

THE MENDEL NEWSLETTER

Archival Resources for the History of Genetics & Allied Sciences

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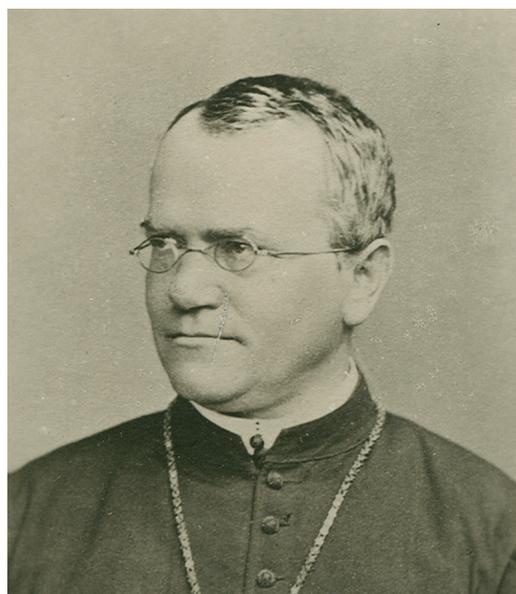
March 2006

A Word from the Assistant Managing Editor ...

Though a bit late in coming, this year's issue of the *Mendel Newsletter* makes up for its delay in its unprecedented length and encompassing content. While the *MN* has always been a valuable source for the latest acquisitions of collections that cover the history of genetics and its related fields, this issue goes a step beyond in providing insight into the trials and tribulations inherent to twentieth century collections, as well as delving into how technology has further affected the ways in which research is conducted.

Chris Beckett's article on the Francis Crick Papers analyzes how lending documents to colleagues and scholars prior to a collection's arrival at an archival repository has resulted in the absences of key documents from collections or their representation as photocopies. James Tabery's review of the Lancelot Hogben Papers at the University of Birmingham and Charles Greifenstein's notes on the acquisition of the George Harrison Shull papers illustrate how gaps in the historical record can result from an individual's temperament towards one's own material and the division of material among family members, respectively. This does reveal that much can happen to historically significant documents before they come to an archive. Occasionally there are those who go above and beyond in collecting their material for posterity, with ticket stubs and grocery receipts intermixed with important correspondence. Others handle their material with a "slash and burn" mentality – disposing of material they believe is no longer useful. And then there are those whose papers are almost intact – leaving the archivist and historian to wonder if documents were inadvertently thrown out, loaned to a colleague, or selectively destroyed. Regardless, now that we are in the digital age, with the use of e-mail and word processing, and the concerns of disk space, one can only imagine how many documents and electronic correspondence that document research in genetics have fallen prey to the "delete" key.

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The use of technology as a research tool also comes up in this issue in relation to digital cameras, oral history, listservs, and online histories. These new tools affect not only how ideas and information are disseminated (as with online and listserv resources), but also how scholars conduct their research and repositories accommodate the new technology.

Finally, a note regarding future plans for the *Mendel Newsletter*. Next year we will change our publication date February and March to mid to late August. We hope that this move will provide more time for our contributors to write their articles, as well as enable us to put information into the hands of our readers at the beginning of the Fall semester when many begin to plan their classes and their research trips.

Joseph-James Ahern
American Philosophical Society Library
March 2006

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The Scientific Papers of Francis Crick A Footnote on Custodial History

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“The world seems made up of three kinds of people. Collectors, who collect and don’t always much care what. Scholars, who hoard every scrap of paper. And people like myself, who wonder why.” (Crick, 2001)¹

Mountains like fortress walls hug the snug capital city of the Tyrol. The train from Innsbruck to Zurich runs picturesquely up the snowy Inn Valley, through the Arlberg Tunnel and along the side of the Zurichsee. The journey to Zurich would probably have taken Maurice Wilkins some six hours. In the spring of 1952, Wilkins had been enjoying his time away from the laboratory, exploring the beer cellars of Munich, skiing in the Dolomites and walking beneath orange trees at Gardone Riviera.

