Master Chronology of Jack R. Harlan

By Harry V. Harlan, the younger

Color Coded KEY: Oklahoma Agricultural Experiment Station Proceedings, Universal Significance, **Biosystematics,** *Zea-Tripsacum-Zea*, Africa, **A taxonomic dilemma.,** sorghum, **Crops and Man,** : Meyer medal, Dead Sea Valley Expedition, sesame, barley

Toward a rational classification of cultivated plants, Tall fescue.

1854: Rev. James Sayre Griffing begins his ministry in Kansas. Kansas-Nebraska Act passed May 30, 1854.

1858: Rev. Griffing is instrumental is the establishment of Bluemont Central College in Manhattan, KS., as a Methodist school.

1859: Charles Darwin publishes *Origin of Species*.

1861: Russian Emancipation, casting off the old Feudal system.

1861, Jan. 29: Kansas becomes a state.

1862, May 20: Homestead Act signed.

1862, July 2: Morrill Act authorized the donation of federal land to states for the purposes of use or sale to raise funds to establish state agricultural and mechanical colleges.

1862: US Civil War begins.

1863: Bluemont Central College goes out of business, but donates its property to the State of Kansas for the establishment of Kansas State Agricultural College (later KSU).

1865: US Civil War ends

1865: Plato and Caroline Harlan begin homesteading in Franklin Co. Kansas

1866: Gregor Mendel proposes his theory of inherited characteristics. It was at first ignored, but rediscovered in 1900.

1868: Charles Darwin publishes *The Variation of Animals and Plants Under Domestication*.

1871: Charles Darwin publishes *The Descent of Man*

1870-1880 Many ex-slaves (Exodusters) migrate to Kansas, encouraged by Supreme Court Justice, John Marshall Harlan

1872: Plato and three sons (Ernest, Orlando and Hershel) return to Illinois following Caroline's death in Kansas.

1874: Mennonites make first important introductions of wheat from Turkey into Kansas.

1875, Jan. 26: Plato Harlan and Elizabeth Phillippi married in Peoria, Il.

1882, Feb. 19: Harry Vaughn Harlan born to Plato and Elizabeth Harlan in London Mills, Illinois.

1882 Charles Darwin dies April 19

1887: Nov. 25, Nikolia Ivanovitch Vavilov born to Ivan Ilyich Vavilov (a successful merchant) and Alexandra Mikhailovana Vavilov in Moscow.[1];

1887: Plato. Elizabeth and three children (Roscoe, Harry & Dora) move back to a farm in southern Kansas – near Walnut, Ks.

1887: The Hatch Act authorized the federal funding of agricultural experiment stations associated with State A&M colleges. (see Morrill act of 1862)

1889: David Grandison Fairchild started working for USDA as a botanist and plant explorer.

1891: Severe Russian famine.[2]

1897-98: Fairchild helped fellow explorer Walter T. Swingle organize the USDA's Office of Foreign Seed and Plant Introduction.

1898: Mark A. Carleton made first plant exploration to Russia and brought back hard red wheat and durum wheat.

1900: Mendel's work on inherited characteristics rediscovered. William Bateson, Mendel's most fervent supporter in Britain, coined the term "genetics" and thus the modern genetics revolution begins.

1900: Otto Frankel born in Vienna.

1904: Harry V. Harlan (HVH) graduates from Kansas State Agricultural College, in Agriculture; Gets a job offer in the Philippians from Mark Carleton.

1905: Uprising in Russia.[3]

1905-8: HVH and his bride, Augusta Griffing Harlan, lived in the backcountry of the Philippians, where he taught school as part of the effort to bring the new colony of the Philippians into the 20th Century. Gussie was excited, but fairly traumatized by the cultural shock of this adventure; but she stuck by Harry. HVH ended up with a nice collection of Philippine artifacts, which are now in the World Heritage Museum at the U of I.[4]

1907, November 16, Oklahoma became a state

1909: HVH at Kansas State College (Manhattan) Graduate School.

1910: Thomas Hunt Morgan shows that genes reside on chromosomes.

1910: HVH went to work for the United States Department of Agriculture (USDA)

> "Harry V. Harlan graduated from Kansas State College in 1904. He worked in Manila, Philippines from 1905-1908. After two years of graduate school at Kansas State, he joined the U.S. Department of Agriculture and worked for David Fairchild, then Mark Carleton, both scientists. Even though he had no prior experience with barley, he was assigned to the barley project.[5]

[1] Pringle, 2008, page 307
[2] Pringle, 2008
[3] Pringle, 2008
[4] Tapes, page 19
[5] Voyager Owner <voyager@lmsdb.nal.usda.gov>

1911: HVH & Gussie in DC? NIV graduates from Petrovskaya Agricultural Institute (Petrovka). Since 1900 the science of genetics in Europe and Russia has been exploding. WHAT HAS BEEN GOING ON IN AMERICA AT THIS TIME RE THE NEW SCIENCE OF GENETICS? IS HVH CAUGHT UP IN THIS REVOLUTION?

1912: HVH and Gussie in DC. HVH working for USDA.

1912-13: HVH and Gussie in DC. NIV travels to Britain, France and Germany, learning from the greatest geneticists in Europe.[6]

1913: Alfred Sturtevant makes the first genetic map of a chromosome.

1913: HVH trip through Peru. "Officials of the Southern Railroad of Peru had requested the United States Department of Agriculture to suggest someone to give them advice on agricultural matters. In this case I was suggested largely because I had been in the Philippines. Peru was in the tropics: the Philippines were in the tropics. What choice could be more logical? If there were two placed that differ more I have not seen them. I doubt that they have a dozen native plants in common."[7] This trip is well documented in *One Man's Life with Barley* and the many letters HVH sent to his wife.

1914: Smith-Lever Act of 1914 passed into law to establish agricultural extension services in connection with land-grant (A&M) colleges.

1914: HVH got Doctor of Science (not PhD)[8] at Univ. of Minnesota;

Harry V. Harlan majored in agronomy with Boss as adviser. Harlan earned a Ph.D (Dr S). degree in Minnesota in 1914, using studies with barley as his thesis problem (Harlan, 1914). In 1915 Harlan's large barley breeding nursery was grown at University Farm independent of the agronomy breeding nursery. In summer 1915, Harlan grew numerous barley crosses in F_2 and F_3 segregating generations and I aided in classifying segregating characters. Although Dr. Harlan soon transferred his major barley nursery to Aberdeen, Idaho, where growing conditions were very favorable for the barley plant, these early studies led to several cooperative researches with barley completed in Minnesota (Harlan and Hayes, 1920; Hayes and Harlan, 1920). One related to inheritance of spike density and another to inheritance and production of *Hordeum intermedium* Krke. from crosses of 6-rowed, *H. vulgare L. with H. distichon L.*

The following is quoted directly from Harlan's autobiography (Harlan, 1957).

> My Minnesota days were enriched by friendships with Tom Cooper, Andrew Boss, H.K. Hayes, and E.C. Stakman. With the latter two the connections were official as well as personal. To the outsider we must have seemed bitter enemies. We were never on the same side of any question except by accident, and then somebody made a quick shift. If we were all three present at the same time, we managed to find three sides to a question. Stakman and I commenced to argue while he was still in the hall. I hope the others look back upon these days with as much pleasure as I do.[9]

May 7, 1914: Bill (Wilbur) Vaughn Harlan born in DC. Bill had been named after Mr. Wilbur Bill, a neighbor.

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[6] Pringle 2008, page 36
[7] Harlan, 1957, page 14
[8] Tapes, pg 22
[9] *The Development of Plant Breeding at Minnesota*, Hebert K. Hayes, Department of Agronomy and Plant Genetics, University of Minnesota, page 4, found at *http://agronomy.cfans.umn.edu/prod/groups/cfans/@pub/@cfans/@agronomy/documents/content/cfans_content_289291.pdf*

1915: HVH builds house in DC, based on Mr. Bill's house.[10]

1915: HVH & family in DC. Bill Harlan recalls: "My earliest memory that I can date was Christmas, 1915 when I was one-and-a-half years old. At that time we were living in a rented house in Friendship Heights, Maryland, with Mr. and Mrs. Bill."[11] 1916: HVH, Gussie and Bill in DC. NIV expedition to northern Persia.[12] "While rebellions in Russia were brewing, he (Nikolai V.) won awards for his work and by 1916 would be known as one of Russia's most promising young scientists. He roamed across the Russian empire looking for rare varieties of wheat and soon had created a collection that was the envy of wheat breeders in Europe and America.[13]

1917: April 6, US enters WWI; Bolsheviks seize power in Russia. NIV joins the faculty of Univ. of Saratov, in Agronomy.

June 6, 1917: Washington DC – Jack born into this world, son of Harry V. Harlan and Augusta Griffing Harlan. Brother, Bill, is 3.

1918 (Jack is 1 year old in June.) Bill enters Kindergarten at age 4[14]): WWI ends on 11/11 at 11 AM. Russian Civil War begins. Nov. 7, NIV's son Oleg is born. Mary Virginia (Jean) Yocum born to Lawrence Edwin Yocum and Mildred Hicks Yocum in Pennsylvania.

1919 (JRH is 1/2 years old): Harry sent to Eastern Europe in a delegation to assess the area's ability to feed itself following WWI. Gussie took the boys to her parent's house in Manhattan, Kansas for the duration.[15]

1920 (JRH is 2/3 years old): HVH & family in DC; NIV formulates Law of Homologous Series.

> Only Vavilov approached the question of the parallelism in variability of allied species and genera from a genetic standpoint and on the basis of a comparative study of very extensive worldwide data (under natural conditions, in cultures, and in experiments) of the variability of a number of plant families abounding in well-studied cultivated species (chiefly grasses). As a result of this work, he read a paper, "The Law of Homologous Series in Hereditary Variability," at the Third All-Russian Congress of Breeders, held in Saratov in 1920. Vavilov showed that if all the variations known to exist in the most studied species of a given group are arranged in a table in a certain order, almost all the same variations in variability of characters will be found in other species as well. Moreover, as research continues on the species belonging to a given group, the "empty" places in the table will be filled and the parallelism in variability of the allied species will become increasingly complete. Fundamentally similar but less pronounced parallelism characterizes the variability of different genera within families and, even less completely, of different families within a group of higher rank.[16]

1921 (JRH is 3/4 years old): N. I. Vavilov came to America for the first time; met with the USDA in Washington DC. He had been sent to America to buy seeds to bring back to

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[10] Tapes, page 9
[11] Harlan, 2001, page 3
[12] Pringle, 2008, Chapter 4
[13] Pringle, 2008, page 46
[14] Harlan, 2001, page 42. Here Bill says that in those days in DC "if you reached the age of five during the school year, he was considered to be five for entrance purposes. Since my birthday was in May I was qualified to enter in the fall of the year in which I became five so I very nearly completed my first year in school at the ago of four." Two paragraphs later he says that he entered Kindergarten not first grade. We can conclude from this that Bill completed kindergarten about the time he made 5 years old (1919) and he entered 1st grade in the fall of 1919, at age 5.
[15] Harlan, 2001, page 63.
[16] http://encyclopedia2.thefreedictionary.com/Homologous+Series,+Law+of

Russia so they could begin their own plant breeding program. Did this visit in DC include HVH? I would think so. HVH had been with USDA for 11 years and was the head of the Barley program. Is this where the NIV-HVH friendship begin? Was this the event that Jack remembers as when he decided what he was going to be when he grew up?[17] I think it was. HVH seemed to keep his family involved in what he was doing at the office. This is why he took them on his Expedition in 1923. So, I think he came home from work one day and told the family that he met a famous scientist from Russia and that this fellow had been going on Plant Explorations. This really grabbed little Jack (age 4) and he decided that that was what he was going to do when he grew up. Jack's continuing interest in plant exploration motivated HVH to take his family on the '23 trip. I don't think Bill was as interested in plants as Jack was. NIV had presented his theory of Homologous Series at the Congress of Breeders in Saratov the year before and he was anxious to have a listening ear from an American scientist. I can see a conversation between HVH & NIV in 1921 where HVH tells NIV that his interest was in Barley and NIV says "Well, you know, barley has a center of origin in Ethiopia and if you go there you can find the mother load of genetic diversity." And that was how HVH got the idea to go to Abyssinia.

1922 (JRH is 4/5 years old): HVH in DC, planning a plant exploration to Spain, North Africa, India and Abyssinia. He would take his family and leave them in France while he made the rest of his journey.

FOR FULLER CHRONOLOGY OF THE TIME IN FRANCE SEE "FRANCE CHRONOLOGY"

1923 (5/6) HVH started his Exploration with Spain, with Gussie. He entered Ethiopia in probably August of '23 (JRH is 6) and emerged in Feb. 1924 (JRH still 6). He left the family in France while he went on his explorations, so that the boys could finish school year 1923-24 (JRH is 6 that whole time)[18]

1923-4 (6 years old) France – JRH started Kindergarten in Paris and 1st grade in Meton[19], with 4th grade reader[20]). Bill was in 4th grade in France.[21] They fished and shrimped and the pension would cook it up.[22]

1924 (6/7) returned to DC. On return trip Jack saw coast of Africa and decided that he would go there someday[23]. Arrived back in US on July 4[24]. This trip put the traveling bug into

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[17] Jack Harlan told me on many occasions when I was growing up that he decided – at age 4 – what he was gong to be (do) when he grew up. (HVH the Younger)

[18] Jack started 1st grade in DC before going to France. (Harlan 2001, page 43)

[19] Many times while growing up my father said that he skipped the first grade and again in making the tapes of his life story he told me that he first entered 1st grade and the teacher said that he was too big and ought to be in 2nd grade. This happened in DC. Then, when they go to France he entered second grade and he said that the only readers they had for the 2nd grade were 4th grade readers. But on pg 16 of the Tapes he says that he started kindergarten in Paris and 1st grade in Meton. HVH the younger.

[20] Harlan, Taped Conversations, 1997

[21] Harlan, 2001, page 44. Bill tells a little different story about the early school years from what Jack said to his children, especially the year in France. Jack always said that he skipped 2nd grade, but Bill says that he (Jack) started 1st grade in France and than he (Bill) started 2nd grade. But that does not seem right, considering that there was a 3 year difference in ages. At any rate, page 44 of Bill's book is a little confusing.

[22] Tapes, page 13

both Bill & Jack. In the fall of 1924 Jack & Bill enter into a French school (Jack in 3rd & Bill in 5th grade). NIV expedition to Afghanistan.

