Pigeons, Visions, and an Ideal Station

C.O. Whitman's vision established a spirit of cooperative enterprise for generations of biologists to follow

by Jane Maienschein

ON THE FIRST DAY of December in 1910, a bitter wind rose from the Northwest and sent a chill through Chicago. Charles Otis Whitman worried for his birds. All afternoon he worked in his backyard, preparing winter quarters for his research pigeons to keep them safe from the cold. The next morning, Whitman was found in a coma. Pneumonia developed swiftly, and five days later he was dead. "In his zeal for his pigeons," his assistant F.R. Lillie later wrote, "he forgot himself."

The zoologist C.O. Whitman is a misunderstood participant in the history of American biology — a stubbornly independent man who inspired fierce loyalty from some, but antagonized others. In the last decade of his life, when the leading young American biologists of the time were embracing increasingly analytical and manipulative techniques, Whitman returned to more descriptive research on his treasured pigeons, using his forty lines of wild stock to seek answers to broad evolutionary questions. How do individual characteristics and behaviors become established? How do they change? What is their significance?

Whitman's pigeon work passed virtually unnoticed. To the new generation of investigators, careful studies of bird behavior and evolution seemed drably out of date. Whitman's prematurely white hair and dogmatic manner, furthermore, made him seem old before his time: an awkward figure obsessed with yesterday's problems. But such a portrait is far from adequate — for it was C.O. Whitman who built the Marine Biological Laboratory, as well as influential programs at the University of Chicago. As the MBL's founding director, his vision for "an ideal biological station" went far beyond his own research interests, and established a spirit of cooperative enterprise for generations of biologists to follow.

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WHITMAN RECEIVED his first real taste of biological work at Louis Agassiz's Anderson School on Penikese Island in the summer of 1873, though he had been interested in birds and in natural history since his boyhood on a farm in Maine. Agassiz inspired Whitman to pursue a graduate education in biology. Accordingly, he traveled to Rudolf Leuckart's physiolgical laboratory in Leipzig in 1875, a favorite choice at the time. There he received his Ph.D. in 1878 for his work on development of form in the leech *Clepsine*, a meticulous and impressive study falling within the established morphological tradition. In his thesis he suggested that some sort of preorganization of parts of the egg cell might have significance for later development: an idea that became central to Whitman's work at the MBL.

In 1879 Whitman accepted an offer to teach at the Imperial University of Japan. Though he demanded high standards and hard work from his Japanese students, he treated them with an almost paternal attention. Whitman labored patiently, instructing his students in elementary microscopic and drafting techniques. He loaned them books and journals, then spent considerable time helping them to translate German, French and English. The stubborn scientist came into conflict with the Japanese administration, however, in part over the issue of whose name should appear on the students' publications. Whitman insisted that his should not, since the work had been conducted by the students. This and other disagreements led the idealistic Whitman to resign his post.

While Whitman's efforts in Japan were to earn him the reputation of "the father of zoology" in that country, his

subsequent contributions to American biology were to be far greater. Five years after his return from Japan, Whitman was chosen by Edward Phelps Allis to direct the Allis Lake Laboratory in Milwaukee — in essence to train Allis in zoology. Whitman urged his eager student to undertake publication of a journal for American research in zoology, since it took so long to work through the European journals. With Whitman as its editor, the *Journal of Morphology* was born — the first American biological journal. Later he also founded the *Zoological Bulletin,* which after two years became the *Biological Bulletin,* and the *Biological Lectures,* a published record of the Friday Night Lectures at the MBL.

As editor of most of the major American journals for biology through the 1890's, Whitman obviously retained a strong influence over the direction of published research. In particular, he encouraged cell-lineage studies, an interest which followed from his sympathies with the theory based on the organization of the early embryo into "organ-forming germ regions." Whitman envisioned the pursuit of cell-lineage work as a community effort, with a group at the MBL — including Edwin Grant Conklin, Edmund Beecher Wilson, Thomas Hunt Morgan and Ross Harrison — comparing results and working toward explanation of a range of related phenomena.

WITH THIS shared emphasis on early cell divisions, Whitman created a climate of common concern at the MBL. What happens during the earliest stages of development? How much is fixed by that time, presumably by heredity, and how much of development responds to conditions of the egg itself or of the outside environment? How does one stage give rise to the next? Such questions led the scientists in Whitman's team to focus on *describing* the changing structures and patterns of the developing egg.

For a full understanding of development, Whitman understood that biologists must also *explain* how one stage gives rise to the next. What causes the changes? In 1892, Whitman invited physiologist Jacques Loeb to the University of Chicago and to the MBL to add physiological investigation to the mix of approaches. Morphology and physiology must work together, Whitman insisted. Either one, or any specialized approach to development, is legitimate itself just as division of labor is legitimate, and even necessary and desirable. But such specialization does not remain sufficient. A community of researchers must work together, cooperatively, pursuing different paths but continually comparing results. Only such cooperative efforts can represent biology in the true modern sense.

Furthermore, Whitman argued, it must be the researchers themselves who control their research. Independence must join cooperation as a byword for biology. This demand led the MBL Director into confrontation with his fellow biologists, and with would-be supporters at both the MBL and Chicago. A crisis in 1897 at the MBL led to a reorganized Board of Trustees and Corporation, resolving some problems, but not all. And Whitman stubbornly rejected later proposals, such as one from the Carnegie Institution in 1902, which might have allowed control or even apparent control of either institution by non-biologists. Cooperation and independence: noble goals rigidly held by this "sober and pious Yankee" scientist.

THE CONSTANT BATTLES to make others accept his visions for biology, however, ultimately disheartened Whitman. He reported to his friend Conklin that the lack of faith and support from the MBL Trustees left him depressed. Having created an institution where no single force could decide the direction of research, Whitman, ironically, found himself less and less in sympathy with the analytical approach that had become prized there. He had little faith in the recent rediscovery of Mendel's evidence for genetic inheritance, and its popularity left him cold. Family stresses were taking their toll on his health as well. Tired of the struggle, Whitman virtually abandoned his administrative post in 1902 to his assistant Lillie.

In his last years at Chicago, Whitman tried to ignore the growing opposition to his non-Mendelian investigations into the nature of evolution. Hypothetical "genes" could not satisfy his search for the ultimate cause of the pattern of stripes on a bird's wing, or the animal's instinct to incubate its eggs in the nest. His was a broader view of what biology could offer. Having established a tradition of cooperative effort at the MBL, Whitman returned to his pigeons, pursuing the problems of evolution that had led him into biology in the first place.