NATIONAL ACADEMY OF SCIENCES
OF THE UNITED STATES OF AMERICA
BIOGRAPHICAL MEMOIRS
VOLUME XXV—EIGHTH MEMOIR

BIOGRAPHICAL MEMOIR

OF

CHARLES VINCENT TAYLOR

1885–1946

BY

C. H. DANFORTH

PRESENTED TO THE ACADEMY AT THE AUTUMN MEETING, 1947

C. V. Taylor

CHARLES VINCENT TAYLOR

1885–1946

BY C. H. DANFORTH

Charles Vincent Taylor, whose death occurred on February 22, 1946, was the descendant of pioneer families who played important and at times spectacular roles in the history of Tennessee. His ancestor, Isaac Taylor, is said to have come to Virginia from County Antrim, Ireland, about 1740 bringing with him several sons, among whom was Andrew I, then a boy about seven years of age. The family settled in Rockbridge, Virginia, where its members later became wealthy landholders and slave owners. Andrew who married first his cousin Elizabeth Wilson, and later her sister Ann, early moved to the now famous Watauga Settlement in the disputed area claimed at that time by both Virginia and North Carolina. Here he was soon made a member of the legislature in the abortive "State of Franklin" and was also a surveyor of more than local renown. He became the progenitor of many distinguished descendants, including General Nathaniel Taylor, Senator Nathaniel Green Taylor (also Commissioner of Indian Affairs under President Jackson), the two Tennessee governors, brothers "Bob and Alf" Taylor, who at one time ran against each other on opposing tickets in Tennessee's "War of the Roses," and of a surprisingly large number of judges, lawyers and other citizens of prominence.

According to penciled notes made by Charles Vincent Taylor, apparently during a visit at the home of Governor Alfred Taylor in "Happy Valley," this branch of the family could also lay claim to an attenuated line of Indian descent which came through Colonel John Carter, father of Langdon Carter, whose name was chosen for Carter County, and for whose wife (Elizabeth Maclin) Elizabethton was named. However, no clear evidence has been found by this biographer that C. V. Taylor himself was a descendant of Langdon Carter, but he may have been, since many of his ancestral lines have not been completely followed out, and there was no doubt a considerable amount of intermarriage in this relatively small community. In the direct Taylor line his

descent seems to have been through Isaac, Andrew I, Andrew II, Jonathan, Andrew D. and Isaac Newton.

At the approach of the Civil War the Taylor family, like many another in the border states, became sharply divided, some joining the Confederacy, others remaining loyal to the Union. Andrew D. Taylor, C. V.'s grandfather, was among the latter, and his three sons, of whom Isaac Newton was the oldest, all joined the Northern Army. While the boys were away in the service, armed men stopped one night at the family home, called the elder Taylor to the door and shot him in cold blood. The sons remained unaware of their father's death for a number of months thereafter.

Isaac Newton Taylor first joined Company B, Fourth Tennessee Volunteer Infantry, but later, apparently with full knowledge of the colonels of both units, he transferred to Company L, First Tennessee Volunteers, in which he served from December 26, 1862 to May 31, 1865. On June 25, following his discharge from the army I. N. Taylor married Christina Bashor, daughter of Henry and Elizabeth (Bowmann) Bashor, well-to-do mill owners of German descent who, like himself, lived near Johnson City, Tennessee. The young couple first lived in a cabin built by the bridegroom, but in 1869 they moved to Missouri and purchased a farm near Whitesville in Andrew County.

From this time on conditions were difficult. Mr. Taylor, now somewhat handicapped physically, was unable to make his farm realize the income it might have yielded, and the family entered upon a period when resources were indeed meager. In 1873, because of disabilities incurred in service, Taylor was granted a pension of $24.00 a month, an appreciable amount for those days. But by 1876 the Pension Bureau had disallowed this pension on the ground that there was no official record of his discharge from the infantry company and, although serving in the cavalry, he was in effect a deserter from the infantry when his disability was incurred. Aside from the heavy financial loss, there seemed to have been a point of honor involved, and over a period of years much effort was devoted to getting the matter clarified. On March 20, 1884, an official certificate of honorable service and discharge was issued.

In religion the early Tennessee Taylors, Wilsons and most others of Scotch-Irish descent apparently were Presbyterians. In later generations some of the Taylors were prominent Methodists and Baptists, but after removing to Missouri this branch of the Taylor family became associated with the Dunkards, or Brethren, to which sect they were zealously devoted. One of I. N. Taylor's daughters later became national director of the dress-reform movement in that church, and the oldest son became a preacher. It is said that before his early death this older brother extracted a promise from Charles V. Taylor, who was then only eleven years old, that he too would preach—a promise which was made good.

