



## Alfred H. Sturtevant (1891-1970)

A. H. Sturtevant, Thomas Hunt Morgan Professor of Biology, emeritus, at Caltech, died of cancer on April 5, 1970, in Pasadena. At a memorial service held in the Athenaeum on April 17, Edward Lewis, the current Thomas Hunt Morgan Professor of Biology, paid this tribute to his colleague.

Alfred Henry Sturtevant, born on November 2, 1891, at Jacksonville, Illinois, was the youngest of six children of Alfred Henry and Harriet Evelyn (Morse) Sturtevant. His grandfather, Julian Sturtevant, was a Yale graduate, a Congregational minister, and one of the founders and later president of Illinois College. Sturtevant's father taught mathematics for a while at Illinois College, but for the most part was a farmer, first in Illinois and later in southern Alabama where the family moved when Sturtevant was seven years old. Sturtevant went to a one-room country school, taught by his future sister-in-law, and went to a public high school in Mobile.

At the age of 17 he entered Columbia University. That crucial choice came about because his brother Edgar, who was 20 years older, was at that time teaching at Barnard College. Edgar and his wife took the young Sturtevant into their family, and he lived with them while attending Columbia University. Edgar was a scholar who later became a professor of linguistics at Yale and an authority on Hittite languages. Sturtevant said that he learned the aims and the standards of scholarship and research from him. One can imagine the great source of pleasure it must have been for Sturtevant when he and Edgar were awarded honorary degrees at the same Yale commencement many years later. Also present was Sturtevant's nephew Julian (the son of Edgar) who was at that time and still is a professor of organic chemistry at Yale. Julian Sturtevant's son Bradford, another Yale man, is on the faculty at Caltech in aeronautics, and A. H. Sturtevant's own children are in the same tradition: One son is in anthropology, the other is in engineering, and his daughter is a practicing lawyer specializing in the legal aspects of the use of atomic energy. A student of behavioral genetics might well begin to wonder whether there may not be some influence of the genes as well as of the environment on the academic and scientific performances of this line of Sturtevants.

How Sturtevant became interested in genetics and how he came to work with Thomas Hunt Morgan are especially revealing anecdotes. Sturt, as he was known to his colleagues, has said that he first became interested in genetics by tabulating the pedigrees of his father's horses. He continued this interest while an undergraduate at Columbia, and he also collected considerable data on his own pedigree. Sturt said his brother Edgar suggested that he go to the library and read some books on heredity to learn more about the meaning of pedigrees. Thus it was that Sturtevant read a textbook on Mendelism by the English geneticist Punnett.

Sturtevant saw at once that Mendelism could explain some of the rather complex patterns of inheritance of coat colors in horses which he and others before him had observed. Edgar encouraged Sturtevant to write an account of his findings and take it to T. H. Morgan, who at that time was a professor at Columbia and from whom Sturtevant had already taken a course in zoology during his

freshman year. Morgan encouraged Sturtevant to publish the paper, and it was submitted to the *Biological Bulletin* in June 1910, at the end of his sophomore year. The paper appeared that same year.

The other result of Sturtevant's interest in the pedigrees of horses was that he was given a desk in the famous fly room at Columbia University where only three months before Morgan had found the first white-eyed fly, a discovery that was to revolutionize genetics. Much of the rest of the story about those early days at Columbia, when modern genetics was in a very real sense born, is a matter of record in the writings of Sturtevant and others.

Sturtevant had a keen interest in the history of science; his book, *The History of Genetics*, which was published in 1965, bears witness to this. This book contains a typical example of the workings of Sturtevant's mind. In it he compiled an appendix that contained a series of "intellectual" pedigrees of many of the men prominent in genetics or cytology in the early days. Sturtevant, of course, was a direct descendant of T. H. Morgan and of E. B. Wilson, another eminent biologist who was a contemporary and friend of Morgan's at Columbia and who was at that time the authority in this country on the cytological behavior of chromosomes and the cell itself. Morgan and Wilson were, in turn, direct descendants of Martin and Brooks, two men who were at Johns Hopkins University where Morgan had obtained his doctorate; Martin was descended from T. H. Huxley, and Brooks from Louis Agassiz, and so it went.

From Morgan, Sturtevant must have first learned—or at least seen in operation—the experimental approach. Sturtevant once wrote that he knew of no one else at the time who was so thoroughly committed to the experimental approach to biological problems as was Morgan. It was Morgan's aim to produce a mechanistic, as opposed to a purposeful, interpretation of biological phenomena; a great deal of this approach clearly rubbed off on Sturtevant, for the simplistic elegance of Sturtevant's experiments in genetics are legendary.

