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ALBERT FRANCIS BLAKESLEE

1874—1954

A Biographical Memoir by
EDMUND W. SINNOTT

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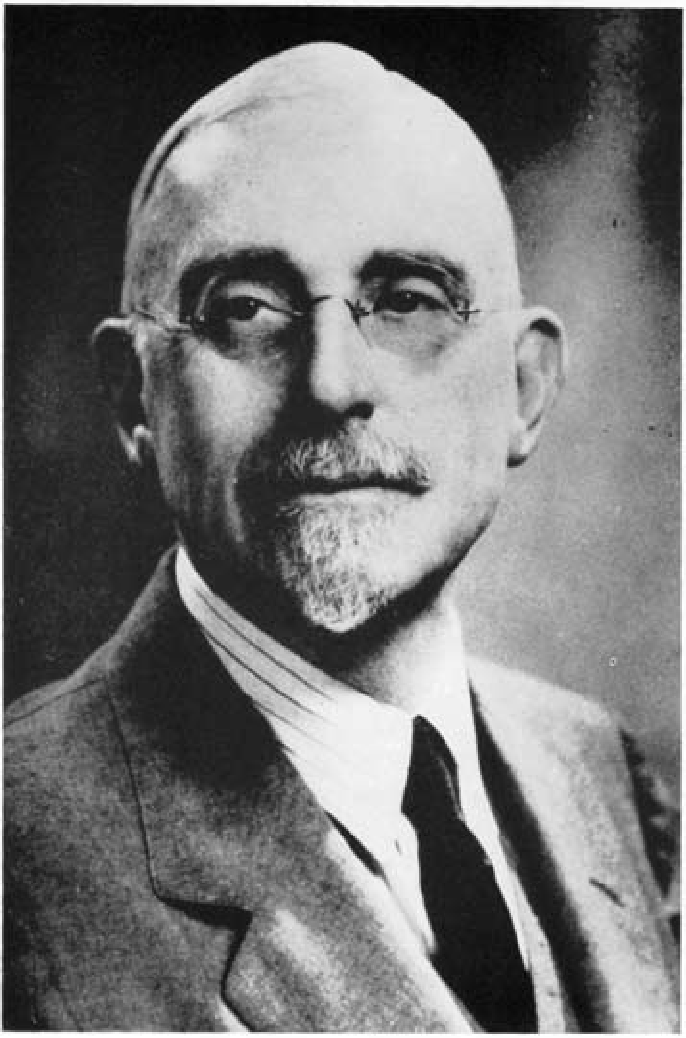

A. F. Blakeslee

ALBERT FRANCIS BLAKESLEE

November 9, 1874–November 16, 1954

BY EDMUND W. SINNOTT

In the death of Albert Francis Blakeslee on November 16, 1954, American botany lost one of its most notable leaders, a man remarkable not only for the high quality of his scientific attainments but also for the breadth of his interests and his friendly concern for the people around him. As a geneticist, he recognized the importance of heredity in determining the character of an organism, but as one concerned for many years in the cultivation of plants, he also knew the necessity of good environment. He himself was fortunate in both these things, since he came from superior human stock and was brought up in surroundings conducive to the full development of his capacities.

Blakeslee was born in Geneseo, New York, on November 9, 1874, in the home of his maternal grandfather. His father, Francis Durbin Blakeslee, was a Methodist minister and educator. Besides serving a number of churches, he had been principal of the East Greenwich (Rhode Island) Academy and of the Casenovia (New York) Seminary. His father's father was also a lifelong Methodist minister. Blakeslee's mother, Augusta Miranda Hubbard, was a remarkable woman, highly gifted and with a brilliant mind, and had a very great influence on the character of her son. She was a daughter of the Hon. Solomon Hubbard, a lawyer and judge of Geneseo, New York, who was an uncle of the author Elbert Hubbard. On both sides Blakeslee's family goes back to early New England.

Most of his boyhood was spent in East Greenwich. He loved out-door life. Very early he showed the strong interest in natural history which distinguished him later, and he collected all sorts of things. A minister once asked him which he liked better, books or bugs. "Bugs," said Bert, "for man made books but God made bugs!" He early showed the originality and nonconformity that later were such important elements in his character.

Blakeslee was fond of the water and was a skillful sailor of small boats on Narragansett Bay. For one summer he worked as deck hand on a private yacht.

His early education was at the East Greenwich Academy, where his father was principal and his mother preceptress. From here he entered Wesleyan University, where he was college tennis champion (almost of national amateur caliber), received his letter in football, made Phi Beta Kappa and won prizes in mathematics and chemistry. After graduating *cum laude* in 1896, he taught mathematics and the sciences in Montpelier Seminary, Vermont, for two years and the same subjects for another year in the East Greenwich Academy.

Teaching was very congenial to Blakeslee and he planned to continue as a preparatory school teacher. Feeling the need for more training, however, he decided to go to Harvard for some graduate work, particularly in botany and zoology. He took a master's degree there in 1900. During this year he came under the influence of two great botanists, W. G. Farlow and Roland Thaxter. They suggested that he try his hand at research in mycology, and Thaxter offered him an assistantship. After attempting several difficult problems without much success, he undertook the classification of the Mucors and gathered a large collection of cultures of these fungi. In attempting to get zygospores for taxonomic study, he observed that they were found only under certain conditions, and this led him to the discovery that to produce zygospores in most species it was necessary to bring together two strains of opposite sexual type, (+) and (−). Such heterothallism, with its suggestion that these simple fungi reproduced by sexual fusion, was a completely new and sensational idea and has had an important influence through the years, both in mycology and genetics. Whether these differences should be regarded as truly sexual in the strict sense may be debated, but Blakeslee so regarded them. For this work he was awarded the Bowdoin prize at Harvard. He received his Ph. D. degree in 1904. This discovery of heterothallism and the publication of his thesis established Blakeslee's reputation as an original investigator. He had found something—research—which was much more exciting than schoolteaching, and to it he devoted himself with energy and enthusiasm for the rest of his life.

