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SAMUEL RANDALL DETWILER

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A Biographical Memoir by

J. S. NICHOLAS

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IT IS SELDOM that one has the opportunity to write about a person who had as many interesting facets of character as Samuel Randall Detwiler. The unfolding of his life and interests is fascinating. The way in which he overcame his handicaps and drawbacks is even more remarkable; some of these he was unable to master. This memoir will consider both the wars he won and the battles he lost. It was my privilege to know intimately some phases of this man, to help him in some of his conflicts, to play with him in his relaxation from work or depression. Through it all I admired his courage, his love of beauty and his loyalty to enduring friendships.

He began his life in the little farm locale of Ironbridge, Pennsylvania, now named Rahn's Station, the youngest of twelve children. In his autobiographical sketch[1] he outlines his early life as that of a typical farm boy but neglects his likes and dislikes and dwells mostly on the customary routine, the chores and duties associated with the earning of one's living from the soil. This is hard work even in Perkiomen Valley.

At the time, the turn of the century, with a family of twelve to support in addition to an invalid mother, Isaiah H. Detwiler (Detwiler's father) had a full time job on his hands. The financial side of the picture was further complicated by the growing mortgage on

[1] I have been permitted to use material from Detwiler's autobiographical notes and also have had before me the volumes of his collected works presented to the Osborn Zoological Laboratory by his devoted wife, Gladys Hood Detwiler.

the farm as the land holdings increased. Under these pressures Isaiah occupied not only his position as head of the household but also as the foreman of a farm in which his family constituted the chief labor supply.

The youngest child, Samuel, did not have the attention which he would have had in a smaller family. His mother was well occupied with household duties implicit to a large and working family. She died when Detwiler was eight years of age. He speaks of her cooking with an admiration almost approaching reverence but it is evident that he was the particular charge of one of his older sisters to whom he accorded the love and respect normally given to a mother. His father was stern, uncompromising and Calvinistic in outlook. One can imagine him heading a Sunday procession to church where his family numerically must have been a large part of the congregation. Little Sam either brought up the rear with his older sister—or I suspect was under rather intimate paternal jurisdiction for his, even then, active mind would not have allowed continued quiet during the normal long (almost two hours) period of the Sunday service.

Nevertheless, Detwiler records that he watched eagerly from the school window for his father's return from a shopping tour to Philadelphia. He and his brothers had been promised baseball equipment. This was his first and most interesting sport interest. He formed a team of which he was the pitcher and they were good enough to challenge the Drexel Institute in Philadelphia where, as Detwiler says proudly, "We held our own and beat them." He does not record the score.

The youngest child was not a brilliant student in the little red schoolhouse which was situated near—about one mile from the farm. He terms himself a backward child probably because he permitted his active mind to wander from its assigned tasks at school. Both his father's mother and his own had died during the period of his early schooling and these events registered their effects on his oversensitive mind. Certainly it affected Isaiah, his father, who in Calvinistic fashion searched for the sin he thought he must have committed. This

then was retributional punishment. In this morbid phase of his father's mourning Detwiler was to have his preliminary view of mental depression to which he himself was to become increasingly prone.

However much he may have characterized himself as a backward child, Detwiler emerged as a teacher in the school where this had been impressed upon him. One year of teaching stimulated him to pursue further training and he took several courses at the State normal school before entering Ursinus College at Collegeville in the Fall of 1910. In his autobiographical sketch nothing is said about his Ursinus days. He had no college life. Each day he returned home to do his chores, morning and evening, in addition to his studies. There was little time left for play in this daily schedule.

There is no inkling of what factors led him to transfer from Ursinus to Yale in the fall of 1912. In his presidential address to the Anatomists in 1955, he states that he at that time had heard of only one man at Yale, Ross G. Harrison.[2] This move completely changed his life. He had never been further from home than Philadelphia. His knowledge of life and living was limited and colloquial. He apparently met the challenge of increased academic competition and the problems of being away from home for the first time with indomitable spirit.

This attracted the attention of Wesley R. Coe and William B. Kirkham both of whom admired the outgoing qualities and the intense interest in the biological subjects which he displayed. During his second year at Yale, he came under the guidance of Henry Laurens whose influence upon him was far greater than Detwiler ever realized. His interest in the structure and function of the eye grew out of this relationship.

