

NATIONAL ACADEMY OF SCIENCES
BIOGRAPHICAL MEMOIRS
PART OF VOLUME VII

BIOGRAPHICAL MEMOIR

OF

CHARLES OTIS WHITMAN

1842-1910

BY

EDWARD S. MORSE

PRESENTED TO THE ACADEMY AT THE ANNUAL MEETING, 1912

CITY OF WASHINGTON
PUBLISHED BY THE NATIONAL ACADEMY OF SCIENCES
August, 1912



C. O. Whitman

CHARLES OTIS WHITMAN.

BY EDWARD S. MORSE.

CHARLES OTIS WHITMAN was born in North Woodstock, Maine, December 14th, 1842, and died in Chicago, December 6th, 1910. The ancestors of Dr. Whitman, so far as the records in this country reveal, were sober, pious, and industrious people. An historian of the first four generations of the family says:^a

Posterity will seldom find occasion to blush upon looking back upon the past times of those from whom they have derived their origin. Fortunate, indeed, may the generations now in being esteem themselves, if they can be sure to bequeath to their posterity an equal source of felicitation.

The first ancestor of the Whitman family in this country was John Whitman, who settled in the town of Weymouth, Massachusetts, about 1638. There is some obscurity as to the part of England he came from.

Associated with the industry and piety of the Whitman generations, there is indicated a strain of persistent obstinacy which crops out here and there in the genealogical records. If we may trust that horrifying Fox's Book of Martyrs, this strain is indicated early in their history. It is there recorded that one John Whitman left his family at Rye, England, in 1572, crossed over to Ostend "and there demeaning himself fanatically and offensively to Roman Catholics of that place was apprehended and consigned to the flames in which he perished without repining and in seeming exultation."

In this country, Nicholas Whitman of the third generation persisted in wearing his hat during church service long after this custom had been abandoned by the worshipers, and thus greatly scandalized the congregation.

^a Memoir of John Whitman and his descendants, by Ezekiel Whitman; Portland, Maine, 1832.

In 1746 another member of the Whitman family came to an untimely death, at the age of 71, by insisting, against the pleadings of his associates, on driving an unruly team of oxen. The cart was upset and he was crushed to death.

From all that is known of Dr. Whitman's father he had a strain of unreasoning obstinacy in his fanatical adherence to the idea that the world was coming to an end at three o'clock P. M. (standard time?) on a certain date in 1843.

On his mother's side may perhaps be traced certain features of Dr. Whitman's character. His mother's brother, George F. Leonard, was a mathematician of rare ability as well as a good Latin and Greek scholar. He was principal of an academy in Norway, Maine, but finally lost his position through his fearless and outspoken manner. He made enemies continually by insisting that the other side was always wrong. He never yielded a point for expediency. After leaving Maine he settled in Newton Highlands, Massachusetts, and often lectured to laboring men in an attempt to improve their condition, and to direct them to avoid strikes and quarrels. His picture in the history of Woodstock, Maine, by William B. Lapham bears a resemblance to Horace Greeley. Mr. Leonard failed to become noteworthy on account of his ultra views on almost every question. He was a rank abolitionist too soon for popular esteem, a pronounced Universalist at a time when not to believe in a hell was considered sufficient reason for consigning one to that place.

These memoranda are given in the interest of heredity because one who was very intimate with Dr. Whitman said that he greatly resembled his Uncle Leonard in temperament, but had a much quieter mien and held his tongue.

As a young man Whitman was little given to talk, though he was a skillful debater. Dr. Whitman's father was a carriage builder by trade; in belief, a Second Adventist of the hardest kind. The son early became imbued with liberal ideas, and long and fierce were the religious discussions between father and son. His mother was a sweet, lovable woman esteemed by all, and from his mother's side it is believed that Whitman inherited all his gentler and dominant traits.

From Woodstock the family moved to Waterford, Maine,

and finally settled in Bryants Pond, Maine, in 1861. Here the father built a house, young Whitman aiding him in its construction.

The family consisted of two sons and two daughters, Whitman being the oldest. While not proud or distant, the members were in a way unapproachable. No one seemed to know them very well and the neighbors never established any intimate relations with them. Diligent inquiries failed to show that Whitman was interested in the usual sports of boyhood. He showed no marked talent as a boy, except that he was very studious, very quiet in manner, and somewhat diffident. He was slow in giving an opinion, but did so when urged. He never went into company or the usual country gatherings. In his school studies he showed marked aptitude for mathematics. He is remembered to have sung songs that were taught him, and it is said that all the Whitman family were good singers.

Mr. John M. Gould, a life-long friend of mine to whom I am indebted for all of these details, says:

There is no hint from any of those I interviewed that young Whitman had any desire to play, draw, paint, climb mountains, travel, or build boat, engine, or carriage, but though I have been in his old home and have interviewed his cousins and acquaintances, I am pretty sure they did not know much about the boy's life, thus showing that his tastes were different from the others and that he did not care to waste time on people not congenial to him.