During his first year at Harvard he held a teaching fellowship in botany and from 1900 to 1902 he served as instructor at Radcliffe. For two summers he was assistant at the summer school at Cold Spring Harbor, Long Island. He spent the summer of 1903 in Venezuela collecting for the Cryptogamic Herbarium of Harvard.

The Carnegie Institution recognized his ability by a grant which made it possible for him to spend two years abroad, working chiefly in the laboratory of Professor Klebs at Halle. Here he carried on his work with fungi and was able to prove that in some of the Mucors sex determination was made in the zygospore, all spores from one zygospore being either (+) or (−). In other forms, however, this determination occurs later, so that both types are formed in the sporangium coming from one zygospore.

During his first visit to Europe Blakeslee gained much more than scientific knowledge. He learned to speak German and made the most of his opportunities to meet European botanists and visit universities. For the first time he had a chance to acquaint himself with the wealth of art that Europe had to offer, and it made a great impression on him. His letters to his mother show how interested he became in it and the many museums he visited. He gathered a wealth of anecdotes and experiences, too, with which he later regaled his friends, such as the story of his temporary arrest for dashing out into the street and scraping up horse-droppings into a paper bag. He had difficulty in persuading the police that he wanted this material as a means for finding new fungi!

On his return to the United States, Blakeslee went back to Harvard for a year as instructor in botany. Positions were scarce and in 1907 he took the post of Professor of Botany and Director of the Summer School at what then was little more than a farm school, the Connecticut Agricultural College at Storrs (now the University of Connecticut). He was the only Ph. D. on the faculty at that time, but entered on the work with his usual enthusiasm, and spent there eight pleasant and profitable years. He took an active part in the life of the college and proved himself a remarkably fine teacher.

After going to Storrs he found it difficult to carry on his Mucor work, and he also felt that his research should be more in harmony with the nature of the institution. He therefore cast about for problems, but at first failed to find a suitable one. He often remarked that for several years he was almost sterile scientifically. In his course for forestry students, however, he developed keys for the identification of trees in their winter condition, and in cooperation with the horticulturalist at the Experiment Station, C. D. Jarvis, he wrote in 1911 a bulletin entitled "New England Trees in Winter," fully illustrated by photographs which the authors took at various places in New England. The bulletin was later published (1913) as a book, *Trees in Winter,* and became one of the best of its kind. Blakeslee lectured rather widely on trees and aroused much interest in their study during a time of year when they are without their distinctive foliage. In connection with this work he did the first of his genetic experiments with higher plants by making some crosses between a number of tree species, one of them resulting in what was probably the first hybrid pine produced in this country.

He continued to serve for several years as Director of the Summer School, which was widely attended by schoolteachers and others. He always had a party at the conclusion of the course, and one year thought it would be appropriate, at an agricultural college, to serve cider. In the summer, however, all he could find was some hard cider. He masked its vigorous flavor by adding copious amounts of sugar, and it was generously distributed and consumed. Nature was not to be denied, however, and the effect of this brew upon the schoolmarms was said to have been remarkable!

All but a few of the students in the college were planning careers in agriculture or home economics. Blakeslee, therefore, felt that botany should make a contribution to the major purpose of the institution. Accordingly he conceived the idea of developing an agricultural botanical garden in which the students could see growing representatives of the important crop and horticultural plants. He obtained permission to take over a small piece of land for this purpose, and with his usual energy he got it under cultivation and soon made it a valuable adjunct to course work in botany and agriculture. At the meeting of the A. A. A. S. in 1909 he took part in a symposium before Section G with a paper on "The Botanic Garden as a Field Museum of Agriculture." He devoted much effort to expanding this garden and its usefulness during his remaining years at Storrs.

To more strictly agricultural problems he also made contributions. Observing that the fancy points by which poultry were judged at shows seemed to have little relation to their productivity, he tried to find characters that might be correlated with high egg yield. Pale yellow color of legs, beak, and vent seemed such a trait, due presumably to the withdrawal of yellow pigment from the bird's body to the egg yolks. The International Egg-laying Contest had been started at Storrs and this made data available on hundreds of hens with trapnest records. To measure intensity of pigment Blakeslee used a color top by which varying proportions of yellow and white could be blended. He and Professor Warner of the poultry department measured the color of hundreds of birds and established a close negative correlation between the intensity of color and the time since the last egg was laid. By this means culling of unproductive birds could be done much more simply than by trap-nesting—a real contribution to agricultural practice. Blakeslee tried to do the same thing with cows, by studying the color of the "dandruff" at the end of the tail, on the assumption that this would be paler in the animals which produced more cream. This technique proved less profitable, however.