These few facts may serve to indicate some of the hereditary background and the environmental setting for Charles Vincent Taylor who, on February 8, 1885, was born into this family, the youngest of ten children, two of whom had died in infancy. His first fourteen years were spent on the Missouri farm, where he early acquired a love for the out-of-doors. Many years later he remarked to one of his colleagues that such an environment quite naturally awakened the interests which were to activate much of his later life.

Another important factor in shaping his early interests was the influence of his first school teacher, Gladys Kent (now Mrs. J. C. Hashor of Savannah, Missouri). Miss Kent seems to have had rare ability to inspire her pupils with ideals of morality and a high quality of intellectual curiosity. Mottoes, in the B. Franklin tradition, and classical quotations pasted on the walls of her school room were remembered by Charles Taylor, and often quoted by him. Many years later he wrote on the back of one of her photographs "Gladys Kent, Rosendale, Missouri. My first teacher. At Crockett country school about ½ mile north of our Missouri home, near Whitesville, Missouri. She, probably more than any other teacher I had, helped me to sense my interest and abilities in gaining a knowledge and understanding of things animate and inanimate in the world around us." Then follows a slightly paraphrased quotation from Shakespeare ("Good name in man or woman, dear my lord, ...") and the notation "Written by G. Kent on fly leaf of a book

'Robinson Crusoe' given me as first prize in spelling." In a letter dated May 19, 1947, Mrs. Hashor herself writes: "Yes, he was one of my first pupils, and I was his first teacher, and as I go back down the years I see an eager, enthusiastic boy, smiling up at me with big brown eyes filled with gratitude for something I had said or done for him. He was a wonderful pupil for four years, with every task faithfully and gladly done, and I always felt he would strive to attain the highest and best in life." She disclaims any credit for herself, extolling the home from which he came and adding that his father and mother "were the kind of parents that give the world sons like Charles Taylor."

At the age of fourteen, he considered himself ready to seek new fields of endeavor, and quite naturally looked toward Mount Morris College, which was under the sponsorship of the Brethren, and to which several of his brothers and sisters had already been attracted. When his father protested that he was too young and the expense would be too great, Charles immediately sold his pony and squirrel gun—property dear to the heart of a boy in his teens—and paid his own transportation to this mecca of his young dreams. From that time on, he was not only self supporting but contributed freely, and often beyond his means, to other members of the family whenever he felt any of them were in need of help. He was especially generous to an invalid sister and to his mother in her later years.

At Mount Morris, he first attended the Academy, taking a business course and living at the near-by home of his sister, Mrs. Nora Wallace. He earned his expenses by acting as "bell-ringer" and doing various odd jobs about the school. A classmate of those days reports that his bell ringing was a model of punctuality except for an occasional retardation in the rising bell. He is remembered from this period for his unfailing good nature, his jovial disposition, and the aptness with which he was wont to characterize his classmates by appropriate nicknames, "but never to anyone's discredit." He was fond of music and had an especially fine bass voice, which put him in great demand for solo and group singing. For a time he considered music as a possible career.

On completion of his business course he secured a position as bookkeeper in a publishing house in Elgin, Illinois, where he worked for some time, but by 1906, with greater maturity and somewhat improved resources, we find him back at Mount Morris College, this time working toward the A. B. degree which he was to receive in 1911. With all his fun and whimsy, he was devoutly religious and according to the custom of the Church of the Brethren he was elected by ballot to the Ministry. This unsought distinction is in itself indicative of the esteem in which he was held by his fellow church members.

During this second period at Mount Morris he was prominent in student affairs and participated in many extra-curricular activities. Among items culled from contemporary numbers of *College Campus,* we find him preaching at a revival meeting, addressing a missionary meeting on "Pure Fun and Worthless Foolishness: Their Effect on Christian Development," winning first honors in a peace contest, a member of the Leaders Club directing an advanced group in physical education, singing in quartets and solo on many occasions, acting as a toastmaster, holding various offices in a literary society, serving as associate editor on the college paper and participating in many other activities. For one or two years he was listed and photographed among the faculty.