Young Whitman became interested in birds at the age of twelve. He had a pet blue-jay which on its death he stuffed and mounted. This was his first attempt at taxidermy and in this difficult task he was self-taught. His interest in natural history was evidently spontaneous, for in his boyhood he was always interested in birds, squirrels, pigeons, etc. Later he showed exceptional skill as a taxidermist. His father's house was like a museum, as young Whitman not only collected birds, but had quite a collection of minerals. He was often seen working in his father's carriage shop, but only in making mounts for his birds or cabinets for his collections. In this way he learned the use of tools.

His father was poor and young Whitman began early to teach and for several terms was teacher of the school in

Bryants Pond. He also taught privately, receiving tuition from his pupils. In this way he earned the means to go to college. He was prepared for college by his Uncle Leonard at Norway Academy.

At the age of seventeen his hair turned white. He wore it long and brushed back. He always wore black clothes, was neat and clean in appearance, and was always polite, agreeable, and easy to get along with. As a teacher he was strict, just, impartial, and thorough, and was liked by all his pupils. He endeavored to teach his students to love those things which were right. Though greatly interested in birds, he never brought specimens to school or in any way alluded to them. He was scrupulous in attending to the prescribed studies and work of the school to the exclusion of other subjects. He never went to church and was regarded as an unbeliever and would have been called an agnostic in these days.

His commencement address at Bowdoin College was entitled "Free Inquiry" and, as Professor Lillie said in his biographical sketch of Whitman, was an early indication of an unfettered mind.

No one knew much about him except that he was always reading, studying, teaching, or collecting birds.

That he was inspired by the spirit that animated so many of his neighbors to enlist during the Civil War is attested by one who knew the family, who says that Whitman's father was opposed to the Civil War and would not allow his son to volunteer. Finally he was drafted and went before the examining board, insisting that he was sound and would go to the war. An examination, however, revealed some defect, probably due to some trouble of the eyes, and he was rejected. For the cause of science this was certainly fortunate.

As an illustration of young Whitman's patience and perseverance Rev. Harrison S. Whitman, a cousin, relates the following incident. He wanted a certain bird so much that he pulled off his shoes and stockings and waded into a pond and stayed there in the rain the best part of a forenoon waiting for the bird to come back and be shot.

He entered Bowdoin College as a sophomore in 1865 and

was graduated in 1868. He immediately took high rank, standing well in a class having fine scholars.^a

He was out of college a good deal during his course, engaged in teaching to earn the means to continue his college work. Shortly after graduating he gave a lecture in a church at Bryants Pond which was well received. The subject was of a philosophical nature as reported by one who listened to the lecture.

His room-mate, now Judge Clarence Hale of Portland, to whom I am also indebted for much information about Whitman, says:

He kept our room full of mounted birds, and developed great fondness for natural history. Every week he made hunting trips covering a radius of ten miles about Brunswick. He had a fine genial disposition and no man in his class commanded more respect or was more generally liked. Although he had no boon companions or close personal cronies, we were always thoroughly good friends.

Judge Hale first met Whitman at Norway Academy in the spring of 1864. In the fall of that year, he taught in the high school at Turners Falls. When in college his appearance was odd and striking on account of his perfectly white hair, his neatness of dress, and courtesy of manner. He had the appearance of an idealist.

From 1868 to 1872 he was principal of the academy in Westford, Massachusetts.

As I recall Dr. Whitman, he was a man of medium height and weight. He always dressed simply and neatly and in summer wore light colored clothes. Three marked features in his appearance not only arrested one's attention, but remained indelibly fixed in one's memory. These were an abundance of the purest white hair crowning a rather pale and youngish face, large round nostrils, and blue eyes of unequalled depth

^a Thomas J. Emery, Esq., a classmate of Whitman, says in a letter to me, "he did fairly well in his studies but did not take high rank. I don't think he was interested in any branch of science as such, but was very enthusiastic in the collection and preparation of specimens in entomology and ornithology, and my intimacy with him was largely the result of excursions I made with him with these objects in view."

and brilliancy. Eyes of a similar character I recall in only one other person and he, curiously enough, is also a distinguished naturalist and a member of this Academy. In manner Dr. Whitman was courteous and amiable, and in no way constrained or reserved; he had a quiet cultivated laugh and was agreeable in every way. He was hospitable and welcomed friends to his house and table in a genial and even in a bohemian spirit. In association and conversation with him, one could often see that his thoughts were on his studies.

My first acquaintance with Dr. Whitman began when, as an instructor at the Penikese school, he attended my lectures. He came fresh from the Boston English High School where he distinguished himself by his original methods in teaching certain branches of elementary science. He showed remarkable talent as an artistic draughtsman and his drawings under the microscope were fine and exact.

