Ernest R. Sears Papers
(C3892)

Collection Number: C3892

Collection Title: Ernest R. Sears Papers

Dates: 1928-1991

Creator: Sears, Earnest R., 1910-1991

Abstract: The professional papers of Ernest R. Sears, a wheat cytogeneticist associated with the University of Missouri from 1936 until his death in 1991. The papers consist of correspondence, reprints of publications, reports, manuscripts, research notes, speeches, photographs, news clippings and miscellaneous items.

Collection Size: 19.6 cubic feet
(1283 folders)

Language: Collection materials are in English.

Repository: The State Historical Society of Missouri

Restrictions on Access: Collection is open for research. This collection is available at The State Historical Society of Missouri Research Center-Columbia. If you would like more information, please contact us at columbia@shsmo.org. Collections may be viewed at any research center.

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Preferred Citation: [Specific item; box number; folder number] *Ernest R. Sears Papers* (C3892); The State Historical Society of Missouri Research Center-Columbia [after first mention may be abbreviated to SHSMO-Columbia].

Donor Information: The papers were donated to the University of Missouri by Sears' colleague, J. Perry Gustafson, on February 7, 1992 (Accession No. CA5139). Additions to the papers were made by Gustafson on February 14, 1992 (Accession No. CA5144), by Kathleen Ross on April 26, 1994 (Accession No. CA5424).

Related Materials: Additional materials related to the Ernest R. Sears Papers can be found in the following collections:

Ernest R. Sears Papers, (CA5428)
Lotti M. Sears Papers, (C4021)

Processed by: Processed by Diane Ayotte, November 1992-April 1994. Finding aid updated by Elizabeth Engel on September 29, 2022.

Biographical Note:

Ernest Robert Sears, son of Jacob P. and Ada Estella Sears, was born 15 October 1910 in Bethel, Oregon, where he graduated from a rural one-room high school in 1928. He obtained a B.S. degree in Agriculture from Oregon State University in 1932, and an M.A. and Ph.D. in Genetics from Harvard University in 1934 and 1936. Upon graduation he married Caroline F. Eichorn and accepted a position as a geneticist with the United States Department of Agriculture at the University of Missouri in Columbia. He remained at the university, working on the origin, evolution, and cytogenetics of wheat for the next 55 years.

Over a 15-year period, Sears developed a complete series of aneuploids--nullisomics, monosomics, trisomics and tetrasomics--for all 21 chromosomes of wheat. Previously, geneticists had made little progress with common wheat, a hexaploid whose mostly triplicated genes tend to mask each other. His aneuploids made it possible to study each chromosome separately to analyze its function. From the beginning, Sears made it a policy to maintain and distribute these stocks to anyone in the world who wanted them.

Sears also pioneered methods of transferring desirable genes from wild relatives to cultivated wheat in order to increase wheat's resistance to various insects and diseases. Breeding disease resistance into the most important food crop in the world had far-reaching economic and social effects. For the application of these techniques, including x-radiation, to transfer leaf-rust resistance from a wild grass to wheat, Sears received the 1958 Hoblitzelle national prize for agricultural science.

Also in 1958, Sears and his student Masasuke Okamoto discovered independently from--but at the same time as--British scientist Ralph Riley and his colleague that chromosome pairing in wheat is genetically controlled. Consequently, the chromosomes of many other species, not ordinarily able to pair and recombine with those of wheat, could be induced to do so by removing chromosome 5B from commercially grown hybrids. For this discovery, Sears and Riley shared the 1986 Wolf Foundation Prize in Agriculture.

Although Sears received numerous honors in Missouri, Oregon, Canada, India, Germany, and Israel, he remained modest about his accomplishments. He credited part of his success to the good fortune of working in his youth with noted corn geneticist Lewis J. Stadler, and Nobel Prize winner Barbara McClintock. He also felt he owed a great deal to his "closest collaborator" in research, his wife of 40 years, Lotti M. Steinitz-Sears, a geneticist he met at MU and married in 1950.