Most of his articles in those days involved a blend of philosophical and scientific thinking, with a strongly religious flavor. In "The Greatest Conqueror" (Jesus) he alludes to the conquests of Alexander, Hannibal, Caesar, Grant and others, all of which pale by comparison with the conquest at Gethsemane. In an article "Man a Metaphysical Animal" (listed in the table of contents, no doubt to his amused annoyance, as "Man a Physical Animal"), he compares the development of individual human interests and scientific yearnings with those of the human race as a whole. This was in the manner of the evolutionist, suggesting a kind of recapitulation, but it is obvious that it contained nothing in fact or attitude which he regarded as in any way inconsistent with orthodox religion. The article closes with ". . . and so we shall ever muse and wonder, because we

have come into existence 'not in entire forgetfulness . . . from God who is our home'."

During this second period at Mount Morris, his interests in biology were intensifying, and in view of his later major preoccupation, it is of interest to find a frontispiece in the annual catalogue of Mount Morris College for 1906-1907 showing the detailed anatomy of a "*Paramoecium* drawn from life by Charles Taylor of the biology class." His determination to follow biology as a profession seems to have begun to take shape at about this time. At about this time, too, he probably began to be assailed by the doubts and mental conflicts which are common to most students of biology who have earlier had orthodox religious training. But whatever these doubts may have been, he apparently solved his own problems by himself and emerged an honest agnostic with no pretense at finality of judgment in religious matters. Of course there was no longer any question of his continuing in the ministry, but the training and orientation of his earlier days left an enduring impression on his character.

Following graduation from Mount Morris he became principal of the high school in Valley City, North Dakota. At that time the school had a faculty of ten or twelve members, and he remained in charge from September, 1911, to June, 1914, when he left for California to do further work in zoology. One of the probable reasons for this temporary departure from the career which he had by now determined upon was no doubt the desire to obtain more adequate funds, both to help a sister who was ill at the time and the better to provide for his own graduate study.

At the University of California, Taylor entered a large department, with diversified interests, where he was able rapidly to broaden his horizons and gain further insight into the scope of his chosen field. In this new environment his abilities and aptitudes were soon perceived and utilized. The University records show that he was assistant in zoology from 1915 to 1917; teaching fellow, 1917-1918; instructor in protozoology, 1918-1919; assistant professor, 1920-1925. The same fine qualities of sincerity, geniality and idealism which had distinguished him at Mount Morris were equally evident at the University of

California where he made friends among both faculty and students. His colleagues of those days speak warmly of his personality and of his abilities as a teacher.

The first serious research problem which he undertook at the University of California was done under the direction of Professor J. A. Long and dealt with behavior of the sperm head and organization of pronuclei following fertilization in the mouse. Although both teacher and pupil have long been known as masters in the development and application of clever manipulative procedures, in this particular study only conventional methods were employed. It is interesting, too, that this is almost the only occasion when Taylor ever ventured to do research in the mammalian field, the hope then expressed of extending his studies to cleavage stages in the mouse ovum never having been realized. Under the title "Some fertilization stages in the mouse" a report on this work was accepted in partial satisfaction of the requirements for the degree of Master of Arts, which was awarded to him on May 15, 1916.

The award of his Ph.D. degree came on December 20, 1918. His doctoral dissertation, done under the supervision of Professor Charles A. Kofoid, was entitled "Demonstration of the function of the neuromotor apparatus in Euplotes by the method of microdissection." This dissertation was published October 23, 1920 in the *University of California Publications in Zoology*. A previous note on "The neuromotor system of Euplotes" had preceded the main paper by about a year. On purely theoretical grounds Kofoid had earlier designated certain fibrils detectible in the protoplasm of the protozoa as a neuromuscular apparatus, and Yocum had presented morphological evidence in support of this view, but Taylor felt that however convincing that evidence might seem to be, methods beyond the limits of ordinary morphological techniques would be necessary to prove, or disprove, the neuromuscular nature of the fibrils. The Barber micropipette, with recent modifications and improvements by Chambers (a close friend in later years), provided the desired tool with which to begin the investigation, and also served as an inspiration for the elaboration of Taylor's own ingenious and remarkably effective microdissection apparatus.

In these early papers a detailed description of the structure and behavior of *Euplotes patella* is followed by a clear-cut and convincing experimental analysis of the fibrillar apparatus, which proved to be neither contractile nor supporting, but strictly a conducting system. At this time he emphasizes, as he continued to do for years to come, that the protozoa are not merely simple cells, but highly complex and coordinated organisms. His doctoral dissertation gave clear indication of Dr. Taylor's chief interests and aptitudes and pointed the direction which his steady series of publications would take during the next quarter of a century. By ingenious and original methods he added greatly to the knowledge of the organelles of various protozoa, especially *Euplotes,* one species of which (*E. taylori*) appropriately bears his name. Another study of considerable importance at that time was the demonstration of the role of the micronucleus in *Euplotes,* where it was shown that if this organelle is removed the protozoan ceases to undergo division, but if it is replaced reproduction continues as before. Among later publications a great deal of attention was given to problems of encystment and excystment. In the latter studies a new species, *Colpoda duodenaria,* described by himself and Dr. Waldo Furgason, proved especially valuable.