Henry Laurens, a comparative physiologist with a Harvard Ph.D., was a highly talented individual, cultured, a southern gentleman in every sense of the word, a descendant of a signer of the Declaration of Independence, with a wonderful family background in art, music

[2] See Detwiler's own remarks in his tribute to Ross G. Harrison as part of his Presidential address at the 68th meeting of the Amer. Assoc. Anat., Anat. Rec., 122: 670–673.

and literature. Detwiler was a farm boy who had had none of these advantages and so Laurens represented everything which Detwiler would wish to be. He emulated him in every way possible. He could not have had a better influence at this time of his development. Laurens was generous and recognized Detwiler's latent abilities. It was through him that Detwiler met Harrison who was to be his scientific idol throughout his life.

Another person who impressed Detwiler was R. A. Spaeth who at that time was investigating the reacting melanophores of fishes. His work on living material fascinated Detwiler and he was a frequent visitor in Spaeth's household where arguments galore were held. Detwiler eventually combined the thoroughness and stability of Laurens with the facility and brilliance of Spaeth. He worked hard to attain this end.

Spaeth was Harrison's assistant in the big embryology course which was taught in a combined class of senior students in the Sheffield Scientific School and first-year students in the Yale Medical School. Spaeth supported by Laurens convinced Harrison to bring Detwiler back after graduation as a graduate assistant in biology instead of having him go to medical school which was his original intention before coming to Yale. This interest recurred for many years and Detwiler later continued some of the medical courses during his stay at Peking with the idea of taking the medical degree. He remained an assistant in the Department of Zoology from 1914–1917 when he went to the Department of Anatomy, as an instructor in the School of Medicine.

During the summer of 1917 Detwiler was employed in a civilian capacity with the chemical warfare corps, first in New York and then in New Haven where he worked with G. T. Taggert, Yandell Henderson and Howard Haggard. I first met Detwiler in the fall of that year. He still was frequently in the laboratory where he shared a room with Professor Richard Goldschmidt, who had just returned from Japan where he had been studying Lymantria. Unable to get

back to Germany on account of World War I, Dr. Harrison offered Goldschmidt laboratory facilities.

Late in the fall of 1917, Detwiler appeared in Harrison's laboratory and said that he might be called into service. His thesis was finished and had been accepted for publication so the Faculty was called together in emergency session for the examination. Detwiler emerged from the examination where Stone and I awaited him. He was in a blue funk for he felt he had done poorly for both Laurens and Spaeth. The questions of the others had not apparently caused him much concern but it was evident that he felt he had let his two friends down. Several years later I had the chance to tell each of them about his reaction and found that both had been thoroughly pleased with the way in which he conducted himself for them and the others. The Ph.D. degree was conferred by Yale in June, 1918, an honorary M.S. in 1931.

Detwiler gave me my first lessons in Amblystoma surgery in the old Yale Medical School on York Street in the spring of 1919. It was he who enthusiastically introduced me to the nervous system. During this period he showed me the preliminary experimental materials which were to explain the changing morphogenetic responses of the nervous system to the presence or absence of end organs and the studies on the formation of plexuses.

In the evenings we had our fun and with W. H. Taliaferro, Ted Hill and others would repair to Edward Moriarity's on Broadway for an evening of fun, beer and music. At the time Taliaferro and I were in uniform so Moriarity served us tea, at least the cups were teacups with foam on top. Taliaferro and Detwiler would take turns telling stories and the evening would pass as a few seconds. Since then there has never been a single story that does not have in it the essence of what I heard there. The trimmings may be different but the basic essential is the same.

In the fall of 1919, Detwiler was married. The summer was spent in cycles of joy and frustration, depending on the news received

from his fiancée. Just before this event he suffered an acute neurasthenia. He appeared one day at the Osborn Laboratory complaining of a sore back; by the third day he was literally doubled up with pain. He got himself fitted first for a brace and then for what we called his straightjacket for he called upon Stone and me to lace it rigidly for him. During this period of lows and highs Henry Laurens attempted to divert his thoughts and raise his spirits by taking him on a four day tour of New England. He was most uncomfortably windblown in the back seat with no one to talk to, but when promoted to a place beside the driver, his spirits rose. It was not long before the beauty of the landscape appealed to his aesthetic side and the transition to his happy self occurred in just a few hours. By the time we reached the Bay View Inn at Jamestown he was in excellent spirits but had forebodings about a third-floor room in what he regarded as a fire trap. The fleet was in the bay at Newport, the sky was clear and the scene with the ships, lights and sundown made him temporarily leave all his cares behind.