About this time Blakeslee's interest in genetics began to develop, particularly in connection with some of the plants that he was growing in the botanical garden. He began to look for mutations, and thought he had found a mutating species in *Rudbeckia hirta,* the black-eyed Susan, which he collected extensively. This proved difficult material, however, though he was able to distinguish chemically two complementary yellow-coned types which, when crossed together, produced plants with purple cones.

Much more important proved to be his introduction to the Jimson weed, *Datura stramonium.* Blakeslee had received from the United States Department of Agriculture for the Botanical Garden a package of seed of this species as an example of an economic weed. The lot happened to include both white-flowered and purple-flowered types, a difference produced by a single gene. Soon after this, seed of the smooth-capsuled type (the normal plants are spiny) was also obtained, so that two different pairs of genes were available. This made excellent material for class work in genetics, since various ratios could be produced which students might study in the garden. These *Datura* cultures were the basis of much of his later work in genetics.

Blakeslee was invited to the Carnegie Institution's Station for Experimental Evolution at Cold Spring Harbor for the year 1912–1913, on leave from the college, and while there he resumed his earlier work on sexual reactions in the Mucors. Here he attempted, in cooperation with R. A. Gortner, to identify possible differences between the proteins of the two mating types by their precipitin reactions, but the extracts injected into rabbits proved so toxic that the experiment was discontinued. The powerful toxin in the common mold *Rhizopus* became of interest to the Bureau of Chemistry in Washington, and Blakeslee cooperated with the bureau by furnishing dried mycelium in quantity.

Back at Storrs, he was able to obtain from the college authorities the appointment of an instructor in botany, who relieved him of some of the pressure of teaching and allowed him to devote more time to research. This research soon began to turn in the direction of *Datura* genetics, foreshadowing his long study of this plant. Among the cultures of it grown for class work there appeared one plant with a more rounded capsule, differing from normal in other respects as well. It was called "Globe," and its traits were transmitted infrequently through its pollen and only through about a quarter of its ovules. It later proved to be a trisomic or $2n+1$ type, one of the forms which later proved to be so important. The chromosomal basis of these was still unknown, but evidently *Datura* was going to prove interesting genetically, and Blakeslee began to study it carefully.

In his advanced work in botany he devoted more attention to genetics and in 1914–15 gave an undergraduate course in this subject, probably the first organized course in genetics in the United States. His title was now changed to Professor of Botany and Genetics.

Early in 1915 the Carnegie Institution invited him to come to Cold Spring Harbor as resident investigator in genetics to fill the post formerly held by G. H. Shull, who had been called to Princeton. Blakeslee was uncertain whether to accept or not. The opportunity for research attracted him, but he was happy at Storrs and loved teaching. He finally told the director, C. B. Davenport, that he would come, and promised to stay two years, but said that he planned eventually to get back to teaching. This he never had the opportunity to do until he went to Smith College in his later years.

Blakeslee not only loved to teach but did it extremely well. He had the faculty of arousing the interest and intellectual curiosity of his students to a high degree. For example, one day when the class was studying protoplasmic streaming in *Elodea* he raised the question as to how fast a plastid was carried along in the stream. A stop watch was secured and the speed was timed. Did the plastid move, relative to its length, as fast as a horse, or not? How long was a horse? The class could not agree on this, and finally went outside and measured one! Now they could translate the relative speeds of streaming in plastid and quadruped. Blakeslee taught for only a few years but there are scores of men and women in Connecticut and elsewhere who remember their work with him as one of the high spots of their college careers.

The decision to move to Cold Spring Harbor was a grave one and quite changed the character of Blakeslee's life. His new environment was not academic and he missed not only his teaching but also the pleasant associations of a small, rural community. As compensation, however, he was now in an atmosphere of research and into this work he threw himself with his accustomed energy and enthusiasm. *Datura* he brought with him, but before concentrating on it he cast about for other favorable material for genetic research. For a time he grew adzuki beans, *Portulaca,* and many other species. Clouds of war were on the horizon, and after war came his work was somewhat disrupted, for he felt that he should direct it toward more practical ends. The war was unfortunate for him in other ways, for it took into the army his brilliant assistant, B. T. Avery, a former student whom Blakeslee had brought with him from Storrs. Avery died near the end of the war and his loss was a severe one. His brother A. G. Avery became Blakeslee's assistant and served in this capacity for twenty-eight years.

With the return of "normalcy," however, Blakeslee's research became very active and now was centered chiefly on *Datura.* One new form after another began to appear in his cultures. Some were gene mutations but many were evidently different. These produced some offspring like themselves but threw many normal plants. For an outsider to recognize these forms was difficult, since most of their differences were subtle ones. It was the despair of his colleagues to see Blakeslee go down a row of plants and pick out these mutants unerringly. This he could do partly because of his acute powers of observation and partly because he was personally familiar with his material and did not leave the observing and recording to his assistants alone.

The size of the *Datura* cultures increased and in the summer as many as 70,000 plants were grown. Work was actively carried on in the winter, as well, in the six greenhouses and laboratories.

Datura justified the choice of it as a research plant. It was easy to grow. Though naturally rank, it remained small if not given too much nitrogen, and could be made to flower and fruit early in pots or in the field. It had all the vigor and vitality of a true weed. Its disadvantages were an unpleasant odor and the possession of a powerful alkaloid, stramonium, in its sap, which sometimes produced unpleasant effects. Blakeslee became attached to this coarse, weedy plant with its beautiful flowers and once rose vigorously to its defense. Edna St. Vincent Millay, in her poem "In the Grave No Flowers," had written

Here beggar-ticks, 'tis true,
Here the rank-smelling
Thorn-apple,—and who
Would plant this by his dwelling?

