

Appendix A

Professional Timeline with USDA

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| 1930 | Bureau of Entomology and Plant Quarantine (BEPQ), Tlahualilo, Mexico – field aid; investigated pink bollworm. |
| 1931 | BEPQ, Dallas, Texas – junior entomologist; investigated the biology and control of the screwworm. |
| 1932-1935 | BEPQ, Galesburg, Illinois, and Ames, Iowa – junior entomologist; investigated biology, taxonomy, and control of cattle grubs, major pests of livestock and horse bots, major pests of horses. |
| 1935-1937 | BEPQ, Valdosta, Georgia – junior entomologist; investigated the biology and control of the screwworm. |
| 1937-1940 | BEPQ, Menard, Texas – assistant entomologist; investigated the biology and control of the screwworm. |
| 1940-1942 | Division of Insects Affecting Man and Animals, Portland, Oregon – in charge of the Portland station; investigated mosquitoes in Pacific Northwest. |
| 1942-1946 | Orlando, Florida – research director; investigated vectors of disease important to the armed forces, including malaria, typhus, and plague. |
| 1946-1952 | Division of Insects Affecting Man and Animals, Washington, D.C. – research director. |
| 1953-1971 | Agricultural Research Service (ARS), Beltsville, Maryland – director of the Entomology Research Division. |
| 1971-1973 | ARS, Washington, D.C. – science advisor to George W. Irving, Jr., Administrator of ARS. |
| 1973-2000 | ARS, Beltsville, Maryland – collaborator. |

Appendix B Honors and Awards

- 1924 Salem Lutheran Church (Port Lavaca, Texas). Certificate of Confirmation.
- 1926 Port Lavaca (Texas) High School. Diploma.
- 1930 The Agricultural and Mechanical College of Texas. Bachelor of science degree.
- 1930 President of the United States of America. Commission, Second Lieutenant of Infantry, U.S. Army.
- 1932 Iowa State College of Agriculture and Mechanic Arts. Master of science degree.
- 1935 President of the United States of America. Commission, Second Lieutenant of Infantry, U.S. Army.
- ca. 1941 U.S. Department of Agriculture. Recognition of 10 years of service as a federal employee.
- 1946 Gamma Sigma Delta Honor Society of Agriculture, Beta Chapter (Iowa State University). Membership.
- 1946 U.S. Department of Agriculture, Orlando Florida Laboratory. Award, to Edward Fred Knipling [accompanied an engraved wrist watch].
- 1946 U.S. War Department. United States of America Typhus Commission Medal.
- 1947 British Government. King's Medal for Service in the Cause of Freedom.
- 1947 The Cooperative Interbreed Cattle Association of New Jersey. Scroll for Distinguished Service to the Livestock Industry.
- 1947 Iowa State College of Agriculture and Mechanical Arts. Doctor of philosophy degree.
- 1947 Sigma Xi, The Scientific Research Society, Iowa State Chapter. Membership.
- 1947 U.S. Department of Agriculture. Award for Distinguished Service, to Edward Fred Knipling of the Orlando Florida Laboratory.
- 1947 U.S. Department of Agriculture. Award for Distinguished Service, to the Orlando Florida Laboratory.
- 1948 The President of the United States of America. Medal for Merit.
- 1950 National Pest Control Association. Honorary membership.