While at Penikese he studied, among other animals, a somewhat translucent ascidian known as *Perophora*. I was also interested at odd moments in drawing the delicate microscopic details of this creature and upon comparing my drawings with his could easily see that his drawings were the better. As an instructor of the anatomy of the animal, he might have taken the platform and I the student's seat. It was at this school that he seriously began his life work in science, for shortly afterwards he went to Dr. Dorhn's laboratory at Naples and then to Leipzig where, under the great Leuckart, he learned methods of microtome section cutting, staining of tissues, and processes of preparation far ahead of those used at Penikese; in short the modern methods of the embryologist and morphologist.

On the expiration of my engagement with the Imperial University in Japan, I was accorded the right of appointing my successor, and though my scientific friends included a number whom I should gladly have selected, I felt compelled to appoint Mr. Whitman as the one best fitted to conduct my class into modern methods of research, especially those of microscopic embryology and morphology. Though having no personal acquaintance with Mr. Whitman, aside from our limited association at the Penikese school, I knew of his ex-

perience as a teacher, realized his great ability as a microscopist, and was familiar with his skill as a draughtsman. In addition to these qualifications he was young, enthusiastic, and single. What better man could have been found to continue the work and grow up with the university?

The class that came under his tuition had been instructed in general zoology, comparative anatomy, classification, and the factors of natural selection. Members of the class had assisted me in dredging expeditions, extending from the west coast of Yezo, in the north, to Kagoshima Gulf in the south. As a general zoological museum had to be made for the university, collecting and museum technique formed part of the instruction. Mr. Whitman came in and carried the class into methods of special research which were new to me and the older schools of naturalists. How well he did this work and the enthusiasm which he aroused in his students may be gathered by consulting the zoological memoirs published by the Imperial University, as well as certain morphological and microscopical journals published abroad.

One has only to recall the names of the lamented Mitsukuri and of Ijima, Yatsu, Ikada, Watase, Ishikawa, Sasaki, Oka, Miyoshi, Gota, Inaba, Hata, Tanaka, Kishinouye, Matsuda, Yamakawa, Hiroto, Harase, and many others to realize the triumphant success due to Whitman's work, and the general interest inspired.

Some of these students went to Europe and worked at the Naples station, others studied under Leuckart and Weismann. Nearly all of them are now instructors or professors and are doing sound scientific work for their country.

One of these students, Dr. Watase, was for some years professor of cytology in the University of Chicago.

Dr. Whitman's rigid insistence on certain ideals while professor at the Imperial University led him into an attitude of antagonism toward the authorities. Not obtaining the conditions for his department which he insisted upon, and especially incensed by the refusal of the university to publish certain investigations of his students, except under the professor's name, the relations became strained and he left abruptly at the end of his two years' agreement. Coincident with his depart-

ure for home he printed a pamphlet of forty-four pages, entitled "Zoology in the University of Tokyo."

In subsequent years, he must have regretted some of the bitter expressions therein contained, for, could he have had the gift of prevision and seen the establishment of all the features he so strenuously insisted upon, his animadversions might never have been uttered. Obsessed by the importance and necessities of his own requests, he was unable to comprehend the attitude of the other side. Concessions must be made when habits of thought have been ingrained in a people for centuries.

In this very pamphlet he admitted the difficulty of establishing the latest appliances and other methods of modern research in certain laboratories of Europe and America. How much more difficult it was for a nation, however civilized, which was just emerging from a state of feudalism, to promptly adopt the extreme modern methods of study when the importance of such work was incomprehensible to the higher officers of the university. This unfortunate experience, however, did not prejudice nor embitter him against the nation. He was always loyal in his appreciation of the people and exulted with the rest of us in the triumphs of Japan over China, and her later victories over Russia. He regarded with infinite pride the work done by his Japanese students. That the Japanese did not resent his sharp criticisms is an illustration of the sound and rational attitude of those to whom these criticisms were directed.

Dr. Whitman's memoirs are few in number, considering the high reputation he sustains among his colleagues, but those that he has published are models of what such work should be: clear, incisive, logical, and enlivened, at times, by flashes of sarcastic criticisms. His exquisite drawings were fitting accompaniments to these memoirs. His first memoir on the embryology of *Clepsine*, when he was thirty-six years old, was published in the *Quarterly Journal of Microscopical Science*, and was an inaugural dissertation to obtain the degree of Doctor of Philosophy at the University of Leipzig. Though he had been a student and an investigator for several years, he had published nothing before this time. It was not for want

of material that his writings were so comparatively few in number, for he has left in notes, manuscripts, and drawings a far greater amount of material than he ever published. This reserve was due to extreme caution and a desire to verify every point. As an illustration of his caution in this respect, I quote from one of his memoirs where, in describing the eye of the leech, he says:

The main features of this eye had been known to me for two years, but it did not seem best to hasten the communication of the facts before giving the whole subject careful study.