1925 (7/8) Jack & Bill in 4th & 6th grade in the French School in DC. Otto Frankel "earned his doctorate in agriculture from the University of Berlin in 1925."[25]

1926 (8/9) Jack & Bill in 5th & 7th grade in French School in DC. NIV goes to Abyssinia. "Expedition to Abyssinia (now Ethiopia). Also visited North Africa, the Middle East, and Mediterranean countries."[26] Was this inspired by HVH's trip 3 years earlier? Ras Tifari is now reviewing a parade of scientists from great countries coming to his country to look at his plants. What impact did this have on him? He was always open to new ideas and western innovations.

1927 (9/10): Jack & Bill in 6th & 8th grade in French School in DC. NIV publishes *Studies on the Origin of Cultivated Plants,* describing 8 centers of origin.[27] Did HVH know about this? Probably so. It was published and HVH was a fan of NIV.

1928 (10/11): Jack & Bill in 7th & 9th grade in French School in DC. First Family trip to Arizona and Idaho, with side trip to New Orleans. Gussie goes to Manhattan first to see her people. Departed during Christmas break; go to Sacaton for the harvest in May, and then Abredeen for the summer harvest in August. [28] Bill comments on mud line on trees from the 1927 flood.[29]. Bill & Jack go to school in the Indian school in Casa Grande, Ariz.[30] HVH starts Long term barley plots in Davis California.[31]

Evolutionary breeding creates resiliency

In the 1920s and 30s, Harry Harlan, a barley breeder from the University of California (UC) began making composite cross populations between many diverse barley varieties from around the world. A composite cross population is developed by making crosses among all the different varieties chosen to each other (Harlan and Martini, 1929). For example, composite cross II is a population developed by Harlan in 1929 using 30 varieties crossed in all possible combinations.

In an evolutionary breeding approach using these composite cross populations, Dr. Coit Sunesen and Dr. Robert Allard, cereal breeders from UC Davis, planted these populations each year. They grew them under standard agronomic conditions, and harvested them each fall. This pattern was repeated for over 50 years (Suneson 1956; Allard 1996). No human selection was conducted on these populations. Instead, they were allowed to respond to multiple environmental stresses and the resulting harvest often reflected the populations' response to pressure from natural selection. These pressures include multiple diseases, prolonged droughts and extreme temperatures. Results from numerous studies on these populations have shown steady increases in grain yield and disease resistance over time and yield stability over diverse environmental conditions.

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[23] Tapes, page 15
[24] Tapes, page 15
[25] http://science.org.au/fellows/memoirs/frankel.html#intro, Otto Frankel stands as a bridge between HVH & JRH. Jack Harlan thought very highly of Frankel and cherished the times he could visit with him.
[26] Pringle, 2008, page 308-9
[27] Pringle, 2008, page 309
[28] HVH took his family with him when he went to visit his experimental plots in Arizona and Idaho. This happened several summers. It is unclear when it started or exactly during which years they made this journey. *Taped Conversations with JRH.* However, Bill said that the first trip was in 1928.
[29] Harlan, 2001
[30] Harlan, 2001, page 45
[31] Personal Correspondence with JRH

In contrast to mixtures, populations have much greater variation as typically every plant represents a distinct genotype. This abundant genetic variation in the field has the potential to adapt through natural selection to different and changing environmental conditions and thereby provide more stable performance across variable environments. Composite crosses that adapt to climatic conditions and farming systems have the potential to become "modern landraces" (Wolfe et al, 2008).[32]

OCR for page 5
Biographical Memoirs: Volume 89 common in their Central Valley environment, including the slender wild oat (Avena barbata) that would later feature importantly in some of Bob's research. It seems likely that Mackie influenced Bob's decision to enter UC Davis as a student of agriculture in the fall of 1937. During his undergraduate years Bob worked as a student assistant for Coit Suneson of the U.S. Department of Agriculture, and this also had an enduring impact on Bob. Suneson, along with Harry Harlan and Gus Wiebe, was engaged in developing bulk populations of wheat and barley, known as composite cross populations. The theory at the time was that bulk populations would both act as a reservoir for useful genetic variation while at the same time evolving toward greater adaptation under standard agricultural conditions. Years later Bob would use these composite cross populations as a powerful resource for studies in experimental population genetics. These early experiences did much to define Bob's approaches to plant genetics and they serve to illustrate the powerful impact that scientific mentors can have on young minds. from publishing his dissertation work following the war, he never returned to this topic. There were strong influences at Madison, including Rubush G. Shands (his major professor), [33]

1929 (11/12): Jack in 8th grade in French School in DC. Bill is now in High School. Family trip to Arizona and Idaho. They must depart over Christmas break as before, in order to catch the winter harvest in Arizona. Stock Market crashes in October. The economy sinks into the Great Depression.

1930 (12/13) Bill turned 16 in May, got his driver's license and drove Gussie & Jack to Aberdeen after school in June.[34]

"In the fall of 1930, Nikolai Ivanovich attended two international conferences of agronomists, one in Ithaca, New York, and the other in Washington, D. C. Then he went plant hunting. He moved quickly through ten of the leading farm states, including California, and even managed a side trip to Mexico, in part to sample the country's unique diversity of maize."[35]

"Vavilov and my father were good friends and when Vavilov came to Washington, as he did twice, in 1930 and 1932, he stayed in the guest room of our home." Jack then gives an account of some very personal interactions on this visit.[36]

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[32] Wolfe, M, Baresel, J, Desclaux, D, Goldringer, I, Hoad, S, Kovacs, G, Loschenberger, F, Miedaner, T, Ostergard, H & Lammerts van Bueren, E (2008) Developments in breeding cereals for organic agriculture. Euphytica in press. doi: 10.1007/s10681-008-9690- found on the internet athttp://www.rodaleinstitute.org/20080926/gw1, : Note: I have not found that Harry V. Harlan was ever a "barley breeder at the University of California". (HVH, the younger)

[33] http://www.nap.edu/openbook.php?record_id=12042&page=1

[34] Harlan, 1997, *Taped Conversations.* Jack said that the year Bill got his driver's license he drove the car and their father was already in Arizona, having traveled there by train. It is not clear if this was 1930, with everything else going on (the NIV trip) or the following year.

[35] Pringle, 2008, page 160

[36] Harlan, 1995, page 51

1931(13/14): The Dust Bowl devastates high plains area of the United States. It was caused by a prolonged drought intensified by the indiscriminate plowing of millions of acres of native grassland and planting non-drought resistant wheat. It ended in about 1939. Trip out west begins after school ends in June and they just go to Aberdeen. Bill & Jack worked at Aberdeen.[37]

1932(14/15): Family trip to Aberdeen. Bill & Jack work. NIV visits US and stayed in Harlan house while visiting DC. NIV first attended the 6th International Genetics Conference.

> A high point of the 1932 Congress was the paper by N. **I.** VAVILOVi,n which he reported extensive geographical studies of the wild relatives of cultivated plants. He described a series of polyploid potatoes in South America, wheat varieties in Abyssinia, and many others. In those premolecular days, he realized that one could compare noncrossable species by looking for homologous chromosome changes and genetic variants. He emphasized that the future of plant breeding must rely on wild varieties as sources of useful genetic variability and established foundation stocks in widely different latitudes in the **USSR.** Alas, VAVILOV'S methods promised only hard work, more geographical expeditions, and slow (but certain) improvement of cultivated crops. In contrast LYSENKO'S expansive promises based on his eccentric Lamarckian views caught Stalin's eye. It is ironic that, in his Congress paper, VAVILOV called attention to the "remarkable discovery" by LYSENKO of "simple physiological methods of shortening the period of growth, of transforming winter varieties into spring ones and late varieties into early ones by inducing processes of fermentation in the seeds before sowing them," thereby building up the man who would later be his ruination. 'VAVILOV was the first of four speakers in a session on evolution. The other three were R. **A.** FISHERJ,. B. **S.** HALDANE and SEWAWLRLIG HT. This was one of the few times, if not the only one, that this triumvirate who founded the genetical theory of evolution appeared on the same platform.

VAVILOV was named president of the1939 Congress in Edinburgh. Shortly before the opening, he sent a letter noting that the Congress had been postponed for a year by the Academy of Sciences of the USSR so as to make better arrangements, and added, "The International Committee, how and chose as its place of meeting not the USSR but another country. Under ever, postponed the Seventh International Congress of Genetics until 1939 consider it possible to take part in the Congress." Nobody who knew VAVILOV such circumstances Soviet geneticists and plant and animal breeders do not thought this represented his true feelings. F. A. E. CREW was then chosen President and, with his usual grace, said, "I understand that in those places as a 'stand-in' who is required to look more or less like his principal and to where films are made, every star has his shadow (technically known, I think, take his place in the more arduous parts of his role. I would suggest to you that at the moment this is exactly what I am-a stand-in for a star. *You* invite me to play a part that VAVlLOV would have *so* adorned. Around my unwilling shoulders you drape his robes, and if in them I seem to walk ungainly, you will not forget that this mantle was tailored for a bigger man" (PUNNETT 1939). Soon after, VAVILOV was arrested and died in prison.[38]

[37] Tapes, page 11

[38] http://www.genetics.org/content/131/4/761.full.pdf+html. This piece was edited by James F. Crow and William F. Doue, The text, as it was copied from the web site had some formatting issues and required some superficial editing to make it more readable. (HVH)

1932: Family trip to Aberdeen?[39] NIV visit to DC. Bill says: "On Vavilov's last visit, Dad had had a heart attack and was not available to go around town so I served as a guide."[40]

1933(15/16): Great Depression worsens and dust bowl intensifies.

1934(16/17): JRH begins studies at George Washington University. During his time at GW his advisor and Botany professor was Dr. L Edwin Yocum. Harlan met his daughter, Jean, whom he would later marry.

1935(17/18): WVH graduates from college, begins PhD program at Univ. of Minn. Otto Frankel visits NIV in Leningrad.[41]

1936(18/19): WVH surveying out west during summer.

1937(19/20): WVH surveying out west during summer.

1938(20/21): Jack graduated with honors from George Washington University in Botany and began graduate studies at UC Berkley. Bill dropped out of his PhD studies at the Univ. of Minnesota (he had all the course work done and all he needed was the thesis) and got his first job, like his father, teaching school – in Afghanistan.

1939(21/22): Julian Huxley published "Evolution: The Modern Synthesis", from which the term "The New Synthesis" derived. In this work Huxley synthesized a modern theory of evolution from the work of a number of researchers, including George Ledyard Stebbins, in various disciplines including: genetics, cytology, systematics, botany, morphology, ecology and paleontology.

Aug. 4, Jack (age 22) marries Mary Virginia Yocum (age 21), the only child of Mildred and Dr. L. Edwin Yocum, Jack's Botany professor at GW, in Washington, DC. They took their honeymoon in the Sawtooth Mountains of Idaho, where the Harlan family use to stay when they were in Idaho as HVH was harvesting his barley experimental plots.

1940 (22/23) Jack and Jean Harlan live in Berkeley or San Francisco as Jack continues his graduate studies. Jean works as a receptionist at a local restaurant.

1941 (23/24) Ditto.

1942(24/25) Jack received his PhD from the University of California at Berkley.

Harlan, J.R. 1942. A survey of the genetic variability in the *Bromus carinatus* complex. Ph.D. Thesis. University of California, Berkeley, USA.[42]

Note: Bromus carinatus is a grass found in the western portions of North America. It is in the family Poaceae, which includes wheat, maize, rice, sorghum, barley as well as many forage plants. What Harlan learned about California Brome could be applied to the major forage crops and food crops around the world. It is remarkable that he could choose Bromus carinatus for his thesis work. Harlan seems to be able to stay on track and keep learning more about his subject, without wasting time and energy on blind

[39] Tapes, page 11

[40] Harlan, 2001, page 57.

[41] "The other major impact of Otto's overseas trip in 1935 was his meeting with Nicolai Vavilov who warmly welcomed his visit to the USSR, arranged his visa and itinerary [12], and spent much of his time with Otto during the week he was in Leningrad (129). Otto was impressed by Vavilov's passionate drive to identify general principles, by his style of leadership and by his stamina, if not by the poor state of his experimental plots. At the time of Otto's visit Vavilov was preparing the second and third volumes of his *Theoretical Bases of Plant Breeding*, yet shared his time and ideas generously with Otto. Many years later Otto and Erna Bennett dedicated *Genetic Resources in Plants* (72) to Vavilov, of whom Otto always had a photograph in his office." Quoted from *Biographical Memoirs: Sir Otto Frankel, 1900-1998*, originally published in *Historical Records of Australian Science*, vol.12, no.4, 1999.

[42] Harlan, 2008 (*Publications*). In this Master Chronology all references beginning with Harlan, J.R. and then a date are from *The Publications of Jack Harlan*, compiled by Cal Qualset and emailed to HVH in 2008. They will not be individually referenced.

allies and false starts. Dr. Stebbins trained him in the very best methodologies of scientific research and the latest of scientific understanding of genetics and evolution. This thesis provides an extraordinary starting point for a man who would become a legend in his own time. (HVH2)

Jack's first job after graduation was with the Tela Railroad Company (United Fruit Co.) in Honduras as a research assistant. He left this position after becoming discouraged because the investigators did not know how to do science. Later in 1942, Jack & Jean moved to Woodward, Oklahoma lived on a farm of 160 acres. Jack went to work with the U.S. Department of Agriculture (USDA) at Woodward, Oklahoma, where he was a plant breeder at the Oklahoma Forage Crop and Rangeland Improvement program and the Southern Great Plains Regional Grass Breeding program.[43]

1941-43: Russia invaded by the Nazis. "Stalin's disdain for Vavilov's work was made manifest in 1941 with his refusal to protect his seeds from the advancing nazis. The Soviet leader ordered factories in the path of the invaders to be dismantled and reassembled in safe territory east of the Ural mountains, but did not do likewise for the seed collections. However, unlike Stalin and Lysenko, the nazis did appreciate the importance of those seeds. They knew about Vavilov's seeds, understood their priceless value and intended to seize them in order to give the Third Reich unrivaled supremacy over world agriculture (not very different from what Monsanto intends to do nowadays). In June 1943, in the wake of the Germans' defeat at Stalingrad, the nazi SS sent a detachment to Ukraine to get a hold of the Soviet seed collections. The captured seeds were taken to an Austrian castle near the city of Graz. But the majority of Vavilov's seeds were stored at the Pavlovsk Research Station. The city was besieged by the nazis for two and a half years, and its resistance was one of the most heroic episodes not only of World War Two, but of the twentieth century. The Germans seized the Pavlovsk station but did not find the coveted seeds. These had been moved by Vavilov's colleagues to a location within the city. They guarded them with their lives, as they knew full well that if the nazis ever captured them all of Vavilov's work would be lost forever, and if they won the war they would not have seeds with which to regenerate Soviet agriculture. They also had to protect the seeds from the hungry population- over one million people died during the siege, many of them of starvation. At least a dozen scientists starved to death while guarding the seed collection. The Soviets defeated the nazis. The Germans never took Leningrad and never got their hands on the Pavlovsk station seeds. The stolen seeds were recovered, and on top of that the Soviets took control of Germany's Gatersleben agricultural station, which housed a seed collection whose first samples were collected in the days of the Kaiser."[44]

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[43] Harlan, 2007, page 32

[44] http://alainet.org/active/55720&lang=es. Reprinted from *Vavilov's Legacy* by Carmelo Ruiz Marrero. The following is reprinted from the subject website:

Vindication

After Stalin's death, members of the Soviet scientific c*ommunity started to speak openly against Lysenko. In 1962 physicist and astrophysicist Yakov B. Zel'dovich, astrophysicist* Vitaly L. Ginzburg, a Nobel prize winner, and physicist Pyotr L. Kapitsa, also a Nobel laureate, publicly declared that Lysenko's work was a fraud. Two years later, nuclear scientist Andrei Sakharov, who would win the Nobel peace prize in the following decade, accused Lysenko of pseudoscience and defamation and held him responsible for the firings, arrests and deaths of real scientists (6). Vavilov was posthumously exonerated of all charges against him and given due honor. In 1968 the Institute of Applied Botany that he led was renamed after him. Today it is still called the Vavilov Institute.

