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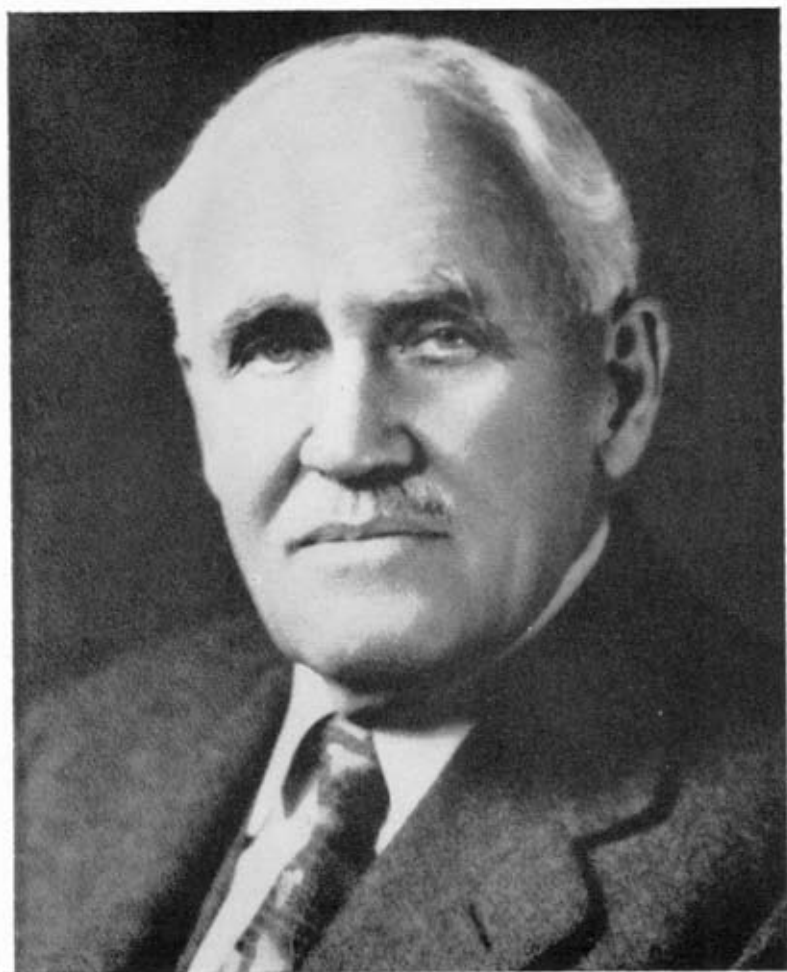
ROBERT ALMER HARPER

1862–1946

BY

CHARLES THOM

PRESENTED TO THE ACADEMY AT THE ANNUAL MEETING, 1948



R. A. Harfen

ROBERT A. HARPER—CHRONOLOGY

- 1862—Born at LeClaire, Iowa, Jan. 21
1863—Parents moved to Port Byron, Ill. Elementary education at Port Byron
1882—Entered Oberlin College
1886—A.B. Oberlin College
1886-88—Taught Greek and Latin in Gates College, Neligh, Nebraska
1888 (Fall)—Graduate Student, Johns Hopkins University
1889 (Spring)—Taught science and mathematics at State Normal School, California, Pa.
1889-91—Master in Sciences, Lake Forest Academy
1891—A.M. Oberlin College
1891-96—Professor of Botany and Geology, Lake Forest College
1894-96—On leave for study in Europe
 94-95—At Bonn, with Strasburger
 95 (Spring)—At Munster with Brefeld
 95-96—At Bonn
1896-98—Professor of Biology, Lake Forest College
1898—Professor and Head, of Botany, University of Wisconsin
1899—Married Alice Jean McQueen, who died 1909
1909—Elected: American Philosophical Society
1910—Elected: Phi Beta Kappa—Oberlin
1910—Sigma Xi—University of Wisconsin
1911—Member National Academy of Sciences
1911—February to August—Visiting Professor University of California
1911-1930—Torrey Professor and Head of Department of Botany, Columbia University
1911—Member of Torrey Botanical Club, President 1914, 15, 16
1911-1942—Member of Board of Managers of N. Y. Botanical Garden
1916—President Botanical Society of America
1918-1933—Chairman of Scientific Directors, N. Y. Botanical Garden
1918—Married Helen Sherman
1923-24—Chairman of Division of Biology and Agriculture, National Research Council
1930—Professor Emeritus
1938—Retired to his farm near Bedford, Virginia
1945—Donated his reprint collection of 15000 units to New York Botanical Garden
1946—Died May 12.