Dr. Ishikawa, who studied under Weismann, in an article in a Japanese zoological magazine, says:

When I was working in Weismann's laboratory I remember the name of Professor Whitman was often mentioned. Once it was at the time when Dr. Whitman had written about Bonnet's theory of evolution. Professor Weismann said Whitman had not written much, but that his exquisiteness in investigation and his steadiness in thought might place him in the first rank of American zoologists.

Professor Albert P. Mathews, in a tribute to Whitman in Science, says:

His scientific work marks him a great master, for his finished published papers are truly masterpieces, both in content and expression.

Had it not been for his scrupulous insistence upon accuracy we might have had a preliminary memoir on the great work he had been engaged upon for years, namely, the study covering the factors of evolution, mendelism, variation, heredity, etc., as developed in his study of pigeons. In all his memoirs, he followed the dictum of Louis Agassiz, who insisted that a student should make himself familiar with the literature of the subject before publishing.

Whitman quoted liberally from the works of other specialists in the subject under discussion. Reading these various memoirs of his, of which the first appeared, as has been said, in the *Quarterly Journal of Microscopical Science*, followed by another in the *Zoologische Anzeiger*, and subsequent ones in the *Journal of Morphology*, one becomes impressed with the keen analytical study and the insight revealed in the discussion of morphological problems.

His observations on the origin of the Trochosphere in *Polygordius* and its absence in other annelids, a feature which, despite the numerous studies on the subject, still remains a morphological puzzle, is a fine example of the logical methods which characterize his writings. As an illustration of the character of his work and of the profound problems which he set himself to answer mention may be made of his work on the germ layers of *Clepsine* and the determination of the origin of certain organs from these layers, the seat of formative and generated energy, the relative influence of the nucleus and cytoplasm, and others of a similar character.

In these discussions, he reminds one of a German type of mind. In one of the biological lectures at Woods Hole entitled "Animal behavior" Dr. Whitman gave one of his most interesting and delightful essays. The table of contents even is as enjoyable as the menu of a rich feast. The lecture is crowded with facts which reveal his wonderful powers of observation. General considerations regarding the origin of instinct, which he shows precedes intelligence, and weak points in the habit theory, etc., indicate his thorough knowledge of the various discussions which have been published. In short, a fair presentation of this luminous lecture would be impossible in this brief memoir. It may stand as a model for discourses of this nature.

His bibliography embraces about sixty memoirs and communications, and while most of these were on embryological and morphological subjects dealing chiefly with the lower worms, he nevertheless made a number of communications on echinoderms, crustaceans, fishes, amphibians, and birds, and general zoology. He rarely if ever wrote for the daily papers. When, however, he was called upon to write on subjects outside his special studies, he expressed himself clearly and to the point. In a short paper entitled "A broader culture for the doctorate," published in the *University of Chicago magazine*, he expressed himself in terse sentences many of which may be regarded as aphorisms, as in the following:

Research in its best sense is mental effort to grasp facts, interpret them, and express them in well chosen words. * * * Investigation is the normal thing for all living creatures, it is the trial and error

method all along the line from our Amœboid ancestors down to the full-fledged "Homo sapiens." * * * Annihilation is the part of those who miss the mark, survival the lot of those that achieve the best adaptation, and the highest type of adaptation is in brain organization. * * * Majority rule may do for politics, but it is minority intelligence that evolves the better ideas and sets the race ahead.

A complaint that I have often heard from professors of English composition in one of our great universities is recognized by Dr. Whitman in this short paper. He says:

So long as our high schools and colleges continue to send us pupils without a decent training in the English language and its fundamental sources; and so long as the capacity for thinking is dwarfed by the continual strain of cramming; so long as we tolerate a system of education contrived to surpress thought and to substitute therefor capacity only for memorizing, so long shall we have this lack of broad culture in our candidates for the doctorate.

Mr. Whitman's address when president of the Society of American Naturalists, which he entitled "Some of the functions and features of a biological station," is a masterly presentation of the subject, embracing as it does the results of his observations of zoological stations in Europe. This address abounds in short pithy sentences which convey suggestive truths. As examples we quote the following:

Ideas are absolutely essential, provided they are kept growing. Like all biological things, live ideas originate by germination and their growth is subject to no limit except in mental petrification. * * * Seeds may be kept for years without sensible change or loss of power to germinate, but it is because they are kept, not planted nor cultivated. Once planted, they must grow or rot; so it is with ideas.

One might profitably collect from this address and other addresses and reports by him a sufficient number of aphorisms and apothegms to form a daily calendar for the year. He believed, and sustained his belief with the strongest arguments, that a biological station should associate instruction with investigation, and insisted that the function of teaching aids in every way the specialist, and says:

I suppose no investigator, not even the most confirmed claustrophil, would deny that instruction compels thinking and improves ability to express ideas as well as to describe facts. But wherein is the advantage with instruction? Every teaching investigator can answer that and the

answer will be, that power of exposition can be acquired and perfected by class-work and lectures in an extent otherwise unobtainable.