His legacy lives

Vavilov's feat was never repeated. No other individual has ever launched an effort of similar proportions to collect, catalogue and classify the world's agricultural biodiversity. His theories about the geographic distribution of crop biodiversity have passed the test of time and are accepted by biologists and agronomists all over the world.
After facing formidable foes like the Third Reich and Lysenko's pseudoscience, Vavilov's work keeps finding new enemies. In 2010 part of the Pavlovsk agricultural station was going to be razed by a developer who wanted to build houses there. The station and its 1,200 acres of fields can rightly be considered one of the marvels of the modern world.
"The Pavlovsk Research Station houses one of the world's largest collections of seeds and planted crops, roughly 90 percent of which are found in no other scientific collection in the world. The station's inventory includes almost a

1942: Jack & Jean Harlan move to Woodward, Oklahoma. Jack is hired at the USDA Experiment Station as a plant breeder.

January 26, 1943 "Vavilov dies in Saratov prison hospital, aged fifty-five of malnutrition (starvation)."[45] This is tragic irony of Shakespearian proportions: N I Vavilov, who dedicated his life to averting famine and starvation in his beloved country, Russia, himself is starved to death by the Communist state government in that same country.

Stebbins, G.L., Jr., H.A. Tobgy and **J.R. Harlan**. 1944. The cytogenetics of hybrids in *Bromus*. II. *Bromus carinatus* and *B. arizonicus*. Proceedings of the California Academy of Science 4th Series 25: 307-322.

Harry V. Harlan died late 1944 in Arizona. His ashes were placed under a certain rock in the desert not too far from his Barley plots near Sacaton.

Feb. 13, 1945 Sue Carol Harlan, Jack & Jean's first daughter is born in Woodward.

Harlan, J.R. 1945. Cleistogamy and chasmogamy in *Bromus carinatus* Hook and Arn. American Journal of Botany 32: 66-72.

Harlan, J.R. 1945. Grasses of the plains. Southern Seedsman, April.

Harlan, J.R. 1945. Natural breeding structure in the *Bromus carinatus* complex as determined by population analyses. American Journal of Botany 32: 142-148.

Harlan, J.R. Feb. 1946. The development of buffalo grass seed. Journal of the American Society of Agronomy 38: 135-141.

Sept. 12, 1946 Harry Vaughn Harlan, Jack and Jean's first son was born in Woodward.

October 1946: JRH first domestic collecting exploration to West Texas and Eastern New Mexico to collect seeds of different types of Blue Grama grass, to assess the condition of this dry plains area. The seeds were grown out at Woodward and El Reno and studied. The results were published starting in 1953.

1948: JRH first plant exploration to Turkey, Syria, Lebanon & Iraq. There is one collection made during this expedition which has become legendary. The following is a quote from **19th and 20th Century Plant Hunters**[46]

> While the history of recent plant exploration is rightly dominated by a handful of legendary collectors, many others have made important contributions. In 1948, Jack Harlan and Turkish colleague Osman Tosun collected a wheat sample from a field in Turkey that looked terrible. It lodged, had no winter-hardiness, and was susceptible to leaf rust. Harlan wrote of the wheat, PI 178383, "it was a

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thousand types of strawberries from more than 40 countries; a similar number of black currant varieties from 30 countries, including North America, Europe and the Far East; 600 apple types collected from 35 countries; and more than a hundred varieties each of gooseberries, cherries, plums, red currants, and raspberries. More than half of the black currant varieties grown in Russia, the world's leading producer, were bred at Pavlovsk. Sales of black currants in Russia are valued at more than $400 million annually." (7)
After an urgent international campaign for the station's protection, Russian president Medvedev declared he would take a look into the matter. The construction project has apparently been shelved indefinitely.

[45] Pringle, 2008, page 310

[46] **Allan Stoner'***USDA ARS National Gerinplasm Resources Laboratojy, Beltsville, MD 20705*

Kim Hummer'*USDA ARS National Clonal Gerniplasm Repository, 33447 Peoria Road, Corvallis, OR 9 7333-252 1*, found on-line at http://naldc.nal.usda.gov/download/17792/PDF.

hopelessly useless wheat but was dutifully conserved" (Harlan and Harlan, 2005). However, 15 years later, when United States wheat breeders were looking for resistance to a stripe rust outbreak, PI 178383 was found to have resistance to 4 races of stripe rust, 35 races of common bunt, and 10 races of dwarf bunt, as well as tolerance to flag smut and snow mold. Today PI 178383 appears in the pedigree of virtually all of the wheat grown in the Pacific Northwest.

About this same collections he said: "The potential value of a collection cannot be assessed in the field. Perhaps this statement could best be illustrated by PI 178383, a wheat I collected in a remote part of Eastern Turkey in 1948. It is a miserable looking wheat, tall, thin-stemmed, lodges badly, is susceptible to leaf rust, lacks winter hardiness yet is difficult to vernalize, and has poor baking qualities. Understandably, no one paid any attention to it for some 15 years. Suddenly, stripe rust became serious in the north-western states and PI 178383 turned out to be resistant to four races of stripe rust, 35 races of common bunt, ten races of dwarf bunt and to have good tolerance to flag smut and snow mould. The improved cultivars based on PI 178383 are reducing losses by a matter of some millions of dollars per year." [from "Practical problems in exploration: Seed crops", 1975]

April 4, 1948 Sherry Ruth Harlan, second daughter of Jack and Jean was born in Washington DC. Jean, being great with child while Jack was on his first plant expedition, had temporarily moved back in with her parents in DC to await his return. When he did return, the young family sold the farm to Surface (?)[47] and moved into a two story "stationhouse" in Woodward, near the experimental station.

Harlan, J.R. 1948. Tucson side-oats grama; an improved strain. Oklahoma Crops and Soils. Oklahoma Agricultural Experiment Station Bulletin No. B-319.

1948: Haile Selassie (Ras Tafari) invited Henry G. Bennett, president of Oklahoma A & M College to meet him in Ethiopia and discuss the possibility of starting a Land-Grant type college in Ethiopia. Bennett went to Pres. Truman with the idea that was the origin of "Point Four" of Truman's four point foreign policy given during his inaugural speech of 1949, which became the Technical Cooperative Assistance Act, which became the USAID[48] under Eisenhower.

Harlan, J.R. 1949. Apomixis in side-oats grama. American Journal of Botany 36: 495-499.

Sept. 24, 1949: Richard Edwin Harlan, Jack and Jean's second son, and last child, was born in Woodward.

**********1950******** **********

Harlan, J.R. 1950. Adventure on Turkish exploration trip. Farmer Stockman. April.

Harlan, J.R. 1950. Collection of crop plants in Turkey, 1948. Agronomy Journal 42: 258-259.

Harlan, J.R. 1950. Collecting forage plants in Turkey. Journal of Range Management 3: 213-219.

Harlan, J.R. 1950. The breeding behaviour of side-oats grama in partially isolated populations. Agronomy Journal 42: 20-24.

Harlan, J.R. 1950. The near east cattleman. Northwest Cattleman, April.

Harlan, J.R. 1950. The wandering gardeners of Yusufeli. Seed World. April 12, 1950.

**********1951**********

[47] I remember Daddy saying that he sold the farm in Woodward to his friend, Surface. I am not sure who Surface is, but I see his name in Uncle Bill's book and he was in DC. Someone named Surface was also mentioned by HVH1 in his letter to Gussie re the cabaret in France, 1919. I guess I will just leave that out. It is unimportant. (HVH2).
[48] "When the Emperor Came to Stillwater", by Theodore M. Vestal, 2001 and "OSU in Ethiopia Terminal Report 1952-68"

1951 Feb. Harlan family moved to Stillwater, Oklahoma. Jack still working for the USDA, took a position at Oklahoma A & M College for no pay. He specialized in Forages and Pastures. (He taught a course Mon/Sat morning for no pay.)?

1951: Okla. A&M College signs agreement with Ethiopia to start the Alamaya Agricultural College in Ethiopia under the Point Four Technical Cooperative Assistance Act.

Harlan, J.R. 1951. New grasses for old ranges. Journal of Range Management 4: 16-18.

Harlan, J.R. 1951. New World crop plants in Asia Minor. Scientific Monthly 72: 87-89.

Harlan, J.R. 1951. Anatomy of gene centers. American Naturalist 85: 97-103. (Based on 1948 exp.; refl. on NIV)

Harlan, J.R. and R.P. Celarier. 1951. Some Asiatic bluestems in America. Proceedings 49th Annual Convention of the Association of Southern Agricultural Workers.

**********1952** (All may be from Turkey Exp.)**** **********

Harlan, J.R. and W.C. Elder. 1952. Establishment of grasses and legumes. Oklahoma Agricultural Experiment Station Forage Crop Leaflet No. 1. January.

Harlan, J.R., W.C. Elder and R.A. Chessmore. 1952. Seeding rates of grasses and legumes. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 2. January.

Harlan, J.R., W.C. Elder and R.A. Chessmore. 1952. Forage crops recommended in Oklahoma. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 3. January.

Harlan, J.R. 1952. Harvesting and cleaning grass seed in Oklahoma. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 4. January.

Harlan, J.R. and W.C. Elder. 1952. Tall fescue. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 5. February.

Harlan, J.R. 1952. Blue panic.Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 6. February.

Harlan, J.R. 1952. Caucasian bluestem. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 7. February.

Chessmore, R.A. and **J.R. Harlan**. 1952. Smooth brome .Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 8. February.

Harlan, J.R. 1952. King ranch bluestem. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 11. May.

August 17-23, 1952 Sixth International Grasslands Congress, State College, PA. Harlan presented a paper with Snyder, L.A. lead author, see 1953 publications.

**********1953 **********

April 25, 1953, James Watson and Francis Crick published "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid" in the journal *Nature*.

Harlan, J.R. and W.R. Kneebone. 1953. Effect of various methods and rates of nitrogen applications on seed yield of switchgrass (*Panicum virgatum* L.). Agronomy Journal 45: 385-386.

Harlan, J.R., C.E. Denman and W.C. Elder. 1953. Weeping lovegrass. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 16.

Harlan, J.R., L.A. Snyder and R.P. Celarier. 1953. Cytological studies of Southern Great Plains grasses. Proceedings of the 6th International Grassland Congress. I: 229-232.

Snyder, L.A. and **J.R. Harlan**. 1953. A cytological survey of blue grama (*Bouteloua gracilis*) types from west Texas and eastern New Mexico. American Journal of Botany 40: 702-708.

Dr. Harlan taught one course, FCROP500 (Thesis and Research) in the Spring Semester, Summer School and Fall Semester. In the Summer Semester he also taught 530 (Field Crop Research)

**********1954 **********

Harlan, J.R. 1954. Indian grass and switch grass. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 17.

Harlan, J.R. 1954. Range management in Turkey. Journal of Range Management 7: 220 222.

Harlan, J.R. 1954. Side-oats grama. Oklahoma Agricultural Experiment Station Forage Crops Leaflet No. 18.

Harlan, J.R. 1954. Southland, a new southern bromegrass for Oklahoma and the upper South. Oklahoma Agricultural Experiment Station Bulletin No. B-444.

Harlan, J.R., G.W. Burton and W.C. Elder. 1954. Midland Bermuda grass, a new variety for Oklahoma pastures. Oklahoma Agricultural Experiment Station Bulletin No. B 416.

Spring Semester 1954 Harlan taught FCROP 500 & 530, 500 in the summer and 530 in Fall Semester. In the Fall Semester he taught FCROP 593 (Evolutionary Mechanics)

1954: Haile Selassie (Ras Tafari) visited the United States. He came to Oklahoma State University (still Oklahoma A&M College), which was doing some crop research in Ethiopia as part of establishing the Alamaya Agricultural College in Ethiopia . Jack undoubtedly met with him there and would have mentioned his father's visit to Ethiopia in 1923. Jack's son, Harry, remembers seeing the Ras as he traveled in an open convertible from the airport right past their house at Stillwater to Oklahoma A&M College. "I was surprised at how small he was, but I saw his beard." (HVH the younger)

**********1955 ***** **********

Margaret Brooks begins her PhD study. Harlan is her advisor and she is his first graduate student to advise.

Celarier, R.P. and **J.R. Harlan**. 1955. Studies on Old World bluestems. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-58.

Harlan, J.R. 1955**. Crops, weeds, and revolution**. Scientific Monthly 80: 299-303.

Harlan, J.R. 1955. The Great Plains Region (Part 4). Agricultural and Food Chemistry 3: 29-31.

Harlan taught FCROP 500 & 530 in the Spring Semester, 500 in the summer and 530 in the fall (OSU Records).

**********1956 **********

Margaret Brooks' 2nd year in grad. School.

1956 Marlowe Thorne starts as Agronomy Dept. Chairman at Okla. A&M College

Celarier, R.P. [49] and **J.R. Harlan**. 1956. An Andropogoneae garden in Oklahoma. Taxon 5: 183-186.

Harlan, J.R. 1956. **Distribution and utilization of natural variability in cultivated plants**. pp. 191-208 *in* Brookhaven Symposium in Biology No. 9. Genetics in Plant Breeding, Brookhaven National Laboratory, Upton, New York, USA. (Quoted by OHF in 1975 Crop Genetic Resources …)

Harlan, J.R. 1956. BOOK: *Theory and dynamics of grassland agriculture*. D. Van Nostrand, Princeton, New Jersey, USA. 281 pp.