For further indication of his earlier scientific contributions, as well as his later ones, reference may be made to the readily available papers listed at the end of this article. Dr. Taylor's own summary, characteristically brief, and written not long before he died is as follows: "Research contributions (a) on living cells: function of fibrillar systems; role of micronucleus; development of egg fragments; polarity in normal and centrifuged ova; x-ray effects; lethal effects of x-rayed media; high vacua and extreme temperature effects; induced encystment and excystment; cell growth factors; and (b) on protoplasm: sol-gel reversibility; cataphoresis of ultramicroscopic inclusions; bio-electric potentials; cytoplasmic reorganization; nuclear reorganization; reversible protoplasmic structure. . . . Of the various contributions made to science, probably the most important would be (a) experimental evidence of protoplasmic reorganization during various cell cycles, (b) tying this in

with the sol-gel reversibility and other physical properties of living cells."

So far as can be judged at this time, Dr. Taylor's estimate of his own work was accurate and well-balanced, although the significance of what he did, and its influence on fellow protozoologists, was undoubtedly greater than he himself implied, or perhaps even realized. His investigations on the organelles of protozoa, especially the pioneer determination of the true nature of the fibrillar apparatus in *Euplotes,* not only established important new facts but set an admirable pattern of research in the field. His demonstration of the function of the micronucleus in the same organism was of great significance in both protozoology and genetics, and, since it was so, served to emphasize still more the value of the microdissection method. Another phase of his work which deserves additional emphasis is the analysis of the effects of x-rays on protozoa. He showed that alterations due to radiation may be observed not only in protozoa which have themselves been exposed, but even in unexposed specimens placed in previously irradiated media. The importance of the latter finding is probably better appreciated now than when the observation was first made, but Taylor's studies in the field undoubtedly have from the first had a significant influence on the thinking of protozoologists.

Perhaps the outstanding characteristic of his scientific work was its consistently high quality and the technical skill with which his experiments were conducted. His endeavor to reduce all experimental situations to their simplest form is well exemplified by his persistent effort, over a period of years, to attain a purely synthetic medium which would permit him to grow experimental forms for the study of encystment and excystment under completely controlled conditions. In the laboratory his meticulous care and scientific skill impressed students and collaborators almost as much as the results to which they led. His influence was thus extended by his example no less than by his findings.

During the eleven years in which he was connected with the University of California Dr. Taylor had opportunity to broaden his contacts further through temporary appointments at other

institutions. He visited the Marine Biological Laboratory at Woods Hole where he met and collaborated with Dr. Chambers; was Johnston Scholar at Johns Hopkins University, 1918-1920; acting assistant professor at the Hopkins Marine Station of Stanford University in the summers of 1922 and 1923; assistant professor at the University of Michigan in 1923-1924; and Research Associate at the Tortugas Laboratory of the Carnegie Institution in 1924 (and again in 1926).

An event of importance in the University of California period was his marriage on May 6, 1921 to Lola Lucile Felder. Miss Felder, who had been a student in one of his classes, brought to their marriage a spontaneity of spirit and an artistic outlook which to no small degree mirrored latent or suppressed components in Charles Taylor's own makeup, but she was never able to free him entirely from intolerance of the "worthless foolishness" which he had long ago deprecated. From the time of his marriage, he was "CV" at home and to most of his friends and associates.

His first summer at the Hopkins Marine Station seems to have been a particularly stimulating one, and he entertained high hopes of being able to enlist the cooperation of the University of California in making this a fully equipped marine station dedicated to the training of advanced students in biology at the two sister institutions. Such a plan seems to have won the approval of the director, Professor W. K. Fisher, but at the University of California CV met with the academic inertia which he often found so trying to the spirit. He returned to the Station in 1923 with one or two graduate students but he had by then temporarily given up hope of seeing the laboratory the joint venture of which he had dreamed. The next summer he went to the Tortugas Laboratory, renting a house in Sebring, Florida, for his wife and children, his mother and two of his sisters. However, his connection with the Hopkins Laboratory was by no means terminated, for when he joined the Stanford Faculty in 1925 he was made associate director, a position which he held for the rest of his life.