His conceptions in regard to what a laboratory should be were certainly ideal. To him ideas were verities and had to be established. He planned conditions which, if carried out literally, would have required hundreds of thousands of dollars as a first endowment. That this is not an exaggerated statement may be judged by the concluding paragraph in his first annual report to the trustees of the laboratory. The most modest stipends for the number of investigators, teachers, attendants, and other assistants enumerated would easily require the sum of twenty thousand dollars, or four per cent on an endowment fund of half a million dollars! Now half the trustees that he appealed to had been struggling to raise funds for their own departments at the Boston Society of Natural History, the Harvard Medical School, and the Massachusetts Institute of Technology, and these men were rigidly impressed with the conviction that going in debt was not for a moment to be permitted by the authorities controlling their respective institutions. How could they be expected for a moment to permit any laxity of a similar nature in this new station for research and teaching. Furthermore they were greatly hampered in raising any considerable sum for the laboratory by the pressing demands of their own institutions. These reasons were responsible for the serious troubles which later came near to disrupting the institution at Woods Hole; and I say this with no reflections on Director Whitman, who poured out his own time and money lavishly for the work, but in justice to the distinguished naturalists who were on the board of trustees. Whitman was a genius, honorable and truth loving, but like many geniuses immune against the worry of financial responsibility.

Dr. Whitman's writings, whether scientific or popular, official reports, or reviews, indicate a mind crowded with ideas and stocked with knowledge. His metaphors show familiarity with many sciences. In discussing Bonnet's theory of evolution he was not content with Bonnet's final work, but made himself familiar with all that Bonnet had written upon the

question. Furthermore, he studied the works of contemporary and later writers on the subject. One is impressed with the evidences of wide reading and study in every contribution he has made to science.

His various annual reports to the trustees of the biological laboratory are interesting as showing how deeply he had at heart the success of the institution and how large his vision was as to its future growth and maintenance. In reading these official reports one observes the many allusions to zoological subjects. The inception and development of the laboratory are expressed in embryological terms, and the nomenclature of evolution is used in describing the growth and diversified activities of the school.

He wrote very few popular articles or articles of a general nature. In a paper of this character in the *American Naturalist* entitled "Do flying fishes fly" he begins by saying:

Of all modes of animal locomotion, none has excited more general attention than that of flying creatures, and this is none the less so now that many who believe in the ultimate success of the flying machine have discarded the balloon theory and come to regard nature's contrivances for flight as the true models of aerial locomotives.

And this was written nearly a third of a century ago.

Dr. Whitman was led by his studies to follow Weismann in believing that natural selection pure and simple is sufficient to account for the present condition of living forms.

Interesting accounts of Dr. Whitman were written by three of his special students, Iwakawa, Ishikawa, and Takahashi, and published by the Zoological Society of Japan. These were translated for Prof. Frank R. Lillie and to him I am indebted for a copy of this translation. Whitman's interest in mendelism, the theory of De Vries, and certain problems in evolution led him to undertake an extensive and long continued series of experiments in breeding and intercrossing various kinds of pigeons. At one time he had over one thousand pigeons from all parts of the world. He crossed many forms, studied their color markings, followed out the results of heredity, considering even their psychological peculiarities, and has left a vast amount of data which it is hoped may some day be published. The work of caring for all these birds caged in little boxes

and transporting them back and forth from Chicago to Woods Hole was simply appalling. It required two freight cars to hold them. He expended thousands of dollars out of his own resources in these investigations and finally came to an untimely death by undertaking during a cold snap to place his precious birds in winter quarters. Professor Lillie says that in his zeal for his pigeons he forgot himself. He contracted pneumonia and died within a few days.

Burdened as he was with his professional duties at the University of Chicago and the directorship of the biological laboratory at Woods Hole with its multiform and distracting duties one stands amazed at the working capacity of the man. From Doctor Takahashi, who was a student and assistant under him at Chicago, I quote the following paragraph from a translation:

As the result of long continued investigation, Dr. Whitman's attitude toward evolution was selectionist, and he severely opposed the mutation theory of De Vries. He considered that variation occurred in nature in various ways and that nature selected certain ones among various ones.

The expressions of Dr. Whitman are reported by Professor Ishikawa as follows:

I cannot believe the mutation theory of De Vries; the cause that makes the species vary is selection. Nothing but selection can explain the cause of variation. It is Professor Weismann who completely beat the mutation theory. It is Professor Weismann who completely confirmed that the selection theory is true. Weismann is certainly one of the greatest zoologists of the present day.

