

## Random Observations on a Distinguished Professor<sup>1</sup>

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When talking informally with his graduate students, Dr. Rhoades has often recalled his days at Cornell University and remarked on the relationship between the members of the corn genetics group and their major professor, R. A. Emerson. Professor Emerson did not supervise his students closely; he encouraged them to work independently although he was always available when his counsel was sought. Dr. Emerson usually gave the beginner a routine problem in order to get him started in research. It was his experience that the imaginative student would soon find more interesting material while the mediocre one might complete a pedestrian problem but was unlikely to achieve distinction as a scientist. Under this strategy, the superior students flourished; Rhoades himself became interested in various aspects of chromosome behavior and published several papers before obtaining his Ph. D. While he found the intellectual environment of Emerson's laboratory stimulating, his development as a scientist was markedly advanced when he interrupted his graduate work at Cornell to spend a year (1929–30) as a Teaching Fellow at the California Institute of Technology. Here, he had the opportunity to work on *Drosophila* under the guidance of Sturtevant and Dobzhansky. In the late spring of 1930 he returned to Ithaca to resume the research on cytoplasmic male sterility which constituted his Ph. D. thesis. This was an exciting time at Cornell; the group in corn genetics included McClintock and Beadle and new discoveries were almost a daily occurrence. Dr. Rhoades often speaks with nostalgia of his graduate days when cytogenetics was in the ascendant.

An opportunistic approach to research appealed to Dr. Rhoades and it was to become his life-long philosophy. The rigid schedules and long-range plans of a massive research program seem tedious and burdensome to one of his temperament. Where others would delegate pollinating chores to their field assistants, he has always preferred to become closely acquainted with all of his corn plants so that he could exploit the unexpected deviations that happened to occur in his stocks. This style of doing research requires both serendipity and perception, qualities possessed in full measure by Professor Rhoades. His pioneering study of the genic control of mutation began with the selection of a single ear with spotted kernels from a drawer full of stored corn. A routine attempt to determine

the map distance between the R locus and the end of chromosome 10, marked by means of a large terminal knob, led to the discovery of preferential segregation and neocentromere formation. Similar changes in the direction of research occurred in the inversion studies and in the discovery that B chromosomes could induce loss of knobbed members of the regular chromosome complement. Thus, a number of significant findings had their origins in pedestrian efforts and might have remained undetected but for the discernment and imagination of Professor Rhoades.

My association with Dr. Rhoades began in 1946 when I enrolled in his two-semester course in cytogenetics at Columbia University. In the following summer, I was hired as his research assistant to help with the cytology and the corn field operations. I became a member of a lively group including Dr. Rhoades's first Ph. D. students, Delbert Morgan, Ruth Sager, and Drew Schwartz. Before joining the Botany Department of Columbia University in 1940, Dr. Rhoades had served for five years as a geneticist in the U.S. Department of Agriculture, where he had no academic responsibilities and it was not until he accepted the position of associate professor at Columbia that he had the opportunity to supervise graduate students. Of his 26 Ph. D. students, three received their degrees from Columbia, ten from the University of Illinois and 13 from Indiana University.<sup>2</sup>

A year after I began to work for Dr. Rhoades, he decided to accept an offer from the University of Illinois. One of the attractions described to the professor by his friends in Urbana was the availability of a large tract of rich black soil for his corn field. During the years at New York, our corn was grown at Nevis, an estate some 19 miles from the city, once belonging to the son of Alexander Hamilton but now in the possession of Columbia University. An attractive and carefully maintained property with formal gardens, large lawns, a sizeable mansion house and several adjacent buildings, it was not ideal for the culture of maize. One plot was located on the twisted

<sup>2</sup> Illinois Ph. D.'s: Peter A. Peterson, Hope Punnett, S. H. Tulpule, Mei Lin, Albert Vatter, Chuan-ying Chao, Dewayne Richardson, Gary Kikudome, Gregory Doyle and Donald Shaver.

Indiana Ph. D.'s: S. K. Sinha, George Hanson, Andrew Snope, Dorothy Stroup, David Weber, Earle Doerschug, John Mottinger, Karl Rinehart, Reid Palmer, Judith Miles, Wayne Carlson, Paul Nel and Edward Ward.

<sup>1</sup> Dedicated to Dr. M. M. Rhoades on the occasion of his 70th birthday.



Plate 1. A. Dr. Rhoades in the experimental field at Nevis Estate  
 B. Collecting sporocytes  
 C. With greenhouse crop  
 D. Harvest time

roots of orchard trees, a second clearly encroached on the flower garden and a third was on a rolling slope. On one occasion, Dr. Rhoades in his informal field clothes was mistaken by a visitor to the estate for one of the gardeners. It was little wonder that the professor, his research assistant and the two students who accompanied him all looked forward to the flat fertile fields of Illinois in the heart of the corn belt, where agriculture and the plant sciences were truly appreciated.