He was completing the last leg of a meandering trip that had been part holiday, part escape from his impasse with Rosalind Franklin at King’s College, and part scientific mission, a mission that he hoped

would circumvent – if not resolve – his conflict with Franklin. He used his time on the train to write a long prospective letter to Francis Crick. At the head of the first of four sheets, he wrote (like a cinematic establishing-shot): “on train Innsbruck-Zurich.”² Wilkins was travelling to see Rudolf Signer “the [nucleic] acid man in Bern...” Signer, it will be remembered, had previously made available to Wilkins (and others, in May, 1950) a supply of DNA material with a very high molecular weight that was particularly amenable to being carefully pulled into the long fibres required for successful X-ray diffraction. At Wilkins’s suggestion – a suggestion he soon came to regret – Franklin had worked with the Signer DNA, and Wilkins had opted to work with another supply he had recently obtained in America from Erwin Chargaff. Unfortunately, the supply from Chargaff did not crystallise, and it could not be pulled so readily into long fibres. Wilkins decided that the solution to his impasse was to obtain a new supply from Signer for himself, and it was for this that he was travelling home via Switzerland on the

final leg of his holiday.³

It was a bullish letter that Wilkins wrote on the train to Crick, marked by a co-operative eagerness to share his results with Crick and Watson, and full of optimism about the DNA research that laid immediately ahead, particularly his hopes for obtaining diffraction patterns from whole cells or *in situ* DNA. The letter made a chipper reference to a Rosalind Franklin who “barks often but doesn’t succeed in biting”, and the hope was expressed

(in a counter-balancing verbal gesture designed to cement camaraderie through identifying common experience) that “Bragg neither barks nor bites”. Both did, of course.

Shortly before leaving for

his holiday, Wilkins had obtained a good diffraction pattern from *Sepia* sperm. In his letter, he reported: “I have got much better X-ray pictures of the sperm Squid which show very nicely a whole series of helical layer lines and one inter micelle spacing. These spots will not overlap when a disoriented specimen is used and I want to do it on living sperm in glass tubes.” To the side of this passage, Wilkins drew for Crick a sketch of his diffraction results, showing the typical helical cross.

Some fifty years later, in the spring of 2003, whilst I was in the midst of cataloguing the first consignment of Francis Crick’s scientific papers to the Wellcome Library,⁴ I was approached by Dr Jane Gregory, of University College London, who was then assisting Wilkins in the final stages of preparing the manuscript of his autobiography for publication. Wilkins urgently wished to obtain a copy of the letter he had written en route to Zurich. He was especially interested in the sketch he had drawn on its first page. Although most of the text of this letter had been

The archive of Francis Crick’s scientific papers is perhaps one of the last great scientific archives of paper records.

extensively quoted by Olby and by Judson in their published accounts, and thereby had been in the public domain for many years, Wilkins's freehand sketch of the helical diffraction pattern had not been reproduced by either writer. It was this visual ingredient that Wilkins was particularly interested in publishing. (In the spring of 2003, the National Library of Science project to digitize many of Crick's papers – including the letter in question – had not yet begun.)

I was able to locate a colour photocopy of the letter that I had come across, and provided Dr Gregory with a copy of it, fully expecting to discover the original letter in due course. That was not to be. I quickly came to realise that the original letter was not amongst Crick's papers. I had found the colour photocopy of the letter with a number of other distinctive colour photocopies, all copies of key documents from the early part of Crick's career. None of the original documents from which they had been copied were amongst Crick's papers. Indeed, documentation relating to the sale of the archive to the Wellcome Trust confirmed that a number of original papers were known to be missing. Wilkins's autobiography, which was published later in 2003, printed a limited extract from the letter in question, emphasising his "much better pictures of the *Sepia* sperm." He also printed the sketch, both as an individual Plate and as a composite Plate in which it was superimposed upon a diffraction pattern separately obtained by Franklin, showing the B pattern.⁵ The match is striking. Perhaps even more striking is the visual shock of seeing the two disunited halves of the King's College team – or, to be more precise, the *two* King's College teams – as one. Wilkins's purpose and argument aside, the superimposition also seems to stand, conversely, as a resonant image of a unity of research never realised.⁶