The Searses had a son, John, and daughters, Barbara and Kathleen. Sears also had a son Michael from his previous marriage. The family frequently played host to numerous visiting scientists

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and graduate students, all of whom were beneficiaries of the unselfish sharing of the Searses' considerable knowledge, support and expert criticism.

After his retirement from the USDA in 1980, Sears continued to work at his office in Curtis Hall and in his nearby greenhouses on the university campus until his death on 15 February 1991.

Arrangement:

The collection has been arranged into the following two series and ten subseries:

Correspondence
Professional Material
- Publications
- Manuscripts
- Research Material
- Trips and Conferences
- Speeches
- Awards
- Organizations
- Photographs
- Miscellaneous
- USDA Annual Reports

Scope and Content Note:

The **Correspondence** series, arranged alphabetically by correspondent, covers the years 1936-1991 and includes both incoming and outgoing correspondence. The correspondents range from fellow scientists and students to professional journal editors and firms with which Sears did business. Since Professor Sears was so generous with his seed stocks as well as with his knowledge and advice, the majority of incoming letters consist of requests of one form or another. There are numerous requests for seeds, reprints of his articles and recommendations for various professional positions, as well as petitions for Sears to visit and lecture all over the world or to allow graduate students and post-doctoral scientists to visit and work with him.

There are also many instances of exchange of scientific information, including graphs, statistics and photographs, as well as scientific discussion. Those folders that contain a fair amount of interchange of scientific information are marked with an asterisk (*) in the folder list following this scope and content note. Several folders of correspondence concerning reviews of possible manuscripts for professional journals are included under the name of the organization and its journal, such as the National Academy of Science, Proceedings.

The **Professional Material** series, documenting the various activities and accomplishments of Sears's professional life, is subdivided into publications, manuscripts, research material, trips and conferences, speeches, organizations and programs, photographs, and miscellaneous material.

The publications subseries, arranged chronologically from 1939 to 1988, consist of reprints of articles, research bulletins, and abstracts written by Sears, either as single author or in conjunction with others. Although this section does not contain copies of every one of Sears's publications, most are included. Lists of all of his publications may be found in folders 841 and

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842. The manuscripts, arranged alphabetically by title, include early drafts of possible publications as well as some correspondence with publishers and/or collaborating authors concerning the progress of the manuscripts. Not all of Sears's publications from the previous section have corresponding manuscripts in this one.

The research material section is arranged alphabetically by topic and consists of research notes, abstracts, newspaper clippings, photographs and other material used by Sears in various aspects of his research. Several photographs of wheat chromosomes and hybrid plants illustrate some of the steps of his research. Also included are several folders of research statistics, especially those relating to the breeding of rust resistance into wheat.

The trips and conferences section, arranged chronologically, includes travel itineraries, conference programs and brochures, papers given at some of the meetings, a few photographs of the participants, and some correspondence, usually relating to the planning of the affair. Also included in this section are several small notebooks containing details such as departure and arrival time, addresses, phone numbers and other reminders. Passports and passport information and photos for Ernie and Lotti Sears are included as well.

The speeches section is arranged chronologically, as is the next section of material relating to some of the awards Sears received. Some awards relating to a specific trip--such as the Wolf Foundation Prize he received in Israel in 1986--may be found in the trips and conferences section. At the end of the awards section are several certificates and news clippings publicizing his awards.

The organizations subseries, the largest section in the Professional Material series, pertains to the various organizations to which Sears belonged, as well as those by which he was employed, the United States Department of Agriculture and the University of Missouri. Arranged alphabetically, the section includes reports, newsletters, catalogues, and other records of the groups. The folders containing material about the United Nations Food and Agriculture Organization include several catalogues of international lists of genetic stocks, plant breeders and plant collections covering the years 1949-1967. The USDA material consists of annual and station reports from Sears to his superiors, as well as reports from the department to its employees. It also contains office financial records and other employee records with biographical, insurance, medical, and salary information. It should be noted that the USDA annual reports for 1936-1971 (f. 1239-1283) were added after initial processing was completed; they have been described where they would have been placed intellectually, thus the folder numbers are out of sequence. The University of Missouri material includes information on actual and prospective graduate students and post-doctoral scientists who wanted to work with Sears.

