THE MENDEL NEWSLETTER

Archival Resources for the History of Genetics & Allied Sciences

ISSUED BY THE LIBRARY OF THE AMERICAN PHILOSOPHICAL SOCIETY

***New Series*, No. 18** **August 2010**

Gregor Mendel

IN THIS ISSUE

The Mendel Newsletter

American Philosophical Society Library
105 South Fifth Street
Philadelphia PA 19106-3386
www.amphilsoc.org/library

Editor
Michael Dietrich
Department of Biological Sciences
215 Gilman Hall, HB 6044
Dartmouth College
Hanover NH 03755
Michael.Dietrich@dartmouth.edu

Managing Editor
Martin L. Levitt, *American Philosophical Society*
mlevitt@amphilsoc.org

Assistant Managing Editor
Earle E. Spamer, *American Philosophical Society*
espamer@amphilsoc.org

The Mendel Newsletter is issued annually by The American Philosophical Society Library, free of charge. It is available now only in electronic format. Readers may print their own copies. The current issue and many back issues may be downloaded from *The Mendel Newsletter* webpage at www.amphilsoc.org/library/mendel

To be placed on an email list for notification of the newsletter's availability, send your email address to mendel@amphilsoc.org Requests to be removed from the list may also be sent to this address.

Inquiries relating to article contributions to *The Mendel Newsletter* may be sent to the Editor.

The Ashley Montagu Papers at the American Philosophical Society

Adam Najarian
The American Philosophical Society

PHYSICAL ANTHROPOLOGIST and public intellectual Ashley Montagu was a prominent figure in the history of American anthropology and scholarly life. British by birth, educated at University College London and the London School of Economics, then Columbia University in New York City, Montagu was a persistent advocate for gender and racial equality. He was a tireless activist for human understanding and child welfare in particular. Departing from academe in 1955, a victim of McCarthyite hysteria, he was a remarkably prolific writer and speaker, eventually publishing more than 50 books, over 40 of them after he left the academy. Montagu continued to lobby passionately against the primacy of race in discussions of intellect and skill, and undertook works in a wide variety of fields, from evolution to parenting. Some of his most significant works include *Man's Most Dangerous Myth: The Fallacy of Race* (1942), the UNESCO Statement on Race (1951), *Man and Aggression* (1968) and his novel *The Elephant Man* (1971), which became the basis for an award winning play and movie. Ashley Montagu's contributions to the spread of scientific knowledge and human understanding make him one of the most important intellectuals of the 20th century. When one encounters the papers of such a diverse scholar as Ashley Montagu, one cannot help but be fascinated and impressed with the breadth and depth of his interests.

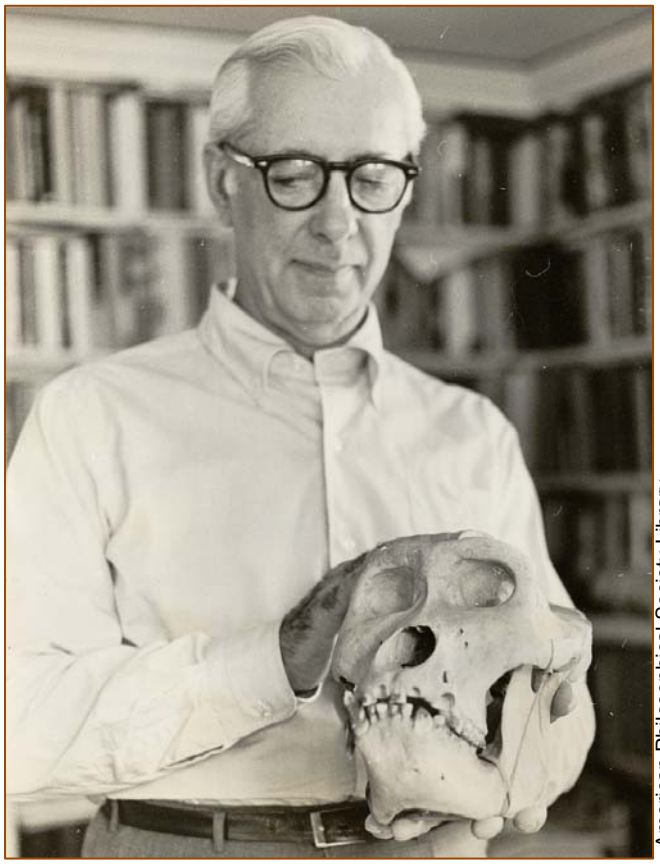
The first series of the papers, Montagu's correspondence, reflects a wide variety of his interests, and contains letters to and from presidents of the United States, women's rights advocates, natural birth associations and such intellectual titans as Ruth Benedict, Franz Boas, Bronislaw Malinowski, Margaret Mead and Albert Einstein. In addition to the wealth of professional correspondence, there is a significant amount of personal correspondence, often with former students of Montagu's, as well as a fair amount of negative response to Montagu's work, what one may be inclined call hate mail, regarding some of Montagu's more progressive work.

The series containing Montagu's correspondence with his publishers is significant, considering he made a living with his writing for nearly fifty years. The majority of the series comprises correspondence with Harper Collins and Oxford University Press. The series also contains correspondence with various magazines and professional journals that published many of Montagu's articles, including *Redbook* and *The Sciences*.

The series works by Montagu, much like his correspondence, reflects the wide range of his interests. Included are drafts of many of his major works, including *The Anatomy of Swearing*, *The Elephant Man*, *Man and Aggression* and *Race and IQ*, as well as related notes and correspondence. Much of the series is comprised of undated manuscripts of both published and unpublished articles, typewritten by Montagu. Also included among Montagu's numerous other works are lectures, journal articles, book reviews, unpublished poetry and even class notes from his time at Columbia, where he studied under Franz Boas and Ruth Benedict.

The fourth series of the collection encompasses Montagu's appearances in the media. It consists of correspondence, transcripts and other ephemera from Montagu's many appearances on television (Montagu appeared multiple times on the Phil Donahue Show, the Tonight Show with Johnny Carson and many public television shows) and radio, as well as many of his public appearances.

The Princeton files contain material from the years that Montagu spent at the University, in multiple capacities. While never seeking a professorship, Montagu held positions as a lecturer in the anthropology



American Philosophical Society Library

department, and as a fellow at Stevenson Hall. The collection contains correspondence, course materials and miscellaneous items from these positions, as well as material from Montagu's term on the Princeton Library Advisory Council.

The works by others file contains a wide range of interesting and controversial material that piqued Montagu's interest throughout his career. The works of many influential people from a variety of fields, such as Henry Louis Gates Jr., Theodosius Dobzhansky, Mary S. Calderone, J.B.S. Haldane, Arthur Jensen, A.H. Maslow, and Benjamin Pasamanick are represented here. Montagu remained well read in the works of those authors he did not always agree with, especially in the racial and eugenic theories of men like Jensen and Haldane, so while the series does not accurately reflect the entirety of Montagu's opinions, it is a great resource for discovering his spheres of interest.

The committee and organization series contains information on Montagu's affiliations dating back to his days at King's College in London. It also highlights his participation in academic and social organizations, such as the Viking Fund, La Leche League and the Cleveland Foundation Anisfield Book Award committee, on which Montagu served as the head of the prize jury. Like many of the other series, this one shows that Montagu was not limited by his training as an anthropologist and that he found ways to branch out into other fields that he found important.

The certificates and awards series mainly consists of lifetime achievement awards bestowed on Montagu in the 1990s. The series holds Montagu's honors from the American Association of Physical Anthropologists, the Association for Humanistic Psychology, the Phi Beta Kappa Association, as well as the Saybrook Institute, for his work in not just anthropology, but psychology and racial equality as well.

The personal series of the Montagu collection holds a wealth of valuable and interesting material, pertaining to Montagu's family, home life and his education. Some of the most interesting material in the series relates to his pre-professional life- a primary school grading sheet (ironically, Montagu graded lowest in writing ability and public speaking), his entrance certificate to Columbia University, as well as a job offer from the Wellcome Historical Medical Museum in England. In addition to medical and financial records, the series also contains family correspondence, information regarding Montagu's dealings with the town of Princeton, New Jersey, as well as passports and other citizenship material from both the United States and the United Kingdom, among a wealth of other material.

The printed material series contains a wide variety of published items from the 1920s through the 1990s. Publications on race, Native Americans, sexual and gender rights, as well as natural birth and breastfeeding are prominent here. Among the most interesting material are trial transcripts from the William Shockley libel lawsuit against Cox Enterprises from 1984, for which Montagu was deposed.

The last two series, photographs and recordings, include portraits of Montagu for professional use, as well as candid snapshots of Montagu with family and friends. Also incorporated are photos taken sure Montagu's conversations with Einstein at the latter's Princeton home, as well as various other photographs Montagu acquired through the course of his studies and teaching tenures. Among the recordings is a speech delivered by Montagu, and a recording of radio

American Philosophical Society Library

Ashley Montagu and Albert Einstein,1950.

debates regarding race that Montagu had with William Shockley.

While the Montagu papers reflect Ashley Montagu's many interests and passions, he found a true cause in supporting gender and racial equality. No fewer than fifteen of Montagu's many literary contributions deal specifically with the issue of race, overlapping his work in anthropology with genetics and evolutionary biology, at a time when all three fields were undergoing significant controversies. He was not alone in his passion, despite all of the controversies he encountered. Renowned geneticist and evolutionary biologist Theodosius Dobzhansky enthusiastically supported the cause of racial equality, and that passion would bring he and Montagu together on multiple works that advocated the biological equality of man.