This aspersion on *Datura* was too much for Blakeslee to take without a protest. "I thought I would write you," he said in a letter to Miss Millay in 1947, "and tell you the answer to your question by saying that *I* would plant this by my dwelling and have done so for the last thirty years rather extensively. It turns out that this plant (*Datura stramonium*) is perhaps the very best plant with which to discover principles of heredity." He then went on to ask her about the name "thorn-apple," and said he wished that he had used it instead of Jimson weed, the name given it by soldiers sent to Jamestown, Virginia, to put down Bacon's rebellion in 1676.

The *Datura* program did not go far in the direction of mapping genes in chromosomes, as had been done with maize and *Drosophila,* but instead concentrated on the behavior and genetic effects of individual chromosomes and their parts. This began in 1920 through the fortunate collaboration between Blakeslee and a distinguished cytologist, John Belling, then a visiting investigator at the station. By use of his aceto-carmine stain and the smear technique, Belling was able to make wholesale chromosome determinations quickly. Most of the strange mutants that had been turning up in the *Datura* cultures proved to be trisomics, plants in which one of the twelve pairs of chromosomes was represented by three instead of two. This was an interesting discovery and explained why these forms did not breed true, for at meiosis only half of the eggs would have the extra chromosome and produce trisomics. This chromosome was seldom carried by the pollen. Belling's connection with these investigations ceased in 1924, but the cytological work was ably continued by Dorothy Bergner.

Since there are twelve pairs of chromosomes in *Datura,* there should be twelve possible trisomic types. One by one these appeared and were duly named—"Globe," "Poinsettia," "Sugar-loaf," and the rest. The unexpected advent of a thirteenth trisomic, however, showed that the problem was not quite so simple. There were evidently relationships among the trisomics, for certain ones produced others rather consistently. The problem was finally cleared up by the demonstration, genetic and cytological, that in some trisomics (the *primaries*) the extra chromosome was one of the twelve usual ones, whereas in others (the *secondaries*) it was one in which one of the two halves of this chromosome had been doubled. Thus there should be two secondaries for every primary, though these were not always found. There were also *tertiary* mutants, in which the extra chromosome was made up of parts from two different chromosomes. In *compensating* types, also $2n+1$, one member of a normal pair was missing, but this loss was made up by having the two halves of this chromosome attached to two others.

Again with Belling's help it was also possible to distinguish types in which reciprocal translocation had taken place through exchange of pieces between two nonhomologous chromosomes. Since no genes are lost in such a process, a race with one or more translocations cannot be distinguished externally. In a cross between two races differing by such translocations, however, similar chromosome ends attract each other at meiosis and rings are formed containing four, six, or more chromosomes. By crossing the original Line 1A with other races of *Datura stramonium* from various parts of the world, Blakeslee was able to distinguish a considerable number of cryptic or prime types, races which were not yet different in their genes but had undergone a certain amount of rearrangement of chromosome material, a step in the process of evolution. This was progress toward the original goal of the station at Cold Spring Harbor—"Experimental Evolution."

Among the early cultures a plant was found which was somewhat stockier than the rest and had a broader capsule. It proved fertile with itself but was nearly sterile in crosses, and Blakeslee called it "New Species." It later proved to be a tetraploid and opened up another series of problems.

Tetraploids were useful in the production of triploids through an occasional hybrid with diploid. The triploids, in turn, were a fertile source of trisomics and other chromosomal types. More exciting than the tetraploid, however, was a haploid plant that turned up among the offspring of a normal individual. It was weak and almost sterile, but undoubtedly haploid, the first to be discovered among vascular plants. Haploid plants, botanists had been taught to believe, should be gametophytes, but this was an undoubted sporophyte. Thus Blakeslee possessed a continuous polyploid series,—1n, 2n, 3n, and 4n—and could determine the effects, as to size and shape, which were produced by increased number of chromosome sets.

Interest in polyploidy was increased by the discovery, in 1937, of the fact that the alkaloid colchicine under certain conditions would induce a doubling of the chromosome number. Blakeslee was one of the first to recognize the importance of this discovery and he vigorously developed its applications, not only in *Datura* but in other plants.

The most important result of the colchicine technique for the *Datura* research was that it made possible, through treatment of germinating seeds, the occasional production of periclinal chimeras, tissue mixtures where the outermost one or two cell layers at the meristem had their chromosome number doubled, or sometimes even quadrupled. Once established, these layers maintained themselves throughout the development of the plant. Such a chimera was of no very marked significance genetically, but Blakeslee saw at once its importance in morphology, for these cell layers, since they differ in number of chromosome sets, differ also in cell size. The structures that are formed by each layer could thus be recognized histologically. In this way it was possible to determine, through a study of cell size in leaves, petals, sepals, stamens, and pistil, what contributions to the development of each had been made by the various meristematic layers. Blakeslee and his colleague, Miss Satina, were thus able to make some very interesting contributions to our knowledge of plant morphology and development. Blakeslee regarded these layers as true germ layers, comparable in a sense to those of animals, though this was disputed by some morphologists.

Early in the *Datura* work the problem arose as to why the addition of a single chromosome, in a trisomic, often made a much greater change than the addition of a whole chromosome set. The effect of a single extra chromosome was evidently to emphasize the contribution of the genes it contained, and thus tip the balance in their direction. Adding a whole chromosome set did not have this effect, and Blakeslee recognized the importance of this concept of genic balance. The diploid should thus, in a sense, be the average of the twelve trisomic mutants.