Wilkins's account stresses the extent to which he had readily shared with Crick and Watson his *own* results – as distinct from making available to them the fruits of Franklin's research – and that his results had also indicated a helical structure for DNA. Printing the diffraction sketch would support this case. When, however, Wilkins turned to Crick's archive for evidence – a fundamental purpose to the keeping of archives – he found his evidence only in the impermanent and physically unstable form of a colour photocopy.

In fact, correspondence in Crick's files at the Wellcome Library shows that the request of spring 2003 was not the first occasion that Wilkins had tried to obtain copies of his letters to Crick. In 1976-77, Crick was at the Salk Institute, enjoying the sabbatical year that preceded his permanent move to California.

On 8 December, 1976, Robert Olby wrote to Crick's secretary, prompted by a letter he had received from Wilkins:

Professor Wilkins wrote to me asking for copies of the letters which he wrote to Dr Crick in the '40s and '50s, and which I referred to in my book The Path to the Double Helix. Unfortunately, I had still not made xerox copies of them when Mr Judson came to see me and asked to take back the Wilkins letters to Dr Crick in Cambridge. I therefore handed them over to him and I assume that they have been passed on by Mr Judson to you. Is this the case, and if so, can you let both Professor Wilkins and me have xerox copies? For the time being I have sent Professor Wilkins copies of my typed transcript set of the letters.⁷

On 10 December, Sue Wilby, Crick's newly appointed secretary, wrote in reply that she had contacted Horace Judson, who would be visiting the laboratory in the following week. Judson had offered to assist her in identifying the letters. On 16 December, Crick wrote to Wilby about the matter:

Thank you for your letter of 10th December. There are no special problems except for the documents from Bob Olby. They are still in a brown box file which Judson had but where this is I am quite uncertain. If it is in the office you and Judson should have little difficulty finding it but if, as I suspect, I took it home I'm afraid it will have to wait till my return. I should think both Bob Olby and Maurice Wilkins could do with the typed transcript till then.

On January 4, 1977, Wilby advised both Olby and Crick that she and Judson have been unable to find the "brown box file," and it is there that the trail from within the Crick archive runs cold.

At this point, before taking custodial history matters further, it will be useful to list the letters from Wilkins to Crick that are cited by Olby in *The Path to the Double Helix* and cross-reference them with the copies that are in the Wellcome archive. Olby cites six letters, as follows:

1. Wilkins 1948? Letter begins: “How is Cambridge? Is the cold wind blowing across the fens....”
2. Wilkins 1952. Letter headed: “on train Innsbruck-Zurich,” as discussed above.
3. Wilkins 1953a. Letter date of 5 February suggested by Olby. Letter ends: “It is very nice of you to get Pauling’s paper and I will tell you all I can remember and scribble down from Rosie.”
4. Wilkins 1953b. Letter begins: “Thank you for your letter on the polypeptides. I think you will be interested to know that our dark lady leaves us next week and much of the 3 dimensional data is already in our hands.”
5. Wilkins 1953c. Letter dated of 18 March suggested by Olby. Letter begins: “I think you’re a couple of old rogues but you may well have something.” The letter has a second part headed “Suggested Modification to your MSS”.
6. Wilkins 1953d. Postcard begins: “You will be relieved (I am) to hear that all is safe in the hands of Gale....”