Harlan, J.R., R.M. Ahring and W.R. Kneebone. 1956. Grass seed production under irrigation in Oklahoma. Oklahoma Agricultural Experiment Station. Bulletin No. B-481. October.

Harlan was made a fellow of the American Association for the Advancement of Science in 1956.

[49] Professor Dr. **Robert Paul Celarier** (1921–1959) was a botanist and agrostologist, who performed extensively as a Professor of the "Department of Botany and Plant Pathology" at Oklahoma State University. (Wikipedia)

Harlan taught FCROP 600 in the Spring Semester & summer and in the fall taught 593: Mech. of Evol.

***************************************1957 ***

Margaret Brooks' 3rd year in grad. School.

K. L Mehra begins work on his PhD studies. Harlan is his adviser.

Celarier, R.P. and **J.R. Harlan**. 1957. Apomixis in ***Bothriochloa***, ***Dichanthium*** **and** ***Capillipedium*****.** **Phytomorphology** 7: 93-102.

Harlan, J.R. 1957. Research effect from trends in farm seed usage Great Plains States. Proceedings 2nd Farm Seed Industry Research Conference, Chicago, Illinois, USA.

1957: Oklahoma A & M College became Oklahoma State University.

1957: Jack Harlan published his father's autobiography: *One Man's Life with Barley*.

Harlan taught FCROP 600 in the Spring and Summer sessions (OSU), FC 573 "Classical Evolution" Fall (Byrd Curtis' notes)

During the 1950's and early 60's Jack took his family camping twice a year (Christmas and summer). They camped in every state of the lower 48, except Nebraska, North & South Dakota. The children learned how to set up camp, start a fire and cook their food. Jack's early training in Idaho was bearing fruit.

1958 *** ***

K. L Mehra 2nd year of grad school.

Margaret Brooks' 4th year in grad. School.

Celarier, R.P. and **J.R. Harlan**. 1958. **The cytogeography of the Bothriochloa ischaemum complex**. I. Taxonomy and geographic distribution. Journal of the Linnean Society (Botany) 55: 755-760

Harlan, J.R. 1958. Agronomic trends and problems in the Great Plains-pasture and range crops. Advances in Agronomy 10: 15-23.

Harlan, J.R. 1958. Blue grama types from west Texas and eastern New Mexico. Journal of Range Management 11: 84-87.

Harlan, J.R. 1958. Generalized curves for gain per head and gain per acre in rates of grazing studies. Journal of Range Management 11: 140-147.

Harlan, J.R. 1958. Book: Grasslands of Oklahoma. Part I. (Teaching Manual). Oklahoma State University, Stillwater.

Harlan, J.R. and R.M. Ahring. 1958. Caddo switchgrass. Oklahoma Agricultural Experiment Station Bulletin No. B-516.

Harlan, J.R. and R.M. Ahring. 1958. Coronado side-oats grama. Oklahoma Agricultural Experiment Station. Bull. No. B-515.

Harlan, J.R., R.P. Celarier, W.L. Richardson, M.H. Brooks and K.L. Mehra. 1958. Studies on Old World Bluestems II. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-72. October.

Margaret H Brooks (New Jersey, B.A.from Smith College-1933) became the first graduate student at OSU to receive a PhD Degree under the direction of Dr. Jack R. Harlan. Her Thesis topic: A Study Of The Reproductive Mechanisms In Certain Species Of Bothriochloa And Dichanthium And Complexes, Spring, 1958

Harlan taught FCROP 593 in the Fall Semester. (OSU), confirmed by Byrd Curtis' notes: 593 is Mechanics of Evolution.

1959 *

K. L Mehra's 3rd year of grad. School.

Diagamber S. Borgaonkar started his grad. studies at OSU in 1959, first under Celarier, then de Wet.

Harlan, J.R. 1959. Plant exploration and the search for superior germplasm for grasslands. pp. 3-11 *in* Grasslands. American Association for the Advancement of Science, Washington, DC, USA.

Mehra, K. L., R.P. Celarier and **J.R. Harlan**. 1959. **Effects of environment on selected morphological characters in the *Dichanthium annulatum* complex**. Proceedings of the Oklahoma Academy of Science 40: 10-14.

1959: Theodore Hymowitz began graduate studies at A&M.

Hemchand R Chheda begins PhD study. Harlan is his advisor.

Harlan taught FCROP 563 in the Fall Semester.

Harlan received a John Simon Guggenheim Memorial Fellowship

Robert Celarier died in December, 1969.

1960 *

Hemchand R Chheda's 2nd year of grad. school.

Dr. Johannes Martinus Jacobus (JMJ) de Wet was recruited by Jack Harlan to come to OSU in the Spring of 1960 to take the place of Bob Celarier who had passed away the year before. Dr. Celarier was in the Botany Department and that is where de Wet was placed. He was originally from South Africa and was a former student of G. Ledyard Stebbins. De Wet became a chief researcher in Harlan's genetic resources group. Although they were in different departments at OSU and their offices were in different buildings, Harlan and de Wet worked closely together.

Harlan, J.R. 1960. ***Bothriochloa intermedia* A. Camus. A study in speciation.** Proceedings of the 10th International Genetics Congress 2: 112.

Harlan, J.R. 1960. Breeding superior forage plants for the Great Plains. Journal of Range Management 13: 86-89.

Harlan, J.R. 1960. Production characteristics of Oklahoma forages: Native range. Oklahoma Agricultural Experiment Station Bulletin No. B-547. February.

Harlan, J.R. and R.M. Ahring. 1960. A suggested method for determining purity of certain chaffy-seeded grasses.Agronomy Journal 52: 223-226.

Harlan, J.R. and W.R. Kneebone. 1960. Woodward sand bluestem: Origin, description and adaptation. Oklahoma Agricultural Experiment Station. Bull. No. B-561. August.

Harlan did not teach any classes during 1960. He was out of the country almost the entire year.

In 1960 (April 1960 – Feb. 1961) Jack made his **second plant exploration**: to the Kew, England, Copenhagen, Iran (including an archeological dig), USSR, Afghanistan, Pakistan, India, Ethiopia, Israel and Lebanon. 10 months in the field.

K. L Mehra, (India, B.S. from University of Delhi-1952, M.S.: ibid-1954) became the second student at OSU to receive his PhD Degree under the direction of Dr. Harlan. His Thesis Topic: Cytotaxonomic Study Of The **Dichanthium annulatum** Complex, Spring, 1960.

**************************************1961***** ***

Hemchand R Chheda's 3rd year of grad. School.

Ahring, R.M. and **J.R. Harlan**. 1961. Germination characteristics of some accessions of *Bothriochloa ischaemum* Keng. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-89.

Ahring, R.M. and **J.R. Harlan**. 1961. Germination studies on the *Dichanthium annulatum* complex. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-90.

Chheda, H.R., J.M.J. de Wet and **J.R. Harlan**. 1961. **Aneuploidy in *Bothriochloa* hybrids. Caryologia** 14: 205-217.

Dewald, C. L. and **J.R. Harlan**. 1961**. Stigma removal studies in certain accessions of *Bothriochloa intermedia* and *Dichanthium annulatum*.** Crop Science 1: 15-17.

Harlan, J.R. 1961. **Geographic origin of plants useful to agriculture**. pp. 3-19 *in* Germplasm Resources. American Association for the Advancement of Science, Washington DC, USA.

Harlan, J.R. 1961. Range (in Agriculture). Encyclopaedia Britanica 18: 972-973.

Harlan, J.R. and H.R. Chheda. 1961. **Intergeneric hybrids in *Bothriochloa* Keng**. pp. 706-710 *in* Recent Advances in Botany. University of Toronto Press, Canada.

Harlan, J.R., J.M.J. de Wet, W.L. Richardson and H.R. Chheda. 1961. Studies on Old World bluestems. III. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-92.

In 1961, Jack resigned from the USDA and became a professor of Agronomy at Oklahoma State University at Stillwater (although he never took a formal course in Agronomy). His specialty remained forages and pastures.

Harlan taught AGRN 600 (Research & Thesis) in the spring and AGRN 563 (Classical Evolution) in the Fall Semester, of 1961.

Note: this happened after his second Expedition. Jack now had some archeology under his belt and felt that he needed to move beyond the confines of USDA and the Woodward Experiment Station. OSU wanted to hire him as a full time scientist and teacher. It was an easy decision for both Harlan and OSU to make.

**************************************1962 (1960)***

Robert R Bridge begins his PhD study. Harlan is his advisor.

Hemchand R Chheda's 4th year of grad. school.

Blaser, R.E., **J.R. Harlan** and R.M. Love. 1962. Grazing management. pp. 11-17 *in* Pasture and Range Research Techniques. Cornell University Press, Ithaca, USA.

Borgaonkar, D.S., **J.R. Harlan** and J.M.J. de Wet. 1962. **A cytogenetical study of hybrids between *Dichanthium annulatum* and *D. fecundum*.** II. Proceedings of the Oklahoma Academy of Science 42: 13-16.

Celarier, R.P., J.M.J. de Wet, D.S. Borgaonkar and **J.R. Harlan**. 1962. **Intergeneric hybrids in the Bothriochloininae. I. *Bothriochloa intermedia* and *Dichanthium annulatum*.** Cytologia 26: 170-175.

Chheda, H.R. and **J.R. Harlan**. 1962. **Fertility in relation to chromosomal abnormalities in some hybrids with *Bothriochloa intermedia* (R. Br.). A. Camus**. Proceedings of the Oklahoma Academy of Science 42: 17-22.

de Wet, J.M.J. and **J.R. Harlan**. 1962. **Species relationships in *Dichanthium* III. *D. sericeum* and its allies.** Phyton (Argentina) 18: 11-14.

Harlan, J.R. 1962. Bibliography of research in forage crop breeding conducted in the southern states and supported in part by regional research projects S-12 and S-46. Oklahoma Agricultual Experiment Station Bulletin No. B-435.

Harlan, J.R. 1962. Hay and pasture seedings for the Southern Great Plains and the Southwest. pp. 468-479 *in* Forages (H.D. Hughes, M.E. Heath and D.S. Metcalfe, eds.). Iowa State University Press, Ames, Iowa, USA.

Harlan, J.R., H.R. Chheda and W.L. Richardson. 1962. **Range of hybridization with *Bothriochloa intermedia* (R. Br.) A. Camus**. Crop Science 2: 480-483.

Harlan, J.R., J.M.J. de Wet and W.L. Richardson. 1962. Improving Old World bluestems for the South: Progress report. Oklahoma Agricultural Experiment Station. Proc. Series P-383.

Harlan, J.R., J.M.J. de Wet, W.L. Richardson and H. R. Chheda. 1962. Improving Old World bluestems for the South: Progress Report 1961. Oklahoma Agricultural Experiment Station Bulletin No. B-412.

Singh, A.P., **J.R. Harlan** and J.M.J. de Wet. 1962. **Relationship within the *Dichanthium annulatum* complex**. Proceedings of the Oklahoma Academy of Science 42: 50-54.

Harlan taught AGRN 470 & 530 in the spring, 500 in the summer and 500 & 593 in the Fall Semester of 1962

Harlan was awarded the American Grassland Council Merit Award in 1962.

Harlan was made a fellow of the American Society of Agronomy in 1962.

Hemchand R Chheda (India, B.S. from Gujarat (India)-1954, M.S.: Indian Technology-1956) became the third graduate student to receive his PhD Degree under the supervision of Dr. Harlan. His Thesis Topic: **An Analysis Of Hybrids With Bothriochloa intermedia (R.Br.) A. Camus**, Spring, 1962.

Jack Harlan was made an ASA Fellow and a CSSA Fellow in 1962.

1962: Jack's mother, Augusta Griffing Harlan, passed away in a nursing home in Manhattan Kansas. Her ashes were placed under the Harlan Rock in Arizona, where her husband's ashes had been placed.

1963*

Robert R Bridge's 2nd year of grad. school.

1963: Marlowe Thorne transfers to Univ. of Ill. Dept. Chair.[50]

May, 1963: Jack's daughter, Sue, graduated from High School and in the fall entered the University of Rhode Island.

August, 1963: JRH went with Harry and about 4 other young men to Philmont Scout Reservation for 2 weeks of backpacking and camping.

Ahring, R.M., N.L. Dunn, Jr. and **J.R. Harlan**. 1963. Effect of various treatments in breaking seed dormancy in sand lovegrass. Crop Science 3: 131-133.

[The following papers all came out of the 1960 Expedition and all attempt to explain the complex behavior of Bint, Bish & Dan, which Harlan collected extensively, especially in West Pakistan.]

Chheda, H.R. and **J.R. Harlan**. 1963. **A cytogenetical study of intergeneric hybrids between *Bothriochloa intermedia* and *Dichanthium fecundum*.** **Cytologia** 27: 418-423.

[50] http://www.news-gazette.com/obituaries/2011-02-23/marlowe-thorne.html

Chheda, H.R. and **J.R. Harlan**. 1963. **Mode of chromosome association in *Bothriochloa* hybrids. Caryologia** 15: 461-476.

Harlan, J.R. **1963. Natural introgression between *Bothriochloa ischaemum* and *B. intermedia* in West Pakistan. Botanical Gazette 124: 294-300. [JSTOR: Abstract**
Morphologically, taxonomically, and cytogenetically, Bothriochloa ischaemum (L.) Keng is a "good" species over nearly the whole of its natural range, but in the foothills of northern West Pakistan the distinctions between it and B. intermedia (R. Br.) A. Camus break down almost completely as a result of extensive introgressive hybridization induced by human disturbance of the natural habitat.]

Harlan, J.R. 1963. **Two kinds of gene centers in Bothriochloininae**. American Naturalist 97: 91-98.

Harlan, J.R. and H.R. Chheda. 1963. **Studies on the origin of Caucasian bluestem, *Bothriochloa caucasica* (Trin**.). C.E. Hubbard. Crop Science 3: 37-39.

Harlan, J.R. and J.M.J. de Wet. December, 1963. **The compilospecies concept**. Evolution 17: 497-501. [Found in JSTOR at: http://www.jstor.org/stable/2407101?seq=2&loginSuccess=true#page_scan_tab_contents.]

Harlan, J.R. and J.M.J. de Wet. 1963. **The role of apomixis in the evolution of the *Bothriochloa Dichanthium* complex**. Crop Science 3: 314-316.

Harlan, J.R., W. L. Richardson and J.M.J. de Wet. 1963. Improvlng Old World bluestems for the South: Progress report 1962. Oklahoma Agricultural Experiment Station. P-458.

