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JACK RODNEY HARLAN
1917–1998

A Biographical Memoir by

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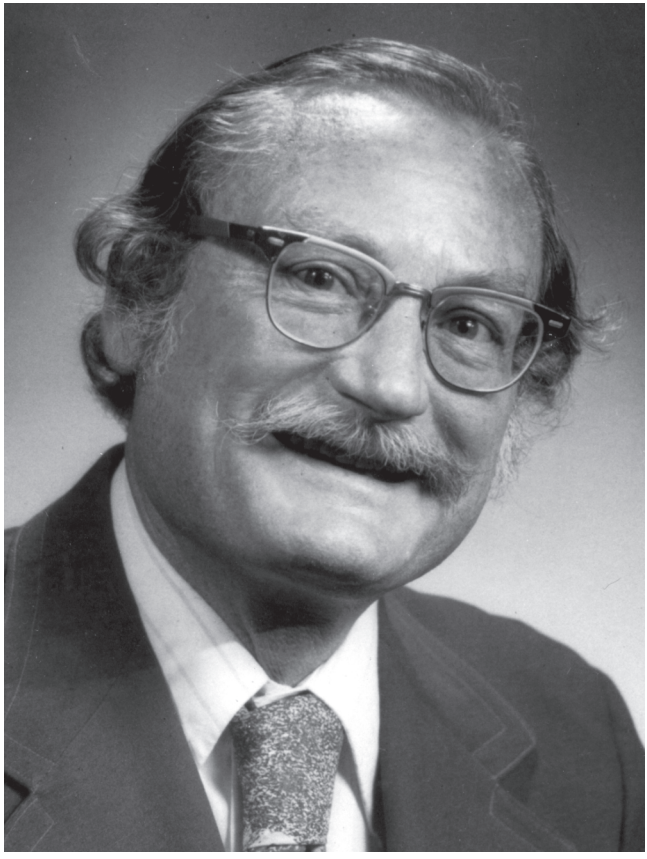

Jack R. Harlow

JACK RODNEY HARLAN

June 7, 1917–August 26, 1998

BY THEODORE HYMOWITZ

HARLAN WAS BEST KNOWN for his contributions to knowledge of the evolution of crop plants, his plant explorations and archeological excavations, and for his clear elucidation of the interdependence of plants and civilization. Jack Harlan was a botanist, an agronomist, an anthropologist, a historian, and a scholar. He spent most of his academic career as a faculty member in departments of agronomy. However, he never took a formal course in agronomy.

Jack Rodney Harlan was born on June 7, 1917, in Washington, D.C. He was the younger of two sons of Harry Vaughn and Augusta Griffing Harlan. He earned a B.S. degree (with distinction) from George Washington University, Washington, D.C., in 1938 and his Ph.D. in genetics from the University of California in 1942. He was the first graduate student to complete a Ph.D. under the guidance of G. Ledyard Stebbins. On August 4, 1939, he and Jean Yocum were married in Berkeley, California. They had four children: Sue, Harry, Sherry, and Richard. After 43 years of marriage, Mrs. Harlan passed away on October 11, 1982, in Urbana, Illinois.

Jack Harlan was greatly influenced in his choice of career by the professional activities of his father. From 1910 to 1944 Harry V. Harlan was the leader of barley investigations

for the U.S. Department of Agriculture, Washington, D.C., as well as a plant explorer. He collected barley in South America, Asia, Europe, and Africa. During the summer months he took his young sons, Bill and Jack, to the barley stations in Aberdeen, Idaho, and Sacaton, Arizona. In Sacaton he often led his sons on digging expeditions for artifacts at American Indian sites. In addition, his tales of adventure, of eating different foods, and of living with differing cultures, must have influenced young Jack. His father loved to entertain visitors from all over the world. For example, during the sixth international congress of genetics that took place in Washington, D.C., in 1932, teenager Jack Harlan met the great Russian agronomist, N. I. Vavilov. After receiving his B.S. degree Jack Harlan planned to study with Vavilov in St. Petersburg; however, the imprisonment and subsequent death of Vavilov put an end to Jack's plans.

After receiving his Ph.D. Jack Harlan was employed for a brief period by the Tela Rail Road Company in Honduras as a research assistant. Later, in 1942, his professional career began with the U.S. Department of Agriculture (USDA) at Woodward, Oklahoma, where he directed the Oklahoma Forage Crop and Rangeland Improvement program and the Southern Great Plains Regional Grass Breeding program. In 1951, while still with the USDA, he transferred to Oklahoma State University, Stillwater. While holding a joint appointment as professor of genetics at Oklahoma State, he began teaching on a limited basis and became involved with graduate students. In alternate years he taught classes concerned with classical evolution and evolutionary mechanics. It was during this period that he developed his philosophy concerning the evolution of crop plants and civilization.