During all this time he drove himself at his work relentlessly. He was writing papers so fast and furiously that we used to ask him when a paper was finished whether the slides upon which he based his conclusions were yet dry. The combined research drive, the uncertainty of marriage adjustments and the anticipated responsibilities which were bound to increase, created in him a tension which he could not overcome. As he reveals in his autobiographical sketch, he would place himself under the greatest tension which took him into his happy work world; then his actual depression was revealed only to his friends. After the work day he would be everything that a brand new and devoted husband should be.

After his marriage, he had less time to play and in May 1920, Samuel, Jr., arrived. During this period, Detwiler received a call to teach anatomy at Peking Union Medical College. The decision was a difficult one for him to make. He had never been abroad, his friendships and acquaintanceships in New Haven were strong and yet he had the urge to see China, to work with Davidson Black and

to have the adventure of it all. So one day in June we all went to the station to see Sam off to China. Sam, Jr., was gotten into the coach carefully packed in a basket. Detwiler was frantically checking his baggage and his boxes of scientific materials, all of which had to move with him.

Of the China experience we know comparatively little. He was stimulated by the new environment and in his customary way became a working part of it. Although his teaching schedule was heavy, he enrolled in regular medical courses in addition to his anatomical duties. Neurology, physical diagnosis and pathology were completed and, in addition, some physiology and pharmacology. By the time he left Peking he had completed all of the work of the first two years and also inadvertently was exposed to practical obstetrics when his second son, Ross Harrison Detwiler, was born unexpectedly where hospital services were not available. During his three-year stay in China, Detwiler published twelve papers.

With his time so thoroughly absorbed by study, teaching and research, one would feel that Detwiler would have expended all available energy. He found time however for multiple outside activities of which his favorite, as in his school days, was baseball. He organized teams among the students and the staff. He gathered his singing cronies into formal choral groups which gave light opera concerts as well as taking part in informal singing for much of which he wrote both the lyrics and the music.

The arrival of the second son, Ross, made his household demands much greater but increased rather than decreased his activities. His response to all this seemed to augment his capacity to complete things quickly, to make decisions accurately and intelligently. It can truly be stated that in the Chinese experience Detwiler matured as probably he would not have done had he stayed at Yale.

On a cold March morning in 1923 a train pulled in to the East Liberty Station, Pittsburgh, where my wife and I welcomed the returning Detwilers. The train arrived at 6:30 A.M. and we had eight minutes together for a greeting in their stateroom. The upper berth

was occupied by the youngsters, Sam and Ross, who looked more like two young Chinese boys than two American youngsters on their way to Harvard since their father had accepted an assistant professorship there.

The trip from China had been harrowing. The storms were intense and for several days the ship could do little more than head into the storm. It was driven off course and reached Hawaii several days late. Detwiler lashed the family in their bunks and did the best he could to keep their wants supplied. The ship's galley was virtually inoperative and Detwiler himself suffered various contusions. The trip from Hawaii to the mainland was comparatively calm and the family had completely recovered both aplomb and avoirdupois by the time of the Pittsburgh arrival.

Detwiler's teaching at Harvard began in the fall. The spring was spent in getting settled before the operating season began, while the family visited first at the old farm in Perkiomen Valley and later with the older sister who meant so much to Detwiler.

At Harvard, Detwiler continued his intellectual improvement and soon became a friend of Profs. G. H. Parker, Walter B. Cannon and many other colleagues. His reputation as a lecturer both at Radcliffe and Harvard was an enviable one. He taught in the introductory courses at Radcliffe and gave the embryology and comparative neurology courses at Harvard. These three courses were far different from the medical histology and embryology which he had given at Yale and Peking Union, so that his lectures and laboratory outlines had to be completely done from a new beginning. He threw himself into this work with his customary vigor and enthusiasm, welcoming the challenge of teaching which never was regarded as a chore.