To establish this, it was necessary to use characters which could be expressed quantitatively. For this purpose, certain structural traits proved of value. The present writer was fortunate enough to be able to collaborate in this problem. It was possible to get a fair measure of the differences between the twelve trisomics in a considerable number of anatomical characters, and the diploid turned out to be approximately the average of the twelve in most characters. Some interesting facts as to the genetic determination of anatomical traits also came from this study.

The inability to obtain seed from certain crosses, even when the pollen was apparently good and would germinate on the style, was often a block to genetic studies, and this turned Blakeslee's attention to problems of pollen tube growth. Here he enlisted the collaboration of J. T. Buchholz, who for several summers carried on a fruitful study of it. By the use of a differential stain which he developed he was able to distinguish microscopically the pollen tubes from the stylar tissue in which they were growing, and he often found that tubes from certain sorts of pollen grew more slowly than the rest and thus did not reach the ovary in time to effect fertilization. To overcome this difficulty, Buchholz spliced a stigma directly to the top of the ovary, thus shortening the distance to the ovules and making possible many crosses which could not otherwise have been obtained.

Obviously it was important to get as large a supply of new mutant types as possible for study. Through collaboration with C. S. Gager, radium emanation was used for this purpose and produced some of the first mutations to be made by radiation among the higher plants. X rays were also employed successfully. Later, the Atomic Energy Commission requested him to study the effects of thermal neutrons and radiations from nuclear detonations and from a cyclotron in the production of chromosome and gene mutations by using the *Datura* material.

Blakeslee noticed that seed which had been kept a long time in storage produced more mutations than fresh seed, and this led him into some physiological problems. In the later years of the *Datura* work, at Smith College, he went still further into physiology by studying the development of early embryos in culture and their nutritional requirements.

In these various approaches to *Datura* genetics, the more familiar techniques of genetic analysis were not neglected, although they did not form the central theme of the work. There were 541 genes found, of which 81 were located in specific chromosomes, some in each of the 12. This was done not only by the usual means of linkage data, but also in other ways, as by the use of trisomic ratios, of compensating types, of pollen-abortion genes, and of data from certain prime types.

Aside from his success in research, two of Blakeslee's qualities are conspicuous in this *Datura* program. He was always on the watch for new lines of attack on the basic problem, approaching it not only from the point of view of genetics but also from those of cytology, evolution, anatomy, morphology, and physiology; and he drew into collaboration with him a group of scientists with special knowledge of their particular fields who were able to contribute to the solution of the *Datura* problems. It was characteristic of him, too, that he provided his collaborators with good support and left them free to work out their ideas, helping them in whatever way he could. In the true sense of the word the *Datura* program was a cooperative one. Its head was no dictator, but simply *primus inter pares*.

Although *Datura* held the center of his attention scientifically for most of his productive life, Blakeslee's interests were so wide that he was continually exploring other problems. Notable among these was the genetics of taste. In 1917 he had noticed that a pink-flowering *Verbena* plant which had a pleasant odor to him was without odor to his assistant, and that a red one which was odorless to him was fragrant to his assistant. He began to watch for differences in olfactory acuteness and then in taste. In 1931 he discovered that there were sharp differences among people in their ability to taste various chemical substances, notably phenyl-thio-carbamide (PTC). To some this was tasteless but to many others very bitter, and individual sensory thresholds to concentrations of it were markedly different. Furthermore, the ability to taste it seemed to be inherited. This interested Blakeslee intensely, not only from a genetic viewpoint but also because of its bearing on fundamental human differences in reaction to the outside world. At several meetings of scientific associations he set up a little booth where hundreds of people were tested for their PTC reactions, and gathered some very interesting data.

The basis of sex was another field of interest. His earlier work involved the demonstration of what he regarded as sexual differences in molds, and he was always anxious to find a chemical basis for this. When he learned of the Manoilov reaction, he at once applied it to his Mucors and found that the (+) and (—) strains reacted differently to it. He then tried it out on certain dioecious plants and could separate the staminate from the pistillate by its means.

He was much interested in better techniques for his work and invented some himself. Buchholz's novel methods in the study of pollen tube growth delighted him. He tried tissue cultures in various problems. He and J. van Overbeek endeavored to induce parthenogenesis by injecting various chemicals into young ovaries. Later Blakeslee and his students grew *Datura* embryos in culture, and in 1944 he convened at Smith College an important conference on embryo culture.

Research did not comprise Blakeslee's entire interest. He ran his own *Datura* program smoothly and efficiently and in an atmosphere of good will. It was only natural, therefore, that on Dr. C. B. Davenport's retirement in 1934 Blakeslee should be chosen acting director of the station, and then director in 1935. This required a good deal of time and thought, but he gave it gladly and made an excellent administrator. He was interested not only in the scientific program of the laboratory but also in the welfare of the members of his staff, young and old.