Sturtevant had a remarkable memory of, I suspect, a special sort. It was as if his memory were composed of an infinity of matrices waiting to be filled with any data that lent itself to classification into discrete categories. The data might be in the form of numbers and kinds of bristles missing in a mutant fly; numbers of snails with a right-handed coil versus a left-handed coil—the genetics of which Sturtevant was the first to explain; the relation between inversion sequences in different species; or the host of other characteristics he investigated not only in *Drosophila*, but in iris, evening primroses, snails, moths, and many other creatures, including human beings. Whatever form the data took, the observations fell in the appropriate matrix in his memory, from which they were readily retrievable to a degree that was truly phenomenal.

The Caltech period was a time of collaboration especially with Sterling Emerson, Theodosius Dobzhansky, George Beadle, Jack Schultz, Edward Novitski, and others. It was Sturtevant's style, at least after he came to Caltech in 1928 with Morgan and Bridges, to spend his mornings doing experiments. Afternoons were reserved for perusing the literature—and there were few journals in any phase of biology that he did not at least dip into—and there were the wide-ranging discussions at the afternoon tea sessions.

Sturtevant taught the undergraduate course in genetics at Caltech for many years. From time to time he also gave a course for undergraduates in entomology, complete with a field laboratory session. His lectures on topics in advanced genetics were scholarly reviews of specialized areas of genetics—often dealing with organisms with a bizarre genetics, such as the protozoa, for example. These lectures were especially valuable to graduate students since they were in areas of research not directly going on at Caltech, and they served to broaden their genetic outlook. The elementary course in genetics that Sturtevant taught was based on a textbook which he and George Beadle wrote in 1939. It was not as widely used throughout the U.S. as it perhaps should have been, probably because it was considered too difficult for the average student. The trouble was that it was tailored for Caltech students, and the problems especially were a real challenge, even for Caltech undergraduates.

Sturtevant and Beadle planned to revise the textbook, but the pressure of other work and the rapidity of developments that followed the discovery of DNA prevented that revision. I would like to mention one episode in this regard. There is a subtle difference in the way geneticists use the word *gene*. Sturtevant discovered that he and Beadle had in fact used the word differently when they wrote the book, and he always facetiously blamed their inability to get out a second edition on this disagreement. Characteristically, when he became aware of this ambiguity in the usage of *gene*, he would ask every geneticist he met how he used the term, and he then promptly cataloged his colleagues according to whether they thought of the *gene* the way he did or the way Beadle did. The person asked did not, of course, need to worry about his answer because he would be sure to be in good company in either case.

Sturtevant read widely and was extremely well informed on every topic of current interest, especially politics. He would, for example, read the *Sunday New York Times* and the *Manchester Guardian Weekly* from cover to cover. He was especially happy if he could do the crossword puzzle in the *Guardian* at one sitting. Those who know those puzzles will know that only a very special breed of person attempts them, let alone solves them in one sitting. Sturtevant was fascinated with puzzles of all

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kinds—especially puzzles involving three-dimensional objects. When Anne Roe made a study some years ago of what makes scientists tick (*The Making of a Scientist*), she wisely chose Sturtevant as one of her subjects. He was not only flattered, but overjoyed at the opportunity to take the tests, which he viewed as simply a new set of puzzles to work out.

Sturtevant would develop a topic logically and succinctly, whether he was publishing a paper or giving a formal lecture. In private conversation, however, he always seemed to assume that the listener was at least as well versed in the subject matter as he was, so he'd leave out the preliminaries and get right to the point. This could be mystifying to some; for others it was a challenge to become versed enough to profit by listening to his ideas or by tapping the tremendous store of information always at his fingertips on almost any topic of substance. His papers were so well written that one would assume that he had labored over each word. I have seen his pencilled manuscripts; they rarely contained more than a few minor word changes inserted into the original draft, which was always done in longhand. I once asked him how he did this; he told me that he usually spent many days mulling the paper over in his mind until all the words fell into place, and then all he had to do was write it down from memory.

Sturtevant's colleagues and students and friends at Caltech will always remember the warmth of his personality. His love for people and for all living things was expressed in many ways. For example, in 1954 he gave the presidential address before the Pacific Division of the American Association for the Advancement of Science, and he dealt with some of the social implications of human genetics. In this address he warned of the hazards to human beings of the fallout from the atmospheric testing of atomic bombs. What had provoked Sturtevant was a strong statement issued by the executive branch of the government that the fallout levels from testing were far below any that could cause damage to human beings.

Although many assumed that the only purpose of Sturtevant's remarks was to halt bomb-testing, he was completely objective about the whole problem. He felt there might be a need for bomb-testing but that the public should be given the best estimate that scientists could make about the nature of the danger of fallout levels of radiation to the unborn. To use the language of today (some 16 years later), Sturtevant was decrying the credibility gap that was developing in the government's handling of information on environmental pollution with radiation.

For Sturtevant, life must have been an exciting, rewarding, and perhaps sometimes heartbreaking journey into the unknown. It was fortunately a long journey, which involved many detours to many realms, and I am convinced that he savored every minute of it. His explorations in genetics will make the journey into the unknown a little easier for the human race.