His friendship with George H. Parker was a combination of Harrison's lifetime acquaintance with Parker and his interest in Parker's ideas of the nervous system. Their approach to nervous system problems was very similar in thought although their methods of attacking them were utterly different. Parker oriented Detwiler to the Harvard scene although Laurens had given him a considerable pre-

view of what to expect. Accustomed to the freedom of the Osborn Laboratory where you could work all day and all night Detwiler was shocked when he was told that he could not work after hours and that he could not have a key to the building nor could he smoke in it. He apparently had never believed Laurens who had told Detwiler how one must hang out of the window of the upper floors if he wished his smoking to go undetected. Detwiler revolted against the rules of Mark and Henshaw and soon found avenues of ingress and egress which these two shrewd observers never suspected. As a consequence Detwiler was able to work in unscheduled hours, as later was his student R. L. Carpenter. The rigidity of the system appalled him as it had Parker and they enjoyed violating the arbitrary rules as any normal pair of schoolboys would. Their association was continued at many lunches and it was here that Parker introduced Detwiler to the clubs and sequestered restaurants which both thoroughly enjoyed. They formed a true mutual admiration society which both enjoyed to the full.

Detwiler's acquaintance with the Cannons was one of those friendships at first sight also brought about by the Harrison linkage. Detwiler was virtually a member of the family and later was influenced in securing a summer home in Sanbornton, New Hampshire, just a few miles from one owned by Cannon.

It was here that Detwiler found work and relaxation, for he never could do one without the other, and he loved work. In this new setting with Boston so near, he found an old farm of seventy-five acres with the customary buildings at hand. He himself rebuilt, remodeled and refurbished the place to his own uses and it brought him happiness and new interests when he most needed them. He carried his work with him and wrote most of his *Neuroembryology* at the farm.

Each year he would invite Dr. Harrison to visit him and some of his happiest memories were brought about by these visits for Detwiler was always his best with Harrison who was respectfully known to his students as the Chief. With his two sons and the Chief he

enjoyed visits with the neighbors among whom were many anatomists and biologists. C. M. Goss and L. S. Stone were the closest ones, and, of course, Dr. Cannon. Many an evening of science and good fun was had by this group.

In 1926 Detwiler was made associate professor at Harvard and granted leave of absence to study in Spemann's laboratory at Freiburg. For him this was a rich experience. It brought him in touch with the quiet and calm of Spemann who admired Detwiler's drive and energy and his ability to get things done. As usual Detwiler made friends of the entire laboratory and speedily mastered his spoken German so that he could get the most out of his work and play. He was accustomed to collect his own amphibian eggs in unlimited supply both at New Haven and at Cambridge. The experience of having to share the relatively meager numbers of eggs laid by axolotls in the aquaria at Freiburg irked him but also made him more cautious in his use of material.

Just before leaving for Germany, Detwiler was called to the headship of the Department of Anatomy at the College of Physicians and Surgeons of Columbia University so in the fall of 1927 Detwiler took up his duties in the old medical school. The new Columbia Presbyterian Medical Center was nearing competion and Detwiler had the job of planning the department space, moving the apparatus, choosing a new full-time teaching staff and planning their facilities for work and teaching. Philip Smith and Earl Engle were brought from Stanford, W. M. Copenhaver from Rochester, D. J. Morton from Yale, R. L. Zwemer and R. L. Carpenter from Harvard, and W. M. Rogers from New York University. These men, with Detwiler, formed a hardworking team which soon put Columbia anatomy at the top in anatomical teaching and research.

His own research effort was intensified and his publication output increased in spite of the tremendous job he was doing in planning not only for his own department but also for the Medical Center. It is a remarkable demonstration of capacity for continued concen-

tration on all lines. He had the peculiar gift of budgeting time and effort with extreme efficiency. This was combined with a degree of perfectionism in everything he did. It also added to the tensions which built up within him and led to mental depression.

His lectures were given with a clarity that left no doubt in the students' minds about his mastery of the subject. He imparted his enthusiasm to them and he was never dull or dry no matter how complex the topic. He enjoyed breaking down the complexity of a subject and would frequently intersperse his lectures by placing his outlines in lyrics. I remember Dr. Conklin's amazement when Detwiler sat at the piano and sang his ode to the embryos. Conklin said, "What a wonderful outline for a course in embryology." Detwiler's ease in lecturing was a practiced one for as he often admitted he was a prima donna and never appeared before an audience without the preliminary acute tension which characterizes that species. In spite of the intrinsic tension his planning and organization carried him through so smoothly that no audience ever suspected that he was not at perfect ease. His lectures came as the result of heavy intensive work and planning. He was most irritated by the presentations of others who had not done the refining of their lecture material and were therefore neither facile nor clear in their presentations.