In 1941 Blakeslee reached the age of retirement and left his post at Cold Spring Harbor where he had labored so successfully for twenty-six years. Still vigorous in mind and body and eager to continue his work, he cast about for an opportunity to do so. He had the good fortune, at this critical time, to be invited to serve as William Allan Neilson Research Professor of Botany at Smith College for 1942–43. The next year he was appointed visiting professor there and, thanks to support from other sources, as well, he organized the Smith College Genetics Experiment Station, bringing to Northampton two former members (Satina and Avery) of his staff at Cold Spring Harbor. He succeeded in getting funds for a new greenhouse. To set up this station and get it supported and running smoothly required no little executive ability, diplomacy, and persistence. He had to secure financial support from many societies, foundations, and private donors, and was very successful in doing this. To develop a competent staff was another problem. That these jobs were well done is testified by the fact that Blakeslee and his group had twelve very productive years at Smith. Here *Datura* had its second blooming. The list of papers turned out from the new laboratory is imposing, both as to their quality and the extent of the fields covered. Blakeslee not only continued his earlier studies in *Datura* genetics, but expanded it to include work on the physiology and embryology of this plant. In it J. Rappaport and afterward J. Rietsma cooperated.

Quite outside his research interests, Blakeslee was a good scientific citizen and devoted his energy, good sense, and wide acquaintance to the solution of a number of administrative problems in the biological profession. In 1935 when the *American Journal of Botany* was having financial difficulties and was unable to publish all the worthy material sent to it without a delay of two years, he was made chairman of a committee to study the situation. To this he devoted much time, and his committee's report was the basis for a reorganization of the publication policies of the Society and the *Journal* which resulted in a great reduction in the costs of publication.

Blakeslee was president of the Trustees of *Biological Abstracts* when that journal was going through similar financial difficulties, and his initiative and good judgment did much to avert a catastrophe to this useful publication. He brought the experience he had gained with these two publications to the assistance of others.

He was the original instigator of the movement which led to the establishment of the National Science Fund. He was a member of the Board of Managers of the New York Botanical Garden. He was president of various scientific societies, among them the American Association for the Advancement of Science. These offices he regarded not simply as honorific assignments to him but as opportunities to advance the interests of the organizations. His presence at the often somewhat formal meetings of their officers was like a breath of fresh air, and he was instrumental in inaugurating many new ideas and policies. He was made a member of many foreign scientific societies and received honorary degrees from universities of four continents (see list of honors).

Blakeslee's interests were not confined to existing scientific organizations. In one case, at least, he started a new one. Not long after coming to Smith College in 1942 he suggested that the faculty and students at Smith, Mt. Holyoke, Amherst, and the University of Massachusetts—institutions located near each other—who were interested in genetics and related fields should get together from time to time for discussion of problems in these subjects and for the presentation of papers. The Four-College Genetics Conference was the result, an organization which has done much to stimulate interest in genetics in these institutions.

There was probably no botanist in the country who had as wide an acquaintance among the botanical profession as Blakeslee had. He was usually present at the meetings of the many scientific societies to which he belonged. At these gatherings he made it a point to meet scientists whom he did not know. He exchanged ideas with them and kept in touch with developments not only in botany but in other sciences, as well. Blakeslee was also widely known among European botanists, for he always attended the International Botanical Congresses and he held important offices in them. At the last one, in Paris in 1954, he could not be present because of ill health, though until the last minute he had planned to attend.

In 1924 the Carnegie Institution sent him as its delegate to the Pan-American Scientific Congress at Lima, Peru, and in 1947–48 he was delegate of the American Association for the Advancement of Science to the Indian Scientific Congress. In 1929 he was elected to membership in the National Academy of Sciences. In 1931–33 he was a member of the Division of Biology and Agriculture of the National Research Council.

Harvard recognized his qualities and made him a lecturer there in 1948–49, where he gave a course in genetics. He was also a member of the Visiting Committee for Biology and the Bussey Institution in 1952.

Beyond this work in his professional organizations, Blakeslee was broadly interested in human affairs generally, and especially in education. At Storrs he wrote a paper entitled "Corn and Men," in which he showed that human beings vary genetically just as corn does, and that they are also susceptible to environmental influences. In "Corn and Education," published later, he amplified this idea. Later he had the opportunity to show in a practical way his interest in education, for he was long the chairman of the trustees of the Cold Spring Harbor School District.

He made many suggestions for the consideration of educators and, though these were not all accepted, they stimulated thought. One of them was to establish a school in New York City in which all the pupils should be identical twins. Investigation showed him that there were about 150 pairs of such twins in the New York public school system. By the use of identical twins, genetic differences would be eliminated. He proposed that one of each pair be taught by the new educational techniques and the other by traditional methods, as a control. The idea still seems to be sound!

Another suggestion was that the Carnegie Foundation award pensions to deserving individual teachers regardless of their institution, and not simply to members of the faculties of a selected list of universities. Still another suggestion, to the universities this time, was to use their honorary degrees more productively. He believed that such degrees should be given more often than they now are to young and active scholars who would gain encouragement and recognition thereby. He also suggested that they be awarded to promising men in academic life who did not have the doctorate and who thus were denied preferment.

Particularly after coming to Smith College, his thoughts turned to matters of undergraduate education. He delighted in having the opportunity of associating with such students again and took a lively interest in their work. His old teaching skills came back. In a very readable paper, "Teachers Talk too Much," he described a chapel talk he gave at Smith on the function of a college education. At its conclusion he distributed slips of paper impregnated with PTC and asked each student to taste one. This created a mild sensation, for the young ladies found that a substance violently bitter to some had no taste at all to others. This did more to convince the girls of the existence of genetic variability in the human species than any amount of talking. Few students—or faculty members—remembered long what he had said in his talk, but they never forgot the taste test.