Dr. Taylor's appointment at Stanford was due in no small measure to the favorable impression he had made at the Hopkins

Marine Station, and the director of that Station was active in urging his subsequent appointments and promotions; but Taylor quickly made his abilities felt and needed no special backers. By the time he moved to Stanford he had developed a mature outlook and a definitive orientation toward life and his profession. He impressed his associates above all by his idealism and his devotion to science on its highest planes. He emanated a spirit of scientific fervor, almost religious in character, which was inspiring to students and colleagues alike. In him, one saw a man who genuinely believed in the preeminence of science, who would do his best to promote it, and who would be on the alert to defend it against subversive influences of all sorts. That he was doomed to disappointments and a measure of bitterness later was not apparent in those days. While it might have been better for his peace of mind if he had not fallen heir to administrative duties and executive responsibilities, nevertheless, from the very first he seemed especially fitted for such assignments.

Dean Taylor's relation to the School of Biological Sciences at Stanford can best be understood in terms of the history of the school and his own philosophy of science. In the early days at Stanford, individual departments enjoyed an unusual degree of independence and autonomy in budgetary matters and in the control of both graduate and undergraduate students. But for some years before Dr. Taylor arrived efforts had been made to weaken the barriers between what were facetiously called "the water-tight compartments" of the University. Previously a few courses, especially those given by President Jordan, had treated biology from a broad point of view, but not till 1919-1920 did "Biology" appear in the annual Register of the University as a distinct entity. In that year a general course, somewhat of the "survey" type, was presented by President Wilbur and members of the departments of Botany, Entomology, Physiology and Zoology. This was the germ from which the School of Biological Sciences was to develop. The first year the course was listed as if it were a division in the Department of Botany, and it is interesting that later on Botany was the first Department to be absorbed by it. The following year lecturers were brought in from Paleontology and Psychology, and the man in

charge of the laboratories was listed as acting assistant professor of *biology*, possibly the first teacher at Stanford to have "biology" appear in his title.

During succeeding years "Biology" made steady progress, soon acquiring a status coordinate with Botany, Zoology, and other major departments; and then, in a sense, it absorbed them. By 1925-1926, when Dr. Taylor's name first appeared, several departments had already been ingested and "Biological Sciences," listed in the Register as if coordinate with most major departments in the University, now included as divisions, the School of Biology with an executive committee of ten members, General Biology with several courses and an administrative committee, Botany, Hopkins Marine Station, Physiology and Zoology. The following year Dr. Taylor became a member of the executive committee and Public Health Nursing, Anatomy, and Bacteriology and Experimental Pathology, were first definitely included in the grouping under Biological Sciences. In 1929 the name of the new aggregate was officially changed to School of Biological Sciences and its status somewhat, but by no means completely, clarified.

At this point Dr. Taylor's connection with the School was interrupted for a brief period. In 1930 he received an especially attractive offer from the University of Michigan, which he considered seriously for a time, but his wife's health and what he considered as favorable prospects for the School of Biological Sciences at Stanford decided him against acceptance. When this decision was finally made, he conscientiously returned the money which Michigan had advanced to cover the cost of a visit to Ann Arbor and paid for the trip out of his own pocket. He did, however, take a leave of absence for the year 1930-1931, during which he acted as visiting professor of zoology at the University of Chicago.

On his return to Stanford he was made Herzstein Professor of Biology and, in 1933, Chairman of the School of Biological Sciences. This position was equivalent to that of dean, but he was not officially given that designation until several years later. At the time he became chairman, or dean, ten departments were listed as falling wholly or in part within the School and, in

addition General Biology, offering five courses by various instructors, was also included as still another entity.

It will be apparent from the preceding paragraphs that the School which Dr. Taylor was asked to head was one which had evolved in part from a single course and in part from the absorption of pre-existing departments, and that technically it was still ill-defined as to content and scope. Developments at Stanford, of course, reflected, in their own way, a movement that was widespread at the time, but it is not surprising that some of the older men looked upon the new school as an aggressive parasite that was sapping the life blood of the traditionally established departments. Dr. Taylor himself, if he could have viewed developments from a little greater distance, would no doubt have detected some interesting parallelism between the evolution of the school and the ontogeny of a living organism. While in no way responsible for its initiation and early development, he was sympathetic with the trend and anxious to further its advancement along sound lines of teaching and research.