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- ca. 1951 U.S. Department of Agriculture. Recognition of 20 years of service as a federal employee.
- 1952 American Association of Economic Entomologists. Presidency for the year 1952.
- 1958 Bausch & Lomb. Honorary Science Award.
- 1958 The Chicago Alumni Association of Iowa State College. The Alumni Merit Award.
- 1958 Cosmos Club. Membership.
- 1959 *The Progressive Farmer*. Man of the Year in Service to Southern Agriculture.
- 1959 U.S. Department of Agriculture. Certificate of Merit.
- 1960 Texas Research Foundation. Hoblitzelle National Award in the Agricultural Sciences.
- 1960 U.S. Department of Agriculture. Award for Distinguished Service.
- 1961 The City of Philadelphia. John Scott Medal and Premium.
- 1961 Ford Farming. Distinguished Service Award.
- 1962 Academy of Achievement. Golden Plate Award.
- 1962 Agricultural and Mechanical College of Texas. Distinguished Alumni Award.
- 1962 Catawba College. Honorary doctor of science degree.
- 1962 U.S. Atomic Energy Commission. Commendation.
- 1963 U.S. Department of Agriculture, Agricultural Research Service, Entomology Research Division, Insect Nutrition and Rearing Conference. Certificate of Appreciation.
- 1964 American Agricultural Editors Association. Distinguished Service Award.
- 1964 American Association for the Advancement of Science. Fellowship.
- 1964 Cosmos Club. Cosmos Club Award.
- 1965 Entomological Society of America. Founders' Memorial Award.
- 1965 Entomological Society of India. Honorary Membership.
- 1966 National Academy of Sciences. Membership.
- 1966 The President of the United States of America. National Medal of Science.
- 1966 The Trustees of Princeton University. Rockefeller Public Service Award.
- 1967 North Dakota State University. Honorary doctor of science degree.

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- 1968 Mathematics and Science Center (Richmond, Virginia). Certificate of Merit.
- 1970 American Academy of Arts and Sciences. Fellowship.
- 1970 Clemson University. Honorary doctor of science degree.
- 1970 Robinson, Donald. *The 100 Most Important People in the World Today*. New York: Putnam.
- 1971 The President of the United States of America. The President's Award for Distinguished Federal Civilian Service.
- 1971 Texas Animal Health Commission. Resolution of Honor.
- 1971 U.S. Department of Agriculture. Recognition of 40 years of service as a federal employee.
- 1971 University of Sydney. Thomas Lawrence Pawlett Visiting Scholarship Award [nomination].
- 1972 Entomological Society of America. Honorary membership.
- 1972 The President of the United States of America. Presidential Prize for Innovation [never officially awarded].
- ca. 1973 The Wisdom Society for the Advancement of Knowledge, Learning, and Research in Education. Wisdom Hall of Fame.
- 1974 *Cotton Farming* March 1974. [framed cover featuring Knipling]
- 1974 U.S. Department of Agriculture Graduate School. Certificate of Appreciation.
- 1975 John and Alice Tyler Ecology Fund at Pepperdine University. Tyler Ecology Award.
- 1975 University of Florida. Honorary doctor of science degree.
- 1976 American Biographical Institute. *Notable Americans of the Bicentennial Era*.
- 1976 Arlington Outdoor Education Association. Title of Acre Saver.
- 1979 The Nobel Foundation. The Nobel Peace Prize [nomination].
- 1982 U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Award of Appreciation.
- 1984 Entomological Society of America. Fellowship.
- 1986 U.S. Department of Agriculture, Agricultural Research Service. Honorary Citation.
- 1986 U.S. Department of Agriculture, Agricultural Research Service. Science Hall of Fame.
- 1988 Southwest Animal Health Research Foundation. Outstanding Service Award.

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Edward Fred Knipling Papers: Screwworm Eradication Program Records

- 1988 U.S. Department of Agriculture, Agricultural Research Service. Dedication, Knipling-Bushland U.S. Livestock Insects Research Laboratory.
- 1990 Iowa State University Alumni Association. Distinguished Achievement Citation.
- 1991 Food and Agriculture Organization of the United Nations. Special Science Award.
- 1991 Mexico-United States Commission on the Eradication of Screwworm, Secretario de Agricultura y Recursos Hidráulicos de Mexico, United States Department of Agriculture. Certificate of recognition, to the Agricultural Research Service.
- 1991 President of the United States of America. Proclamation for World Food Day, 1991 and 1992.
- 1992 Charles Valentine Riley Memorial Foundation. Recognition of selection as a 1992 World Food Prize Laureate.
- 1992 The Entomological Foundation. Recognition of continued support for the science of entomology.
- 1992 U.S. Department of Agriculture. Special Recognition (1992 World Food Prize, 50 years of service).
- 1992 The World Food Prize Foundation. The World Food Prize.
- 1994 Calhoun County (Texas). Proclamation in honor of Edward Fred Knipling.
- 1994 Calhoun County (Texas) Cattlemen's Association. Hall of Fame.
- 1995 Prince William County (Virginia) Fire and Rescue. Phoenix Club.
- 1995 The Science and Technology Foundation of Japan. Japan Prize.
- 1995 Texas A&M University, College of Agriculture and Life Sciences. Outstanding Alumni Award.
- 1995 Iowa State University, Iowa Beta Chapter of Gamma Sigma Delta. Alumni Award of Merit.
- 1996 Texas A&M University. Honorary doctor of science degree.
- 1997 Florida Entomology Society. Pioneer Lecturer Honoree.
- 1999 *Progressive Farmer Magazine*. "Prominent agricultural researchers tribute."
- n.d. City of Uvalde, Texas. Key to city.
- n.d. North Dakota State University. President's Bronze Medallion.