ROBERT ALMER HARPER

1862-1946

BY CHARLES THOM

Robert Almer Harper¹ was born at LeClaire, Iowa, on January 21, 1862. His parents moved to Port Byron the next year. His father, Almer Sexton Harper, was a Congregational Minister, a graduate of Oberlin College, and of the Oberlin Theological Seminary in 1853. His wife Eunice Thompson from New York and New Jersey antecedents, had been a classmate at Oberlin. Both were actively connected with educational projects as well as church work. Their three sons, Edward Thompson, Robert Almer and Eugene Howard were thus brought up in an atmosphere of scholarship. Edward after a boyhood interest in plants turned to theology, took his doctorate in Leipzig and became a professor in Chicago Theological Seminary. Robert stayed with botany and Eugene went to zoology but eventually turned to farming.

Dodge in his memoir followed the Harpers one generation further back. Almer Sexton Harper was born in Indiana in 1826, the ninth child, his father Edward Harper was born in 1779 in the Charleston district of South Carolina. Edward Harper married Charity Reed, a school teacher from Connecticut. After several moves in the Carolinas, mostly in pioneer villages, we find them with five children moving to

¹ Professor Harper collected no biographical data. He evidently put little value upon such material in spite of much study in the field of plant genetics. The writer of this memoir was the first graduate student to take a degree with him (A.M. Lake Forest 1897). Personal relations as a student had begun in 1889 and casual contact continued until retirement. He acknowledges freely using the various published notices and memoirs of Dr. Harper, especially those of Stout (*Journal of N. Y. Botanical Garden* 47 (563): 267-269, 1946); Dodge (*American Philosophical Society Yearbook* 1946: 304-313); the committee report (MS) of Dodge, Karling, Trelease, and Matzke to the graduate Faculty of Pure Science of Columbia University. The chronology of the years at Lake Forest was furnished by the alumni secretary, Mrs. E. C. Fleming. The bibliography was prepared from the files of the Department of Botany of Columbia University by Miss Sally MacDonald, Departmental Secretary. Dr. B. O. Dodge, Dr. A. B. Stout, Dr. L. O. Kunkel, Professors S. F. Trelease, E. B. Matzke and C. E. Allen have contributed from their personal memories and Mrs. Helen S. Harper has checked data carefully.

Indiana about 1815. The four younger children, among them Almer, were born in Indiana.

Professor Harper thus represented one of the families which followed closely the advancing front of settlement of the central west and carried with them the best ideals of religion and education from the Atlantic seaboard states. These ideals and mental aspects were thus a composite from a varied ancestry which included components from the spiritual heritage of the Carolinas, from Connecticut, from New York and New Jersey, plus the welding power of pioneer experience which broke many and built others to commanding stature.

Robert followed his parents and his older brother Edward to Oberlin, where he took his bachelor's degree in 1886. In spite of his scientific inclinations, we find him teaching Latin and Greek for the next two years, in Gates College, Neligh, Nebraska. He went back to botany, however, in the fall of 1888 as a graduate student at Johns Hopkins University. He stayed there only a few months, since we find him teaching a list of sciences in a Pennsylvania teachers' college during the latter part of the academic year.

In the fall of 1889, he became Master in Science at Lake Forest Academy, Lake Forest, Illinois, where he served during two academic years. The high quality of his scholarship and teaching ability combined with an impressive personality as shown in those two years, led Lake Forest University to shift him to Lake Forest College as Professor of Botany in the fall of 1891. He had received his A.M. from Oberlin in the spring. For a time the title was Professor of Botany and Geology but since few courses in geology were called for, geology was dropped from the title. The coming of the great botanist John M. Coulter to Lake Forest as President in the spring of 1893, offered a favorable opportunity for Harper to take leave of absence for two years for graduate study in Germany (1894-5 and 1895-6).

Harper was already keenly interested in the cell (cytology) and secondly in fungi. Those who worked with him at that time were never allowed to lose sight of the cell as the primary unit of structure. Strasburger's *Zellbildung* and *Zelltheilung*

was his "standby." Naturally he went directly to Bonn where Strasburger was a great figure among German cytologists. During part of this two year period he went on to Brefeld's laboratory, an outstanding center of fungous investigations. Exactly how he divided the time is not recorded. His praise of Brefeld's contributions as a pioneer in fungous morphology as determined by culture, was always tempered by recognition of Brefeld's² stubborn adherence to methods that were already outmoded and conclusions of his own which were already questioned. Eventually Harper found more congenial territory back at Bonn, where Fairchild, Swingle, Osterhout and Mottier were fellow workers.