Nilan, R.A., C.F. Konzak, **J.R. Harlan** and R.P. Legault. 1963. The magnitude of the oxygen effect in irradiated barley seeds. Page 94 *in* Genetics Today (S.J. Geerts, ed.). Proceedings of the XI International Congress of Genetics (abstr.). The Hague, Netherlands.

Harlan taught AGRN 500 in the spring, 470 & 600 in the summer and 563 & 600 in the fall.

1964*

Robert R Bridge's 3rd year of grad. school.

Harlan, J.R., W. L. Richardson and J.M.J. de Wet. 1964. Improving Old World bluestems for the South: Progress report 1963. Oklahoma Agricultural Experiment Station P-450.

Chheda, H.R. and **J.R. Harlan**. 1964. **Chromosome evolution and genome building in Bothriochloiniae**. Nigerian Agricultural Journal 1: 18-21.

Harlan, J.R. 1964. Quality: Dry range and humid pasture. Joint Symposium of the American Grassland Council and American Society of Range Management. American Grassland Council Publication.

Harlan, J.R. 1964. Review: Pasture economy and meadow cultivation, by I.V. Larin. Moscow, A. Lapid (trans.). 1962. Office of Technical Services, US Department of Commerce, Washington, DC. *in* Journal of Range Management 17: 46-47.

Harlan, J.R. 1964. Book: Plant scientists and what they do. Franklin Watts, NY. 181 pp.

Harlan, J.R., M.H. Brooks, D.S. Borgaonkar and J.M.J. de Wet. 1964. **The nature and inheritance of apomixis in *Bothriochloa* and *Dichanthium***. Botanical Gazette 125: 41-46.

Harlan taught ARGN 600 in the spring, and 593 & 600 in the fall.

In 1964 (April – Sept.) Jack took his **third plant exploration**, starting with a visit to the Kew in London, which became his pattern. This time he went to Rome, Israel, Athens, Turkey (including archeological dig), Israel, Bulgaria, Yugoslavia, Scotland (X Intl. Botanical Congress 3-12 Aug. 1964, Edinburg, where he delivered a lecture, see below), Wales and the Netherlands. 4 months in the field. It was on this expedition that he harvested wild wheat with a stone sickle in Turkey, demonstrating that primitive men could have survived using this technique.

May, 1964: Jack's son, Harry, graduated from High School and in the fall, entered Oklahoma State University. Two years later Harry transferred to MIT and graduated in February, 1969, with a degree in Life Sciences.

Oct. 4, 1964: FAO published a very extensive study: "The State of Food and Agriculture 1964" see: http://www.fao.org/docrep/016/ap652e/ap652e.pdf

1965

Robert R Bridge's 4th year of grad. school.

Harlan, J.R. 1965. **The possible role of weed races in the evolution of cultivated plants.** Euphytica 14: 173-176, presented at the X Intl. Botanical Congress 3-12 Aug. 1964, Edinburg (see above)

Harlan, J.R. 1965. The use of apomixis in the improvement of tropical and subtropical grasses. Proceedings of the International Grassland Congress Brazil 1964: 1: 191-193.

Harlan has been publishing studies on apomixis since 1963. Following is a statement found on the Internet, dating from 1998: "Apomixis is a natural way of cloning plants through seed. It offers plant breeders a unique system for developing new and distinctive cultivars in many species," says plant geneticist Bryan K. Kindiger, who is at the ARS Southern Plains Range Research Station in Woodward, Oklahoma. "Apomixis will give scientists a potent tool to create hybrids that can produce generations of genetically identical plants that retain their original hybrid genetics.", from "Agricultural Research" December 1998

Harlan, J.R. and J.M.J. de Wet. 1965. **Some thoughts about weeds.** Economic Botany 19: 16-24.

Robert R Bridge (LaCasa (Near Hollis, Oklahoma), B.S from OSU-1961) becomes the 4th student at OSU to receive his PhD Degree under Dr. Harlan. His Thesis Topic: **A Study Of Heterosis In Interspecific Crosses Of Bothriochloa**, Spring, 1965.

Harlan taught AGRN 500, 600 & 610 in the spring, 500 & 600 in the summer and 500, 563 & 600 in the Fall

1966

Harlan's colleague and former student, J.M.J. de Wet, and the others at the OSU Experiment Station, begin to broaden the scope of their studies by introducing concepts in **biosystematics**, an approach to the study of living systems pioneered by Harlan's PhD professor, G. Ledyard Stebbins and others in the San Francisco Bay area. The following papers were published in 1966:

de Wet, J.M.J., **J.R. Harlan** and W.L. Richardson. 1966. **Biosystematics** of the Bothriochloininae (Andropogoneae, Gramineae). Oklahoma State University Agricultural Experiment Station P-532.

de Wet, J.M.J., **J.R. Harlan**, J.P. Huckabay and M.H. Lu. 1966. **Biosystematics** of Sorghum, a report of progress. Oklahoma Agricultural Experiment Station Proceedings Series P-539.

de Wet, J.M.J and **J.R. Harlan**. 1966. Morphology of the compilospecies *Bothriochloa intermedia*. American Journal of Botany 53: 94-98.

Harlan, J.R. 1966. Plant introduction and **biosystematics**. pp. 55-83. *in* Plant Breeding (K.J. Frey, ed.). Iowa State University, Ames, Iowa, USA.

Harlan, J.R. and D. Zohary. 1966. Distribution of wild wheats and barley. Science 153: 1074-1080. (Quoted by OHF in 1975 Crop Genetic Resources …)

Harlan, J.R., J.M.J. de Wet, W.L. Richardson, W.W. Huffine, J. Deakin, S.P. Sen Gupta and A. Carpena. 1966. **Biosystematics** of the genus *Cynodon* (Gramineae). Oklahoma Agricultural Experiment Station Proceedings Series P-537.

Jack had been elected president of the Crop Sciences Society of America for 1966. He attended an Executive Committee meeting in Madison Wisconsin on April 28, 1966. Soon after his return he resigned from OSU because of a loyalty oath to the President of the University that he refused to sign. He felt that signing it would impinge upon his independence as a scientist. Dr. Marlow Thorne, the Chairman of the Department of Agronomy at OSU had resigned in 1963 and taken a similar position at the Univ. of Ill. He offered Harlan a position of Professor of Plant Genetics at the University of Illinois, Urbana. Harlan left for Champaign/Urbana in June, 1966.

August 21-26 Jack returned to OSU to chair the annual meeting of the Crop Sciences Society of America in Stillwater. The Executive Committee in April had recommended and the general meeting adopted the CSSA join with the ASA and the SSSA to form the Agronomic Science Foundation to provide scholarships for students in Agronomy. The ASF has since grown to the point that in 2011 it was able to award a total of $241,000 in awards, lectureships and scholarship/ fellowships to some 138 people. Harlan returned to the U of I campus after the CSSA meeting.

Sept. 1966: Jean, Harry, Sherry and Richard travel to the Northeast. Harry has transferred from OSU to MIT and Sherry enters Tufts Univ. Sue and Bob Hughes are married in Fall River Mass. on Sept 10. Jack travels from Illinois to Fall River for the wedding. Jean & Richard return to Stillwater, Sue and Bob returned to school at the Univ. of Rhode Island, Harry and Sherry went to school in Cambridge, Mass. and Jack returns to Champaign/Urbana. So, in 1966 the Harlan family scattered - never to return, except for periodic family reunions.

November, 1966: Jack starts his first expedition from the Univ. of Ill. He visits the various projects U of I has ongoing in India. He returns by Europe: the Kew, Paris and Berlin. This is his **4th trip. It was not really a Plant Exploration**, although Jack probably did do some exploring. Count this as Plant Exploration No. 4.

Otto Frankel was knighted in 1966 because of his efforts to feed the allies in the Pacific theater during World War II[51]

**************************************1967***

[51] **The Viking in the Wheat Field: A Scientist's Struggle to Preserve the World ...**
By Susan Dworkin, page 92.

During the 1960s, Jack Harlan played a leading role in the beginning of the international movement to conserve plant germplasm resources (PGR). September 18-26, 1967 he chaired the 10-day FAO/International Biological Program (IBP) Technical Conference on the Exploration, Utilization, and Conservation of PGR, held in Rome in 1967 (see DIVERSITY, no.8, pp.30-32). Though he remembers trying in vain to slow the speed of English-speaking representatives for the purpose of simultaneous translation, his ability to respond to questions in several languages impressed many participants. A colleague recalls Harlan's "superbly smooth performance as chairman.'' This event put Jack Harlan on the international map.

The following is quoted from an Internet Website *CROP NETWORKS, Searching for New Concepts for Collaborative Genetic Resource Management*: (All the grammatical & spelling errors were retained, HVH2)

"IBP, established under the auspices of the International Council of Scientific Unions (ICSU) adopted as one of the principal thermes, the maintenance of 'genepools' of wild species and primitive forms of cultivated plants following a proposal of Stebbins. The chairman of the Working Group of the IBP, Sir Oito Frankel, developed contacts to FAO in 1965 which led in 1967 to the organization of a joint FAO/IBP Tech~iical Conference on the Exploration, Utilization and Conservation of Plant Genetic Resources. This conference is considered as a landmark for the so-called 'Genetic Resources Movement' (Frankel 1985). Sir Otto Frankel and Erma Bennett were in charge of the very thorough preparation of this conference. Their publication of the proceedings under the IBP is considered the first comprehensive book on plant genetic resources (Frankel & Bennet 1970).

The conference moved the emphasis towards a comprehensive system of genetic resources including exploration, evaluation, documentation, utilization and conservation. The need for long-term preservation was recognized and the method of ex situ long-term seed storage adopted as its most important method. A 'generalist' strategy of collection and conservation was supported as more appropriate than a mission oriented approach.

An action programme was proposed by the conference giving highest priority to primitive cultivars and endangered wild species of economic importance. FAO was urged to assume international coordination and guidance and to seek the resources for the implementation of the programme. The direct follow-up to this proposal was somewhat disappointing. Yet, FAO established a Crop Ecology and Genctic Resources Unit in 1968. The FAO Panel of Experts on Plant Exploration and Introduction which was set up already in 1965 pursued a number of issues addressed in the conference. It actually laid the groundwork to many activities of later years (Frankel 1985). FAO also established in 1986

a Panel of Experts on Forest Genetic Resources taking stock of forest genetic resources and proposing priorities for action.

A programme based cn theproposal ofthe conference of 1967developed in FAO failed to receive financial support in 1971 by UNDP (United Nations Development Programme). Yet, in the United Nations Conference for the Human Environment in 1972 in Stockholm, FAQ with the help of Sir Otto Frankel gave the issue of plant genetic resources world recognition. The Conference requested FAO to take responsibility in assisting the establishment of an international resources programme, UNEP to take partial responsibility for plant resources, and called on all countries to participate (CGIAR/TAC 1980).[52]

Jack's son, Harry, remembers that his father was very humble about chairing the FAO meeting, saying with displeasure that "they had me holding the gavel, so that I could not engage in the discussion that was going on."

CHECK OUT "MANAGING PLANT GENETIC DIVERSITY" FOR GREAT QUOTES

During his consultancy at the FAO in 1966, Otto was visited by a fellow student from Baur's group, Professor Hermann Kuckuck, who painted an alarming picture of the accelerating loss of land races and wild relatives in Turkey and Ethiopia. His account brought home to Otto the need for urgent and comprehensive action, which he stressed in his report to FAO.

The 1967 FAO/IBP Conference on 'The Exploration, Utilization and Conservation of Plant Genetic Resources' was a landmark for the genetic resources movement. In both its planning and the reworking of its proceedings, Otto was joined, at his personal request, by Erna Bennett, and together they coined such phrases as genetic resources and genetic erosion. The conference itself led to a programme for FAO-initiated international action, while the book (72) had a substantial impact on the scientific community. In particular, the book emphasised the importance of what Otto liked to refer to as the 'generalist strategy' of Vavilov as against 'mission-oriented' collecting (122).

After the 1967 conference there followed a frustrating period of bureaucratic inaction by FAO. The Panel of Experts was reconstituted with a membership representing both IBP and FAO under Otto's chairmanship, and many issues were considered at their four meetings. The high priority for collection of endangered land races was retained. Consideration was given to the problems of evaluating accessions more broadly, to computerizing the information, to long-term seed storage, to the establishment of a global network of genetic resource centres, and to the respective roles of the various kinds of collection. Throughout the late sixties and early seventies it was the Panel of Experts under Otto's activist chairmanship, and Erna Bennett within FAO, who kept the genetic resources issues alive. As Otto wrote later: 'Conservationists who became so concerned in the eighties when the battle was essentially over were notably uninterested when their publicity might have been invaluable' (127).

Otto published several papers on genetic resources issues through this period, many of them aimed at increasing public awareness of the problems. One of the finest of these – in the estimation of Soulé and Mills [19] – was his Macleay Memorial Lecture entitled 'Variation – the essence of life' (77), in which he argues that the scale of human impact on genetic variation within both domesticated and natural communities is now such that we can no longer claim evolutionary innocence: 'We have acquired evolutionary responsibility' and must develop an 'evolutionary ethic'.

[52] http://pdf.usaid.gov/pdf_docs/PNABK861.pdf

A conference of experts was convened at Beltsville, USA in 1972, to consider the proposal of the IBP/FAO Panel of Experts for the establishment of a network of regional genetic resource centres plus a coordinating centre to recommend priorities and organize training and other activities of the network, which would be associated with FAO. Otto was invited to present the report of the Beltsville meeting to the Technical Advisory Committee of the Consultative Group on International Agricultural Research (CGIAR) in April 1972.

Two months later Otto unexpectedly found himself given an opportunity to address the United Nations Conference for the Human Environment, in Stockholm, on genetic resources. He had been asked by FAO to prepare a background paper on this subject for the conference, with recommendations. Several delegates moved the adoption of these recommendations, and another requested that Otto be allowed to address the conference. He relished the opportunity, his recommendations were adopted in Articles 39-45 [20], and the world's news media carried his message. He became a cult figure at Stockholm and genetic resources became an international issue, requiring consideration by national governments and inviting the concern of public interest groups. The genetic conservation wave began to roll, fourteen years before the term 'biodiversity' was coined.

In 1973 the CGIAR established an International Board for Plant Genetic Resources (IBPGR). Otto, who was widely expected to be the first chairman of the Board, was not even a member. Moreover, FAO, which had sponsored the cause of genetic conservation when no other organization did so, abandoned its own Panel of Experts once IBPGR was established. Although the panel members had expected their accumulated experience in the area to be retained, the Panel was barred from contact by the Board, and disappeared (128). A round-up technical conference was held in Rome in 1973, the proceedings being edited by Otto and Professor J.G. Hawkes (88).

