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## THE ALFRED E. MIRSKY PAPERS AT THE ROCKEFELLER UNIVERSITY ARCHIVES

The papers of Alfred E. Mirsky (1900-74), general physiologist and biochemist, were presented to the Rockefeller University Archives in 1974, as a generous gift from his widow, Sonya Wohl Mirsky. The collection comprises 74 boxes (approximately 37 linear feet), and includes biographical and personal material, bibliography, professional correspondence, subject files, administrative papers of The Rockefeller Institute and University, manuscripts, scientific reports, photographic materials, collected reprints, and laboratory samples. Some highlights of the collection will be noted below in a brief, necessarily limited, biographical sketch.

Alfred E. Mirsky was born on October 17, 1900, in Flushing, New York. He attended the Ethical Culture School in New York City, and in 1918 entered Harvard College, where his concentration subject was chemistry. The transcript of his college record is preserved, as is an interesting paper written in March 1919 for a freshman English course: "From a biological standpoint, the mechanistic theory of life is more acceptable than the vitalistic one."

Mirsky's graduate training included studies at Columbia University's College of Physicians and Surgeons, the University of Cambridge (Ph.D. 1926), and Harvard Medical School. At Cambridge Mirsky worked in the laboratory of Joseph Barcroft, where he began in collaboration with M. L. Anson (a fellow student) a series of spectroscopic observations on hemoglobins from different animals. Mirsky and Anson were the first to demonstrate the reversibility of protein denaturation, reported in preliminary form in Mirsky's thesis on "The Haemoglobin Molecule."

In 1927 both Mirsky and Anson received appointments at The Rockefeller Institute for Medical Research: Mirsky at the laboratories in New York City, and Anson at the Institute's Princeton branch. They were able to continue and extend the studies of protein denaturation, and between 1928 and 1935 co-authored 29 published papers. From 1935 to 1936 Mirsky was a visiting professor at the California Institute of Technology where he worked with Linus Pauling on theory of protein structure. Mirsky's early scientific work is documented primarily in laboratory notebooks and unpublished scientific reports. There are also some valuable autobiographical and historical remarks in

exchanges with Alfred D. Hershey (1970), Daniel Koshland, Jr. (1971), and Jeffries Wyman (1972).

The protein denaturation studies led to the fruitful discovery of new methods for chemically isolating constituents of cell nuclei. How this discovery came about is related in Mirsky's very interesting scientific report for 1941-42. Among the contributions of Mirsky and his collaborator A. W. Pollister (of the Department of Zoology, Columbia University) were (1) a general method for preparing desoxyribose nucleic acid (DNA), (2) an improved method for isolating cell nuclei, and (3) the identification of non-histone nuclear protein. This work was a bridge to wider appreciation of DNA research: Chargaff has written that Mirsky and Pollister's studies, with those of Hammersten's, were of "particular importance in providing the impulse for the isolation of a large number of highly polymerized preparations of deoxy-pentose nucleic acid." Indeed, some of Mirsky's own preparations were used by Oswald T. Avery and his associates in their work on transforming principle of Type III pneumococcus.

Details of Mirsky's experiments from this period, and references to the scientific literature, are preserved in laboratory notebooks; of special interest are the notebooks "Plasmosin" (1941-42), "Chromatin" (1942), "Nucleoproteins" (1942-44), "Bacteriology" (1943-44), and "Chromosome and Gene--References" (ca. 1942). The overlap of Mirsky's work with that of Avery's laboratory is documented in the Mirsky scientific reports for 1942-43 and 1943-44, as well as in several entries in the laboratory notebooks. Also of interest is a 1-1/2 inch subject file on O. T. Avery, which consists of reprints, articles, correspondence (1972-74), and photocopies of Avery's scientific reports.

A new physiology laboratory for Mirsky's research was completed in 1947, and the following year he was appointed a senior Member of The Rockefeller Institute. With his first Assistant, Hans Ris, Mirsky worked out methods for studying the chemistry of isolated chromosomes and nuclei of different cells. They were among the first to demonstrate that the quantity of DNA per cell nucleus is a species constant, irrespective of the somatic origin (e.g. liver versus blood) of the cells; sperm cells were found to have one-half the amount found in somatic cells. There is a letter in the collection from H. J. Muller to Mirsky, 11 August 1950, about the "grand discovery" of DNA constancy.

In the 1950s the research of the Mirsky laboratory shifted to the study of synthetic functions of the cell nucleus. The laboratory hosted many visiting investigators, and graduate students also joined the department as the Institute established itself as a graduate university in the 1950s and 1960s (the name was officially changed to "The Rockefeller University" in 1965). The correspondence from this later period is much more extensive; a comprehensive list of names is recorded in the unpublished guide to the collection. Letters relevant to the

scientific work of the Mirsky laboratory include a letter from Salvador E. Luria to Mirsky, 25 March 1955, expressing "delight" at findings recently published by Mirsky's associate Vincent G. Allfrey on the role of DNA in protein synthesis. Also of note is Mirsky's correspondence with M. H. F. Wilkins, April-December 1955, on X-ray diffraction studies of chromosomal nucleoproteins. Mirsky supplied Wilkins with biological material, and several X-ray diffraction photographs sent by Wilkins are in this file. A very helpful overview of the Mirsky laboratory's contributions may be found in a biographical memoir of Mirsky by a former Ph.D. student, Bruce S. McEwen.<sup>6</sup>