Allowing for indefiniteness of reporting and difficulties of translation, one can easily comprehend the spirit of the above. Dr. Takahashi goes on to say:

Although Dr. Whitman might not stand absolutely against mendelism as yet, at least he suspected the theory and told me that an investigation of the varieties and hybrids of pigeons seemed to show that the mendelian theory did not contain much truth. At any event, when I was in Chicago, members of the biology department of the University of Chicago were all interested in a test of mendelism, and the leader in the investigations was Professor Whitman. There might, perhaps, be some mistake in Whitman's opinion of mendelism. No matter how it be, I have no doubt that his methods of accumulating facts and data were exquisite and impartial. If this wide-scoped investigation of his should ever fail to be published on account of his death, it is actually a great

loss to biology, whether he is medelian or not, and this is the main reason why I mourn bitterly for his death.

I cannot resist interpolating here the question asked of those, especially Englishmen, who are always holding up the virtues of the Chinese in disparagement of the Japanese: Where among the four hundred million Chinese can one be found who ever showed the slightest interest in questions of this nature or any question regarding the behavior or the cause of phenomena?

Gentle and courteous as Dr. Whitman was in manner, his love of truth, his hatred of injustice, his detestation of misrepresentation led him to criticise sharply and in some cases to use language far from parliamentary. He would hardly temporize in calling a liar "an economizer of truth." He was just as prompt in calling attention to his own errors of judgment, as in his memoir on spermatophores of leeches as a means of hypodermic impregnation. Without mentioning names, I cannot forbear quoting a few of his critical and satirical expressions: "To discover what has already been discovered and to refute what has already been refuted is a double-headed offense, inexcusable if the result of ignorance, unpardonable if done deliberately." And again after showing errors of interpretation in tracing the derivation of the nervous system in the leech he says: "The invention of such a blunder is as preposterous as its commission is impossible." In another memoir on *Hirudinea* he closed some sharp reflections by saying: "Charity and necessity alike commend us in taking leave of such oracular wisdom." And when this same investigator in his preliminary memoir promised an extended monograph on the subject, Dr. Whitman says: "It is to be hoped that before that impending final monograph is launched, our author will have discovered the unregenerate source of his present afflatus." These severe and cutting remarks seem strange, coming from one so kindly in disposition, yet his abhorrence of all pretense, of careless work, and of what he often believed to be intentional misrepresentation rendered him helpless in finding words strong enough to express his feelings.

Dr. Whitman has left two monuments to his memory and

these are the Marine Biological Laboratory at Woods Hole, of which he was the first director, and the *Journal of Morphology*, which he founded. The one in vigorous growth and prosperity, the other ceasing at the end of the seventeenth volume after publishing nearly ten thousand pages and hundreds of plates. The Biological Laboratory is too well known to require further mention, though an account of its early struggles and the almost single-handed fight made by its director at a critical time in its history is another illustration of the indomitable tenacity of Dr. Whitman in insisting on his ideas. He never compromised.

It is sad to recall the heart-breaking failures he experienced in carrying out other ideas, one of which was never born: The biological farm which he hoped to establish in Chicago and afterwards endeavored to induce the trustees of the Woods Hole laboratory to undertake as an adjunct of the institution. Much thought and planning must have been given to it by Dr. Whitman and these plans are probably preserved among his papers. It is to be hoped that some wealthy friend of science may in the future endow this biological farm and that it shall bear the name of Whitman. The bi-products of such a farm might be made a source of income for its maintenance, though one can imagine how Dr. Whitman would have frowned on the idea.

It is impossible to realize the amount of work and worry Dr. Whitman must have endured in establishing and directing that great undertaking, the *Journal of Morphology*. Though having the able cooperation of Dr. Edward Phelps Allis, Jr., still the selection of papers, the preparation of his own memoirs for its pages, the proof reading, and the final struggles to maintain it must have caused him many weary days and nights. That these struggles must have begun early is shown by a letter from Dr. Whitman to me.^a

^a "I fully appreciate your kindness in offering to do so much for the *Journal*. I have thought over the matter and have decided to postpone such an appeal as you suggest until it has become absolutely unavoidable. I am afraid I should not have the good luck to find others who would, like yourself, be willing to sacrifice so much to aid the *Journal*. Your offer is a most pleasing evidence of your cordial interest in the matter, and I am thankful for it."

His introduction in the first number of the *Journal* is an excellent presentation of the reasons for establishing such a publication. The needs of it are convincingly pointed out and in his appeal he reminds us that Germany, France, England, Austria, Holland, Belgium, Italy, Sweden, Norway, and Switzerland have their morphological journals and that our country should at least support one. His confidence in its success was based on the fact that we had in this country a number of morphological laboratories and many workers in the field. He believed that one journal at least could be creditably maintained. Any one familiar with its numbers will testify that with its generous size, fine printing, superb plates, many in color, it was creditably maintained to its last page and plate.