Otto's most widely admired and influential paper, 'Genetic conservation: our evolutionary responsibility' (84), presented at the 13th International Congress of Genetics in Berkeley, had already been published. Regarded by M.J.D. White 'as a landmark in the cultural evolution of the human species', and by Soulé and Mills as 'prophetic...(presenting) the conceptual and moral agenda for the discipline of conservation genetics', this paper signalled the end of Otto's most active, creative and influential role in the genetic resources movement. Otto then collaborated with Michael Soulé in the writing of *Conservation and Evolution* (109). Published in 1981, this was a pioneering book, particularly in placing the genetic resources movement within the wider context of the conservation of biological diversity and of the opportunity for continuing evolution.

Otto was now freer to speak out on genetic resources issues as he continued to think and write about them. He urged greater activity by the national gene banks (128) and more comprehensive evaluation and documentation of accessions. He proposed the use of representative 'core collections' as being more accessible for plant breeders (118). Nevertheless, Otto had always regarded the global network of base collections as the backbone of the genetic conservation strategy, and was appalled when one of his erstwhile colleagues suggested a shift of emphasis to the national collections. At the age of 90 he still responded vigorously (140). He had earlier engaged in public debate with P.R. Mooney on the subject of 'farmers' rights', and in 1988 locked horns with J.R. Kloppenberg and others on the 'sovereignty of seeds' and our 'genetic debts' to developing countries (131). He expressed his views on the FAO International Undertaking, on the Commission on Plant Genetic Resources, and on the Keystone International Dialogue (137). He became less and less sanguine about the role of botanic gardens in genetic conservation, and more and more convinced of the benefits of *in situ* conservation of wild species, while remaining unsure to the very end on where to draw the line between the impossible goal of conserving everything and the utilitarian approach of conserving only species of likely usefulness.

Otto's views on several issues in genetic conservation evolved, but his commitment to the effective conservation and use of genetic resources never wavered. However, there were times when the populist excesses and errors of Mooney, the genetic debts movement and the FAO commission made him want to dissociate himself from the issue: 'I sometimes wonder whether the ideas of the early days – which became the Genetic resources dogma – did harm through overstatement and over-acceptance' [21]. When political fashion and rhetoric displaced reasoned debate, or when bureaucratization and management issues predominated, he often wished to quit but continued to debate them to the very end. He was a worthy successor to Vavilov, and took great pleasure in the decision of the erstwhile IBPGR to establish a Vavilov-Frankel Fellowship Program in genetic resources, with the first awards in 1993. At 95 years of age Otto, with two younger colleagues A.H.D. Brown and J. Burdon, published *The Conservation of Plant Biodiversity* (142).[53] (See web site for references.)

[53] http://science.org.au/fellows/memoirs/frankel.html#proselytizing

**********1967**********

Harlan, J.R. 1967. A wild wheat harvest in Turkey. Archaeology 20: 197-201.

Harlan, J.R. 1967. **Biosystematics** of cultivated plants. pp. 183-198 *in* Reconstructing African Culture History (C. Gabel and N. R. Bennett, eds.). Boston University Press, Boston, Massachusetts, USA.

J.M.J. de Wet was hired at the U of I in 1967 and together they founded the Crop Evolution Laboratory.

In 1967 Jack began his special interest in African "Centers of Origin" of plant domestication and took his **fifth plant exploration**: to West Africa: Senegal, Upper Volta, Gambia, Mali, Burkina Faso, Niger, Benin and Nigeria. He returned by way of Paris and the Kew. (Nov. 1967 – April, 1968) 3 months & 3 weeks in the field.

May, 1967 Son, Richard, graduated from High School. In the fall he entered Northwestern University near Chicago. He would go on to earn his PhD from the UCLA in Neurophysiology.

May 30, 1967 the Biafra Provence of Nigeria declared independence and a civil war began resulting in horrific images of starving Ibo children. The British sent supplies to Nigeria and the church, especially the Catholic Church sent supplies to Biafra. It was said that this was the only war that was financed by charities. Nigeria eventually retook Biafra in 1970. Jack Harlan ventured into Nigeria in 1968 at the very height of the conflict. He sojourned in the interior near Kaduna, some 260 miles inland from the capital of Biafra, Enugu. When he flew from Kaduna to Lagos on his way out he was well clear of the fighting.

**********1968**********

Liwayway M. Engle begins working on her PhD Degree under Harlan.

de Wet, J.M.J. and **J.R. Harlan**. 1968. Taxonomy of *Dichanthium* section *Dichanthium* (Gramineae). Boletin de la Sociedad Argentina de Botanica 12: 206-227.

Harlan, J.R. 1968. On the origin of barley. pp. 9-31 *in* Barley: Origin, Botany, Culture, Winter-hardiness, Genetics, Utilization, Pests (G.A. Wiebe, ed.). Agriculture Handbook No. 338 ARS/USDA, Washington, DC, USA.

1968 (Sept. – Dec.) Jack took his **sixth plant exploration** across Africa: Sudan, Chad, Cameroon, Niger, Nigeria, Ivory Coast and Sierra Leone. 3 months in the field.

**********1969**********

Liwayway M. Engle was working on her PhD Degree under Harlan. Phil Busey began working on his Master's Degree under Dr. Harlan

Harlan, J.R. 1969. Ethiopia: A center of diversity. Economic Botany 23: 309-314. (Quoted by OHF in 1975 Crop Genetic Resources …)

Harlan, J.R. 1969. Evolutionary dynamics of plant domestication. Japan Journal of Genetics 44: 337-343 (Supplement 1).

Harlan, J.R. 1969. Review: Plants and archaeology, by G. W. Dimbleby. 1967. Humanities Press, NY. *in* Archaeology 22: 76-77.

Harlan, J.R. and J.M.J. de Wet. 1969. Sources of variation in *Cynodon dactylon* (L). Pers. Crop Science 9: 774-778.

Harlan, J.R. and J. Pasquerleau. 1969. D'ecrue agriculture in Mali. Economic Botany 23: 70-74.

Harlan, J.R. and J. Pasquerleau. 1969. L'agriculture de d'ecrue in Mali dans la zone du delta central du Niger. Bulletin de l'Economie Rurale, Bamako, Mali.

Harlan, J.R., J.M.J. de Wet and W.L. Richardson. 1969. Hybridization studies with *Cynodon* from East Africa and Malagasy. American Journal of Botany 56: 944-950.

Zohary, D., **J.R. Harlan** and A. Vardi. 1969. The wild diploid progenitors of wheat and their breeding value. Euphytica 18: 58-65.

March 5 – 15, 1969 he is going to Puerto Rico to look at the sorghum collection

Harlan organized and chaired a meeting on Maize at the Univ. of Illinois, September, 1969 in which the prime players, including Mangelsdorf and Beadle, attended.

1969 (Nov. 1969 – Jan. 1970) Jack went on his **seventh plant exploration**: this time to the Kew, Egypt, Sudan, Uganda, Kenya and Ethiopia. 2 months & 9 days in the field, followed by a 10 day[54] conference on Sorghum held in Puerto Rico. His quest was to find the center of origin for sorghum in Africa, which he had determined was in East Africa on his previous expedition.

**********1970**********

Liwayway M. Engle was working on her PhD Degree under Harlan. Phillip Busey was working on his Master's Degree under Dr. Harlan

January 13-16, 1970 Meeting in Puerto Rico on world's sorghum collection.

Attended the 1970 FAO/IBP Conference on 'The Exploration, Utilization and Conservation of Plant Genetic Resources March 13-18

Harlan, J.R. 1970. *Cynodon* species and their value for grazing and hay. Herbage Abstracts 40: 233-239.

Harlan, J.R. 1970. Evolution of cultivated plants. pp. 19-32 *in* Genetic resources in plants - Their exploration and conservation (O.H. Frankel and E. Bennett, eds.). Aldine, Chicago, USA.

Harlan, J.R. 1970. Review: The domestication and exploitation of plants and animals (P.J. Ucko and G.W. Dimbleby, eds). 1969. Aldine Publishing Co., Chicago, Illinois, USA. *in* Social Biology 17: 1.

Harlan, J.R. 1970. World survey of genetic resources of *Sorghum* . Plant Introduction Newsletter (FAO) Rome 23: 19-20.

[54] Some sources say the conference went from Jan. 10-13.

Clayton, W.D. and **J.R. Harlan**. 1970. The genus *Cynodon* L. C. Rich in tropical Africa. Kew Bulletin. Royal Botanic Gardens, London 24: 185-189.

de Wet, J.M.J. and **J.R. Harlan**. 1970. Apomixis, polyploidy and speciation in *Dichanthium*. Evolution 24: 270-277.

de Wet, J.M.J. and **J.R. Harlan**. 1970. **Biosystematics** of *Cynodon* L. C.Rich (Gramineae). Taxon 19: 565-569.

de Wet, J.M.J. and **J.R. Harlan**. 1970. Bothriochloa intermedia **A taxonomic dilemma.** Taxon 19: 339-340.

de Wet, J.M.J., **J.R. Harlan** and E.G. Price. 1970. Origin of variability in the Spontanea complex of *Sorghum bicolor*. American Journal of Botany 57: 704-707.

de Wet, J.M.J., R.J. Lambert, **J.R. Harlan** and S.M. Naik. 1970. Stable triploid hybrids among *Zea-Tripsacum-Zea* backcross populations. Caryologia 23: 183-187.

Harlan, J.R., J.M.J. de Wet and K.M. Rawal. 1970. Geographic distribution of the species of *Cynodon* L. C.Rich (Gramineae). East African Agricultural and Forestry Journal 36: 220-226.

Harlan, J.R., J.M.J. de Wet and K.M. Rawal. 1970. Origin and distribution of the Seleucidus race of *Cynodon dactylon* (L.) Pers. var. *dactylon* (Gramineae). Euphytica 19: 457-461.

Harlan, J.R., J.M.J. de Wet, K.M. Rawal, M.R. Felder and W.L. Richardson. 1970. Cytogenetic studies in *Cynodon* L. C.Rich (Gramineae). Crop Science 10: 288-291.

Harlan, J.R., J.M.J. de Wet, S. M. Naik and R.J. Lambert. 1970. Chromosome pairing within genomes in maize-*Tripsacum* hybrids. Science 167: 1247-1248.

Harlan, J.R., J.M.J. de Wet, W.W. Huffine and J.R. Deakin. 1970. A guide to the species of *Cynodon* (Gramineae). Oklahoma Agricultural Experiment Station Bulletiin No. B-673.

Rawal, K.M. and **J.R. Harlan**. 1970. The evolution of growth habit in *Cynodon* L. C.Rich. (Gramineae). Transactions of the Illinois State Academy of Science 64: 110-118.

1970 (Oct. - Dec.), Jack made his **eighth Plant Exploration**: to the Kew, Rome, Ethiopia, Rome, Turkey & back to Rome. He went to Ethiopia to drum up support for the founding of a Germ Plasm Resources Center in Ethiopia and to view this important center of origin & diversity for Sorghum.

**********1971**********

Liwayway M. Engle was working on her PhD Degree under Harlan. Phil Busey was working on his Master's Degree under Dr. Harlan

de Wet, J.M.J. and **J.R. Harlan**. 1971. South African species of *Cynodon* (Gramineae). Journal of South African Botany 37: 53-56.

de Wet, J.M.J. and **J.R. Harlan**. 1971. The origin and domestication of *Sorghum bicolor*. Economic Botany 25: 128-135.

de Wet, J.M.J., **J.R. Harlan** and C.A. Grant. 1971. Origin and evolution of teosinte (*Zea mexicana*) (Schrad.) Kuntze. Euphytica 20: 255-265.

Harlan, J.R. 1971. Agricultural origins: Centers and noncenters. Science 174: 468-474.

Harlan, J.R. 1971. On the origin of barley: A second look. pp. 45-50 *in* Barley genetics II (R.A. Nilan, ed.). Proceedings of the 2nd International Barley Genetics Symposium, Washington State Univ. Press, Pullman, pp. 45-50. (Quoted by OHF in 1975 Crop Genetic Resources …)

Harlan, J.R. and E. James. 1971. Crop Research and Introduction Center, Izmir, Turkey: Report of Review Mission. FAO, Rome AGP: SF/TUR 8.

Harlan, J.R. and J.M.J. de Wet. 1971. Toward a rational classification of cultivated plants. Taxon 20: 509-517.

Harlan was awarded the Frank N. Meyer Memorial Medal and Crop Science Award in 1971

Feb. 6, 1971 son, Harry, married Kathleen Alice Sebastian in Shreveport, LA and honeymooned in West Africa, visiting Senegal, Ivory Coast and Ghana.

Jack Harlan was given the Crop Science Research Award in1971 – may be in July or Aug. See U/I letter from Dr. Royce P. Murphy dated Aug. 30, 1971 (U/I # 41).

Phillip Busey received his Master's Degree under Dr. Harlan in the spring of 1971.

Harlan went to Puerto Rico April 2, 1971 to "look at the winter nurseries there." (April 2. 1971 letter to George Beadle (U/I #45))

In 1971 (Oct - Dec.) Jack went to the Kew, Belgium, Rome, Ethiopia, India, Nigeria, Ghana, Burkina Faso, Ivory Coast, Mali, Senegal and Mexico (VERIFY THIS). This was his **ninth Expedition**. Note: he set foot on four continents during this expedition. Almost 3 months in the field. When he got to Mexico he had Jean fly down for a few days of R&R, before he set out on a teocintle collection run in Mexico. (See Letter to Beadle Jan. 12, 1972 - U/I # 55)

**********1972**********

de Wet, J.M.J. and **J.R. Harlan**. 1972. Chromosome pairing and phylogenetic affinities. Taxon 21: 67-70.

de Wet, J.M.J. and **J.R. Harlan**. 1972. Origin of maize: the tripartite hypothesis. Euphytica 21: 271-279. See https://link.springer.com/article/10.1007/BF00036767.

de Wet, J.M.J., **J.R. Harlan** and B. Kurmarohita. 1972. Origin and evolution of guinea Sorghum. East African Agricultural and Forestry Journal 37: 114-119.

de Wet, J.M.J., **J.R. Harlan** and E.G. Price. 1972. Evolutionary dynamics of Sorghum domestication. Wenner Gren Foundation for Anthropology Research Symposium No. 56.

de Wet, J.M.J., **J.R. Harlan**, R. J. Lambert and L. M. Engle. 1972. Introgression from *Tripsacum* into *Zea* and the origin of maize. Caryologia 25: 25-31.