To further develop his academic interests Jack Harlan resigned from the USDA in 1961 and joined the faculty of Oklahoma State University on a full-time basis. In the mid-

1960s he refused to sign an Oklahoma State University faculty loyalty oath developed by and for the university's administrators, demonstrating his fierce desire for independence and his loyalty to the concept of academic freedom. In 1966 Jack Harlan moved to the University of Illinois, where he became professor of plant genetics in the Department of Agronomy. With Professor J. M. deWet, a colleague from Oklahoma State and then at the University of Illinois, he founded the internationally known and respected Crop Evolution Laboratory a year later. Opportunities were established for graduate study in such fields as chemical taxonomy (now called molecular systematics), numerical taxonomy, cytotaxonomy, cytogenetics, genetics, archaeobotany, and ethnobotany concerning cultivated plants and their wild relatives. In 1984 he retired from the University of Illinois with the rank of professor emeritus. Because of his wife's death in 1982 and other factors, Jack Harlan decided to relocate to New Orleans to be near his sons. In New Orleans he became an adjunct professor at Tulane University.

During his professional career Jack Harlan received many honors and awards. He was a member of Phi Beta Kappa, Phi Kappa Phi, and Sigma Xi. Harlan was awarded a John Simon Guggenheim Memorial Fellowship (1959), the American Grassland Council Merit Award (1962), the Frank N. Meyer Memorial Medal (1971), Crop Science Award (1971), and the International Service in Agronomy Award (1976). He received the 1985 Distinguished Economic Botanist Award from the Society for Economic Botany. He was a fellow of the American Association for the Advancement of Science (1956), American Society of Agronomy (1962), Crop Science Society of America (1985), and the American Academy of Arts and Sciences (1975). In 1972 he was elected to membership in the National Academy of Sciences. He served as president of the Crop Science Society of America in 1965-66.

In addition he received a medal for service to the U.N. Food and Agriculture Organization and the International Board for Plant Genetic Resources and a medal at the N. I. Vavilov Centennial Celebration. In May 1997 the Harlan Symposium was held at the International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria. It was titled "The Origins of Agriculture and Domestication of Crop Plants in the Near East." Unfortunately he was too ill to attend. In November 1999 at the Crop Sciences Society of America annual meeting in Salt Lake City, a symposium was held in Jack Harlan's honor. Many of his former students and colleagues recalled with fondness their personal experiences with their mentor and friend.

In the field, Jack Harlan explored for and introduced plants from Africa, Asia, Central America, South America, and Australia into the United States. In 1948 he led a USDA-sponsored plant exploration trip to Turkey, Syria, Lebanon, and Iraq. In 1960 he led a USDA-sponsored plant exploration trip to Iran, Afghanistan, Pakistan, India, and Ethiopia. He was a consultant to the U.N. Food and Agriculture Organization in 1970-71 and a member of the International Board of Plant Genetic Resources from 1974 to 1979. In 1974 he was selected to be a member of the first team of U.S. agricultural scientists to visit the People's Republic of China.

Jack Harlan participated in several archeological digs. From 1960 to 1963 he was a senior staff member for the Iranian Prehistoric project, Oriental Institute, University of Chicago, and the Turkish project in 1964. He was a member of the Dead Sea Archeological project in 1977, 1979, and 1983.

Jack Harlan was an excellent speaker and coupled a strong grasp of the English language with a remarkably dry sense of humor. One of his last public lectures at the

University of Illinois was entitled "Lettuce and the Sycamore: Sex and Romance in Ancient Egypt." The title was so intriguing that the lecture attracted a huge audience. In addition to being a Sigma Xi chapter lecturer, W. E. Key lecturer in genetics, visiting scientist of the American Society of Agronomy, he lectured at many major institutions of higher education in North America, Europe, Asia, and Africa. He was a visiting professor, University of California, Davis (1975), University of California, Riverside (1976), and the University of Nagoya, Japan (1979). Even in retirement he received requests to present lectures at symposia, conferences, and at individual institutions.

Harlan was interested in music, art, history, sailing, languages, birds, museums, and libraries. He believed that an individual's education should not end with a Ph.D.; rather education should be a continual process throughout one's life. His contributions to science cover the broad areas of agronomy, botany, genetics, anthropology, archeology, and history. These scientific contributions are summarized below.

Grassland Breeding. At Woodward and then Stillwater, Oklahoma, his research focused on the development of rangeland grasses for re-vegetating the southern Great Plains. A number of improved grassland cultivars were developed, tested, and released. Among the many releases were "Woodward" sand bluestem, "Southland" bromegrass, "Caddo" switchgrass, and "Coronado" side oats grama.