His research thinking had already followed especially three lines, (1) the structure of the nucleus and its relation to sex especially in fungi; (2) the multinucleate cell as seen in the ascus, in the sporangium of the mucors, in coenocytic organisms and in the naked protoplasmic plasmodium of the myxomycetes; (3) the cell in its transformation as the structural unit of every complex organism that he studied, plant or animal, this covering the field later known as morphogenesis.

In the Bonn papers, Harper considered the first two categories. His students had long heard him discuss the fungous nucleus and its relation to sex. He often discussed the so-called "free cell formation" resident in the puzzle of how eight nuclei could each cut out its unit of cytoplasm so that eight apparently equal, uniformly marked spores would lie with possible unused cytoplasm in the ripe ascus. His clearcut figures depicted the nucleus definitely as the active center around which a unit of cytoplasm was cut off by strands emanating from a central body at the pole of the nucleus. The work was done upon *Sphaerotheca* but appears to be a fundamental contribution to our knowledge of the development of the fungous ascospore.

The series made up an outstanding contribution not only to fungous cytology but to workmanship. Any one who has followed Harper's method in finishing a cell drawing in india ink, under a handlens, realizes his skill, his patience, and the

² The writer encountered Brefeld later in Berlin. Knowing Harper, he was not surprised that he did not stay long with Brefeld.

exacting nature of the observations required. That last paper (1897) was a model which so impressed itself upon the work of students in his laboratories that any one reading a subsequent thesis automatically recognized the Harper influence.

The problem of the ascospore led directly to the sporangium of the mucors. The multinucleate sporangium of a mucor breaks up its mass completely, somehow to form a multitude of spores. Similarly a myxomycete plasmodium with thousands of nuclei but with no cell wall at all in the whole vegetative phase, suddenly turns into a mass of spores with characteristic walls. The ascus had been covered in Strasburger's laboratory at Bonn. Those of us who knew him the next year at Lake Forest saw him attack *Pilobolus*. During the next ten years, he went back several times to the myxomycetes to puzzle over their spore producing process.

Each myxomycete plasmodium contains countless numbers of nuclei yet without sign of cell wall or apparent relation to particular masses of cytoplasm. Then when fruiting time comes, each nucleus cuts out for itself a unit of characteristic size, which surrounds itself with a wall with the markings of its species, and when set free participates in reproducing the whole cycle. How to reconcile such a procedure with the ordinary cellular process was his puzzle. Nevertheless the myxomycete ends its life story with a definitely cellular unit as a propagating body. Thus there was a common bond in all these protoplasmic masses in that as they reached the fruiting stage they became definitely cellular. But the multinucleate condition shows up in many other groups and there again it always troubled him.

He watched Debski study nuclear division in *Chara* during his last year at Bonn. Apparently he was not satisfied for he made me repeat the work at Lake Forest during the next year. He summed up his contact with the coenocytes in two papers with a five year interval between them. After so many years of study of the nucleus and cellular organization he just naturally turned to morphogenesis and found in the finished morphology of *Gonium*, *Pediastrum*, *Volvox*, *Hydrodictyon* and in the *Acrasieae* (*Dictyostelium* and *Polysphondylium*)

striking genera, in which cells apparently equal and capable of independent life could respond to the tensions of organized life by assuming bizarre structures contributory to the final organized unit. Inheritance, then, in such cells included ability to respond, by filling, in more or less definitely predictable degree, the tasks thrown upon the cell by the incidents of organization. The forces which seized upon the single cell as a building block, and caused it to take its place in such weird figures as *Hydrodictyon*, *Pediastrum*, *Polysphondylium*, and *Dictyostelium*, were troubling him clear back to the days when I worked with him.

Looking over Harper's bibliography, these same three groups of problems stand out. No one could live with him for a few years, then meet him now and then over forty more, as I did, without knowing that he read voraciously and critically in many fields. He used all kinds of material in class-room lectures but published no papers from his reading. Outdoors there were few growing things he did not recognize, and he was not unacquainted with those that crawled. But he did not write about many of them.