Harlan, J.R. 1972. A new classification of cultivated sorghum pp. 512-516 *in* Sorghum for the Seventies (N.G.P. Rao and L.R. House, eds.). Oxford & IBH, New Delhi, India.

Harlan, J.R. 1972. Breeding success brings a peril. Crops and Soils 72: 5-6.

Harlan, J.R. 1972. Crops that extend the range of agricultural settlement. pp. 239-243 *in* Man, Settlement and Urbanism (P.J. Ucko, R. Tringham and G.W. Dimbleby, eds.). Duckworth, London, UK.

Harlan, J.R. 1972. Genetic conservation of plants that feed the world. Environmental Journal 46: 15-17.

Harlan, J.R. 1972. Genetics of disaster. Journal of Environmental Quality 1: 212-215.

Harlan, J.R. 1972. Les origines de l'Agriculture. La Recherche 3: 1035-1043.

Harlan, J.R. 1972. Space and time in the genetic variation of crops. Proceedings of the American Association of Geographers 4: 126.

Harlan, J.R. and J.M.J. de Wet. 1972. **A simplified classification of cultivated** sorghum. Crop Science 12: 172-176.

Taliaferro, C.M., **J.R. Harlan** and W.L. Richardson. 1972. Plains bluestem. Oklahoma Agricultural Experiment Station Bulletin No. B-699. (OSU)

Harlan was elected to membership the prestigious U.S. National Academy of Sciences in 1972.

Liwayway M. Engle received her PhD Degree under Harlan.

In 1972 Harlan went to Mexico and Peru. His interest had turned to the origins of maize and other New World crops. This was his **tenth Plant Expedition**. On this expedition he kept his notes in his pocket calendar.

**********1973**********

Satish C. Gupta began working on his PhD under Harlan. Tom Stalker also began working on his PhD under Harlan.

de Wet, J.M.J, **J.R. Harlan**, L.M. Engle and C.A. Grant. 1973. Cytology of backcross offspring derived from a maize-*Tripsacum* hybrid. Crop Science 13: 690-694.

Harlan, J.R. 1973. Barley genetics and breeding. East Africa Agriculture and Forestry Journal Special Issue No. 6, 39: 21.

Harlan, J.R. 1973. Genetic resources of some major field crops in Africa. pp. 45-64 *in* Survey of crop genetic resources in their centres of diversity. FAO-IBP, Rome, Italy.

Harlan, J.R. and J.M.J. de Wet. 1973. On the quality of evidence for origin and dispersal of cultivated plants. Current Anthropology 14: 51-62.

Harlan, J.R., J.M.J. de Wet and E.G. Price. 1973. Comparative evolution of cereals. Evolution 27: 311-325.

Taliaferro, C.M., and **J.R. Harlan**. 1973. Registration of Plains bluestem. Crop Science 13:580. (from: *Old World Bluestem Seedings in Western Oklahoma* Scott D. McCoy, Jeffrey C. Mosley, and David M. Engie, bibliography,found in RANGELANDS 14(1), February 1992)

In 1973 Harlan went to Mexico and Guatemala: his **11th Expedition**.

**********1974**********

Satish C. Gupta and Tom Stalker working on their PhD's under Harlan.

de Wet, J.M.J. and **J.R. Harlan**. 1974. *Tripsacum*-maize interaction: A novel genetic system. Genetics 78: 493-502.

Engle, L.M., J.M.J. de Wet and **J.R. Harlan**. 1974. Chromosomal variation among offspring of hybrid derivatives with 20 *Zea* and 36 *Tripsacum* chromosomes. Carylogia 27: 193-209.

Harlan, J.R. 1974. Sorghum and African millets. Page 40 *in* Handbook of plant introduction in tropical crops (J. Leon, ed.). FAO Agriculture Studies No. 93. Rome.

Harlan, J.R. and J.M.J. de Wet. 1974. Sympatric evolution in sorghum. Genetics 78: 473-474.

In 1974 Jack was invited to the People's Republic of China as part of the first group of scientists to visit mainland China since the Communists came to power. This was a groundbreaking journey as part of President Nixon's effort to open up relations with

China and the party was given the royal treatment. Jack also visited Colombia that year and took Jean along (VERIFY THIS). The Colombian part looks like an exploration. Call it Exp. # 12.

**********1975**********

Satish C. Gupta and Tom Stalker working on their PhD's under Harlan.

de Wet, J.M.J. and **J.R. Harlan**. 1975. **Weeds** and domesticates: Evolution in the manmade habitat. Economic Botany 29: 99-107.

Harlan, J.R. 1975. **Crops and Man**. American Society of Agronomy, Madison, Wisconsin. 295 pp.

Harlan, J.R. 1975. Geographic patterns of variation in some cultivated plants. Journal of Heredity 66: 182-191.

Harlan, J.R. 1975. New uses for old herbals. Non Solus. 2: 12-20.

Harlan, J.R. 1975. Our vanishing genetic resources. Science 188: 618-621.

Harlan, J.R. 1975. Practical problems in exploration: Seed crops. pp. 111-115 *in* Crop Genetic Resources for Today and Tomorrow (O.H. Frankel and J.G. Hawkes, eds.). Cambridge University Press, Cambridge, UK.

Harlan, J.R. and 11 others. 1975. Plant studies in the People's Republic of China: A trip report of the American Plant Studies Delegation. National Academy of Science, Washington, DC, USA. 205 pp.

Harlan, J.R. and J.M.J. de Wet. 1975. On Ö. Winge and a prayer: The Origins of Polyploidy. Botanical Review 41: 361-390.

Rawal, K. and **J.R. Harlan**. 1975. Cytogenetic analysis of wild emmer populations from Turkey and Israel. Euphytica 24: 407-411.

Stemler, A.B.L., **J.R. Harlan** and J.M.J. de Wet. 1975. Caudatum sorghums. and speakers of Chari-Nile languages in Africa. Journal of African History 16: 161-183.

Stemler, A.B.L., **J.R. Harlan** and J.M.J. de Wet. 1975. Evolutionary history of cultivated sorghums (*Sorghum bicolor* (Linn.) Moench) of Ethiopia. Bulletin of the Torrey Botanical Club 102: 325-333.

Voight, P.W., W.R. Kneebone, **J.R. Harlan** and R.M. Ahring. 1975. Registration of Texoka buffalograss. Crop Science 15: 885.

Harlan was made a fellow of the American Academy for Arts and Sciences in 1975.

Harlan delivered the Wilhelmina Key American Genetic Association Distinguished Lecture in 1975.

This Key Lecture series is made possible by a bequest to the AGA from Dr. Wilhemine Key in support of the implementation of genetics for human welfare and improvement. Dr. Key earned her PhD from the University of Chicago in 1901, and taught at New Mexico Normal University and Belmont College before joining the faculty of Lombard College.

**********1976**********

Satish C. Gupta and Tom Stalker working on their PhD's under Harlan.

Quick trip to India, Sept. 29 to some unknown date to Delhi & Hyderabad, India. Evidence found in his pocket notebook for 1976 for start, but nothing else.

Harlan, J.R., J.M.J. de Wet and A.B.L. Stemler, eds. 1976. The Origins of African plant domestication. Mouton Press, The Hague. 498 pp. Illustrated.

de Wet, J.M.J. and **J.R. Harlan**. 1976. Cytogenetic evidence for the origin of teosinte (*Zea mays* ssp. *mexicana* (Schrad.) Iltes). Euphytica 25: 447-455.

de Wet, J.M.J., J.R. Gray and **J.R. Harlan**. 1976. Systematics of *Tripsacum* (Gramineae). Phytologia 33: 203-227.

de Wet, J.M.J., **J.R. Harlan** and E.G. Price. 1976. Variability in *Sorghum bicolor*. pp. 453-464 *in* Origins of African Plant Domestication (**J.R. Harlan**, J.M.J. de Wet and A.B.L.Stemler, eds.). Mouton Press, The Hague, Netherlands.

de Wet, J.M.J., S.C. Gupta, **J.R. Harlan** and C.O. Grassl. 1976. Cytogenetics of introgression from *Saccharum* into *Sorghum*. Crop Science 16: 568-572.

Engle, L.M., J.M.J. de Wet and **J.R. Harlan**. 1976. Cytology of plants derived from 20 *Zea* and 18 *Tripsacum* chromosome hybrids backcrossed with maize. Philippine Journal of Crop Science 1: 26-31.

Gupta, S.C., **J.R. Harlan**, J.M.J. de Wet and C.O. Grassl. 1976. Cytology of backcross four individuals derived from a *Saccharum*-*Sorghum* hybrid. Caryologia 29: 351-359.

Harlan, J.R. 1976. Barley. pp. 93-98 *in* Evolution of crop plants (N.W. Simmonds, ed.). Longman Press, London, UK.

Harlan, J.R. 1976. Diseases as a factor in plant evolution. Annual Review of Phytopathology 14: 31-51.

Harlan, J.R. 1976. Genetic resources in wild relatives of crops. Crop Science 16: 329-333.

Harlan, J.R. 1976. Plant and animal distribution in relation to domestlcation. Philosophical Transactions of the Royal Society of London 275: 13-25.

Harlan, J.R. 1976. Response: Meyer medal presentation. Journal of Heredity 67: 140.

Harlan, J.R. 1976. Review: Plants, man and the land in the Vilcanota Valley of Peru, by D.W. Gade. 1975 *in* Journal of Agronomy 5: 87. W. Junk, The Hague, Netherlands..

Harlan, J.R. 1976. The plants and animals that nourish man. Scientific American 235: 88-97.

Harlan, J.R. 1976. Tropical and sub-tropical grasses. pp. 142-144 *in* Evolution of crop plants (N.W. Simmonds, ed.). Longman Press, London, UK.

Harlan, J.R. and A.B.L. Stemler. 1976. The races of sorghum in Africa. pp. 465-478 *in* Origins of African plant domestication (J.R. Harlan, J.M.J. de Wet and A.B.L. Stemler, eds.). Mouton Press, The Hague, Netherlands.

Harlan, J.R., J.M.J. de Wet and A.B.L. Stemler. 1976. Plant domestication and indigenous African agriculture. pp. 3-19 *in* Origins of African plant domestication (**J.R. Harlan**, J.M.J. de Wet and A.B.L. Stemler, eds.). Mouton Press, The Hague, Netherlands.

Stemler, A.B.L., F.I. Collins, J.M.J. de Wet and **J.R. Harlan**. 1976. Variation in levels of lipid components and protein in ecogeographic races of *Sorghum bicolor*. Biochemical Systematics and Ecology 4: 43-45.

Harlan was awarded the International Service in Agronomy Award by the American Society of Agronomy for "outstanding contributions in research, teaching, extension, or administration made outside of the United States by a current agronomist. The award consists of a certificate and $2000 honorarium" (at least that is what it is now, see www.agronomy.org/awards/view/44)

1977*

Brunken, J.M., J.M.J. de Wet and **J.R. Harlan**. 1977. The morphology and domestication of pearl millet. Economic Botany 31: 163-174.

de Wet, J.M.J. and **J.R. Harlan**. 1977. Pathways of genetic transfer from *Tripsacum* to *Zea mays*. Proceedings of the National Academy of Science (USA) 74: 3494-3497.

Harlan, J.R. 1977. Breeding plants for resistance to climatic stress. pp. 119-145 *in* Proceedings of the Climate-Technology Seminar. College of Agriculture, University of Missouri, Columbia, USA.

Harlan, J.R. 1977 . Gene centers and gene utilization in American agriculture. Environmental Reviews 1: 26-42 .

Harlan, J.R. 1977. How green can a revolution be? pp. 105-110 *in* D. S. Seigler (ed.) Crop resources. Academic Press, New York, USA.

Harlan, J.R. 1977. Review: Farming in prehistory: from hunter-gatherer to food producer, by B. Bender. 1975. J. Baker, London. *in* American Anthropologist 79: 174-175.

Harlan, J.R. 1977. Sources of genetic defense. pp. 345-356 *in* The genetic basis of epidemics in agriculture (P.R. Day, ed.). Annals of the New York Academy of Science 287: 400.

Harlan, J.R. 1977. The origins of Old World cereal agriculture. pp. 357-383 *in* The Origins of Agriculture (C.A. Reed, ed.). Mouton, The Hague, Netherlands.

Stalker, H.T., J.M.J. de Wet and **J.R. Harlan**. 1977. Cytology and morphology of maize-*Tripsacum* introgression. Crop Science 17: 745-748.

Stalker, H.T., J.M.J. de Wet and **J.R. Harlan**. 1977. Observations on introgression of *Tripsacum* into maize. American Journal of Botany 64: 1162-1169.

Stemler, A.B.L., J.M.J. de Wet and **J.R. Harlan**. 1977. The sorghums of Ethiopia. Economic Botany 31: 446-460.

In 1977 Jack was invited to Jordan to participate in an archeological dig where he identified plant seed fragments being unearthed (13th Exploration). Extending that same trip, pursuing his interest in the origins of corn, he traveled to Colombia and Mexico: his 14th Expedition. Perhaps Jean accompanied him on this portion of the trip. (We have no note cards on either part of this trip.)

Satish C. Gupta and Tom Stalker received their PhD Degrees under Jack Harlan.

**********1978**********

Mark Widrlechner begins Masters work under Harlan.

de Wet, J.M.J. and **J.R. Harlan**. 1978. *Tripsacum* and the origin of maize. pp. 129-141 *in* Maize Breeding and Genetics (D.B. Walden, ed.). Wiley and Sons, New York, USA.

de Wet, J.M.J., **J.R. Harlan** and A.V. Randrianasolo. 1978. Morphology of tripsacoid maize (*Zea mays* L.). American Journal of Botany 65: 741-747.

de Wet, J.M.J., **J.R. Harlan**, H.T. Stalker and A.V. Randrianasolo. 1978. The origin of tripsacoid maize (*Zea mays* L.). Evolution 32: 233-244.

Gupta, S.C., J.M.J. de Wet and **J.R. Harlan**. 1978. Morphology of *Saccharum*-*Sorghum* hybrid derivatives. American Journal of Botany 65: 936-942.

Gupta, S.C., **J.R. Harlan** and J.M.J. de Wet. 1978. Cytology and morphology of a tetraploid *Sorghum* population recovered from a *Saccharum*-*Sorghum* hybrid. Crop Science 18: 879-883.

Harlan, J.R. and J.M.J. de Wet. 1978. Possible uses of *Tripsacum* contaminated maize. Agronomy Abstracts p. 53.

Harlan, J.R., J.M.J. de Wet and C.A. Newell. 1978. Apomixis and pseudoapomixis in *Tripsacum*. Abstracts, 14th International Congress of Genetics, Moscow, Part II. p.166.