Of Montagu's many works on the subject of race, his best known include 1942's *Man's Most Dangerous Myth: The Fallacy of Race*, and the 1950 UNESCO *Statement on Race*. The UNESCO Statement flew in the face of eugenical notions of racial supremacy and biological inequality. As the primary author of the statement produced by the UNESCO committee, which included Claude Lévi-Strauss and Edward Franklin Frazier, Montagu crafted a statement that espoused man's biological similarities, rather than differences. The *Statement* begins, "Scientists have reached general agreements in recognizing that mankind is one: that all men belong to the same species *Homo sapiens*… that all men are probably derived from the same common stock."[1] The *Statement* advocated dropping the construct of race and offered the term "ethnic group" as a replacement. In the eyes of the UNESCO group, a majority of people were apt to use the term "race" non-biologically, but rather as a convenient label for those of a different religious, geographic, linguistic or cultural background, and thus in error.[2] The *Statement* goes on to declare that science is unable to support the conclusion that mental characteristics such as temperament, personality and character are racially based, and that like other cultural differences and achievements are based on personal history and experience, rather than genetics.[3] The *Statement* concludes eloquently with a petition for unity among all peoples,

> Lastly, biological studies lend support to the ethic of universal brotherhood; for man is born with drives toward co-operation, and unless these drives are satisfied, men and nations alike fall ill. Man is born a social being who can reach this fullest development only through interaction with his fellows. The denial at any point of this social bond between man and man brings with it disintegration. In this sense, every man is his brother's keeper. For every man is a piece of the continent, a part of the main, because he is involved in mankind.[4]

Geneticist and evolutionary biologist Theodosius Dobzhansky reviewed the UNESCO Statement, and Dobzhansky was also a frequent correspondent of Montagu's. In a review of over thirty years of correspondence, one finds a warm personal, and strong collegial relationship in which the two men found themselves on the same side of the arguments of race and evolutionary genetics. Both men clearly found a common cause in racial and biological equality, though they had differing philosophies by which they intended to bring their ideas to the public.

Montagu was a vocal critic of racism in society (often to the point of controversy[5]) as well as the prac-

tice of race-based science for many years prior to his correspondence with Dobzhansky. Dobzhansky, however, preferred a more restrained tone. In 1944, he wrote Montagu, "It is obvious I think that the racialists which were so overwhelmingly strong in the USA before 1932 and before Hitler . . . have not disappeared since . . . Just think what will then be written by the eugenicists- every little slip of yours will be used to show that all that you wrote is wrong."[6] Dobzhansky's concerns regarding the corruption of his and Montagu's work tempered his enthusiasm for some of Montagu's more aggressive ascertains concerning race, including Montagu's advocacy of the term ethnic group, as an alternative to race. He wrote Montagu that if the term race was to become less significant and equality more prominent, "The only way is to divest the word race of it[s] emotional contents."[7] In response to Dobzhansky's concerns, Montagu wrote to reassure Dobzhansky of his thinking, "There is a great difference between a race and an ethnic variety, and this is what I hope I may someday convince you of . . . The term ethnic group is not merely a substitute . . . it's a new concept, a concept for human groupings which modern knowledge has for the first time made possible."[8] While Dobzhansky saw no value in Montagu's terminology, the disagreements between the two were minor, given the large potential impact of their collaboration on the question of race in evolutionary biology.

Montagu wrote to Dobzhansky in October 1944 about his frustration regarding general attitudes toward heredity and environment, stating, "Everyone pays lip service to the bogusness of the dichotomy between heredity and environment, but in practice most people forget the spurious nature of that dichotomy and keep on opposing the one to the other."[9] Partially due to this frustration, Montagu and Dobzhansky collaborated on various works regarding race and genetics, including two articles entitled "Natural Selection and the Mental Capacities of Mankind," and "Natural Selection and Civilization." In the first article, written in 1947 and included in Montagu's 1975 work *Race and IQ*, Montagu and Dobzhansky dispel the notion that mental capabilities are inherently different among the races of man. In evidence of this, they point to the affect that certain features that are exclusive to man, namely the human social environment and human inventiveness, can have. According to Montagu and Dobzhansky,

> The most important setting of human evolution is the human social environment . . . social environment can influence evolutionary changes only through the media of mutation, selection, genetic drift, and hybridization . . . there can be no genuine clarity in our understanding of man's biological nature until the role of the social factor in the development of the human species is understood.[10]

They go on to explain that while the social environment is not the only factor in human development, it is an extremely important factor, stating, "the adaptation of man consists chiefly in developing his inventiveness; a quality to which his physical heredity predisposes him, and which his social heredity provides him with the means of realizing. To the degree to which this is so man is unique."[11] Inventiveness is followed by educability, and thus the ability to learn and adapt to societal and environmental challenges.

Dobzhansky and Montagu point to the fixity versus the plasticity of human traits as an important evolutionary factor as well. Given that, as the two point out, social environments have always been vastly widespread and rapidly changing, "immediate adjustment is demanded," and "genetic fixation of behavioral traits in man would have been decidedly unfavorable for survival of individuals as well as of the species as a whole."[12] The evolutionary advantage, therefore, lies with those who have the most plasticity, or flexibility of traits. Those that display the most fixity of traits are often neglected, or left behind by society, as a function of natural selection, meaning that natural selection "seemingly favors such a development [of high mental capacity] everywhere."[13] While physical traits, such as skin color and hair type (to name only two) vary regionally due to natural selection, Montagu and Dobzhansky assert, "it does not necessarily follow that [ethnic groups] must differ in mental [traits] as well."[14] They state that natural selection "in all climes and at all times favored genotypes which permit greater and greater educability and plasticity of mental traits under the influence of the uniquely social environment to which man has been continuously exposed."[15]

Montagu and Dobzhansky combined on another work that served to reinforce their theories of the effect of man's environment on natural selection, entitled, "Natural Selection and Civilization." In this work, they claim that even as civilization serves to protect many individuals who would not have survived in the past, "natural selection remains operative (1) on the 'weak' who are preserved, and (2) upon those who

break down under the stresses and strains of modern civilized life."[16] Those individuals of weak mental, physical or psychosomatic character, according to Montagu and Dobzhansky, "tend to remain reproductively isolated."[17] They indicate two distinct types of "general devitalization" in man: hypotnia, "a gross physiological insufficiency" and dystrophy, characterized "by the interruption of vigorous response."[18]

Both hypnotic and dystrophic individuals suffer what Montagu and Dobzhansky call "behavioral infertility," which has increased in industrialized societies from 1870 onward, due to the stressful psychological effects of wars, financial crises and "general social uncertainty."[19] They point out that these disorders strike men and women at different rates, but occur across the racial and gender spectrum. They cite a "general agreement that there has been an increase in mental illness with the progress of civilization, and that this progressive increase is not of recent origin," thus, "natural selection in civilized societies operates to eliminate those individuals who are psychologically unable to adjust themselves to the demands of civilized living."[20] In the two works, Montagu and Dobzhansky make clear that while there are many factors in the evolution of man, including civilization and natural selection, race was and is not a factor, but rather it is man's environment that aids in evolutionary determination.

The desire of Montagu and Dobzhansky to keep anthropology and evolutionary biology free of race bias, and to prevent works in the fields from becoming weapons against racial equality, led the two to embark on individual critiques of Carleton Coon's *The Origin of Races*, which were published in *Current Anthropology* in October 1963. In *The Origin of Races*, Coon states that man is divided into five races, each race being its own subspecies, and that each subspecies evolved to *Homo sapiens* from *Homo erectus* individually and independently over hundreds of thousands of years. He goes on to state that the Caucasoid race evolved first, followed finally by the Congoids, or African races, some 200,000 years later.[21]

While Coon's work was not well received in the scientific community, or the public in general, segregationists, as Montagu and Dobzhansky feared, heralded the book, "as proof that African Americans were 'junior' to white Americans, and thus unfit for full participation in American society."[22] Dobzhansky's review rejects Coon's theories outright, pointing out Coon's apparent ignorance of accepted biological convention. Dobzhansky states that the assignment of names to subspecies divides a species into various races, merely in keeping with zoological standards and that, "It is biologically no more and no less clearly defined."[23] He further criticizes Coon by stating that acceptance of the fact that the evolution of man was an ongoing process, makes "cutting a continuous process into two or more sections called 'species' . . . arbitrary,"[24] and ultimately unscientific. If, as Coon says, there were five subspecies, or races of *Homo erectus* that evolved into five races of *Homo sapiens*, why then do most anthropologists not agree, placing the "number of races of living men . . . anywhere from 2 to more than 200"[25]?

Dobzhansky submits the convincing point that it is virtually impossible for the evolution of man to have occurred separately over such a long period, because if it were so, *Homo erectus* "must have been genetically isolated from *sapiens*. Yet its modern descendants are not genetically isolated; they belong to the same species. For a single species to have arisen from two species that could not breed would indeed be extraordinary."[26] He openly agrees with Coon on the point that "natural selection has favored, in human races everywhere in the world a *sapiens*-like genotype over the *erectus*-like one," but points out that Coon's theories ignore man's tendency to wander and colonize, and thus discount genetic exchange hybridization, which would render moot Coon's theory of separate evolution of five distinct subspecies. [27]

Montagu's criticism of Coon centers on flaws he finds in Coon's understanding of evolutionary biology. Montagu states, "*Homo sapiens* is a species because all its members have shared a more or less common biological history . . . Coon implies that that history has been essentially and independently different for his five assumed races, and further implies that in isolation the genetic direction of *Homo erectus* was predetermined,"[28] neglecting natural selection and environmental factors that are so influential in evolution. Montagu states that if Coon's ideas of isolation were correct, it would be more likely that the independent subspecies or man would have become different species altogether, rather than evolving into one species, retaining many similar traits.[29] The similarities of man push Coon's theory beyond the breaking point, in Montagu's eyes, in light of what is known about the evolutionary process.

Montagu goes on to attack Coon for implying that the differences exhibited by the different subspecies, or races of man are a function of their evolutionary timeline. Under Coon's hypothesis, Caucasoid peoples, the subspecies that evolved into *Homo sapiens* first, possess higher mental capacity as well as a more civilized society than the subspecies that evolved afterwards. Coon also asserts that the late-evolving Congoid peoples have lower mental capacity and less civilization than those subspecies that evolved before.[30]Montagu vehemently criticizes these assertions, blasting their lack of scientific basis as "likely to be misunderstood by the unwary, or rather understood for what they are not, and misused by racists and others for their own nefarious purposes."[31] While Montagu stops just shy of labeling Coon himself a racist, he slams the fact that "The African Negroes . . . would almost seem to have been specially created, according to Coon's findings."[32]

While Dobzhansky and Montagu (particularly the latter) worked aggressively, and often in concert, to correct racialist attitudes in the sciences, they certainly did not find themselves alone in their struggle. As the historian of science John P. Jackson Jr. points out, "When Coon's book arrived in October of 1962 anthropologists were already undergoing an intense self-examination about the nature of their discipline in relation to society. The response to Coon's book must be understood within the contours of this larger debate about the social responsibility of scientists in American society."[33] The late 1950s and early 1960s were a time of great social unrest; the civil rights movement, desegregation and racial unrest, the Cold War, the Cuban Missile Crisis and the looming conflict in Vietnam writ large the divisions in, and the fragility of, American society. In the shadow of this unrest, men like Theodosius Dobzhansky and Ashley Montagu felt responsible for establishing genetic basis for the equality of man, while at the same time, defending their field from damaging works, such as Coon's *Origin of Races*. In an attempt to use their fields to bring people together, rather than drive them further apart, Montagu and Dobzhansky made a significant contribution to the understanding of physical anthropology and evolutionary biology.