Knowing nothing of its financial condition, though the editors must have often helped from their own resources, attention must be called to the generosity of its publishers, Ginn & Co. After continuing the publication of the *Journal* to the bitter end, the publishers, in a final circular announcing its discontinuance, say: "For many years the *Journals* have been sustained by us at a financial loss which of late has amounted to several thousand dollars annually." The morphologists have since revived this valuable publication which is now published by the Wistar Institute of Anatomy and Biology of Philadelphia. An extended memoir of Professor Whitman's work prefaced by a biological sketch by Prof. Frank R. Lillie is presented in the *Journal of Morphology*, volume 22, No. 4. A deep analytical study of his various contributions to science has been prepared by Professors Conklin, Mathews, Morgan, Moore, and Riddle, and to this important contribution reference must be made. The life history of Professor Whitman is admirably set forth, with records of his marriage, his family, and the various positions he filled, always with devotion to the duties he assumed. Accompanying this memoir an exhaustive bibliography is given, prepared by Prof. Alfred P. Mathews, to whom I am indebted for the privilege of using it in this memorial. From this memoir I have also compiled *seriatim* the various degrees, honors, positions, etc., held by him.

To the editors of the *Journal of Morphology* I am indebted

for the portrait of Professor Whitman which accompanies this memorial.

He was the recipient of the following degrees: Bowdoin College, A. M., 1868; Ph. D., 1871; Leipzig, Ph. D., 1878; and the University of Nebraska, LL. D., 1894.

He was a member of the National Academy of Sciences, the Linnean Society of London, the American Society of Naturalists, and the American Ornithological Union; and a fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences.

During his active and varied life he occupied the following positions: Westford Academy, principal, 1868-1872; Boston English High School, sub-master, 1873-1875; Imperial University of Tokyo, professor of zoology, 1880-1881; Harvard University, assistant in zoology, 1883-1885; Allis Lake Laboratory, director, 1886-1889; Clark University, professor of zoology, 1889-1892; Marine Biological Laboratory, director, 1888-1908; University of Chicago, professor of zoology, 1892-1911.

He was editor of the *Journal of Morphology*, the *Biological Bulletin*, the *Biological Lectures*, and the *Journal of Biology*.

BIBLIOGRAPHY

The embryo of Clepsine. *Quart. Journ. Micr. Sci.*, vol. 18, 1878, pp. 215-315.

Ueber die Embryologie von Clepsine. *Zool. Anz.*, Bd. 1, 1878, p. 5.

Changes preliminary to cleavage in the egg of Clepsine. *Proc. American Assoc. Adv. Sci.*, vol. 26, 1878, pp. 263-270.

Do flying fishes fly? *American Nat.*, vol. 14, 1880, pp. 641-653.

Zoology in the University of Tokyo, 1881.

Japanese aquatic animals living on land. *American Nat.*, vol. 16, 1882, pp. 403-405.

Methods of microscopical research in the Zoological Station in Naples. *Idem.* pp. 697-706, 772-785. *Journal de Micrographie*, vol. 6, 1882, pp. 558-565; vol. 7, 1882, pp. 18, 89, and 188.

A new species of Branchiobdella. *Zool. Anz.*, 1882, pp. 636-637.

A contribution to the embryology, life-history, and classification of the Dicyemids. *Mitth. Zool. Sta. Neapel*, vol. 4, 1883, pp. 1-89.

Treatment of pelagic fish eggs. *American Nat.*, vol. 17, 1883, pp. 1204-1205.

A rare form of the blastoderm of the chick and its bearing on the question of the formation of the vertebrate embryo. *Quart. Journ.*

Micr. Sci., vol. 23, 1883, pp. 376-397. Proc. Boston Soc. Nat. Hist., vol. 22, 1883, pp. 178-179.

On the development of some pelagic fish eggs. Proc. American Acad. Arts and Sci., vol. 20, 1884, pp. 23-75. (With A. Agassiz.)

External morphology of the leech. Idem, pp. 76-87.

The connective substance of Hirudinea. (A review.) American Nat., vol. 18, 1884, p. 1070.

Segmental sense organs of the leech. Idem, pp. 1104-1109.

Methods of research in microscopical anatomy and embryology. Pp. VIII + 255, 1885, Boston, S. E. Cassino & Co.

Means of differentiating embryonic tissues. American Nat., vol. 19, 1885, pp. 1134-1137.

Osmic acid and Merkel's fluid as a means of developing nascent histological distinctions. American Nat., vol. 20, 1886, p. 200.

The leeches of Japan. Quart. Journ. Micr. Sci., vol. 26, 1886, pp. 317-416.

Germ layers of Clepsine. Zool. Anz., Bd. 9, 1886, pp. 171-176.

A contribution to the history of the germ layers in Clepsine. Journ. Morphol., vol. 1, 1887, pp. 105-182.

Ookinesis. Idem, pp. 228-252.

Biological instruction in universities. American Nat., vol. 21, 1887, pp. 507-519.

