected with them for the outlet of their specialized deliberations. In the fall of 1895 he suggested to President Gilman, of the Johns Hopkins University, the need for an American Journal to take care of the ever-increasing amount of material developing in this country in the general domain of experimental medicine. At Gilman's request a plan for such a journal was presented by Abel to the medical faculty which resulted in the establishment of the Journal of Experimental Medicine, with Dr. William H. Welch as the first editor-in-chief. This journal was a success from its first issue in 1896. Encouraged by this outcome and realizing the increase in this country of investigations of a biochemical order, Abel elicited the interest and aid of his friend, Dr. C. A. Herter, Professor of Pharmacology at Columbia University, for the establishment of the Journal of Biological Chemistry. In this instance Herter not only furnished his interest but his financial support for the venture so that with Abel and Herter as joint editors and Professor A. N. Richards as associate editor, the first issue of this publication appeared in 1905. In 1906 Professor Abel called a meeting of a group of biological chemists in New York City which resulted in the formation of the



American Society of Biological Chemists. The first meeting of this society was held in 1907 at which time Abel presented one of the several contributions. The same order of reasoning that specialized thought should come before like-minded individuals and have a specialized outlet in the form of a journal led Abel in 1908 to the establishment of the Society for Pharmacology and Experimental Therapeutics, and a year later to start through the publishing house of the Williams and Wilkins Company the Journal of Pharmacology and Experimental Therapeutics. At first this was a private venture being incorporated in the name of Abel, Hunt and Voegtlin. At a much later date, 1934, this journal became the official organ and financial responsibility of the Society For Pharmacology and Experimental Therapeutics. It was the pleasure of the American Society to request the British Pharmacological Society to become associated with it and in this tangible fashion to strengthen the scientific bond between the two countries. Acting in the capacity of the organizer of scientific societies as well as the instigator for various journals of this nature it would be difficult to evaluate the ever-expanding influence of this simple and learned man of the laboratory.

In writing such a designatedly brief biographical sketch of Professor Abel it has not been difficult to enumerate many of his attainments for they are of such an order of eminent worthwhileness that they stand alone, isolated, for anyone to chronicle and evaluate. As notable and as definite as are many of these contributions, the attribute which made them possible, which made other men of a similar nature of scientific integrity hold fast to the desire to so live and work as to be worthy of the Abel tradition, was that intangible, perhaps nonscientific (who knows?) Something that we may designate, as did J. S. Haldane, spirit. If it be spirit it defies definition, but it was good and honest and thoughtful and rigorous in its exaction for truth through established evidence. His ideal as a man of science was Carl Ludwig, under whom he worked and to whom he felt greatly indebted. In speaking of his great teacher as a guide for the investigation of life, Professor Abel used words first

spoken by Socrates, and these words may be in turn applied to him. "A man whose desires are drawn towards knowledge in every form and who is therefore absorbed in the pleasures of the soul—one who is harmoniously constituted and who is not covetous or mean or a boaster or a coward and can never therefore be unjust or hard in his dealings—he has no secret corner of meanness and is a searcher after and a lover of the truth in all things."

Professor Abel was blessed by the devotion, care and stimulating guidance of his wife, Mary Hinman Abel, over a period of fifty-five years. Mrs. Abel died on January 20, 1938. On May 26, 1938, Professor Abel succumbed to a coronary thrombosis while a patient in the Johns Hopkins Hospital. Three children came from this union, an infant daughter who died in Strassburg, October 30, 1888, and two sons who survive, George H. Abel of Philadelphia and Robert Abel of Boston.

In the preparation of this biographical memoir I must first acknowledge my indebtedness to Dr. Carl Voegtlin for the privilege of the free use of his appreciation of Professor Abel which appeared soon after his death in the *Journal for Pharmacology and Experimental Therapeutics*, and to Miss Dorothy Wilson, one time secretary to Professor Abel, for the list incorporating the degrees, medals and awards, and the outline of his career. I am also indebted to Professor E. M. K. Geiling for certain letters concerning Professor Abel, and for his as well as the statements concerning Professor Abel by E. K. Marshall, Jr., Paul D. Lamson and W. Mansfield Clark. To Drs. Samuel Amberg and L. G. Rowntree I am grateful for valuable information contained in personal letters.

## PART II

### *Degrees:*

- Ph.B., Michigan, 1883
- Hon. A.M., Michigan, 1903
- Hon. Sc.D., Michigan, 1912
- Hon. Sc.D., Pittsburgh, 1915

Hon. Sc.D., Harvard, 1925  
Hon. Sc.D., Yale, 1927  
M.D., Strassburg, 1888  
Hon. M.D., University of Lwów, Poland, 1927  
Hon. LL.D., Cambridge, 1920  
Hon. LL.D., Aberdeen, 1932

*Medals and Awards:*

Awarded first Research Corporation Prize, 1925  
First award of Lectureship of Kober Foundation, 1925  
Award of the Willard Gibbs Gold Medal by the Chicago Section  
of the American Chemical Society, 1927  
Awarded Gold Medal, Society of Apothecaries, London, 1928  
Awarded the Conné Medal, New York Chemists' Club, 1932  
Awarded Kober Medal, 1934.