A zealous advocate for racial and gender equality, Ashley Montagu devoted a large portion of his work to this end, bolstering his arguments with biological and anthropological evidence. The 56 linear feet of the Ashley Montagu papers, held at the American Philosophical Society, reflect far more than this, however, and in fact demonstrate the diversity of interests and passions held by one of the most prominent public intellectuals of the 20th century. A review of the papers shows that Montagu's concerns were not limited to anthropology or evolutionary biology, but extended to a wide variety of subjects, including language, childbirth and breastfeeding, as well as children's rights. The papers reveal a strong intellectual curiosity that drove Montagu to explore these, and many other topics making the collection a fascinating study into the life and work of an extraordinary mind.

Collection Contact Information

Manuscripts Department
American Philosophical Society Library
105 South Fifth St.
Philadelphia, PA 19106
manuscripts@amphilsoc.org

---

[1] UNESCO, *Statement on Race*, July 18, 1950, 1.

[2] *Ibid*, 2.

[3] *Ibid*, 3.

[4] *Ibid,* 5-6.

[5] For more information, see David H. Price. *Threatening Anthropology: McCarthyism and the FBI's Surveillance of Activist Anthropologists* (Durham, NC: Duke University Press, 2004).

[6] Theodosius Dobzhansky to Ashley Montagu, May 22, 1944, Ashley Montagu Papers, American Philosophical Society, Ms Coll 109.

[7] Theodosius Dobzhansky to Ashley Montagu, May 22, 1944, Ashley Montagu Papers, American Philosophical Society, Ms Coll 109.

[8] Ashley Montagu to Theodosius Dobzhansky, May 23, 1944, Theodosius Dobzhansky Papers, American Philosophical Society, Mss.B.D65.

[9] Ashley Montagu to Theodosius Dobzhansky, May 23, 1944, Theodosius Dobzhansky Papers, American Philosophical Society, Mss.B.D65.

[10] Ashley Montagu and Theodosius Dobzhansky, "Natural Selection and the Mental Capacities of Mankind" (Draft manuscript, 1947), 2.

[11] *Ibid*, 3.

[12] *Ibid*, 5.

[13] *Ibid*, 9.

[14] *Ibid*, 8.

[15] *Ibid*, 10.

[16] Ashley Montagu and Theodosius Dobzhansky, "Natural Selection Civilization" (Draft manuscript, undated), 2.

[17] *Ibid*, 2.

[18] *Ibid*, 3.

[19] *Ibid*, 4.

[20] *Ibid*, 5.

[21] For more information see, Carleton S. Coon. *The Origin of Races* (New York: Alfred A. Knopf, 1962).

[22] John P. Jackson Jr. "'In Ways Unacademical': The Reception of Carleton S. Coon's *The Origin of Races*" *Journal of the History of Biology* 34 (2001): 247.

[23] Theodosius Dobzhansky. "Possibility The Homo Sapiens Evolved Independently 5 Times Is Vanishingly Small" *Current Anthropology* 4 (1963): 365.

[24] *Ibid*, 365.

[25] *Ibid*, 365.

[26] *Ibid*, 366.

[27] *Ibid*, 365.

[28] Ashley Montagu. "What Is Remarkable About Varieties Of Man Is Likenesses, Not Differences" *Current Anthropology* 4 (1963): 361.

[29] *Ibid*, 361.

[30] Coon, *Origins*, in Montagu, "Likenesses," 362.

[31] Montagu, "Likenesses," 362.

[32] *Ibid*, 362.

[33] John P. Jackson Jr. "'In Ways Unacademical': The Reception of Carleton S. Coon's *The Origin of Races*" *Journal of the History of Biology* 34 (2001): 250.

The John C. Green Papers at the University of Connecticut

Stewart Kreitzer
University of Florida

JOHN COLTRAINE GREENE (1917–2008) was a leading historian of science, best known for his contributions to our understanding of the history of science in the United States, and for his contributions to our understanding of the history of evolutionary thought. His major work includes *American Science in the Age of Jefferson* (1984) and *The Death of Adam: Evolution and Its Impact on Western Thought* (1959), which sold well over two hundred thousand copies. Though appearing to be heterogeneous, Greene's work was unified by the recurring themes of science, ideology and worldview and how they interacted in the works of major twentieth century evolutionists like Julian Huxley who wove political, religious and ethical concerns with their science. His papers, now deposited at the University of Connecticut Dodd Center, span a career that lasted five decades. It includes a wide range of correspondence with major twentieth century figures including both scientists and historians and philosophers of science, as well as papers and documents associated with the History of Science Society, for which he served as 29th President.

Education and Scholarly Career

Greene grew up in the Vermillion, South Dakota in an academic family. After he graduated from high school, he remained in Vermillion to attend the University of South Dakota, where his father was a faculty member teaching French. He received his BA in 1938 and then attended graduate school at Harvard, his father's alma matter (his mother had attended Barnard). He distinguished himself as a scholar, earning election into the prestigious Harvard Society of Fellows in 1941 (Senior Fellows at the time included Alfred North Whitehead, Abbott Lawrence Lowell, Lawrence Joseph Henderson, and Crane Brinton; Junior Fellows included Arthur Schlesinger, Jr., Carl Kaysen, James Tobin, and John E. Sawyer). He received his MA in history, but his graduate education was interrupted by the war. While a volunteer in training for code work learning Japanese, he received his draft notice. He subsequently attained the rank of Captain while serving as liaison officer and aide-de-camp for Brigadier-General Donald P. Booth of the Persian Gulf Command. His travels during the war took him to British India, the Mediterranean and the Middle East, where he met Ellen Weimann, an army nurse he said he couldn't forget. They married in Cairo. After his tour of duty, they returned to Harvard, where he resumed his activities at the Harvard Society of Fellows.

Greene's first job was teaching at Robert Hutchins's experimental college at the University of Chicago (1948-1952), but he returned to Harvard in 1952 to complete his doctoral exams in history with a committee that included Arthur Schlesinger, Sr., Oscar Hamblin and Crane Brinton. Greene next taught successively at the University of Wisconsin (1952-1956), Iowa State University (1956-1962), the University of California Berkeley (1962-1963), and the University of Kansas (1963-1967). In 1967 he took a position as the historian of science at the University of Connecticut, where he remained for the next thirty years. During his career, Greene was honored as a Guggenheim Fellow (1966-1967); he was also a Visiting Scholar at Corpus Christi College, Cambridge University (1974), and Visiting Historian, National Museum of History and Technology, Smithsonian Institute (1978). The University of South Dakota awarded him an honorary doctorate of Humane Letters in 1985. After his wife's death in 1998, he moved from Connecticut to a retirement home in California on the Monterey peninsula.

The greatest of his honors came in 2002 when he was awarded the prestigious Sarton Medal by the History of Science Society in recognition for his lifetime work as a historian of science. He served the society well; during the 1960s he first served as its secretary, and then became vice president (1971-1974), and president (1975 to 1977).

Greene was liked by his colleagues, who viewed him as affable in his dealings. Though he did not have an opportunity to supervise many doctoral dissertations while at the University of Connecticut, he did mentor a number of junior scholars, the best known of whom was James R. Moore. The Memorial Resolution by Iowa State University Faculty Senate, written by his fellow historian of science Hamilton Cravens, said it best: "In his personal relations, John was always a kind, sweet-tempered man with generous impulses who helped junior scholars in their careers."[1]

Scholarship and Publications

Greene's first mentor in American intellectual history and the history of science was Bert J. Loewenburg, at the University of South Dakota. Loewenburg had only just recently completed his Harvard doctorate in 1934, and had published a series of essays on the reception of evolutionary thought in the United States. With Loewenburg's personal guidance and his connections as historian, Greene earned a number of favorable scholarships, choosing to accept an opportunity to study at Harvard under Schlesinger, who previously had been Loewenberg's advisor. It was Schlesinger who encouraged Greene to pursue a thesis in "Geology and Religion: 1820-1860."

As his studies progressed, Greene gradually came to the conclusion that the key issues demarcating traditional from modern perspectives on nature were not based on the celebrated conflicts between Biblical interpretation and science, but resulted from a breakdown of a static worldview. He noted that while Deists and Christians could vehemently disagree about Biblical interpretation before Darwin, they would nonetheless share a belief "in a static natural world that testified to the wisdom and goodness of the Creator." Greene recalled that at this point during his research, he "ceased to focus in the relations between science and the Bible, and, instead set out to trace the gradual breakdown of the static view of nature in astronomy, in geology, in paleontology, in biology, in physical anthropology, and if possible in philosophy also."[2]

Though Greene earned his doctorate in American history, his interests increasingly turned to the intellectual history of science, beginning with his dissertation. In the 1950s Greene published a number of essays that drew on his thesis, and that culminated with the appearance of, *The Death of Adam: Evolution and its Impact on Western Thought*. Described in one book review as an account of "man's changing attitude to change" over the two centuries before Darwin, when "philosophers and scientists were deciding whether nature was static, whether it was once and for all in an immutable pattern, or whether it was dynamic," it was one of the first historical attempts to come to grips with the impact of evolution on the western intellectual tradition.[3] It was also well timed to capitalize on the 1959 Darwin Centennial, which fueled interest in evolution and its history.