The problems with which he was confronted as dean of the school included the disposition of such, now "vestigial," departments as Botany and Zoology and the coordination of work in departments which, because of their diverse affiliations, were not assimilable. The latter difficulty remained partially unresolved until some of the medical departments were finally removed from the School in their listing and in their administration. A long step toward solution of the other main problem was taken during Dr. Taylor's first year as chairman when, presumably at his suggestion, the trustees officially abolished the departments of Botany and Zoology, assigning all members of these departments to comparable ranks in Biology. It is due in no small degree to confidence in Dean Taylor's sincerity and his devotion to the best interests of science that this final step in the dissolution of formerly strong departments was accomplished with a minimum of opposition or dissatisfaction.

The years following the primary reorganization showed frequent further shifts and rearrangements within the School, but the general drift is intelligible in terms of Dr. Taylor's outlook

on the field of biology as a whole. It might be, and indeed has been, argued that it makes little difference whether a degree be granted in "Botany," which is admittedly a biological subject or in "Biology (Botany)," as was prescribed a short time after Dr. Taylor became dean. But to Dean Taylor there was a fundamental difference. The central tenet of his philosophy was the unity of all life, and to him the various biological disciplines merely represented different aspects of a single whole. Where some students like to emphasize the divergencies in biology, he was impressed by factors that are common to all the manifestations of life. Recognition of a basic unifying principle was to him a *sine qua non* of sound biological scholarship and teaching. He extended this line of thought to fields outside biology and was convinced that there is little hope of genuine advancement unless students in the social sciences, humanities and politics can achieve an essentially biological approach. He believed thoroughly in always having biology presented from this unitarian point of view; and so to him it did make a real difference whether the degree was in *Botany* or *Biology (Botany)*. The connotation of the two expressions are obviously different. One emphasizes that botany is a facet of biology, the other does not.

In meetings of the executive committee and of the faculty he labored this point and its ramifications with great earnestness. Few were the meetings when he did not turn to the blackboard and emphasize his points with diagrams such as circles within a circle, a tree with concentric rings and branches, each representing an aspect or division of the subject, until one almost gained the impression that these figures had come to mean more to him than mere symbols. One diagram in particular, a cube done in colors and shown as if sectioned in all three planes to reveal interrelations of morphological, physiological and developmental aspects of various categories, was displayed in his office for a number of years, and not infrequently brought to faculty meetings.

His conviction as to what is fundamental and significant in education tended to make him apprehensive of the real or fancied desire of the professional schools to exercise too great a control

over undergraduate curricula. He felt that professional training should be based on a sound foundation in biology, and to this end fought long and hard to keep botany, for example, a requirement for all degrees in the school, whether pre-professional or not. In time, with the loyal and sympathetic cooperation of his executive committee, the curriculum of the school was whipped into a well-knit unit which gave a tangible expression to the ideals which he cherished. But he continued to feel the danger of encroachment from without and particularly feared that his own university, along with other private institutions, might come under the influence of agencies which might debase the ideals of true scholarship. He felt, too, that the authorities did not adequately support him in his endeavors to combat these tendencies. Finally it was with special bitterness that he came to realize that his own faculty could not stand solidly behind him in his opposition to certain developments on the campus or in his methods of combatting them. This and his slowly developing fatal illness (leukemia) made his final months a period of discouragement and sadness.

Time-consuming, and to a degree unrewarding, administrative duties were necessary concomitants of his position, and he devoted himself to them without stint. In general tolerant and humorous, there were rare occasions when his patience gave way completely and he became arbitrary and dictatorial, but such times were indeed few. His pleasanter and more valuable functions as teacher and promoter of research were the happier ones. With extraordinary ability to recognize superior talent and promise, he gathered around him one of the most outstanding groups of biologists in the country. He was excessively loyal to his staff and was active and effective in raising money in support of their research and in otherwise furthering their interests. One of them writes "Although stubborn in his adherence to a few cherished convictions and objectives, he gave unquestioning support and freedom to his staff within their individual spheres of responsibility. . . . His talents and horizons as an organizer were well exemplified by the highly successful Cell Symposium held at Stanford in 1939 [in celebration of the 100th anniversary of the cell theory] to which he attracted

a distinguished array of internationally known scientists." The papers presented at this symposium were collected by Dr. Taylor and published in "The Cell and Protoplasm" (1940).