Appendix C

Major Correspondents

Alfred H. Baumhover

Alfred H. Baumhover (1921-) began working with the U.S. Department of Agriculture (USDA) Screwworm Eradication Program in the early 1950s in Kerrville, Texas. He worked with Edward Fred Knipling and Raymond C. Bushland, two of the founding scientists of the screwworm program, to develop the sterile male technique. Baumhover was involved in the original tests for the Southeast Screwworm Eradication program in Florida and later in Curaçao, part of the Netherlands Antilles. Continuing to work with screwworms, Baumhover worked at the Mission, Texas, screwworm production plant until 1964 when he moved to the USDA's Tobacco Insects Investigations at the Tobacco Research Laboratory in Oxford, North Carolina. Baumhover retired in 1984.

Raymond C. Bushland

Raymond C. Bushland (1910-1995) is often cited as Knipling's partner in developing the sterile insect technique. Knipling and Bushland worked together at the Menard, Texas, laboratory of the Bureau of Entomology and Plant Quarantine (BEPQ). Bushland later experimented with screwworm sterilization in Kerrville, Texas. He was able to prove, with the help of Donald E. Hopkins, that screwworms of both sexes could be sterilized and sterile male flies exhibited normal sexual competition when compared to normal males. Bushland worked with the screwworm experiments in Curaçao, and remained involved with pest management throughout his career, which included his position as Director of the USDA Metabolism and Radiation Research Laboratory in Fargo, North Dakota. Bushland and Knipling were both awarded the World Food Prize in 1992.

Emory Clayton Cushing

Emory Clayton Cushing (1897-1974) identified the screwworm (*Cochliomyia hominivorax*) as being a different pest than the comparatively unimportant blowfly (*Cochliomyia macellaria*). Cushing served as Knipling's supervisor in an Orlando, Florida, research lab working on insect populations affecting the armed forces in World War II. Cushing was one of the U.S. Army's highest ranked entomologists during World War II and he later authored the book, *The History of Entomology During World War II*. In 1946, while on leave from the USDA and completing his graduate studies at Iowa State University, Knipling wrote a letter to Cushing outlining his thoughts on the sterile insect technique for use in screwworm control. Cushing was at that time Chief of the Insects Affecting Man and Animals Division in the Bureau of Entomology and Plant Quarantine and Knipling's supervisor, a position he held until 1946 when he retired from the USDA.

Arthur W. Lindquist

Arthur W. Lindquist (1903-1980) worked with Knipling and Raymond C. Bushland in Orlando, Florida, during World War II researching insects that were transmitting diseases to the armed

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Edward Fred Knipling Papers: Screwworm Eradication Program Records

forces. Lindquist worked on the Curaçao experiments to eradicate screwworm populations. Lindquist later became the Head of the Insect and Pest Control Section of the Food and Agriculture Organization (FAO) of the United Nations. Correspondence between Knipling and Lindquist spans their careers and offers insight into the partnership between the FAO and USDA in their joint efforts with pest control.

Hermann Joseph Muller

Hermann Joseph Muller (1890-1967) is the author of the 1950 article “Radiation Damage to the Genetic Material,” which explained how x-rays could be used for insect sterilization without affecting other sexual characteristics and behavior. Knipling worked with Muller in developing the sterile insect technique for screwworm control. Muller was the recipient of the Nobel Prize in Physiology or Medicine in 1946.

Appendix D

Related Collections

Listed below are screwworm related manuscript collections housed in Special Collections, National Agricultural Library as of June 2007.

Artifacts: Screwworm Eradication Program Records. Manuscript Collection 348.