Although Greene continued to publish on topics in American history and science, the bulk of his work increasingly addressed the dynamic tension between science and worldview. Along with dozens of journal articles, Greene followed *The Death of Adam* (1959), with *Darwin and the Modern World View* (1961), *Science, Ideology, and World View: Essays in the History of Evolutionary Ideas* (1981), *American Science in the Age of Jefferson* (1984), and *Debating Darwin: Adventures of a Scholar* (1999). Greene also coauthored *Science of Minerals in the Age of Jefferson* (1978) with John G. Burke. In 1989, James Moore organized and edited a *festschrift* in Greene's honor, titled, *History, Humanity and Evolution: Essays for John C. Greene*. This volume featured a forty page introductory dialogue between Moore and Greene, followed by thirteen essays from distinguished scholars on the theme of the history of evolution, all in Greene's honor. In 2005, Greene produced a short autobiographical work describing his extensive travels as an officer during the Second World War, titled: *A Scholar Goes to War*.

Greene's postscript to *Science, Ideology and Worldview* offers an overview of the main thesis woven throughout much of his scholarship. There Greene stated, "To ignore the difference between science, philosophy, and religion and roll them all into one evolutionary gospel claiming to disclose the meaning of existence is as dangerous an idea to science as it is to philosophy and religion." Greene suggested evidence for this could be found in a virulent creationist reaction to evolution, something he felt had potential to undermine

the autonomy of independent scholarship idealized during the Enlightenment. While Greene admitted, "science, ideology, and worldview will forever be intertwined and interacting," he also hoped that "scientists will recognize where science ends and other things begin."[4] That pretty well summed up his primary message to his colleagues in science, as well as in its history and philosophy.

The Greene Collection

Greene officially donated his papers in the 1990s and organized them himself. They cover the interval of time between 1952 when Greene was 35 and just finishing his PhD to 1999 when he moved to Monterey after thirty-one years at the University of Connecticut. (A few subject correspondences continue to 2005.) They therefore span virtually the whole of his academic career and include correspondence with a number of leading evolutionary biologists as well as philosophers and historians of science, frequently exploring the themes of science, ideology and world view with particular reference to modern evolutionary biology. His archives also include extensive papers accrued while he was officer in the History of Science Society (1960-1976), and while working on other important projects within the discipline. While these latter papers should prove useful for anyone interested in the professionalization of the history of science in America, the centerpiece of the collection is the correspondence with evolutionary biologists Ernst Mayr, Theodosius Dobzhansky, and Walter Bock. Additional correspondence with Francisco Ayala and Michael Ghiselin, both evolutionary biologists with extensive experience in the history and philosophy of science, are also included, as well as an extensive collection with the Darwin biographer, James R. Moore.

Having decided to maintain Greene's organization, the curators have retained the original character of Greene's order for the collection. Series I contains general correspondence sorted chronologically. Series II is organized by subject, with the categories devoted to correspondence with prominent historians and philosophers of science. Other headings involve: His projects within the discipline; interactions with organizations such as the Darwin Correspondence Project; the *Journal of the History of Biology*; the International Society for the History, Philosophy, and Social Studies of Biology; and The American Philosophical Society. Not all his personal correspondence will be found in files assigned to a specific person—a few examples will be found in the chronologically organized Series I as well. For example, while the bulk of his correspondence with Mayr will be found in Series II under the heading "Ernst Mayr," there will also be a few examples of his correspondence chronologically sorted in Series I. The curators have not attempted "to rectify such discrepancies in an effort to follow Greene's own organization of his papers as closely as possible."[5]

Series III holds Greene's writings (some unpublished), and research and lecture notes from 1952 through 1998. It also covers reviews by Greene, as well as reviews by others of Greene's work, and elegies. This series is divided into five subcategories according to these topics.

Correspondence with Ernst Mayr and Theodosius Dobzhansky

Greene's relationship with Ernst Mayr dominated much of his latter critique of evolutionary thought. While their correspondence begins in the late 1950s, it was toward the end of the 1970s that Greene began to studiously cultivate this relationship, one that continued until the end of their lives. Their exchange is one of the highlights of the collection, along with Greene's correspondence with Theodosius Dobzhansky during the 1960s. Both are important for any historian of evolutionary biology in the twentieth century. The begin with a collegial exchange requesting comments on a manuscript written by Greene, and culminated with a virulent exchange in the pages of the *Revue de Synthèse*, in 1986; the correspondence between the two held in the archives offers an insightful and amusing back-story. Though the two disagreed on fundamental points having to do with everything from the existence of progress in evolution as well as the task of the historian and scientist, they nonetheless kept up a friendship that ended up stretching for nearly fifty years.

Greene similarly corresponded with another foundational twentieth century evolutionary biologist, Theodosius Dobzhansky, during the 1960s. Once again the two fundamentally differed on religious grounds, though Dobzhansky, unlike Mayr, was an observant follower of the Russian Orthodox Church. While much of the correspondence with Dobzhansky has been published in *Biology & Philosophy* (October, 1996), and also Greene's *Debating Darwin*, there is some additional material found in the archives.

The Archives: Location and Other Details

The "Archives & Special Collections" of the Thomas J. Dodd Research Center at the University of Connecticut is located in the semi-rural town of Storrs, about a twenty-five minute drive north of Hartford, or ninety minutes southwest from Boston. The campus is about a ten-minute drive from Interstate 81, off Exit 68. While there, visitors should check out the famous UConn Dairy Bar at the Department of Environmental Sciences. (I admit to having many fond memories of the place, having grown up in New England. "Jonathan Supreme" is a local favorite; a vanilla ice cream swirl with peanut butter and chocolate-covered peanuts, named in honor of "Jonathan the Husky Dog," the university's mascot.)

A comprehensive overview of the collection is available at: http://doddcenter.uconn.edu/findaids/Greene/MSS19960008.html. Advance arrangements are not required, though they are helpful to the archivists. Betsy Pittman currently serves as interim director, as well as serving as university archivist and curator for personal papers. Her email address is: betsy.pittman@uconn.edu.

The staff at the Dodd Research Center are very helpful, and the study area is secure, convenient, and comfortable. The Center is across a small plaza from the Homer Babbidge Library, the campus's main library, and a short walk from the UConn Co-op that offers a variety of fast food and convenience items, along with parking at the South Parking Garage.

Collection Contact Information

Betsy Pittman
Thomas J. Dodd Research Center
University of Connecticutt
405 Babbidge Road, Unit 1205
Storrs, CT 06269-1205

Telephone: (860) 486-4500
Fax: (860) 486-4521

Email: betsy.pittman@uconn.edu

---

[1] Cravens H (2009) Memorial Resolution for John C. Greene, Iowa State University Faculty Senate. (http://www.facsen.iastate.edu/FSDocketCalendar/S08-27MemorialResolutions20090505.pdf)

[2] Moore JR, ed. (1989) *Introductory Conversation. History, Humanity, and Evolution: Essays for John C. Greene.* New York, Cambridge University Press, 1-38.

[3] Dunbar MJ (1961) review of The Death of Adam: Evolution and Its Impact on Western Thought, *Isis* 52, 594-596.

[4] Greene, JC (1981) *Science, Ideology and Worldview: Essays in the History of Evolutionary Ideas.* Berkeley, University of California Press.

[5] The John C. Greene Papers, Archives & Collections at the Thomas J. Dodd Research Center. (http://doddcenter.uconn.edu/findaids/Greene/MSS19960008.html)

The Embryo Project: Growing a Community

Grant Yamashita and Karen Wellner
Center for Biology and Society, Arizona State University

IF YOU BELIEVE what the technocrats tell us, "old media" is dying (or already dead!) and "new media" is taking its place. New media includes blogs, RSS feeds, Twitter, e-books, and other digital forms of distributing and consuming information. There is a lot of change at once, so perhaps it is not surprising that we historians and philosophers of science are often reluctant to fully embrace these rapid changes. After all, most of our archival materials, primary sources, and personal libraries are still composed of cellulose. We worry about what will happen to them. Yet, most of us are already adopting some aspects of new media when we send email rather than letters, download journal articles rather than photocopy them, and compose papers on the computer rather than with paper and pen.

This ineluctable move towards the digital, towards new media, need not be the death knell for the primary source materials that pervade many of our offices, archives, and libraries. Instead, there is much to be optimistic about since technological advances can help preserve, catalog, and disseminate information much better than we ever could the "old way." The *Mendel Newsletter* is itself an example of old media becoming new since it is now wholly disseminated via electrons to your computer. This optimism underlies the Embryo Project (EP) [1], a digital collaboration that is funded by the US National Science Foundation as part of its Human and Social Dynamics Initiative. "The mission of the project is to document, collect, and compile materials in digital form, and interpret 'everything' related to embryo research and the multiple contexts in which it occurs." [2] Indeed, the Embryo Project is ambitious.

The particularities of new media and its fusion with scholarship in the humanities necessitates a new approach to "doing history." We understand the limitations of creating, developing, and storing all of our own materials. Inasmuch as the EP is intent on documenting all of embryo research in all its contexts through all of time, scarcity of resources prevents us from doing it all on our own. There are bottlenecks in creating and publishing articles and digitizing original source materials. Furthermore, it is impossible to obtain all the original source materials on embryo research for copyright, logistical, and financial reasons, among others. Because of these limitations, we have implemented various methods for increasing the amount of digital content in our data repository and making both our content and our data freely and easily accessible.

The EP is building a network of scholars, students, informaticians, web developers, teachers, and editors to carry out its mission. The EP is housed at Arizona State University in the Center for Biology and Society [3] and major partners include the Marine Biological Laboratory (MBL) [4] in Woods Hole, Massachusetts, and the Max Planck Institute for the History of Science (MPI) [5] in Berlin. In fact, almost every aspect of the EP—from writing encyclopedic entries to building web services to editing interpretive articles—has been a lesson in community-building. Students are mentored in writing articles for the EP; web developers from Arizona State University (ASU) collaborate with informaticians at the MBL; and developmental biologists, historians, bioethicists, and philosophers sit in and participate in writing courses for students. Even the infrastructure of the EP is multinational, multidisciplinary, and multi-institutional. The EP receives technical support from the MBL Biology of Aging

team [6] and the ASU Library's Informatics and Cyberinfrastructure Services. Collaborators include scholars from the United States, Canada, Ireland, England, Australia, Austria, and Germany and the numbers of individuals as well as countries represented continue to grow.

We outline the Embryo Project and its scholarly, educational, and technological goals, present some currently available materials in the encyclopedia, and discuss plans for future growth. We end with an invitation for scholars to become involved in the Embryo Project community.