Detwiler served for thirty years as teacher and research worker at Columbia with unflagging interest in his students, his work and his play. All of this was at a tremendous cost to himself for he found it increasingly hard to relax and as his tensions grew, his depressions became greater and more frequent. These had definite reasons for there were stormy and sad sides to this man.

The tragedy which most seriously affected him after his marriage was terminated by divorce, was the loss of his first son in the Second World War. Young Sam was a bombardier and was lost in a night raid over Germany. For some reason the report "Missing in Action" was all that the War Department could give. It was many months before young Sam's death could be verified. To a man so sensitive

as Detwiler this was a horrible period, first hope and then despair and finally only despair. His friendship with Harry Shapiro helped him amazingly during this episode.

During all of this, he kept his scientific research and his publications going. When his manuscripts arrived in New Haven there usually was a letter asking that the Chief read it and be sure *not* to let him put it on the bottom of the stack. There was no danger of this, for Dr. Harrison was always interested in the material and usually read it during the week in which it arrived but then it had to await its turn on the publication schedule, for this principle of editorial policy was never violated. When Detwiler next appeared he usually brought another manuscript and inquired about the one he submitted six months before.

Detwiler was married to Gladys Hood in July of 1942. It can be truly said that his marriage renewed his vigor in all of his activities and provided the atmosphere in which his talents thrived. The interests in art, music and literature were intensified for both members of this union. Mrs. Detwiler, an artist in her own right, stimulated Detwiler in his art accomplishments. Somewhat later he was responsible for the exhibit of the paintings and sculpture of the New York Medical group and ran a one-man show of his own.

In the meantime his research, far from being neglected, was going ahead at full steam. His bibliography shows that his outside activities, extensive as they were, never interfered with his scientific output.

Detwiler's research follows consistently the two main topics, morphogenesis of the nervous system and the physiomorphology of the eye. In both cases it is remarkable to watch both his maturation in thought as well as in manipulation and technique. His first complete paper was on the effects of light on the retina of the turtle and the lizard. His thesis was on the restitution of the amphibian forelimb girdle which was his last on this subject and was used only to introduce him to the experimental methods which he employed in his nervous system studies.

As Detwiler's mind widened in scope his outside interests were

mirrored in his research and publications. Beginning with his early studies one can see progressively important steps in his grasp of the problem and new approaches to his understanding of it. This was founded initially on a tenacity of purpose, then a growing interest and an alertness to new methods as they might help his thinking.

Transplantation of the amphibian limb was to prove in his hands a tool for refining our ideas concerning the modifiability of the nervous system both centrally and peripherally. H. S. Burr had secured a deficiency in the brain by ablation of the olfactory placodes in amblystoma embryos. Detwiler showed the hypoplasia resulting from limb bud extirpation and also the response of the sensory ganglia to peripheral overloading by transplanting extra limbs which connected with these ganglia. These studies placed Detwiler in the front of experimental neurology of the embryo. At the same time Herrick and Coghill's studies on structure and function of the nervous system of amblystoma attracted attention while the phylogenetic studies of Davidson Black were focusing the minds of the morphological neurologists upon other phases of the nervous system. Leon S. Stone was proving that neural crest was giving rise to the branchial skeleton.

Detwiler's studies continued with transplantations of the parts of the spinal cord by which he showed that this too was modifiable, not over long phylogenetic periods but in the life span of one individual providing the experimental attack was made early enough in that individual's life history. Later, Eric Agduhr, Viktor Hamburger and Donald H. Barron showed that the same results were obtainable in birds and mammals, thus proving the universality of Detwiler's findings.

His results were incorporated in his book, *Neuroembryology,* which appeared in 1936 and was dedicated to Leon Stansfield Stone. This did not mark the end of his interest in the nervous sysem but it did synthesize the work which had done so much to show the compensatory regulation of the nervous system and its almost uncanny ability to modify in response to the conditions which he

imposed upon it whether by transplantation of limbs or by the transposition of segments of the spinal cord. He showed so completely the malleable nature of the nervous system that its modifiability is now accepted without question.