The seat of formative and regenerative energy. Journ. Morphol., vol. 2, 1888, pp. 27-49.

The eggs of Amphibia. American Nat., vol. 22, 1888, p. 857.

Some new facts about the Hirudinea. Journ. Morphol., vol. 2, 1888, pp. 585-599.

Address at the opening of the Marine Biological Laboratory, July 17. First Annual Report of the Mar. Biol. Lab. Boston, 1888, pp. 24-31.

The development of the osseous fishes. 2. The pre-embryonic stages of development. Mem. Mus. Comp. Zool. Harvard College, vol. 14, 1889, pp. 1-56. (With A. Agassiz.)

Spermatophores as a means of hypodermic impregnation. Journ. Morphol., vol. 4, 1891, pp. 361-406.

Description of Clepsine plana. Idem, pp. 407-418.

Specialization and organization, companion principles of all progress; the most important need of American biology. Biol. Lect., Mar. Biol. Lab., 1891, pp. 1-26.

The naturalist's occupation. 1. General survey. 2. A special problem. Idem, pp. 27-52.

Metamerism of Clepsine. Festschrift Rudolph Leuckart, 1892, pp. 385-395.

Artificial production of variation in types. Science, vol. 19, 1892, p. 227.

A marine biological observatory. Pop. Sci. Mo., vol. 42, 1893, pp. 1-15.

A marine observatory the prime need of American biologists. Atlantic Mo., 1893, pp. 808-815.

- The inadequacy of the cell theory of development. *Journ. Morphol.*, vol. 8, 1893, pp. 639-658. *Biol. Lect., Mar. Biol. Lab.*, 1893.
- A sketch of the structure and development of the eye of *Clepsine*. *Zool. Jahrb., Abth. Anat. u. Ont.*, vol. 6, 1893, pp. 616-625.
- The work and the aims of the Marine Biological Laboratory. *Biol. Lect., Mar. Biol. Lab.*, 1893, pp. 236-241.
- General physiology and its relation to morphology. *American Nat.*, vol. 27, 1893, pp. 802-807.
- Breeding habits of the three triclads of *Limulus*. *American Nat.*, vol. 28, 1894, pp. 544-545.
- Prefatory note. *Biol. Lect., Mar. Biol. Lab.*, 1894, pp. ii-vii.
- Evolution and epigenesis. *Biol. Lect., Mar. Biol. Lab.*, 1894, pp. 205-224.
- Bonnet's theory of evolution. A system of negations. *Idem*, pp. 225-240.
- The palingenesia and the germ doctrine of Bonnet. *Idem*, pp. 241-272.
- The egg of *Amia* and its cleavage. *Journ. Morphol.*, vol. 12, 1896, pp. 309-356. (With Eycleshymer.)
- The centrosome problem and an experimental test. *Science, new ser.*, vol. 5, 1897, pp. 235-236.
- Some of the functions and features of a biological station. *Science, new ser.*, vol. 7, 1898, pp. 37-44. (Presidential address to Soc. American Nat., 1897, but not delivered.)
- Lamarck and a perfecting tendency. *Science, new ser.*, vol. 7, 1898, p. 99.
- Animal behavior. *Biol. Lect., Mar. Biol. Lab.*, 1898, pp. 285-338.
- Myths in animal psychology. *Monist*, vol. 9, 1899, pp. 524-537.
- Apathy's grief and consolation. *Zool. Anz.*, 1899, pp. 196-197.
- The impending crisis in the history of the Marine Biological Laboratory. *Science, new ser.*, vol. 16, 1902, pp. 529-533.
- A biological farm for the experimental investigation of heredity, variations, and evolution, and for study of life histories, habits, instincts, and intelligence. *Biol. Bull.*, vol. 3, 1902, pp. 214-224.
- Natural history work at the Marine Biological Laboratory, Woods Hole. *Science, new ser.*, vol. 13, 1904, pp. 538-540.
- The origin and relationship of the rock pigeons as revealed in their color-patterns. *Biol. Bull.*, vol. 6, 1904, pp. 307-308.
- Hybrids from wild species of pigeons crossed *inter se* and with domestic races. *Idem*, pp. 315-316.
- The problem of the origin of species. Congress of Arts and Sciences, St. Louis Exposition, 1904, vol. 5, 1906, Boston, pp. 41-58.
- The origin of species. The introduction and abstract of a lecture delivered before the Nat. Hist. Soc., December 20, 1906. *Bull. Wisconsin Nat. Hist. Soc.*, vol. 5, 1906, pp. 6-14.
- Cheques and bars in pigeons and the direction of evolution. *Agric. Mag.*, vol. 5, No. 6, 1907, pp. 174-182.
- Reports of the director of the Marine Biological Laboratory for the first eight sessions. Annual Reports of the Marine Biological Laboratory for 1888 to 1895.