Sources

We have a number of original source materials that have been digitized for the encyclopedia, including collections of photographs and images [7], videos [8], and PDF facsimiles of lecture notes. We have so far collected, digitized, and stored over a thousand images, many from the archives at the MBL-WHOI Library, with thousands more on the way. Original documents, such as the lecture notes of Viktor Hamburger, who taught the embryology course at the MBL, have been scanned as well. We are starting to organize all these pieces by combining lists of instructors and students of the long-lived embryology course with digitized class photos and, when available, course documents and lecture notes. [9] Sources are presented via entry articles on various topics, longer interpretive essays, and soon, links to other relevant digital objects that sit in various repositories all around the world.

In addition to digitizing primary resources we are aggregating information and working with new technologies to present these materials. Timelines of people, organizations, and long-lived institutions present data in concise and useable ways. The timeline for the MBL, for example, shows important events, the history of directors of the institution, and Nobel recipients associated with the MBL (Figure 1). Similarly, we can view important events in the life of important embryologists like Ross Harrison (Figure 2).

Education

Where do interpretive essays and EP articles come from? Who gets to write them, how are they edited, and how are the topics chosen? The success of the EP depends in part on having a large number of scholarly articles that can be added to the encyclopedia's database. It was decided early in the grant writing process that the most efficient way to begin this collection of articles was to offer a writer's workshop course for students at ASU. While having a "product" for public examination is an essential outcome for this course, we also want to provide a valuable learning experience for our student writers. In order to take the EP class, students must apply and be accepted to the course. This small upper division class is offered in the fall and spring. It is comprised mainly of honors undergraduate and graduate students who are interested in developmental biology or the social context of embryos and embryo research, and also in writing.

The EP writing class has two main goals in addition to producing written products: (1) help students who are already good writers become better writers, and (2) develop relational thinking. Students are required to write at least six articles per semester. The articles are targeted for a general audience and reflect a basic, non-interpretive writing style. To help with focus, categories of writing have been established: people, places, organizations, technologies, literature, images, ethics, law, organisms, concepts, religion, and awards. These categories represent the most concrete aspects of embryology and help organize our growing database of articles. Student work is presented in class for peer-review and undergoes further rewriting through a rigorous editorial process of the EP.

As students write they begin to see how certain aspects of their articles can lead to other potential articles or what we might call the "snowball" effect. It is this type of relational thinking that provides for better writing—a technique that is rarely developed if a student is only writing one or two articles with no open discussion about anything that he or she submits for review. For example, one of our students was interested in the cultural history of the embryo. She was curious about how Lennart Nilsson had taken his famous embryo and fetus pictures—the same ones that made their way into *Life* magazine in 1965. From this initial interest she developed six articles: a biography of Nilsson, an image article about Nilsson's photos that appeared in *Drama of Life Before Birth* in *Life* magazine (1965), a literature article about the popular 1976 book *Birth Without Violence* by Leboyer, an examination of embryo images in *Life* magazine during the 1950s, and two technology articles dealing with laparoscopy and endoscopy.

Because each student's work is read and critiqued in an open forum, suggestions for subsequent articles

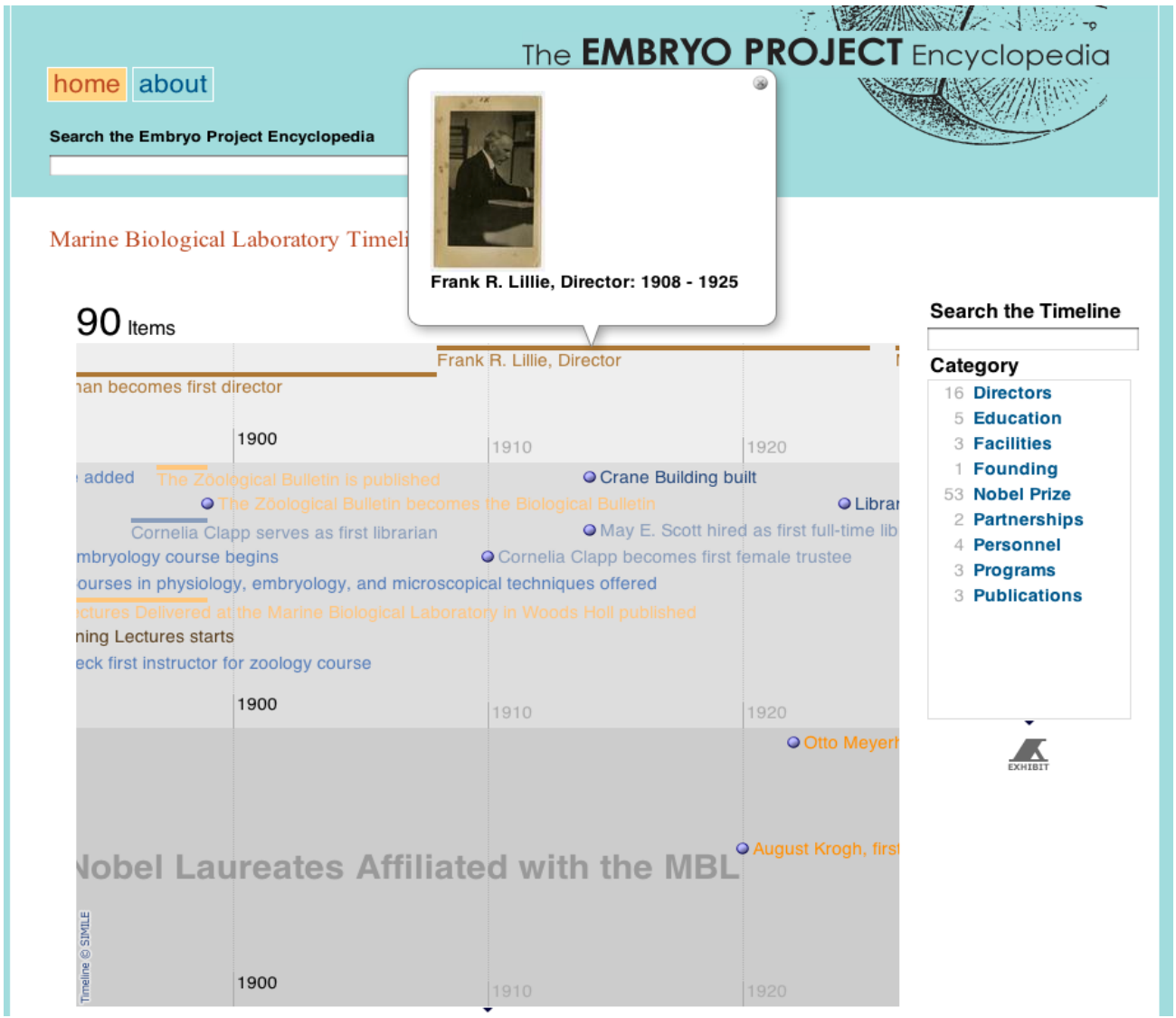


Figure 1. Timeline of the Marine Biological Laboratory. http://embryo.asu.edu/timelines/mbl.php

or how to improve future articles often come from others. The power of many is evident in this class. Given suggestions and guidance, the student who initially wasn't sure how to write about culture and images has since started to look at how Nilsson's photographs became an impetus for the public emergence and acceptance of fetal images.

Our plan is to invite graduate students from other universities to join us with semester-long visits to ASU to participate in the writing workshop as well as to learn about the informatics side of the project.

Technologies

The Embryo Project cannot exist without utilizing the rapidly changing store of technologies that power these kinds of digital projects. Distributing articles, images, videos, and interactive web applications requires a dedicated team of technology experts, web developers, and systems administrators. They, along with the scholars who help inform what sources to use and how the information should be presented, provide the expertise necessary to wade the waters in this world of new media. The tools developed for the EP not only make sources available on the web, but also ensure that the data conforms to various standards to facilitate sharing and interoperability. [10]