He particularly loved a quiet evening at home with the four children Jeanne, Elouise, Lenore and Isaac Newton of whom he was very proud, or with one or more intimates when "our conversation always came around to the unity of science." But in spite of innate social tendencies he had a kind of personal "reserve that was almost Indian in quality," and his biographer repeatedly was confronted with such statements as "Now that I think of it, I never really *knew* CV." However, in a letter written in 1934 during a trip to Europe when he visited German relatives and attended the International Zoological Congress at Venice, he confided to Professor Fisher: "I have never before known what vacation is like, and how much it can benefit one in body and soul. The world is one thing off there in a little corner in California, but quite another thing in reality and not in books," and then went on to suggest the desirability of a rule that everyone who professes to know the living world must travel, "the farther and more the better." He did not follow his own recommendation to any great extent, but he did find much pleasure in organizing camping trips into the Sierra for visiting biological friends.

A colleague from one of the other schools of the University writes: "Taylor was a man of unusual vigilance and insight into the significance of what was going on about him in the university world, and he was quick to see through shams. He was keenly aware of the true nature and requirements of a great university and of what constitutes a real scholar. He was vigorous in upholding academic standards and opposed the many tendencies to lower them."

He was a member of, and took an active interest in, the National Academy of Sciences (elected in 1943), the Society of Sigma Xi, the American Association for the Advancement of Science, the American Society of Zoologists, the American Society of Naturalists, the Pacific Oceanographic Society, the Society for Experimental Biology and Medicine and the Western Society of Naturalists. It was largely through his efforts

that the latter society (which he served as president and in other capacities) was revivified following a period of decline in the thirties. He served on the editorial board of *Physiological Zoology* from its inception in 1928. A survey of his scientific papers reveals a close application throughout his productive period to a few basic problems which he investigated with clear insight and great technical skill. Since he believed strongly in the universality of biological truth, he saw no reason to seek widely for research materials and because of this concentration he was able to make significant additions to biological knowledge at a basic level. More than almost anyone else he brought home the fact that the individual protozoan cell, possessing remarkable capacity for reversibility, can pass through phases of development and differentiation which most zoologists have associated only with metazoan forms.

Dr. Taylor's published contributions to biology are listed herewith and are permanently available to anyone who may wish to review developments in this field. It has seemed equally important to emphasize in his biography the circumstances under which he worked and the ideals and attitudes, which have left a lasting impression on his many students and associates. Here, too, C. V. Taylor made a real contribution to the advancement of science.

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

Am. Nat. = American Naturalist
Ann. Rev. Physiol. = Annual Review of Physiology
Arch. Protistenk. = Archiv fur Protistenkunde
Biol. Rev. = Biological Reviews
Coll. Net = Collecting Net
Jour. Cell. Comp. Physiol. = Journal of Cellular and Comparative Physiology
Jour. Exp. Zool. = Journal of Experimental Zoology
Jour. Gen. Physiol. = Journal of General Physiology
Jour. Morph. = Journal of Morphology
Physiol. Zool. = Physiological Zoology
Proc. Soc. Exp. Biol. and Med. = Proceedings, Society for Experimental Biology and Medicine
Univ. Calif. Publ. Zool. = University of California Publications in Zoology

BIBLIOGRAPHY OF CHARLES VINCENT TAYLOR

1919

The neuromotor system of Euplotes. *Proc. Soc. Exp. Biol. and Med. 16:* 101–103.

1920

Demonstration of the function of the neuromotor apparatus in Euplotes by the method of microdissection. *Univ. Calif. Publ. Zool. 19:* 403–470.

An accurately controllable micropipette. *Science. 5:* 617–618.

1923

The contractile vacuole in Euplotes: an example of the sol-gel reversibility of the cytoplasm. *Jour. Exp. Zool. 37:* 259-289.

The effect of the removal of the micronucleus. *Science. 58:* 308-309.

1924

Fatal effects of the removal of the micronucleus in Euplotes. (With W. P. Farber) *Univ. Calif. Publ. Zool. 26:* 131-144.

The development of egg fragments. (With D. H. Tennent) *Year Book, Carnegie Inst. Wash. 24.*

1925

Cataphoresis of ultramicroscopic particles in protoplasm. *Proc. Soc. Exp. Biol. and Med. 22:* 533.

Improved micromanipulation apparatus. *Univ. Calif. Publ. Zool. 26:* 443-454.

Microelectrodes and micromagnets. *Proc. Soc. Exp. Biol. and Med. 23:* 147-150.

1926

A measurable potential difference between the cell interior and outside medium. (With D. M. Whitaker) *Year Book, Carnegie Inst. Wash. 25:* 248-249.

The organization of the Echinoderm egg. (With D. H. Tennent and D. M. Whitaker) *Year Book, Carnegie Inst. Wash. 25:* 249-255.

1927

Potentiometric determinations in the protoplasm and cell-sap of Nitella. (With D. M. Whitaker) *Protoplasma. 3:* 1-6.