His nervous system studies changed in outlook and the emphasis moved from the morphogenetic to the physiological side. The effects of changes in the nervous system experimentally produced by premotile operations upon the end organ were carefully observed and qualitatively measured. This was a necessary sequel to his morphogenetic work. The glee with which he showed the race track constructed for larval amblystoma by which he tested the depletion of continuous movement in animals with modified nervous systems was spontaneous and these results when compared with the similar movements of normal animals gave him an approximation of the reactive inefficiency of his operated animals. He was always striving for a quantitative expression of the changed reaction. This is difficult to attain in material so variable in small phases of functional development, relatively more simple when applied to his second research program of the eye.

As mentioned earlier, Laurens had encouraged Detwiler to make a serious comparative study of the eyes of various forms and he, with Detwiler, published two papers on the retina of Phrynosoma and the alligator. Previous to this Detwiler had published his first papers on the effect of light on the retina of the tortoise and the lizard. Laurens' encouragement and the firm grounding which was laid on the morphological side impelled Detwiler to continue both fields of study along with his nervous system work. He was amazed at the constancy with which photomechanical changes occurred and how they could be controlled if the variables were known.

From the standpoint of the artist-engineer the pure aesthetic beauty of eye structure and function intrigued him and his physiological experimentation under controlled conditions was of first rank. Technically his eye collection is the finest and most complete, in a comparative sense, of any in the world. He cut, mounted and stained

each slide himself, for he would entrust this work to no one else. His artistry in these studies reached its peak in the morphological description of the eye of the Chinchilla. His original paintings of this eye are real artistic masterpieces.

It is given to so few to be able to demonstrate so successfully the many facets which are humanly possible. A constructive revolutionist in neuroembryology, a careful analyst of the form and function of the eye, a singer and writer of lyrics, an administrator of critical judgment and perspective, an artist both in his scientific field as well as in painting and sculpture, these are some of the attainments for which his friends are proud to honor him.

But in addition to these talents he possessed a warmth of feeling, a zest for living and an unalterable loyalty. He will be remembered permanently for his contributions to his field but for those of us who knew the man in all his various moods the intangible and impermanant values will be those of our memories. He lived and he died in his laboratory. This was as he would have wished it.

KEY TO ABBREVIATIONS

Amer. J. Anat.=American Journal of Anatomy
Amer. J. Ophth.=American Journal of Ophthalmology
Amer. J. Phys. Anthrop.=American Journal of Physical Anthropology
Amer. Sci.=American Scientist
Anat. Rec.=Anatomical Record
Ann. N.Y. Acad. Sci.=Annals of the New York Academy of Science
Arch. Neurology & Psych.=Archives of Neurology and Psychiatry
Biol. Bull.=Biological Bulletin
Biol. Rev.=Biological Review
Bull. Hosp. Joint Diseases=Bulletin Hospital Joint Diseases
Comp. Rend. des Seances de l'Academie des Sci.=Comptes Rendus des Seances de l'Academie des Sciences
J. Amer. Med. Assoc.=Journal of American Medical Association
J. Amer. Optical Soc.=Journal of American Optical Society
J. Biol. Chem.=Journal of Biological Chemistry
J. Comp. Neur.=Journal of Comparative Neurology
J. Dental Research=Journal of Dental Research
J. Exp. Zool.=Journal of Experimental Zoology
J. Morph.=Journal of Morphology
J. Nerv. Ment. Dis.=Journal of Nervous and Mental Diseases
Proc. Amer. Phil. Soc.=Proceedings of the American Philosophical Society
Proc. Amer. Soc. Zool.=Proceedings of the American Society of Zoologists
Proc. Nat. Acad. Sci.=Proceedings of the National Academy of Sciences
Proc. Soc. Exp. Biol. and Med.=Proceedings of the Society of Experimental Biology and Medicine
Proc. X International Zool. Congress=Proceedings of the X International Zoological Congress
Quart. Rev. of Biol.=Quarterly Review of Biology
Roux's Arch. f. Entwick.-Mech.=Roux Archiv für Entwicklungs-Mechanik
Sigma Xi Quart.=Sigma Xi Quarterly
Trans. N.Y. Acad. Sci.=Transactions of the New York Academy of Sciences
Yale J. Biol. and Med.=Yale Journal of Biology and Medicine
Zentralblatt f. ges. Neur. u. Psych.=Zentralblatt für gesammte Neurologie und Psychiatrie

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