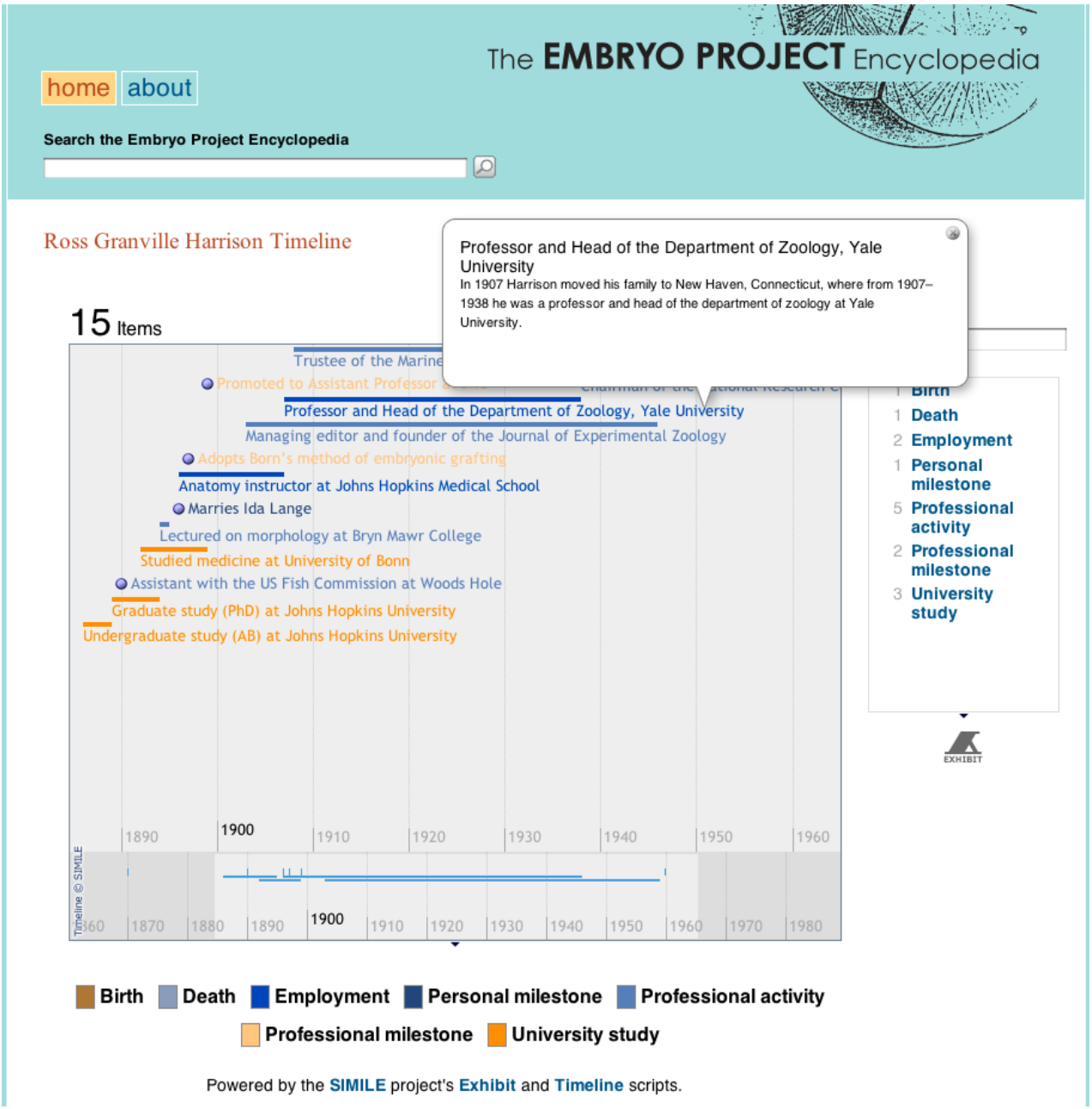


Figure 2. Timeline of Ross Harrison's life. http://embryo.asu.edu/timelines/harrison.php

An exciting technological aspect of the EP is that all objects in the encyclopedia are encoded with relationship information linking two objects. Embedded within each biographical article, for example, is information not only about various people, places, literatures, or institutions, but also about how these things are related to that person. Each link on an article, then, is not merely a link to another webpage. Rather, we capture important bits about that link, such asch as whether that person was an employee of the institution, was a graduate student of the person, obtained a PhD at the institution, used a particular organism for research, etc. All these objects and their relationships are stored as RDF "triples", a semantic web standard that facilitates information storage and retrieval and interoperability. All these triples—objects and their relations to other objects—are stored in a "triple store" data repository that holds the promise of easy data

sharing between different projects. More than just reading an article about a famous person on the website, one can have access to all the relational data of that person to each object of interest within the article.

Because these relationships between objects are stored in the repository, we can start to ask specific questions of interest such as "who are all the students of T.H. Morgan who worked at the MBL"? It is precisely these kinds of queries that are difficult to do via traditional searching of texts. Moreover, these relationships allow us to understand better the interconnectedness among historical actors. Biographies of celebrated embryologists like E.G. Conklin [11], for example, contain information about his membership to the Galton Society. Articles on Papal Encyclicals [12] mention eugenics sterilization and articles about fertility drugs like Enovid [13] link to important figures like John Rock [14] and Gregory Pincus [15]. By looking at all the relationships of these people, institutions, and writings, it is clear that to understand the eugenics movement one must also understand the history of embryology research [16, see Figure 1].

Perhaps this is not a surprising statement since eugenics has received much attention in the history and philosophy of biology and many of us are aware of its rich and complex history. However, the connections between the eugenics movement and embryology only underscore why we are developing articles in this way. By understanding the relationships between the ethics, people, places, organizations, and social and religious factors associated with embryo research, we can better understand all the various agents of change that drive our understanding of why embryos and emb-

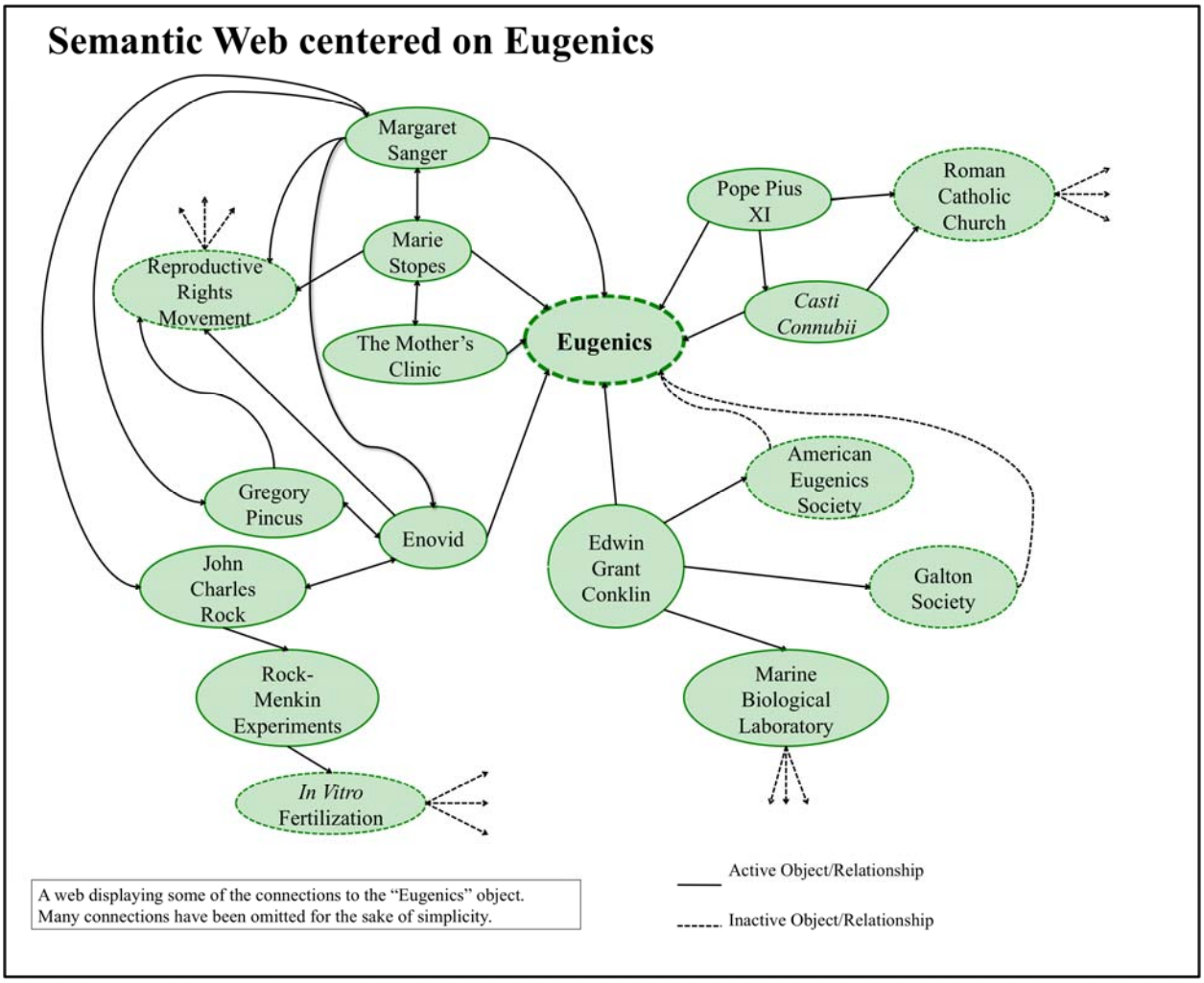


Figure 3. Eugenics and its relationships to other objects in the Embryo Project.

ryo research are viewed in particular ways at particular times in history.

Thus, the EP is planting seeds for what we believe will grow into even greater possibilities for information sharing between digital projects. The EP employs these technologies precisely because we believe they will enable us to learn new things and understand previously-unknown connections that otherwise would have been difficult to ascertain "the old way." The employment of various technologies, then, is not about replacing our books and archives, rather about repackaging our materials in a new media way so that we can do our research better and faster. It also facilitates the move towards a community-based approach to doing scholarly work in the humanities.

The Community

Who is this community? As mentioned above, we are a diverse group that includes IT technicians, computer scientists, biologists, historians, philosophers, undergraduate students in all disciplines, graduate students, educators, librarians, and publishing experts. We feel that the mission of the EP can only be adequately completed with the diversity of interests and expertise of the people involved.

We have had a number of scholars visit ASU to participate in many of the EP's workshops and classes. A workshop focused on Princeton biologist John Bonner's work on morphogenesis convened in the early stages of the EP. [17] In fact, this workshop played a significant role in the first of the scholarly papers to be placed in the encyclopedia—the Ph.D. dissertation of Dr. Mary Sunderland on the history of regeneration research. [18] The addition of scholarly works like Sunderland's lends sophistication and synergy to the EP and reflects the importance that the EP's collaborative workshops have had to graduate students at ASU. Developmental biologist Brian Hall from Dalhousie University is a regular participant and contributor to the EP. He teaches developmental biology at Arizona State during half the year, regularly sits in on the EP class, writes articles for the EP, and responds to questions that students have about specific developmental questions. Christina Brandt from the Max Planck Institute for the History of Science has also visited and participated in the EP class, lending her knowledge of cloning to those students that were interested in writing articles about cloning, and Rachel Ankeny brought her perspective on Australian bioethics and policy. Michael Dietrich from Dartmouth College is a core member who oversees a couple of the EP's projects—one on Viktor Hamburger's developmental genetics course and the other on the General Embryological Information Service (GEIS). Additionally, members of our ASU research network regularly participate in the EP class, lending expertise on a range of subjects from bioethics to religion and law.

Our writing students have varied interests—so varied that they might not have ever met each other if not for an interdisciplinary course like EP. Graduate student Lijing Jiang, from China, is a biochemist-turned-historian who has interviewed Leonard Hayflick several times and written about the Hayflick limit for the EP; graduate student Cera Lawrence is interested in biology education and technology; and graduate student Julia Damerow from Germany is a computer scientist who is developing software for the EP. Our current undergraduate students are also an eclectic bunch just a few of whom show what the group is like: Erica O'Neil who writes about fetal alcohol syndrome and development; Sam Philbrick, a literature major who is interested in what has been written by the U.S. government in terms of stem cell research; Corrine DeRuiter who is going to go on to graduate school in developmental biology; and Angel Lopez, a pre-med major who writes about Catholicism and its viewpoints on human development. At least eight students who have taken the EP class have gone on to present posters dealing with embryology at AAAS meetings.