In addition to his research, Mirsky made valuable contributions to the scholarship of science as editor, critic and historian. He was Editor of The Journal of General Physiology from 1951 to 1961,<sup>7</sup> and he also co-edited, with Jean Brachet, the six volumes of The Cell: Biochemistry, Physiology, Morphology (1959-64), published by Academic Press. The editorial correspondence of the JGP is part of the journal's archive; there is a small file on the journal in Mirsky's papers, including letters of appreciation on the occasion of his retirement as Editor. The editing of The Cell is extensively documented: the planning correspondence between Mirsky and Brachet, ca. 1955-56, is interesting source material, with outlines for the series and comments on possible contributors.

Mirsky took an active interest in the heredity/environment discussion and debate, particularly with regard to the biology of human races. He published critical book reviews from this perspective of C. D. Darlington's The Facts of Life in 1954,<sup>8</sup> and of Sir Julian Huxley's Essays of a Humanist in 1964.<sup>9</sup> Unpublished material on the subject of eugenics may be found in the correspondence; for example, with H. J. Muller (1954), George Polanyi (1956), and N. P. Dubinin (1972). Mirsky's subject files on C. D. Darlington, and on Eugenics, contain useful material; the manuscript file on the Huxley review has letters and correspondence.

In 1968 Mirsky published in Scientific American an historical article, "The Discovery of DNA," on the work of Friedrich Miescher and his contemporaries.<sup>10</sup> Typescripts of the article are preserved with Mirsky's manuscripts; this file also has photocopies of background material, and a letter received from the physician of Mirsky's daughter Mary, dated 11 July 1978. There is additional Mirsky/Miescher source material in the correspondence files: letters from Karl Miescher, Friedrich Miescher's nephew, and a useful list of historical references compiled from Dr. Paul O. P. Ts'o in 1972.

The collection of personal photographs, approximately 2 inches, includes many informal pictures of Mirsky's laboratory associates. Several "vintage" photographs are of special historical interest: an informal portrait of Alfred E. Mirsky in 1922; an informal photo of T. Dobzhansky and L. C. Dunn; a portrait of the anatomist R. R.

Bensley; and, an inscribed portrait from W. J. V. Osterhout to Mirsky.

The gift of the collection was made without restrictions; however, access to material of a confidential or sensitive nature may be limited. An unpublished guide to the collection (92 pages) is available, compiled by Mrs. Gladys Lewis, Archivist.

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<sup>1</sup>A. E. Mirsky and Linus Pauling, "On the structure of native, denatured, and coagulated proteins," Proc. Natl. Acad. Sci. 22:439-77 (July 1936).

<sup>2</sup>A. E. Mirsky and A. W. Pollister, "Chromosin, a desoxyribose nucleoprotein complex of the cell nucleus," J. Gen. Physiol. 30:117-48 (20 November 1946). See also the citations to this paper in J. N. Davidson, The Biochemistry of the Nucleic Acids 4th ed. (New York: John Wiley and Sons, 1960), pp. 37, 137, 140.

<sup>3</sup>Erwin Chargaff, "Isolation and composition of the deoxypentose nucleic acids and of the corresponding nucleoproteins," in: Erwin Chargaff and J. N. Davidson, ed: The Nucleic Acids. Chemistry and Biology vol. 1 (New York: Academic Press, 1955), pp. 307-71; quoted on page 312.

<sup>4</sup>Oswald T. Avery, Colin M. MacLeod, and Maclyn McCarty, "Studies on the chemical nature of the substance inducing transformation of pneumococcal types. Induction of transformation by a desoxyribonucleic acid fraction isolated from *Pneumococcus* Type III," J. Exp. Med. 79:137-57 (1 February 1944); Mirsky acknowledged pp. 146, 147.

<sup>5</sup>A. E. Mirsky and Hans Ris, "Variable and constant components of chromosomes," Nature 163:666-67 (30 April 1949). A more general discussion, with historical background, is A. E. Mirsky, "The chemistry of heredity," Scientific American 188:47-57 (February 1953).

<sup>6</sup>Bruce S. McEwen, "Alfred E. Mirsky (1900-1974)," American Philosophical Society Yearbook 1976, pp. 100-103. See also Vincent G. Allfrey and Alfred E. Mirsky, "How cells make molecules," Scientific American 205:74-82 (September 1961).

<sup>7</sup>Paul F. Cranfield, "Alfred E. Mirsky, 1900-1974," J. Gen. Physiol. 64:131-33 (August 1974).

<sup>8</sup>A. E. Mirsky, Book review of C. D. Darlington, The Facts of Life in: Scientific American 190:92-4 (April 1954).

<sup>9</sup>A. E. Mirsky, "Genetics and human affairs," book review of Sir Julian Huxley, Essays of a Humanist in: Scientific American 211:135-38 (October 1964); Letter to the Editors [Reply to Huxley], Scientific American 212:7-9 (January 1965).

<sup>10</sup>Alfred E. Mirsky, "The Discovery of DNA," Scientific American 218:78-84, 86, 88 (June 1968).