The photographs subseries contains pictures of Ernie and Lotti Sears and their many colleagues around the world, dating from around 1940 to 1990. Two folders of miscellaneous items complete the series.

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Container List:

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*Denotes correspondence containing exchange of scientific information.

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Professional Material Series

Publications Subseries

f. 807-840 Reprints of articles, research bulletins and *abstracts* written by E.R. Sears

f. 807 1939: "Amphidiploids in the Triticinae Induced by Colchicine." *Monosomes,*

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trisomes, and segmental interchanges from a haploid of Triticum vulgare. "Cytogenetic Studies with Polyploid Species of Wheat. I. Chromosomal Aberrations in the Progeny of a Haploid of Triticum vulgare."

f. 808 1940: *Monofactorially conditioned inviability of an intergeneric hybrid in the Triticinae.*

f. 809 1941: *Nullisomics in Triticum vulgare.* "Amphidiploids in the Seven-Chromosome Triticinae." "Chromosome Pairing and Fertility in Hybrids and Amphidiploids in the Triticinae."

f. 810 1944: "The Amphidiploids Aegilops cylindrica x Triticum durum and A. ventricosa x T. durum and Their Hybrids with T. aestivum." "Inviability of Inter-generic Hybrids Involving Triticum monococcum and T. aegilopoides." "Cytogenetic Studies with Polyploid Species of Wheat. II. Additional Chromosomal Aberrations in Triticum vulgare." *The artificial synthesis of Triticum spelta.*

f. 811 1946: "The Origin of *Triticum spelta* and Its Free-Threshing Hexaploid Relatives." *Isochromosomes and telocentrics in Triticum vulgare. The sphaer-ococcum gene in wheat.*

f. 812 1947: "The Genome Approach in Radical Wheat Breeding."

f. 813 1948: "The Cytology and Genetics of the Wheats and Their Relatives." *Nullisomic Analysis of stem-rust resistance in Triticum vulgare var. Timstein.*

f. 814 1950: "Un Crosoma Dicentrico Transmisible en Trigo."

f. 815 1952: "Misdivision of Univalents in Common Wheat." "The Behavior of Iso chromosomes and Telocentrics in Wheat." "A Transmissible Dicentric Chromo some." *Homoeologous chromosomes in Triticum aestivum.*

f. 816 1953: "Addition of the Genome of Haynaldia villosa to Triticum aestivum." "Chiasmata and Crossing Over in a Dicentric Chromosome in Wheat." "Nullisomic Analysis in Common Wheat."

f. 817 1954: "The Aneuploids of Common Wheat."

f. 818 1956: "The Systematics, Cytology and Genetics of Wheat." *Neatby's virescent. Structural relationships between non-homologous chromosomes. The B genome of Triticum.* "The Transfer of Leaf-Rust Resistance from Aegilops umbellulata to Wheat." "Identification of Chromosomes Carrying Genes for Stem Rust Resistance in Four Varieties of Wheat."

f. 819 1957: "Ultraviolet and X-Ray Induced Chromosomal Aberrations in Wheat." "Genetic and Structural Relationships of Non-Homologous Chromosomes in Wheat." *Effect of chromosomes XII and XVI on the action of Neatby's virescent. Intergenomic Chromosome Relationships in Hexaploid Wheat.* "The Aneuploids of Common Wheat."

f. 820 1959-1962: *Neatby's virescent, a chlorophyll aberration in common wheat. Inducing the transfer of hairy neck from rye to wheat.* "Identification of the Chromosome Carrying the Martin Gene for Resistance of Wheat to Bunt." *Identification of the wheat chromosome carrying leaf-rust resistance from Aegilops umbellulata. A pollen-killing gene in wheat.* "Chromosomes Involved in Translocations Obtained from Haploids of Common Wheat." *The use of telocentric chromosomes in linkage mapping.*

f. 821 1963: "Distorted Inheritance of Stem-Rust Resistance of Timstein Wheat Caused by a Pollen-Killing Gene." "Nullisomics in Tetraploid Wheat." *Gene Evolution in Polyploid Wheat. The Nature of a Spontaneous Transfer of Hairy Neck from Rye to Wheat.* The Mutation Process in Hexaploid Wheat.