Audiovisual Materials: Screwworm Eradication Program Records. Manuscript Collection 215.

Baumhover, Alfred H., Papers: Screwworm Eradication Program Records. Manuscript Collection 266.

Graham, Owen Hugh, Papers: Screwworm Eradication Program Records. Manuscript Collection 213.

Husman, Chester N., Awards: Screwworm Eradication Program Records. Manuscript Collection 349.

International Collection: Screwworm Eradication Program Records. Manuscript Collection 355.

Knipling, Edward Fred, Papers: Screwworm Eradication Program Records. Manuscript Collection 210.

Oral Histories: Screwworm Eradication Program Records. Manuscript Collection 305.

Promotional Materials: Screwworm Eradication Program Records. Manuscript Collection 214.

Severn Run's Cazador (Caz), Screwworm Detection Dog, Collection: Screwworm Eradication Program Records. Manuscript Collection 310.

Southeastern United States Collection: Screwworm Eradication Program Records. Manuscript Collection 212.

Southwestern United States and Mexico Collection: Screwworm Eradication Program Records. Manuscript Collection 211.

USDA Entomology Research Division Records. Manuscript Collection 237.

Wyss, John, Papers: Screwworm Eradication Program Records. Manuscript Collection 338.

Appendix E Web Resources

Additional links to related resources accessed in September 2006 are listed below.

Adkisson, Perry, and James Tumlinson. "Edward F. Knipling, March 20-1909 – March 17, 2000." *Biographical Memoirs* 83. 2003.

<http://www.nap.edu/readingroom/books/biomems/eknipling.html>

Cooke, Linda, and Sean Adams. "Shrinking screwworm's domain: ARS assists FAO in groundwork for eradication effort." *Agricultural Research* (September 1993). USDA.

http://www.findarticles.com/p/articles/mi_m3741/is_n9_v41/ai_13281657

Knipling, Edward B. "The Life and Vision of Edward F. Knipling Concerning the Eradication of the Screwworm." Presented at the Screwworm Symposium and the 30th Anniversary of the Mexican-American Commission for the Eradication of Screwworm August 28, 2002. Tuxtla Gutierrez, Chiapas, Mexico: Agricultural Research Service, U.S. Department of Agriculture, 2002. <http://www.ars.usda.gov/aboutus/docs.htm?docid=1604&page=2>

Van der Vloedt, A.M., and Waldemar Klassen. "The development and application of the sterile insect technique (SIT) for New World screwworm eradication." *New World Screwworm Response to an Emergency*, special issue. Edited by R.D.S. Branckaert. Food and Agriculture Organization of the United Nations, 1991.

<http://www.fao.org/ag/AGa/AGAP/FRG/FEEDback/War/u4220b/u4220b0j.htm>

Appendix F List of Abbreviations

Agricultural Research Service	ARS
American Association for the Advancement of Science	AAAS
American Association of Economic Entomologists	AAEE
Animal and Plant Health Inspection Service	APHIS
Association for the Advancement of Agricultural Sciences in Africa	AAASA
attraction-annihilation	A/A
Beltsville Agricultural Research Center	BARC
Binational Agricultural Research and Development	BARD
Bureau of Entomology and Plant Quarantine	BEPQ
Commonwealth Scientific and Industrial Research Organization	CSIRO
dichloro-diphenyl-trichloroethane	DDT
Entomological Society of America	ESA
Entomology Research Division	ERD
Food and Agriculture Organization of the United Nations	FAO
Insect Biology and Population Management Research Lab	IBPMRL
International Atomic Energy Agency	IAEA
International Bee Research Association	IBRA
Journal of Medical Entomology	JME
National Academy of Sciences	NAS
National Pest Control Association	NPCA
Southern Insect Management Laboratory	SIML
Southwest Animal Health Research Foundation	SWAHRF
Southwest Animal Research Foundation	SWARF

Special Collections of the National Agricultural Library
Edward Fred Knipling Papers: Screwworm Eradication Program Records

sterile insect technique	SIT
Subtropical Agricultural Research Laboratory	SARL
United Nations Development Programme	UNDP
U.S. Department of Agriculture	USDA
World Health Organization	WHO