Stalker, H.T., **J.R. Harlan** and J.M.J. de Wet. 1978. Genetics of maize-*Tripsacum* introgression. Caryologia 31: 271-282.

International Genetics Conference in Moscow, August 21-30, 1978. Jack attended and gave a presentation on the last day of the Congress. Otto Frankel was Chairman of that session gave him a great review at the end. Jack & Otto spent much time at the

Congress running around Moscow. Jack also saw Barry Cohn in action, interviewing everyone he could find who knew NIV. Barry introduced Jack to Yurey Vavilov, one of the last remaining descendents of NIV.

1978 (Aug 20 to Nov. 1): Jack went on his fifteenth plant exploration - to USSR, Copenhagen, India and the Kew. This later got revised to: ICRISAT REVIEW IN SENEGAL AND INDIA SEPT. 20 - OCT. 30, 1978

**********1979**********

Mark Widrlechner continues Masters work under Harlan

Hilu, K. W., J.M.J. de Wet and **J.R. Harlan**. 1979. Archaeobotanical studies of *Eleusine coracana* ssp. *coracana* (finger millet). American Journal of Botany 66: 330-333.

1979 (May 1 to approx Nov): Jack made another plant exploration: to Australia, Philippines and Jordan (including archeological dig). Trip number eleven. He also traveled, with Jean, to Japan for a two month stay, lecturing at a university.

**********1980**********

Harlan, J.R. 1980. Crop monoculture and the future of American agriculture. pp. 225-250 *in* The future of American agriculture as strategic resource (S.S. Batie and R.G. Healy, eds.). The Conservation Foundation, Washington, DC, USA.

Harlan, J.R. 1980. Origins of agriculture and crop evolution. pp. 1-8 *in* Biology and Breeding for Resistance to Arthropods and Pathogens in Agricultural Plants (M.K. Harris, ed.). Texas Agricultural Experment Station, College Station, Texas, USA.

Harlan, J.R. 1980. Plant breeding and genetics. pp. 295-312 *in* Science in Contemporary **China** (L.A. Orleans, ed.). Stanford University Press, Stanford, California, USA.

Harlan, J.R. 1980. Studies on the origin and evolution of plants since N. I. Vavilov. pp. 35-38 *in* Well-being of Mankind and Genetics. Proceedings of the XIV International Congress of Genetics Volume 1, Book 1. MIR Publications, Moscow, USSR.

Harlan, J.R. and K.J. Starks. 1980. Germplasm resources and needs. pp. 253-274 *in* Breeding plants resistant to insects (F G. Maxwell and P.R. Jennings, eds.). John Wiley and Sons, New York, USA.

Harlan, J.R., J.M.J. de Wet and C.A. Newell. 1980. Apomiksis y pseudoapo-miksis y Tripsakym. pp. 88-89 *in* Indytsirovannii Myto-genez i Apomiksis Izdatelstvo (D.F. Petrov, ed.). «Nauka» Sibirskoe Otdelenie, Novosibirsk, USSR.

Mark Widrlechner completes Masters work under Harlan in Spring 1980.

**********1981**********

Bedigian, D. and **J.R. Harlan**. 1981. Agriculture in the Nuba Mountains of Sudan. Botanical Society of America, Miscellaneous Series Publication 160: 62.

de Wet, J.M.J. and **J.R. Harlan**. 1981. Maize in art and religion. *in* Proceedings of the 4th South African Maize Breeding Symposium (H.V. Gevers and J.G. duMessis, eds.). Department of Agriculture and Fisheries Technical Communication 172: 64-68.

Harlan, J.R. 1981. Who's in charge here? Canadian Journal of Fisheries and Aquatlc Science 38: 1459-1463.

Harlan, J.R. 1981. Crop evolution. School of Agriculture, Nagoya University, Nagoya, Japan. 138 pp.

Harlan, J.R. 1981. Ecological settings for the emergence of agriculture. pp. 3-21 *in* Pests, Pathogens and Vegetation (J.M. Thresh, ed.). Pitman Books, London, UK.

Harlan, J.R. 1981. Natural resources of the southern Ghor. *in* The Southeastern Dead Sea Valley Expedition: An interim report of the 1977 season (W.E. Rast and R.T. Schamb, eds.). Annals of the American School of Oriental Research 46: 155-164.

Harlan, J.R. 1981. The early history of wheat: Earliest traces to the sack of Rome. pp. 1-19 *in* Wheat Science Today and Tomorrow (L.T. Evans and W.J. Peacock, eds.). Cambridge University Press, Cambridge, UK.

Harlan, J.R. 1981. The origins of indigenous African Agriculture. pp. 623-658 *in* Cambridge History of Africa, Vol. 1: From earliest times to ca 500 BC (J.D. Clark, ed.). Cambridge University Press, Cambridge, UK.

Harlan, J.R. 1981. Hans Helbaek, Hon. D.Sc., Hon. D. Phil., F.M. L.S., Hon. F.S.A. 1907-1981. Journal of Archaeological Science 8: 313.

Harlan, J.R. 1981. Evaluation of wild relatives of crop plants. Page 17 *in* Report of the FAO/UNEP/IBPGR. International Conference on Crop Genetic Resources FAO/Rome, Italy.

de Wet, J.M.J., **J.R. Harlan** and D.E. Brink. 1982. Systematics of *Tripsacum dactyloides* (Gramineae). American Journal of Botany 69: 1251-1257.

*************************************1982**

Harlan, J.R. 1982. Human interference with grass systematics. pp. 37-50 *in* Grasses and Grasslands: Systematics and Ecology (J.R. Estes, R.J. Tyrl and J.N. Brunken, eds.). Univ. of Oklahoma Press, Norman, Oklahoma, USA.

Harlan, J.R. 1982. The garden of the Lord: A plausible reconstruction of natural resources of Southern Jordan in early bronze age. Paleorient 8/1: 71-78.

Harlan, J.R. 1982. Directing the accelerated evolution of crop plants pp. 51-69 *in* Strategies of plant reproduction (W.J. Meudt, ed.). Beltsville Agricultural Research Center (BARC) Symposia in Agricultural Research VI, Beltsville, Maryland, USA.

Harlan, J.R. 1982. The use of genetic traits from wild populations. pp. 136-138 *in* Yearbook of Science and Technology. McGraw-Hill, New York, USA.

Harlan, J.R. 1982. Relationships between weeds and crops pp. 91-96 *in* Biology and Ecology of Weeds (W. Holzner and M. Numata, eds.). W. Junk, The Hague, Netherlands.

1982: Plant exploration to Bangladesh: trip number fourteen and last trip.

Jean Harlan passes away on October 11, 1982 in Champaign, Illinois.

*************************************1983**

Bedigian, D. and **J.R. Harlan**. 1983. Nuba agriculture and ethnobotany, with particular reference to sesame and sorghum. Economic Botany 37: 384-395.

de Wet, J.M.J., G.B. Fletcher, K.W. Hilu and **J.R. Harlan**. 1983. Origin of *Tripsacum andersonii* (Gramineae) American Journal of Botany 70: 706-711.

Harlan, J. R. 1983. Use of genetic resources for improvement of forage species. pp. 29-34 *in* Proc. XIV International Grassland Congress (J.A. Smith and W.V. Hays, eds.), Lexington, Kentucky. June 15-24, 1981. Westview Press, Boulder, Colorado, USA.

Harlan, J.R. 1983. From wilderness to farm: The odyssey of plant domestication. Illinois Research 25: 3-5.

Harlan, J.R. 1983. The scope for collection and improvement of forage plants. pp. 4-14 *in* Genetic Resources of Forage Plants (J.G. McIvor and R.A. Bray, eds.). CSIRO East Melbourne, Australia.

Harlan, J.R. 1983. Some merging plant populations. pp. 267-276 *in* Genetics and Conservation (C.M. Schonewald Cox, S.M. Chambers, B. MacBryde and W.L. Thomas, eds.). The Benjamin/Cummings Publishing Co., Menlo Park, California, USA.

Harlan, J.R. 1983. Bread. pp. 364-365 *in* Dictionary of the Middle Ages (J.R. Strayer, ed.). Vol. 2. Charles Scribners Sons, New York, USA.

Harlan, J.R. 1983. The utility of plant exploration. *in* Twentieth Century Agricultural Science: Discovery, Use, Preservation (A. Fusione and D.J. Fusione, eds.). Journal of the National Agricultural Library Association New Series 8: 199-208.

Harlan, J.R. 1983. Review: Agricultural plants, by R.H.M. Langer and G.D. Hill. 1982. Cambridge University Press, Cambridge and New York. *in* Quarterly Review of Biology 58: 258.

Hymowitz, T. and **J.R. Harlan**. 1983. Introduction of soybean to North America by Samuel Bowen in 1765. Economic Botany 37: 371-379.

**************************************1984**

Harlan, J.R. 1984. Negative trends in crop evolution pp. 171-194 *in* Conservation and Utillzation of Exotic Germplasm to Improve Varieties (Gordon McCleary, ed.). Pioneer Hi-Bred International, Inc., Des Moines, Iowa, USA.

Harlan, J.R. 1984. Evaluation of wild relatives of crop plants. pp. 212-222 *in* Crop Genetic Resources: Conservation and Evaluation (J.H.W. Holden and J.T. Williams, eds.). George Allen & Unwin, London, UK.

Harlan, J.R. 1984. Gene centers and gene utilization in American agriculture. pp. 111-129 *in* Plant genetic resources: a conservation impreative (C.W. Yeatman, D. Kafton and G. Wilkes, eds.). AAAS Selected Symposium 87. Westview Press, Boulder, Colorado, USA.

Harlan was awarded the Wilhelmine E. Key Lecturer in Genetics and the Nilsson-Ehle Lecture for 1984 (Sweden).

Harlan retired from the Univ. of Illinois in 1984.

**************************************1985**

Bedigian, D., D.S. Siegler and **J.R. Harlan**. 1985. Sesamin, sesamolin and the origin of sesame. Biochemical Systematics and Ecology 13: 133-139.

de Wet, J.M.J., R.R. Bergquist, **J.R. Harlan**, D.E. Brink, C.E. Cohen, C.A. Newell and A.E. de Wet. 1985. Exogenous gene transfer in maize (*Zea mays*) using DNA-treated pollen. pp. 197-209 *in* The Experimental Manipulation of Ovule Tissues (G.P. Chapaman, S.H. Mantell and R.W. Daniels, eds.). Longman, London, UK.

Harlan, J.R. 1985. Dedication. Glenn W. Burton: A maker of green pastures. Plant Breeding Reviews 3: 1-19.

Harlan, J.R. 1985. Review: Frank N. Meyer: Plant Hunter in Asia, by I.S. Cunningham. 1984. Iowa State University Press, Ames. *in* Agricultural History 59: 359-360.

Harlan, J.R. 1985. The early bronze age environment of the Southern Ghor and Moab plateau. pp. 133-137 *in* Oxford Conference on Archaeology of Jordan (A. Hadidi, ed.). Vol. 2., Ch. 4. Oxford University Press, Oxford, UK.

Lin, Liang-Shiou, Tuan-hua D.Ho and **J.R. Harlan**. 1985. Rapid amplification and fixation of new restriction sites in the ribosomal DNA repeats in the derivatives of a cross between maize and *Tripsacum dactyloides*. Developmental Genetics 6: 101-112.

Harlan was made a fellow of the Crop Science Society of America in 1985.

Harlan was awarded the Distinguished Economic Botanists by the Society for Economic Botany in 1985.

The award of "**Distinguished Economic Botanist** (DEB)" is bestowed annually by the Society upon an individual on the basis of outstanding accomplishments pertinent to the goals of the Society. A nominee does not need to be a member of the Society. The Chairperson of the Nominations and Awards Committee shall be responsible for the citation which shall be published in Economic Botany. The only responsibility of the awardee shall be to present an address at the annual meeting the year of his/her selection. He/she shall become an honorary member of the Society for life. From the web site: http://cms.gogrid.econbot.org/index.php?module=content&func=view&pid=13.

**********1986**********

Bedigian, D. and **J.R. Harlan**. 1986. Evidence for cultivation of sesame in the ancient world. Economic Botany 40: 137-154.

Bedigian, D., C.A. Smyth and **J.R. Harlan**. 1986. Patterns of morphological variation in sesame. Economic Botany 40: 353-365.

de Wet, J.M.J., **J.R. Harlan** and D.E. Brink. 1986. Reality of infraspecific units in domesticated cereals. pp. 211-222 *in* Infraspecific classification in wild and cultivated plants (B.T. Styles, ed.). Clarendon Press, Oxford, UK.

Harlan, J.R. 1986. Lettuce and the sycamore: sex and romance in ancient Egypt. Economic Botany 40: 4-15.

Harlan, J.R. 1986. Plant domestication: diffuse origins and diffusion. pp. 21-34 *in* The Origin and Domestication of Cultivated Plants (C. Barigozzi, ed.). Elsevier, Amsterdam, Netherlands.

Harlan, J.R. and J.M.J. de Wet. 1986. Problems in merging populations and counterfeit hybrids. pp. 71-76 *in* Infraspecific Classification of wild and cultivated plants (B.T. Styles, ed.). Clarendon Press, Oxford, UK.

In 1986 he received the Distinguished Botanist Award from the Society for Economic Botany.

**********1987**********

November, 1987: Jack R. Harlan attended the centennial celebration of the birth of Nikolai Vavilov in Moscow and presented a paper on Crop Diversity. He was awarded a gold medal[55] for his contribution to the science of genetics. At the conference someone said that Jack Harlan was the American Vavilov. FIND OUT WHO SAID THAT.

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

Harlan, J.R. 1987. Les plantes cultivees et l'homme. J. Belliard and B. Fraleigh (trans.) Agence de cooperation culturelle et techniques conseil international de la langue francais. Presses Universitaires de France. Paris. (Trans. of Crops and Man) p. 414.

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[55] The "gold" medal was submerged during Hurricane Katrina in New Orleans and the gold paint was corroded off the iron medal.

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Harlan, J.R. 1995. The Living Fields: Our Agricultural Heritage. Cambridge University Press, Cambridge, UK., which presents "evidence of the origin and evolution of agriculture in various parts of the world."

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1997: The Harlan Symposium was held in Aleppo, Syria. Dr. Harlan was unable to attend, because of failing health. He was awarded a Seed Montage made from some of the seeds he collected in his first plant exploration to Turkey in 1948. The Seed Montage is now displayed at the University of Illinois. Report and documents from the Harlan I Symposium can be found at: http://pdf.usaid.gov/pdf_docs/pnacf852.pdf.

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**********1998**********

August 26, 1998 Jack Rodney Harlan passed from this life in New Orleans, Louisiana.