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f. 822 1964: "Chemical Mutagenesis in Triticum aestivum." "Mapping of a Wheat-Rye Translocation."

f. 823 1966: "Nullisomic-Tetrasomic Combinations in Hexaploid Wheat." "Relationships Among Stem-Rust Genes on Wheat Chromosomes 2B, 4B, and 6B." "Somatic Association in Triticum aestivum." "Linkage of Resistance to *Erysiphe graminis*f. sp. *tritici* (*Pm3*) and Hairy Glume (*Hg*) on Chromosome 1A of Wheat." "Chromosome Mapping With the Aid of Telocentrics."

f. 824 1967: "Induced Transfer of Hairy Neck from Rye to Wheat." "Genetic Suppression of Homoeologous Pairing in Wheat Breeding."

f. 825 1968: "Mapping of Stem-Rust Genes *Sr9* and *Sr16* of Wheat." "Relationships of Chromosomes 2A, 2B, and 2D With Their Rye Homoeologue."

f. 826 1969: "Wheat Cytogenetics." "Studies of Isozyme Patterns in Nullisomic-Tetrasomic Combinations of Hexaploid Wheat."

f. 827 1970-1971: "*Sr9d*, a Gene in Hope Wheat for Reaction to Puccinia graminis tritici." "Ethyl Methanesulfonate-Induced Chlorophyll Mutations in Triticum aestivum." *Individual Addition of the Chromosomes of 'Imperial' Rye to Wheat*.

f. 828 1972: "The Nature of Mutation in Hexaploid Wheat." "Chromosome Engineering in Wheat." "Reduced Proximal Crossing-Over in Telocentric Chromosomes of Wheat."

f. 829 1973: Agropyron-Wheat Transfers Induced By Homoeologous Pairing." "Genetic Analysis of Rye Chromosomes Added to Wheat." *Translocation through union of newly formed telocentric chromosomes*. "The Gene for Low Reaction to Puccinia graminis tritici in the Thatcher-3B Substitution Line."

f. 830 1974-1975: *Telocentric Chromosomes in Wheat and Their Uses.* "The Wheats and Their Relatives." *A Triticum timopheevii Chromosome Homoeologous to T. aestivum Chromosome 6B. An induced homeologous-pairing mutant in Triticum aestivum*.

f. 831 1976: "A Synthetic Hexaploid Wheat With Fragile Rachis." "Determination of the Chromosomal Location of a Glutamate Oxaloacetate Transaminase Structural Gene Using Triticum-Agropyron Translocations." "Genetic Control of Chromosome Pairing in Wheat."

f. 832 1977: "The Origin and Future of Wheat." "An Induced Mutant With Homoeologous Pairing in Common Wheat." "Analysis of Wheat-Agropyron Recombinant Chromosomes."

f. 833 1978: "The Telocentric Chromosomes of Common Wheat."

f. 834 1980-1881: "Genetic Control of Disease Expression in Stem Rust of Wheat." "Transfer of Alien Genetic Material to Wheat." "The Wild Gene Resources of Wheat."

f. 835 1982: "A Wheat Mutation Conditioning an Intermediate Level of Homoeologous Chromosome Pairing." "The Transfer of Short Segment of Alien Chromosomes to Wheat." "Elimination of an Undesirable Trait for an Alien Translocation Line Induced by Homoeologous Pairing."

f. 836 1983: "The Transfer to Wheat of Interstititial Segments of Alien Chromosomes." Assignment of Genome Symbols in the Triticeae." "Mapping of the Agropyron Segment of Wheat-Alien 7D/7Ag Transfers of 8 and 10." "Transferring an Alien Segment to an Interstitial Position in a Wheat Chromosome." "The Role of Plant Genetics in the 21st Century."

f. 837 1984: "Mutations in Wheat That Raise the Level of Meiotic Chromosome

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