The move to Illinois took place in the fall of 1948. The summer's crop of freshly harvested ears was loaded into the trunk and back seat of a passenger car to be transported 900 miles to the new laboratory in the midwest. Although the biologists at Columbia were an outstanding group and Dr. Rhoades was reluctant to break his association with the Schraders, Dobzhansky, Dunn and others, the University of Illinois also offered stimulating colleagues. The photosynthesis group in the Botany Department was world famous and brilliant scientists were to be found among the chemists, engineers, and microbiologists.

In his own field of corn genetics, Dr. Rhoades was joined by John Laughnan and many lively discussions of research took place in the corn lab or over a coke at the Student Union Building. With his customary ease in dealing with people, from deans and university presidents to greenhouse workers and custodians, Professor Rhoades was equally at home at the meetings of the exclusive Philosophy Club, at the poker games of the chemists, and in the faculty bowling league. An ardent sports enthusiast, he was regularly on hand to boost the Illini on the football field or at the basketball court.

But in the summers, everything centered on the corn field. The first summer at Illinois began inauspiciously. The corn was duly planted in the well-prepared plot allotted us at the Agronomy Farm, but before the first seedlings emerged, unusual weather conditions combined to produce a nearly impene-

trable crust of soil. We spent the next days on hands and knees breaking the surface with screwdrivers to save the already sprouted seedlings. In the course of this arduous labor on a hot and humid day, Dr. Rhoades was visited by the head of the Agronomy Department, who jovially inquired as to "how things were going". That they were not going well was evident from the colorful language Rhoades used to express his opinion of the field to which he had been assigned. In spite of a bad beginning, a congenial relationship developed between Dr. Rhoades and the agronomists and he soon held a joint appointment in the Botany and Agronomy Departments.

Unlike many a research scientist, Dr. Rhoades has mastered the art of communication and presents his own findings and those of other geneticists with admirable clarity. His cytogenetics course attracted students in agronomy, bacteriology, zoology and botany, many of whom later became leaders in the field of genetics. Several established investigators attended his lectures, some travelling a considerable distance to do so. The impact of his training left its

impression and a number of individuals later in their careers acknowledged their indebtedness to Dr. Rhoades. Many of his lectures were to reach a wider audience with the publication in 1955 of a definitive chapter on maize cytogenetics. The influence of this essay extended to the Soviet Union where a faithful disciple of Dr. Rhoades translated it into Russian. As a scientist of international renown, Dr. Rhoades was often visited by investigators from all corners of the world; geneticists from Brazil, Sweden, Yugoslavia, Portugal, Denmark, Italy, Wales, Russia, Formosa, Canada and the United States came to work in his laboratory and we were often crowded for space to accommodate them.

Although an excellent lecturer, Professor Rhoades believes that the student learns more in the laboratory sessions and in the experimental field than in the formal classroom atmosphere. He feels that the laboratory exercises in his cytogenetics course are especially instructive. After learning to recognize the normal corn chromosomes at pachynema from slides of their own preparation, the students are given samples of microsporocytes from plants with chromosomal aberrations which they are expected to identify. In addition to the "unknowns", a magnificent series of demonstration slides is shown during the semester, the great majority of which were prepared by Dr. Rhoades. Among these is a slide of the meiotic chromosomes of the scorpion, *Tityus*, following x-ray treatment, made while he was on sabbatical leave in Brazil. This slide invariably brought forth a short performance by Dr. Rhoades, who delighted in recounting to the students the difficulty encountered in x-raying these poisonous animals since the only available x-ray machine emitted a horizontal rather than a vertical beam. He would illustrate how he overcame this handicap by enclosing the squirming mass of scorpions in his handkerchief and gingerly rotating it in the beam.



Plate 2. A. Agronomy Farm at University of Illinois. Standing from left to right: M. M. Rhoades, John Laughnan, S. H. Tulpule, Drew Schwartz. Seated: Peter Peterson, Ellen Dempsey  
 B. Back row left to right: Peter Peterson, George Ziska. Front: M. M. Rhoades, John Laughnan, Dewayne Richardson, Mei Lin, Edward Coe, S. H. Tulpule  
 C. At Oak Ridge Symposium. Left to right: Dewayne Richardson, Edward Coe, M. M. Rhoades, Mei Lin  
 D. Harvesting corn. Standing: M. M. Rhoades, Andrew Snope. In front: David Weber, John Mottinger, Annette Waters

Professor Rhoades's acceptance in 1958 of the Chairmanship of the Botany Department at Indiana University surprised his friends, who were aware of how over the years he had carefully avoided becoming involved in administrative matters. Although without any previous administrative experience, Professor Rhoades proved to be an able chairman and ran a happy department. He was convinced that the successful administrator is one who surrounds himself with the best possible people and then leaves them alone to pursue their scholarly endeavors. With the least interference and the greatest tact, Dr. Rhoades invariably consulted his faculty about major decisions but shielded them from the minor crises and day-to-day problems in the functioning of the department. Several new faculty members were added during his tenure. He took special pleasure in bringing to Indiana one of his first Ph. D. students, Drew

Schwartz, who had established a new area of maize genetics in his study of isozymes. While Chairman, Dr. Rhoades taught his cytogenetics course, carried on an active research program, and directed the thesis problems of graduate students. At one time, he had ten graduate students working under his supervision.