Harper defied the dictum that a man is appreciated for the weight of his publications (on the "hay" scales); he published only when he felt that he had something of importance to contribute. Yet he was automatically recognized as among the great botanists of his time.

His career covered the whole rise of plant pathology as a professional field: he joined the society. Dodge says he was a practical plant pathologist on his own farm and in the council of the Botanical Garden, but he did not write a single paper about a plant disease as such.

He saw the rise of genetics—no one could work intensively for ten years upon the nucleus and ten more upon morphogenesis without coming in contact with the whole ground work of modern genetics. Characteristically skeptical of the idea that living things would faithfully follow mathematical formulas, he seized upon factors in corn which seemed to blend in the hybrid—rather than be represented by plus or minus signs, and put several seasons into throwing doubt upon the concept of im-

mutable hypothetical units of inheritance concocted to account for selected results.

Harper was not satisfied with the iron clad concept of nuclear organization which hypothesizes such fixedness of its mechanism as tied it to inevitable fate. To him it was a thing alive and there is a fluidity about living; it was able to adjust itself to changing demands, at least, to a difficultly predictable degree. If it carried factors determining the morphology of its species in its chromosomes, these chromatic elements were so related to other components of actively circulating protoplasm as to put their impress upon the whole cell without realistic fatalism. To him, the concept of inheritance illustrated by a lot of beads strung upon a wire, might suggest as many misconceptions as truths. Fully alive to the value of hypotheses, he still took much pleasure in puncturing "balloons" that he believed to have doubtful continuing value. Such an attitude might appear destructive but it must be remembered that to one who has worked widely in the biological field and with many types of investigation the mechanical concept of inheritance leaves the mind often unsatisfied.

He was elected to the National Academy of Sciences in 1911. He belonged to a number of professional societies in which a man becomes a member because he wants to work with others in either the narrow field of one discipline or in a broader aggregate of many types of training. Among the botanical groups we find: The Botanical Society of America (President 1916), The Torrey Botanical Club (President 1914-15-16), Linnean Society of London, Corresponding member of Deutschen Botanischen Gesellschaft, Phytopathological Society, Ecological Society.

In the broader field: The American Association for the Advancement of Science (V. President. Sec. G, 1910), American Academy of Arts and Sciences, American Philosophical Society, The Wisconsin Academy of Sciences, Arts and Letters, New York Academy of Sciences, Washington Academy of Sciences, the Century Association of New York City.

In his own biographical notices in *Who's Who in America* and *American Men of Science*, he omitted mentioning Honorary

Doctorates of Science from Columbia University and the University of Pennsylvania. These must be included in this record.

Certain types of responsibility naturally went with his professorship. He was Chairman of the Board of Scientific Directors of the New York Botanical Garden from 1918-1933; he was a member of the Board of Managers from 1911 to 1942. He kept an office there and spent at least one day of the week there for many years. Naturally his collection of reprints (15000) was given to the Garden before his death.

He served also as a Director of the Tropical Plant Research Foundation, and of the Boyce Thompson Institute. Those who worked with him in these relationships bear testimony to his active participation in working out the problems encountered.

He taught botany for forty years. A lot of us at one time or another listened to his lectures, and argued with him in his study or at his microscope table. He contributed unstintingly of himself. The impress of his ideals of scholarship has reached several generations of students. What manner of man was he?

Harper called himself a botanist; he included all plant study under the name. His published papers are not particularly numerous, but practically all of them covered problems fundamental to plant life. Though he was interested in practical as well as theoretical phases of the subject, he never called himself anything but a botanist. He was a collector with experience and skill—he knew where to go to get what he wanted. He took his classes to the fields, to the dunes, to the hills; he was no stranger in the swamp or on the waterside—he had just one name for it, botany. Back of that, he knew a lot about animal life. He was thoroughly saturated with biology—the idea that all living things had a mass of fundamentals in common. One had to be a botanist because there was not time enough for everything.

He was not a spell-binder; he would never have been popular upon the Chautauqua circuit. In his early class-room lectures, he put biological details together so compactly as to tax the best student's ability to take notes. Professor Matzke

says that, "In later years, his lectures were beautifully prepared, forcefully delivered, filled with provocative thoughts and suggestions for further research." That same background of accurate scholarship made him a keen critic of publications which expanded a minor idea to great length and never used a short word if a long one could be found. Our seminar in the winter of 1896-7, consisted of Harper, Timberlake and Thom—he passed to Timberlake a new book by a distinguished professor (afterward a colleague of his), to read a chapter. Then as a long paragraph was finished and another was started, Harper spoke—"Stop! Skip that next paragraph—that's just **a mess of long words.**" A discussion must be adequate and accurate but not merely prolonged.