Compilospecies Concepts. At Stillwater Harlan established a biosystematics laboratory to study three grass genera, *Bothriochloa, Dicanthium,* and *Capillipedium.* The three genera form a polyploid, largely agamic complex. Of particular interest was the species *B. intermedia*, "a hodgepodge of germplasm assembled from at least 5 species belonging to three genera." Furthermore, "*B. intermedia* seems to have

genetically consumed its own ancestral form." A compilospecies is therefore a genetic, aggressive plunderer incorporating germplasm of related species and hence able to expand its range.

Cynodon and Sorghum. Harlan and his associates conducted biosystematic analyses of both *Cynodon* and *Sorghum*. These research activities led to revisions in both genera. The revised classifications were based on evidence from morphology, geographical distribution, field observations, collections, and cytogenetics. In the case of *Cynodon* he sided with the splitter faction among taxonomists. For example *C. dactylon* was divided into six taxonomic varieties. On the other hand, with the cultivated sorghums he sided with the lumper faction among taxonomists. The sorghums were lumped together into one species having five basic races: bicolor, guinea, caudatum, kafir, and durra.

Weeds. In his plant collecting trips Harlan was impressed with the association of weeds and cultivated crops. In the Middle East it was wheat and the associated diploid species of weeds; in Africa there were cultivated and weedy races of sorghum; in Asia cultivated and weedy rice; and in Central America and Mexico maize and weedy teosinte grew in proximity. He recognized that these weedy races were living germplasm banks available to the plant breeder as sources for resistance to disease and insect damage.

Plant Exploration. It is estimated that Harlan collected more than 12,000 accessions from 45 countries for the United States. He collected wheat, barley, maize, forage legumes and grasses, large seeded legumes, forest trees, fruits, and ornamentals. Some of these accessions have been used extensively as sources of disease resistance or for their unique genetic properties.

A Rational Classification of Cultivated Plants. Harlan and deWet recognized that the formal method used in

taxonomy was not very satisfactory for the classification of cultivated plants. On the other hand, users of germplasm as plant breeders had developed their own informal system for grouping plants. Harlan and deWet attempted to reconcile these different approaches by developing a unified system. They looked at the total available gene pool of a cultivated plant and assigned taxa to one of three gene pools: primary, secondary, or tertiary.

The primary gene pool (GP-1) consists of the domesticate and conspecific wild form, corresponding with the biological species. Among forms of this gene pool, crossing is easy, and hybrids are generally fertile with good chromosome pairing.

The secondary gene pool (GP-2) includes those biological species that can exchange genes with the domesticate (i.e., belonging to the same coenospecies). Gene transfer is possible but difficult. Hybrids tend to be sterile and chromosomes pair poorly or not at all.

The tertiary gene pool (GP-3) includes all members of that coenospecies to which the domesticate belongs. Crosses can be made with the crop, but the hybrids tend to be lethal or completely sterile. Transfer is only possible using drastic techniques (e.g., embryo culture, doubling of chromosome number, or using bridge species to obtain some fertility). GP-3 was the outer limit of the potential gene pool of a crop.

Centers of Origin. The Russian agronomist N. I. Vavilov proposed eight centers of origin for most of the cultivated plants of the world. Jack Harlan refined the concept to include space, time, and variation. In a series of papers Harlan proposed new terms to express the specific evolutionary patterns of different crops (e.g., endemic, semiendemic, monocentric, oliocentric, noncentric, and microcenter).

A Wild Wheat Harvest. Harlan destroyed the prevailing paradigm that hunter-gathers were driven to cultivate plants. In Turkey he demonstrated that he could gather the equivalent of more than 2 pounds of clean wild einkorn grain per hour using a stone-blade sickle. Thus, in about a three-week period a family could gather more grain than it could possibly consume in a year.

Crop Evolution Lab. The Crop Evolution Laboratory was a cosmopolitan place. There were graduate students, post-graduate students, and visiting scholars from all over the world. In early 1983 deWet and I estimated that 19 different languages were spoken in the lab. Visitors from many diverse disciplines literally popped into the lab and often were prevailed upon to present impromptu seminars. The students and visiting scholars studied evolutionary patterns of major and minor seed crops as well as root and tuber crops. During the classroom lectures Harlan often showed slides taken by him of exotic crops grown in their home area as well as sites of historic or cultural interest. The labs often consisted of the students tasting freshly made ethnic foods from various regions of the world. The students were delighted with the master teacher.

MOST OF THE MATERIAL in this memoir was based on a biography I prepared for *Plant Breeding Reviews* (vol. 8, 1990), which was dedicated to Jack Harlan. Family members provided some personal information. Other material is the result of memories from having been associated with Harlan as a graduate student at Oklahoma State University and afterwards as a faculty colleague at the University of Illinois.

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