*Outline of Career:*

Principal, High School, La Porte, Indiana, 1879-1880  
Superintendent of Public Schools, La Porte, Indiana, 1880-1882  
Graduate Student, Hopkins, 1883-1884  
Student of chemistry and medicine, 1884 to January, 1891, at:

Leipsig  
Strassburg  
Heidelberg  
Vienna  
Berne  
Würzburg  
Berlin

Lecturer, *Materia Medica* and Therapeutics, University of  
Michigan, January to June, 1891  
Professor of *Materia Medica* and Therapeutics, Michigan, 1892-  
1893  
Professor of Pharmacology, Hopkins, 1893-1932 (July)  
Professor Emeritus of Pharmacology and Director of the Lab-  
oratory for Endocrine Research, 1932 to 1938 (May)  
Editor of the *Journal of Pharmacology and Experimental*  
*Therapeutics*, 1909 to 1932 (July)

*Memberships in Societies in the United States:*

National Academy of Sciences  
 American Philosophical Society  
 Fellow, American Association for the Advancement of Science  
 American Physiological Society  
 American Chemical Society  
 American Society of Biological Chemists  
 Society of Experimental Biology and Medicine  
 Society for Pharmacology and Experimental Therapeutics

*Honorary Memberships in the United States:*

Honorary Fellow, New York Academy of Medicine  
 Honorary member, Association of American Physicians  
 Honorary member, The Chemists' Club  
 Honorary Fellow, The Institute of Medicine of Chicago  
 Honorary member, Philadelphia College of Pharmacy  
 Honorary member, American Institute of Chemists

*Memberships in Foreign Societies:*

Foreign member, Dutch Society of Scientists  
 Foreign member, Royal Society of London  
 Associate member, Société Royale des Sciences Médicales et  
     Naturelles de Bruselles  
 Corresponding member, Société de Biologie de Paris  
 Corresponding member, K. K. Gesellschaft der Aerzte, Vienna  
 Honorary Fellow, Royal Society of Edinburgh  
 Honorary member, Kais. Deutsch. Akad. d. Naturforscher zu  
     Halle  
 Honorary member, Physiological Society of Great Britain  
 Honorary member, The British Pharmacological Society  
 Honorary Correspondent, Société de Thérapeutique de Paris  
 Honorary member, Society for Biology of Buenos Aires  
 Honorary member, Chinese Physiological Society  
 Honorary Fellow, Société de Chimie biologique  
 Honorary member, Wiener Biologischen Gesellschaft

PART III

BIBLIOGRAPHY OF JOHN JACOB ABEL

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

- Am. Chem. J. = American Chemical Journal  
 Am. J. Phar. = American Journal of Pharmacy  
 Am. J. Physiol. = American Journal of Physiology  
 Am. Med. Assn. Bull. = American Medical Association Bulletin  
 Arch. f. exper. Path. u. Pharmakol. = Archiv für experimentelle  
 pathologie und pharmakologie  
 Arch. f. Physiol. = Archiv für physiologie  
 Ber. d. deutsch. chem. Gesell. = Deutsche chemische gesellschaft Berichte  
 Ber. d. Kais. Akad. d. Wissensch. in Wien, Mathem.—naturw. Classe,  
 Abth. = Berichte d. Kaiserlichen Akademie der wissenschaften,  
 Vienna, mathematisch-naturwissenschaften, klasse—Abtheilung  
 Bull. Johns Hopkins Hosp. = Bulletin, Johns Hopkins Hospital  
 Ind. & Eng. Chem. = Industrial & Engineering Chemistry  
 J. Am. Med. Assn. = Journal, American Medical Association  
 j. Biol. Chem. = Journal of Biological Chemistry  
 J. Chem. Ed. = Journal of Chemical Education  
 J. Exper. Med. = Journal of Experimental Medicine  
 J. Indus. & Eng. Chem. = Journal of Industrial & Engineering Chemistry  
 J. Pharmacol. & Exper. Therap. = Journal of Pharmacology and  
 Experimental Therapeutics  
 Phila. Med. J. = Philadelphia Medical Journal  
 Proc. Inst. Med. Chicago = Proceedings, Institute of Medicine of Chicago  
 Proc. Nat. Acad. Sci. = Proceedings, National Academy of Sciences  
 Trans. Assn. Am. Phys. = Transactions, Association of American  
 Physicians  
 Univ. Mich. Rec. = University of Michigan Record  
 Virchow's Archiv. = Virchow's archiv für pathologische anatomie und  
 physiologie und klinische medizine  
 Ztschr. f. Physiol. Chem. = Zeitschrift für physiologische chemie

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