The student without a rigorous background of English composition faced an ordeal when he started to write a thesis for Harper. He had little tolerance for verbosity and less for loose thinking. He was a direct man. He wanted to know exactly what you meant in every statement—he expected you to have mastered the doctrine as he laid it down, to dispute it, if you could make your point stick. No one regretted his rigorous demands after the task was completed.

Something of his mental attitude may be seen in the advice he gave the writer when he faced a scientific meeting with his first paper. "If you have an idea that you wish your audience to carry away, turn it upside down and inside out, rephrasing it from different angles. Remember that the form in which the thing may appear best to you may not impress half your audience." He added that a miscellaneous audience can not be expected to carry away a lot of separate facts but one good idea, well pictured out, will be remembered by some of them.

Again, speeding him on his way to a new University position, Harper said—"Remember, when you get there, that some of the faculty members have been there five years, some ten, fifteen, twenty, perhaps twenty-five years. They probably know as much about running a University as you do. Keep your ears open, and your mouth shut!"

Dodge quotes Fairchild as saying, "he had a smile that was

irresistable and a way of looking at you that made you conscious of a presence." Fairchild thus phrased the experience of generations of students. It was an asset, not a pose. The lesser man may gradually earn profound respect from his students; Harper started with it. It did not break down with the contacts of the laboratory which soon dispose of pretensions. He could tell a student—"I don't know, that's for you to find out"—yet hold respect for his scholarship. I knew just one student at Lake Forest that never took him seriously—perhaps the most of us took him too seriously to get the best out of personal relations. Some men loom large only to the undergraduate. Harper as a leader and thinker was a figure that the student remembered with undimmed respect in the years that followed.

In 1899, he married Alice Jean McQueen who died in 1909, during his stay in Madison. After he moved to New York, he married Helen Sherman, who had at one time been in his laboratory at Wisconsin and was later in the United States Department of Agriculture at Washington. They had one son, who is a farmer at Bedford, Virginia, where Professor and Mrs. Harper moved when failing health began to appear about 1938. The Professor was a good farmer. He had owned a farm in New Jersey for years and made it a practical laboratory which kept him keenly alive to the applied side of botany.

He died at Bedford May 12, 1946. He is buried there.

We have described a man particularly fitted by nature and training to sit at one of the great botanical cross-roads of the world. Few botanists come to or go from America without passing through the Port of New York. For a quarter of a century, few failed to look for Harper at Columbia University or at the Botanical Garden. He had a prodigious grasp of problems and projects over the whole range of biology and he was always ready to meet the wayfarer upon common ground. He left us an invaluable heritage.

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

- Amer. Jour. Bot. = American Journal of Botany
 Amer. Nat. = American Naturalist
 Ann. Bot. = Annals of Botany
 Ber. Deutsch. Bot. Gesell. = Berichte Deutsche Botanische Gesellschaft
 Bot. Gaz. = Botanical Gazette
 Bot. Soc. Amer. Publ. = Botanical Society of America Publications
 Bull. Torrey Bot. Club = Bulletin of the Torrey Botanical Club
 Carnegie Inst. Wash. Publ. = Carnegie Institution of Washington Publications
 Jahrb. Wiss. Bot. = Jahrbücher für Wissenschaftliche Botanik
 Jour. Amer. Soc. Agron. = Journal of the American Society of Agronomy
 Jour. N. Y. Bot. Gard. = Journal of the New York Botanical Garden
 Mem. Brooklyn Bot. Gard. = Memoirs of the Brooklyn Botanical Garden
 Mem. N. Y. Bot. Gard. = Memoirs of the New York Botanical Garden
 Mem. Torrey Bot. Club = Memoirs of the Torrey Botanical Club
 Proc. Amer. Phil. Soc. = Proceedings of the American Philosophical Society
 Proc. Int. Congr. Plant Sci. = Proceedings of the International Congress of Plant Science
 Trans. Amer. Micro. Soc. = Transactions of the American Microscopical Society
 Trans. Wis. Acad. Sci. = Transactions of the Wisconsin Academy of Sciences, Arts, and Letters

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