1928

Protoplasmic reorganization in *Uronychia uncinata* n. sp. during binary fission and regeneration. *Physiol. Zool. 1:* 1-25.

1929

Experimental evidence of the function of the fibrillar system in certain Protozoa. *Am. Nat. 63:* 328-345.

An investigation on organization in a sea urchin egg. (With D. H. Tennent and D. M. Whitaker) *Carnegie Inst. Wash., Publ. 391:* 1-104.

1930

Contributions to Marine Biology. (With others) Stanford University Press.

1931

Polarity in normal and centrifuged eggs of *Urechis caupo* Fisher and MacGinitie. *Physiol. Zool. 4:* 432-460.

A study of the conditions of encystment of *Colpoda cucullus.* (With H. A. Barker) *Physiol. Zool. 4:* 620-634.

1933

Studies on the excystment of *Colpoda cucullus.* (With H. A. Barker) *Physiol. Zool. 6:* 127-136.

Lethal effects of the x-radiation of a sterile culture medium for *Colpidium campylum.* (With J. O. Thomas and M. G. Brown) *Physiol. Zool. 6:* 467-492.

The action of x-rays on *Euplotes taylori* and associated bacteria. (With M. G. Brown, J. Murray Luck and Grace Sheets) *Jour. Gen. Physiol. 16:* 397-406.

1934

The effects of x-rayed medium on living cells. *Atti del 1° Congress Internazionale di Elettro-radio-biologia. 2:* 1103-1105.

1935

Protoplasmic reorganization and animal life cycles. *Biol. Rev. 10:* 111-122.

Some factors in the excystment of dried cysts of *Colpoda cucullus.* (With A. G. R. Strickland) *Arch. Protistenk. 86:* 181-190.

Introduction to Volume 39 of the University of California Publications in Zoology, dedicated to Professor Charles Atwood Kofoid.

1936

Effects of high vacua and extreme temperatures on cysts of *Colpoda cucullus.* (With A. G. R. Strickland) *Physiol. Zool. 9:* 15-26.

Effects of a given x-ray dose on cysts of *Colpoda steinii* at successive stages of their induced excystment. (With M. G. Brown and A. G. R. Strickland) *Jour. Cell. Comp. Physiol. 9:* 105-116.

1938

Structural analysis of *Colpoda duodenaria,* sp. nov. (With W. H. Furgason) *Arch. Protistenk. 90:* 320-339.

The kinetics of excystment in *Colpoda duodenaria.* (With M. G. Brown) *Jour. Gen. Physiol. 21:* 475-500.

Reactions of *Colpoda duodenaria* to environmental factors. (With A. G. R. Strickland) *Arch. Protistenk. 90:* 398-409.

1939

Reactions of *Colpoda duodenaria* to environmental factors. II. Factors influencing the formation of resting cysts. (With A. G. R. Strickland) *Physiol. Zool. 12:* 219-230.

Reorganization of the "silverline system" in the reproductive cysts of *Colpoda duodenaria.* (With Laura Garnjobst) *Arch. Protistenk. 92:* 73-90.

Résumé of the Symposium on the Cell and Protoplasm. (The Cell and Protoplasm Symposium at Stanford University, by invitation) *Nature. 144:* 884-87.

1940

Fibrillar systems in ciliates. Chapter IV, Protozoa in Biological Research, Columbia University Press.

The Cell and Protoplasm. Introductory Chapter, The Cell and Protoplasm, Science Press.

1941

Growth studies of *Colpoda duodenaria* in the absence of other living organisms. (With W. J. van Wagtendonk) *Jour. Cell. Comp. Physiol. 17:* 349-353.

Growth studies of *Colpoda duodenaria.* I. Sterilization of the ciliates. (With W. J. van Wagtendonk) *Physiol. Zool. 14:* 431-436.

Nuclear reorganization in resting cysts of *Colpoda duodenaria*. (With Laura Garnjobst) *Jour. Morph. 68:* 197-214.

1942

The nature of the Plasmoptyzate growth factor for *Colpoda duodenaria*. (With W. J. van Wagtendonk) *Jour. Cell. Comp. Physiol. 19:* 95-101.

Protoplasmic Reorganization. *Coll. Net 17:* 41-44.

1943

Physical Properties of Protoplasm. *Ann. Rev. Physiol. 5:* 17-34.

Further Studies on the Nutritional Requirements of *Colpoda duodenaria*. (With Laura Garnjobst and E. L. Tatum) *Jour. Cell. Comp. Physiol. 21:* 199-212.