One of us (GY) is an evolutionary biologist who studies the history and philosophy of developmental biology. As the Senior Project Manager and Technical Coordinator, Yamashita has helped develop many of the technological aspects of the EP and works closely with the tech teams at the ASU library and the MBL. Yamashita is currently at the Marine Biological Laboratory on an NSF Professional Development Fellowship to work with the Biolteam and gain training in science informatics. This training is directly relevant to the EP and will be useful for the growing number of digital projects in the humanities. KW is a science educator whose most recent scholarship revolves around the importance of spatial ability in understanding three-dimensional models. This interest has led to several articles about wax-model building in Germany [19] and the Carnegie Institution of Washington. Currently Wellner co-teaches the EP class with Jane Maienschein and is an examining how human development has been represented in American secondary biology textbooks from 1900 to 1990.

Together, we are part of a community that hopes to take scholarship in history and philosophy of science further into the digital realm, and we are poised to do this effectively. We have a number of NSF grants that fund our Project, which currently supports us and a number of graduate and undergraduate students. Jane Maienschein and Manfred Laubichler co-direct the Project, Felicity Snyder is our open access publishing expert, Jacob Sahertian is our web designer, and June Hall serves as our final copy editor. We have put together a dedicated team and we invite interested scholars and students to participate with us in the growth and maturation of this exciting project.

Growing the Community: Getting Involved

Given the scope of the project and our efforts to date, we have an infrastructure in place to now expand the EP community. We want to cast our net wider to bring in collaborators from other institutions and backgrounds who want to participate. The EP is not a monolithic entity, rather it serves as a "collaboratory" that brings together students, research scholars in history, philosophy, sociology, and biology, as well as librarians, publishers, and technology experts and informaticians. Therefore, we welcome all interested parties to become involved with the Embryo Project. We offer five concrete ways to do so:

1. *Write and submit articles for the Embryo Project*—In addition to shorter entry-level articles we solicit proposals for longer, scholarly essays. The EP is a *bonafide* publishing entity with its own ISSN number and editorial staff that has already begun reviewing papers for submission to the encyclopedia. Submitted articles are peer-reviewed and edited like traditional journals. Once articles have gone through the editing process, they are deposited into the encyclopedia database and available via the EP website. For more information on submitting a paper to the EP, please contact Jane Maienschein (maienschein@asu.edu).

2. *Have your students write articles for the EP* —As described above, we mentor students to write entry articles for the encyclopedia. Perhaps your students could write a few short articles and submit them to the EP rather than just for a grade? We are happy to provide materials and instructions on how to format articles and write with relationships in mind. All articles are peer-reviewed and published under the EP's ISSN. Please contact Karen Wellner for more information (karen.wellner@asu.edu).

3. *Provide materials to include in the encyclopedia* —We welcome your primary source materials. Perhaps you have photos, slides, videos, lecture notes, or letters related to embryo research in your personal collection. We would be happy to digitize them and make them available on the EP website. Or, if you already have digital materials available but need a repository to hold them or a venue in which to display them, we can help prepare your materials for inclusion in the EP encyclopedia. Please contact Grant Yamashita for more information (grant.yamashita@asu.edu).

4. *Send your graduate students to ASU as "graduate students in residence"* —Very soon, we will have a training grant for visiting graduate students from around the country. Students will learn about the historical project, participate in the EP class writing workshop, and learn about the informatics tools used in the EP. We hope to bring in more people and perspectives into the EP, as well as to help expand the digital HPS community. For more information, please contact Jane Maienschein (maienschein@asu.edu).

5. *Become a member of the digitalHPS.org consortium* —The EP is a founding member of the consortium of digital humanities projects that make up digitalHPS.org. If you are interested in starting your own digital project and are wondering how to do this, digitalHPS.org members are committed to providing the necessary help. See [20]. Please contact Grant Yamashita for more information (grant.yamashita@asu.edu).

Acknowledgments

We owe much thanks to Jane Maienschein for her support and helpful comments and suggestions. We also thank ASU and the Center for Biology and Society and our colleagues for their support. The students of the EP seminar also deserve our gratitude for all their work and for making our jobs fun and exciting. GY also thanks the MBL and the Biology of Aging team.

Our work has been supported by the Embryo Project NSF grants and supplemental grants, as well as an NSF career grant to Manfred Laubichler and Professional Development Fellowship to GY.

[Notes follow]

[1] http://embryo.asu.edu

[2] Maienschein, J. and M. Laubichler. 2010. "The Embryo Project: An Integrated Approach to History, Practices, and Social Contexts of Embryo Research" *Journal of the History of Biology* 43: 1-16. DOI: 10.1007/s10739-009-9204-1. For more information on the Embryo Project, see also Laubichler, M.D., J. Maienschein, and G. Yamashita. 2007. "The Embryo Project and the Emergence of a Digital Infrastructure for History and Philosophy of Science" *Annals of the History and Philosophy of Biology*. 12: 79-96.

[3] http://cbs.asu.edu

[4] http://www.mbl.edu

[5] http://www.mpiwg-berlin.mpg.de/en/index.html

[6] http://biologyofaging.org/blog/

[7] http://embryo.asu.edu/results.php?query=image&op.x=0&op.y=0&op=em_search

[8] http://embryo.asu.edu/view/embryo:125746

[9] http://embryo.asu.edu/articles/embryologycourse1943.php

[10] The Embryo Project is committed to openness and has adopted protocols that ensure that common standards and practices are followed and technologies and platforms are adopted that make the Project open and freely and easily accessible. All content is open access and under a non-commercial, no-derivative works Creative Commons license (http://creativecommons.org/). Whenever possible, we utilize open source technologies to drive our site. Most notably, we utilize the Fedora Commons (http://www.fedora-commons.org) data repository that many libraries and data-collecting institutions have implemented. Images are stored in the JPEG2000 format, which is quickly becoming the standard for archiving digital images.

[11] D.Brian Scheurmann, "Edwin Grant Conklin", Embryo Project Encyclopedia (2009) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:123965

[12] Katherine Brind'amour, "Casti Connubii", Embryo Project Encyclopedia (2009) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:124885

[13] Aliya Buttar, Sheraden Seward, "Enovid: The First Hormonal Birth Control Pill", Embryo Project Encyclopedia (2009) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:123917

[14] Kimberly A. Buettner, "John Charles Rock", Embryo Project Encyclopedia (2007) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:124783

[15] Katherine Brind'amour, "Gregory Goodwin Pincus", Embryo Project Encyclopedia (2008) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:123905

[16] Lawrence, Cera. 2009. "Telling a Different Story: The History of Science as a Web of Relationships in the Embryo Project" Senior Thesis. http://embryo.asu.edu/pdf/lawrencethesis.pdf

[17] http://embryo.asu.edu/workshops/0802WorkshopBonner.php

[18] Sunderland, Mary E. 2008. "Studying Development: The Value of Diversity, Theory, and Synthesis" Ph.D. Dissertation. http://embryo.asu.edu/pdf/sunderlanddissertation.pdf

[19] Karen Wellner, "Adolf Ziegler", Embryo Project Encyclopedia (2009) ISSN: 1940-5030. http://embryo.asu.edu/view/embryo:127428

[20] Digital HPS: http://www.digitalhps.org

Review

Beyond *The Double Helix*

Robert Olby, *Francis Crick: Hunter of Life's Secrets* (Cold Spring Harbor Laboratory Press. 2009)

A good biography does more than capture the chronology of its subject's life. It conveys to the reader a sense of the personality of its subject. Olby's insightful biography of Francis Crick shares with us Crick's infectious enthusiasm, making it easy to imagine Crick's laughter booming through the Cavendish or resounding through lecture halls and meeting rooms around the world. But writing the biography of a scientist also demands that the details of a subject's personality and person life be balanced with a careful account of the development of their thought and work. We want to know how Crick came to DNA and why he wandered away into neuroscience. Moreover, we'd like to know how Crick's irrepressible energy and incisive criticism influenced his ideas, his collaborations, his reputation, and his career. Making extensive use of Crick's papers (reviewed in *The Mendel Newsletter* in 2006) and personal interviews, Olby's biography of Crick offers a masterfully balanced account of Crick's life and wide ranging career in science.

Olby makes a decision in his biography to start with Crick at the moment he wins the Nobel Prize. This is an interesting choice for a biography, after all one's life has a natural chronology from birth to death. Why begin with Crick's greatest moment of public recognition?

Certainly this opening signals to the reader that Crick is an unmistakably important figure in the history of biology. Olby suggests that the general public probably has no idea who Crick was. Perhaps this is reason enough to start with the Nobel Prize. But this structure may also carry with it some unintended consequences. Beginning with Crick's Nobel Prize may create an expectation that the narrative that follows will chart the one path to Crick's triumph with the structure of the DNA, and in doing so it may place too much emphasis on the structure of DNA.

On the one hand, this atemporal structure runs counter to the sense of historical contingency that is otherwise be conveyed in the nuanced account of the false starts and complicated sets of interactions that shaped the path to the double helix. The narrative of the race for the helix hinges on the possibility that Crick and Watson could have been beaten to it by Linus Pauling's group or by Maurice Wilkins and Rosalind Franklin at Kings.

On the other hand, beginning with the Nobel Prize allows Olby to address the controversial but very well known historical narrative offered by Watson in *The Double Helix*. Watson's account has a number of flaws, but chief among them is that it focuses attention on Watson and Crick as heroes in a competitive struggle to determine DNA's structure. Discussing Crick's reaction in the first chapter allows Olby to situate his narrative as distinct from Watson's, but, I think, does not capture the complexity of the story of the life that follows. For instance, many accounts of the so-called race for the double helix focus our attention on the structural problem: What is the three dimensional structure of this molecule? Olby's account admirably reconstructs this history, but reveals how from the start, especially for Crick, the problem of DNA replication is guiding how he thinks about the plausibility of that structure. The problem of how genes make copies of themselves was put at the foundations of genetics in the post war period by a number of very prominent geneticists including H. J. Muller. If the structure of DNA had not so directly addressed the problem of replication, the determination of the structure would have been well received as a finding in structural chemistry, but it would not have been heralded as a major break through in genetics. Crick's interest and ability to articulate the genetic consequences of this structure are crucial parts of Olby's narrative that explain the reception of the double helix and Crick's eventual recognition.