The duties of the Chairmanship were fortunately lighter in the summer months and did not greatly interfere with the work in the experimental field. Thousands of ears from controlled pollinations were harvested each year, more than could be analyzed before the next growing season. It became difficult to find an uninterrupted period for the assembling of data into a finished publication and reports of research were largely confined to articles in the *Maize Genetics Cooperation News Letter*. In 1965 Dr. Rhoades spent a sabbatical semester in Australia, where two long-delayed articles were completed. Although his publication list is not as lengthy as might be expected from the vast amount of time and effort spent in research, each paper presents a significant finding in clear and lucid English. The importance of his research is evidenced by many citations in textbooks and monographs.

Dr. Rhoades has always been completely engrossed in his work. He spends long hours in his laboratory and only rarely can be persuaded to take a few days vacation. He often tells the nascent Ph. D.'s to choose a position where they will be happy in their work and not to be concerned with salary, fringe benefits or location. Dr. Rhoades's pleasure in his research must have been obvious to his four year old son; when asked about his father's occupation, Marc replied that "he played at the laboratory". During his career as a maize geneticist, Dr. Rhoades has received many honors and his outstanding qualities are widely recognized. He nevertheless remains unassuming, considerate of others and is easily approachable. His modest demeanor was no doubt responsible for the astounding statement made by one of the greenhouse aides to the effect that he could learn to do everything Dr. Rhoades did in a period of two weeks!

Of all the many committees and boards on which Professor Rhoades has served, membership on the Selection Committee for Guggenheim Fellowships affords him the most satisfaction. He not only enjoys his association with the extraordinarily able members of the Committee, but also the exposure to varied fields of learning and accomplishment. To read the Guggenheim proposals is truly a feast for a man of his intellectual curiosity.

When Dr. Rhoades is not thinking about research problems he is an omnivorous reader, consuming history, biography, adventure tales and current magazine articles with equal zest. He is an avid sports

fan, following both professional and collegiate teams. Although his brief days of glory as a pole vaulter in high school are long past, he still prides himself on his quick reflexes, whether it be behind the wheel of an automobile or when dealing with a bee in a pollen bag or a mouse in the corn storage area. His prowess at bowling is recorded on a plaque in the Plant Science Building at Cornell University. He took pleasure in being physically fit and at age 60 challenged some of the younger members of his department to a leap upon the loading dock of the biology building. After his successful jump, they withdrew from the contest. Dr. Rhoades has a predilection for wagering on any debatable subject and his friends are well aware that, because of his retentive memory, a bet with him is likely to lead to the loss of a dime, a dollar, or a chocolate soda. The severe coronary he suffered at age 65, just after retiring as Chairman of the Botany Department, forced him to reduce the tempo of his activities. Even though now approaching his 70th year, he puts in long hours and though the pace has slowed, the scope of his activities has not decreased.

Although the cultivation of the experimental fields was the responsibility of the field workers, it not infrequently occurred during a rainy season that weeds threatened to overwhelm the corn plants, many of which were weaklings because of genetic defects. To see his precious plants threatened was more than Professor Rhoades could endure. Rather, he seized a hoe and spent many an hour rescuing his experimental material from the encroaching weeds. When walking through his plots, he never tires of pointing out the potential threat and innocent appearance of the emerging weeds and cannot resist digging out the offenders with the toe of his shoe.

It is no exaggeration to say that he has had a lifelong love affair with the maize plant. Some see only monotony in the endless fields of corn of our mid-western states but to Professor Rhoades they afford unceasing pleasure. In driving through the countryside he would often exclaim "Now there is a good field of corn". Dr. Rhoades knows his experimental material as do few others and no one appreciates more than he the characteristics of the maize plant that make it so favorable an object for genetical and cytogenetical studies. He never tires of examining excellent cytological preparations; these give him the same aesthetic pleasure that others find in music or works of art. Few will dispute the claim that more is known of the cytogenetics of maize than of any other plant and Professor Rhoades is not reticent in extolling the advantages of corn. I remember his summing up a lecture on controlling elements by saying "Maize is amazing". Among his wide circle of friends there are no doubt some who fail to appreciate the virtues of the corn plant, but the sterling qualities of Professor Rhoades are recognized by one and all.