This incident emphasizes Blakeslee's ability to dramatize his point, as a good teacher should. He was a wonderful showman and even his scientific papers were often vividly illustrated. To emphasize the human diversity in ability to taste and smell, he arranged a series of tests at the biologists' dinner at the summer meeting of the AAAS at Berkeley in 1935. Here the guests recorded their reactions to benzoate of soda, PTC of two concentrations, mannose, artichokes followed by water, and to the odors of several kinds of flowers.

In his later years he was much concerned with the intellectual life of undergraduates. He was chosen president of both the Sigma Xi and the Phi Beta Kappa chapters at Smith, and it was characteristic of the man that at the end of his term in each office he presented to the members a list of suggestions—thirty in the case of Sigma Xi!—which he felt it would be beneficial to adopt.

Not only the problems of students received his attention. From the days when he served as chairman of the social committee at the Connecticut Agricultural College through his years at Cold Spring Harbor, and especially during his service at Smith, human relations interested him. He was elected president of the Smith Faculty Club and made it a much more active center of faculty life. So successful was it that the trustees of the college voted to underwrite some of its expenses. One of his friends in industry became interested in the club and donated $10,000 to redecorate the clubhouse and install labor-saving devices in the kitchen. During his term as president he gave much thought to the way in which the four neighboring colleges handled the problems of human relations among their faculties and staffs, and in 1948 he invited representatives from these institutions to a Four-College Human Relations Conference at the Smith faculty club to discuss this matter.

Blakeslee was also concerned with the relations between the college and the community, often a thorny problem. As president of the Northampton Leonard Club (a town-and-gown club) he made it a more active organization and helped meet this problem.

In almost everything he did he introduced an element of good humor. This shows particularly, perhaps, in one of the last of his efforts towards improving human relations. He was impressed, as his birthdays accumulated, with the desirability of bringing together the older and retired members of the faculty and staff, for their own enjoyment and the elevation of their morale. Consequently he founded the OBND Club (Out But Not Down)! These oldsters foregathered for two dinners a year and a monthly luncheon at the faculty club.

These activities all emphasize Blakeslee's intense and friendly interest in people. In a letter he wrote to a member of OBND only ten days before his death he remarked that "being one of the begatees of clergy (children of ministers) I acquired by inheritance and environment a somewhat sensitive conscience which I have not always succeeded in keeping under control." During his whole life, this conscience was always at his elbow.

His friendly spirit and concern for the welfare of other people was evident all through his scientific career. What made the *Datura* program at Cold Spring Harbor so successful was not only Blakeslee's scientific insight, energy, and imagination but the spirit of the group who participated in it, from gardeners to professors. Every summer there gathered for work in laboratory, greenhouse, and field a considerable number of men and women from other institutions. Most of them were young, and he delighted in working with them. It was unfortunate that through these years he could have no graduate students, but these young people in a sense were his graduate students. Many of them went on to careers in genetics and they owed not a little of their success to the stimulus that he provided.

With the older men and women, his professional colleagues, his relations were also friendly and stimulating. He gave them the best facilities available for their work and enjoyed the give-and-take of exchanging ideas with them. He was generous with everyone in the allocation of credit. Belling, who aided the *Datura* work so fruitfully, was given full recognition for his contributions, and the same is true for the others. It is significant that in most of his papers his name did not appear alone, but that he shared the authorship with others.

Blakeslee's contacts with his colleagues extended far beyond the field and laboratory. The hospitality of his home was one of the delightful aspects of working with him. No description of his life and service to his fellows can leave out the very vital share in all of it contributed by his charming wife. Margaret Dickson Bridges was a daughter of the Rev. William James Bridges of Binghamton, New York, and was a friend of Blakeslee's sister, through whom she met him. She was a graduate of Smith College and was later trained for the profession of nursing. She and Blakeslee were married on June 26, 1919. Both were past their first youth at the time, but it proved to be an ideal marriage. The Blakeslees had a large house not far from the laboratory and entertained in it with delightful charm and informality. During the summer their home always sheltered several of the visiting *Datura* workers, and sometimes their families, as well. Mrs. Blakeslee's interest in these friends of her husband was no less than his own, and she brought to their entertainment the charm of her personality. When Blakeslee became director of the station his social responsibilities were increased, and here his wife was of inestimable service to him. She also accompanied him on his trips abroad and to many of the scientific meetings in this country, and was a helpmeet to him in every sense of the word. A friend once said that Blakeslee had two great loves—Margaret and *Datura,* and in that order. Her sudden death in 1947 left him desolate and he never fully recovered from the shock of it.

The social life of the Cold Spring Harbor laboratory in the summer, centering in the Blakeslees, involved more than their home. There were beach parties and picnics which those fortunate enough to share will never forget. Blakeslee's songs, recitations, and impromptu speeches were a delight, and he was a catalyzer of fun and good times.

No story of the Blakeslees would be complete without mention of Prince, their little dachshund. This remarkable dog was with them for years and shared much of their lives. He was extremely intelligent and Blakeslee taught him a host of tricks. He would dance around the dinner table on his hind legs for a tidbit. When his master whistled, "Where did you get that hat," he fetched the hat. Not till he heard reveille whistled in the morning would he come upstairs, nor would he cross the road until the signal came. For miles he rode on the fender of his master's car, and he could distinguish the sound of this particular car from that of all the others, and would rouse himself and go to the door when it entered the station yard. To the pleasure of life in the Blakeslee circle, Prince contributed his not inconsiderable share.