One of the most impressive aspects of Olby's biography is his expert ability to explain a wide range of technical scientific material in a way that is accessible to an audience that is not necessarily at home with the details of x-ray crystallography, molecular genetics, and neurobiology. Indeed, it is probably fair to say that Francis Crick may be the only person to have established expertise in three such divergent fields of science.

Explaining Crick's science is essential, and Olby beautifully explains the intricacies of data analysis in x-ray crystallography in a way that no other historian of biology has. As a result, readers gain a clear sense of how difficult it truly was to infer three dimensional structures from the kinds of two dimensional data that they could collect at the time. The struggle to find new methods in crystallography helps us to understand why model building would have held such attraction to a neophyte like James Watson, and why professional crystallographers, such as Rosalind Franklin and Maurice Wilkins, would have been much more painstaking in their interpretation of the data.

The inferential challenges of x-ray crystallography also highlight Crick's exceptional ability to think clearly and critically as he follows different inferential paths from data to conclusion about molecular structures, and later the genetic code and the unidirectional flow of information in macromolecules. Crick's problem solving ability is highlighted by Olby throughout this book, but one of my favorite examples concerns Crick's experimental determination that the code was in fact a triplet code. This episode represents one of the few experimental forays of Crick's career after his dissertation research. Using bacteriophage, Crick developed a system for tracking the addition of and deletion of single bases in a specific section of the RII region in T4. Crick reasoned that, assuming that the cells knew where to begin reading a piece of genetic code, a single addition or deletion would create a shift in the reading frame that would alter the resulting code resulting in a non-functional protein. Two deletions would also produce a non-functional frameshift, but three deletions resulted in a functional protein. Crick interpreted these results in terms of reading frames and so as evidence of the triplet nature of the code. The triplet code is one of those things that is taken for granted by most biology students today—at least by mine. Yet as with some many foundational principles in molecular genetics, they were articulated and refined in the hands of Crick and his cohort.

One of the important features of even this result is that it was done in collaboration with Sydney Brenner and Leslie Barnett. You could even add in Ernst Freese and Seymour Benzer who pioneered the fine structure mapping of the RII region and then explored the effects of chemical mutagens. Collaboration is a common feature of science today, but it was an especially significant aspect of Crick's career. Crick actively put himself at the center of the growing network of biologists, chemists, and physicists working on molecular genetics. The RNA tie club represents one effort to organize part of this network. Although not created by Crick, he certainly understood its value and took advantage of it to circulate his ideas and to gather in as much information as he could. This club was heavy with physicists and Watson and Crick's old circle from the Cavendish days. Significantly the code was cracked by biochemists, such as Marshall Nirenberg and Har Khorana, who were not part of the RNA tie club. As Olby points out, Crick did not feel limited to the RNA tie club and actively sought out biochemists like Nirenberg and Khorana. The result was Crick's synthesis of information to produce the now canonical coding table that gives the triplet code for each amino acid as well as start and stop codons. Crick's ability to articulate the table, and I would argue many of this other claims, depended crucially on the work of others. Crick's achievement then was his willingness to actively seek out this information, critically weigh the results, and formulate a synthetic understanding of the molecular phenomena.

As I said at the beginning of this review, biographies are expected to convey a sense of the subject's personality or character. Olby paints a picture of Crick that is vivid and convincing. But in the wake of Watson's notorious account of the search for the structure of the double helix, no historian can ignore how Watson, Crick, Wilkins, and others interacted with Rosalind Franklin and the other women with whom they worked and lived. However, where Watson makes great efforts to portray himself as a ladies' man, Olby seems reluctant to do the same for Crick. Only in the 21st chapter at the end of the biography do we get reflections on Crick's more private pursuits including his extramarital "liaisons". Olby explains these as an extension of his passionate character—Crick's passion for science and love of a challenge extended to the personal realm. But here is one of those choices that faces the historian? Does Olby have to include this information? Given the stories that we have been told about Watson, Crick, and Franklin, how Crick interacted with women does seem relevant to the history of his science, at least in that one episode.

Olby discusses Crick's relationship with Franklin in his chapters on the discovery of the double helix. He counters the "dark lady of DNA" narrative with a much more careful account of the complicated set of relationships between especially Wilkins and Franklin that then influence how Watson and Crick will interact

with both of them. But Olby reconciles Crick and Franklin in a telling paragraph on page 174.

> Franklin's chief memory of Crick before 1953 went back to 1951 when Watson and he had built that hopeless three-chain model, and Crick had tried in vain to rescue it in the face of her devastating critique. Now the two of them were of like mind about DNA—Franklin had banished her antihelical concerns, she appreciated Crick's grasp of crystallographic analysis, and he appreciated her remarkable skill as an experimentalist. By the summer of 1953, they were in correspondence, and before Crick returned from American in the fall of 1954, Franklin had visited the Cricks in Brooklyn. Back in Campbridge, she began to visit the Cricks to enjoy their company and discuss her work with Francis. By April 1956, she had vacationed with them, and in November it was with the Cricks that she convalesced from cancer surgery. Two years later, she was dead. Meanwhile, the important role of her work in leading Crick and Watson to the structure for DNA was obscured, not emerging, until the publication of Watson's little book *The Double Helix*.

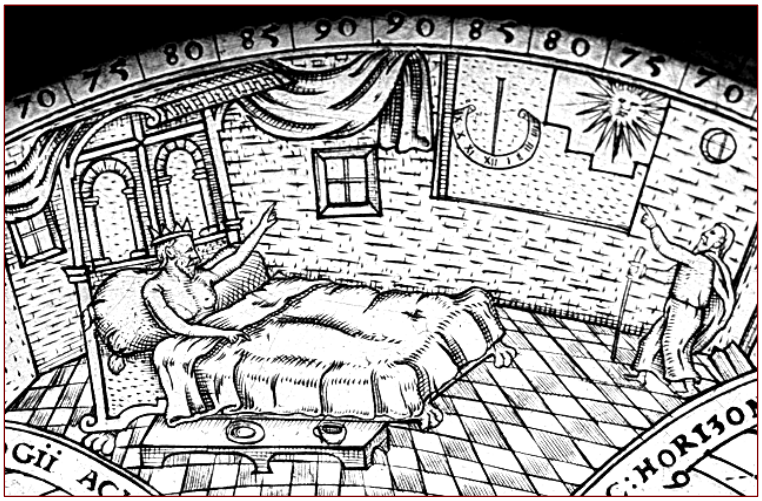
This is a remarkable passage. It left me wanting to know more about the Crick and Franklin relationship after the helix, because, in part, I think that a lengthier discussion of this relationship would paint a picture of a more humane and more complex Francis Crick. But perhaps that will be the undertaking of Crick's next biographer. Certainly there is enough material in Crick's life and work to fuel a next generation of historians and biographers. Regardless of what comes after, Olby's outstanding and original biography of Crick will be the standard against which that future work will be judged.

MICHAEL R. DIETRICH
Department of Biological Science
Dartmouth College
Hanover, NH 03755

2011–2012

Resident Research Fellowships

in Genetics, History of Medicine and Related Disciplines



The American Philosophical Society Library in Philadelphia offers competitive short-term funded fellowships supporting in-residence studies with its collections.

The American Philosophical Society Library

We are a leading international center for historical research with holdings renowned for their depth and interdisciplinary value to scholars. Resources include more than 11 million manuscript items, 350,000 printed volumes, thousands of maps, prints and photographs, and thousands of hours of audio recordings.

Among the Library's most well known collections are the papers of many noted scholars, academics and statesmen particularly of the 18th through 20th centuries. Significant research collections of far-reaching social and political interests embrace topics as diverse as first-person historical accounts and the official records of research organizations. Our holdings have great depth in many fields of history, science, and art, conserving centuries of intellectual pursuits, professional achievements and the personal reflections of men and women worldwide. The Library does not hold collections on philosophy in the modern sense. Interested parties unsure if the Library has materials related to their research are invited to inquire.

Our collection strengths include, but are not limited to

- Studies in Genetics and Eugenics
- History of Physiology, Biochemistry and Biophysics
- American and European Science and Technology
- Natural History Through the 19th Century

History of Genetics Collections

The American Philosophical Society began specifically collecting manuscripts and books relating to the history of genetics in the early 1960s at the instigation of the mouse geneticist L. C. Dunn, but it was the project conducted by H. Bentley Glass between 1977 and 1985 that led to truly outstanding growth. Funded by the Mellon Foundation, Glass surveyed

and indexed the existing collections at the library and prepared a printed guide to them for researchers. This was the original basis for the comprehensive guide to the American Philosophical Society's own collections in genetics, which include the papers of L. C. Dunn and H. Bentley Glass, among numerous others.

See the web version of Glass's guide to the APS holdings at

www.amphilsoc.org/library/guides/glass

This online guide contains links to the collection descriptions prepared by Glass, to abstracts of some collections acquired since, and, when available, the complete finding aids. Researchers must also examine our comprehensive, up-to-date online finding aids for all collections through our main page at www.amphilsoc.org/library (and there see the drop-downs under "Library").

The APS continues to seek out new collections in the history of genetics and to make them available to scholars.

Library Resident Research Fellowships

Candidates are

- U.S. citizens or foreign nationals
- Holders of the Ph.D. or equivalent
- Ph.D. candidates having passed their preliminary examinations
- Degreed independent scholars

A stipend of $2,000 per month is awarded for 1 to 3 months. Awardees may take their fellowships at any time between 1 June 2011 and 31 May 2012. During the time of their fellowship, Fellows must be in residence in the Library for consecutive weeks.

Applications are evaluated based on the quality of the project, the letters of recommendation, and the *relevance of the Library's collections to the project*. Candidates living more than 75 miles from Philadelphia receive some preference.

Next application deadline: 1 March 2011

Notifications are sent in early May

Information and instructions for applying for Library Resident Research Fellowships are on our website: www.amphilsoc.org/grants/resident

Applications are accepted only online

Specific inquiries relating to the Library fellowship program may be sent to Libfellows@amphilsoc.org

Inquiries relating to the APS's collections may be sent to manuscripts@amphilsoc.org

THE AMERICAN PHILOSOPHICAL SOCIETY LIBRARY
105 South Fifth Street, Philadelphia PA 19106
U.S.A.

215-440-3400 www.amphilsoc.org/library