Blakeslee was a many-sided person. His versatility was great and his energy and persistence boundless. He was no narrow specialist but combined a devotion to science with a warm appreciation for the humanities. He loved art sincerely and used to lecture on it at Storrs and elsewhere. He seized every chance to visit art museums and became a connoisseur of some distinction. The beauties of nature always appealed to him. Music moved him, and in his last days, sick and alone, he consoled himself by playing records of the classics that he knew so well. He loved children and had a way with them. A born nurse, he almost made medicine his career. His friends remember countless instances of his thoughtfulness and consideration for others, though he would often pass these off with a smile or jest. He was a man of great reticence, and only rarely did there come to the surface the deep feelings that stirred him. In his death science has lost a skilled practitioner, but to his friends, scientists and laymen alike, the loss is a deeply personal one.

HONORS

MEMBERSHIP IN AMERICAN HONORS SOCIETIES:

American Academy of Arts and Sciences
American Philosophical Society
National Academy of Sciences

PRESIDENCIES OF AMERICAN SCIENTIFIC SOCIETIES:

American Association for the Advancement of Science, 1940
American Society of Naturalists, 1930
Botanical Society of America, 1950
Society for the Study of Development and Growth, 1946
Torrey Botanical Club, 1933

HONORARY MEMBERSHIP IN FOREIGN SCIENTIFIC SOCIETIES:

Genetics Society of Japan (Honorary Member)
Académie des Sciences, Institut de France (Foreign Member)
Linnaean Society of London (Foreign Member)
Mycological Society of Leningrad (Honorary Member)
Nederlandsche Botanische Vereeniging (Corresponding Member)
Royal Academy of Belgium (Associate Member)
Royal Danish Academy of Science (Foreign Member)
Royal Physiographical Society of Lund (Foreign Member)
Royal Swedish Academy of Science (Foreign Member)
Société de Biologie de Paris (Associate Member)
Society of Naturalists of Moscow (Honorary Member)
Société Royale de Botanique de Belgique (Associate Member)

HONORARY DEGREES:

D. Sc., University of San Marcos, Lima, Peru, 1925
D. Sc., Wesleyan University, 1931
LL. D., University of Arkansas, 1947
D. Sc., Yale University, 1947
D. Sc., University of Delhi, India, 1947
D. Sc., The Sorbonne, Paris, 1951
D. Sc., Smith College, 1952

MEDALS AND PRIZES:

A. Cressy Morrison Prize, New York Academy of Sciences, 1926
Henry de Jouvenal Prize, Palais de la Découverte, 1938
George Robert White Medal of Honor, Massachusetts Horticultural Society, 1952

KEY TO ABBREVIATIONS

Amer. Biol. Teacher = American Biology Teacher
Amer. Home = American Home
Amer. Jour. Bot. = American Journal of Botany
Amer. Jour. Physiol. = American Journal of Physiology
Amer. Nat. = American Naturalist
Amer. Phil. Soc. Yearb. = American Philosophical Society Yearbook
Annal. Mycolog. = Annales Mycologici
Annals N. Y. Acad. Sci. = Annals of the New York Academy of Sciences
Biochem. Bull. = Biochemical Bulletin
Biol. Bull. = Biological Bulletin
Bot. Gaz. = Botanical Gazette
Brooklyn Bot. Garden Mem. = Brooklyn Botanic Garden Memoirs
Bull. Torrey Bot. Club = Bulletin of the Torrey Botanical Club
Carnegie Inst. Wash. Publ. = Carnegie Institution of Washington Publications
Compt. Rend. Acad. Sci. Paris = Comptes-rendu, Académie des Sciences, Paris
Jour. Genet. = Journal of Genetics
Jour. Hered. = Journal of Heredity
Mem. Hort. Soc. N. Y. = Memoirs of the Horticultural Society of New York
Mem. N. Y. Bot. Garden = Memoirs of the New York Botanical Garden
Mycol. Centralbl. = Mycologisches Centralblatt
Nat. Hort. Mag. = National Horticultural Magazine
Proc. Amer. Acad. Arts Sci. = Proceedings of the American Academy of Arts and Sciences
Proc. Amer. Phil. Soc. = Proceedings of the American Philosophical Society
Proc. First Nat. Cancer Conf. = Proceedings of the First National Cancer Conference
Proc. Int. Cong. Pl. Sci. = Proceedings of the International Congress of Plant Sciences
Proc. Nat. Acad. Sci. = Proceedings of the National Academy of Sciences
Proc. Seventh Int. Cong. Genet. = Proceedings of the Seventh International Congress of Genetics
Proc. Sixth Int. Cong. Genet. = Proceedings of the Sixth International Congress of Genetics
Proc. Soc. Exp. Biol. Med. = Proceedings of the Society for Experimental Biology and Medicine
Records Genet. Soc. Amer. = Records of the Genetics Society of America
Sci. Monthly = Scientific Monthly
Storrs Exp. Sta. Bull. = Storrs (Conn.) Experiment Station Bulletin
U. S. D. A. Handbook = United States Department of Agriculture Handbook
U. S. D. A. Yearb. = United States Department of Agriculture Yearbook
Yearb. United Hort. = Yearbook of United Horticulture
Zeitschr. Ind. Abst. Vererb. = Zeitschrift für Inductive Abstammungs- und Vererbungslehre

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