These letters will be familiar to readers of the various histories of the discovery of the structure of DNA. Their memorable turns of phrase – displaying Wilkins’s “gift for metaphor”⁸ – have added dramatic colour to many accounts. Of the six, all but two are represented in the Wellcome archive as colour photocopies. The exceptions are: 1953a and the main body of letter 1953c, from which only the tail to the letter is present (headed “Suggested Modification to your MSS,” it refers to the first Watson and Crick paper). The opening sentence to the first portion of 1953c, written on receipt of a pre-publication draft from Crick – “you may well have something” – is an understatement without equal, and the letter’s vivid ending – “As one rat to another good racing” – is all we need to know of irony. A researcher wishing to consult 1953a and the first portion of 1953c (in which Wilkins makes the case for papers from King’s College to accompany Watson and Crick’s paper) must be content with Olby’s transcriptions (or, in the case of 1953c, a rather poor black and white photocopy).⁹ The National Library of Medicine digitisation programme cannot assist, since it derives from the Crick papers at the Wellcome Library. By an

inexplicable accident of good fortune, the letter from 1948 (“How is Cambridge? Is the cold wind blowing across the fens....”) is present in the same group of letters as an original document (with a casual semi-circular stain approximately 4” in diameter). In the context of the other missing letters from Wilkins, the presence of this letter in the archive as an original item can only be accidental. By a paradoxical twist of custodial history, we are forced to conclude that the letter from 1948 is present not through design but because it was overlooked when the other letters were either removed or mislaid.

The Wellcome archive includes, as colour photocopies, four letters from Wilkins to Crick that are not quoted by Olby. They are: (1) letter (3 February, 1948), beginning: “Very sorry to hear about your father...”; (2) letter (without date), beginning: “Thank you for your shoal of daily letters...”; (3) letter (without date), beginning: “So glad to hear you are coming up. I would be very glad if you & Odile would come to dinner on Sat...”; and (4) a postcard [1952], from Brazil (Wilkins had attended a conference in Rio de Janeiro). In addition to these letters from Wilkins, the set of colour photocopies includes copies of a number of other important documents: Crick and Watson, “The structure of sodium thymonucleate” (in Crick’s hand, 1951), five letters from James Watson (1952-54), and two letters from George Gamow (1954).¹⁰ To this tally of the missing can be added two of Crick’s scientific notebooks, which are known to exist from their full citation in the histories by Olby and by Judson, but are not amongst Crick’s papers. The first notebook, for the period July to August 1952, contains notes of Crick’s attempts to prove base-pairing experimentally. The second is a loose-leaf notebook for the period February to June 1961, containing details of Crick’s genetic experiments that proved the genetic code to be a triple code.

To bring matters up to date, I turn now to the announcement, 10 August, 2005, by American genomics scientist, and entrepreneur, Craig Venter, that he has purchased the Jeremy Norman Collection of molecular biology papers. Assembled over many years from a variety of sources, the intended auction of the Norman Collection in 2003 by Christie’s (New York) was prompted by the Wellcome purchase of Crick’s papers – Norman had long wanted to acquire Crick’s papers to add to his collection – but the auction was prevented by considerable protest from

the scientific community, distressed by the prospect of Norman's collection being split and sold in separate lots.¹¹ The purchase by Venter now ensures that the collection will remain together, and Venter's statement includes the promise of access:

The J. Craig Venter Institute (Venter Institute) today announced the acquisition of the Norman Collection of molecular biology archives from Christie's. The archive includes correspondence, galley proofs, photographs and laboratory notebooks from renowned scientists, such as Sydney Brenner, Francis Crick, Max Delbrück, Rosalind Franklin, Aaron Klug, Linus Pauling, Max Perutz, Maurice Wilkins, and James Watson. The collection will be housed at the Venter Institute [Maryland] and will be made available to scholars for viewing.¹²

The list of material for the cancelled auction of 2003 is a guide of sorts – imperfect, superseded – to the collection purchased by Venter. The list of 2003 is divided into 56 items. Some items are individual documents, such as signed copies of off-prints. Other items are larger groupings of material, such as “the complete extant archive of Max Perutz” (item 35), or the large archive of papers from Aaron Klug, “all of his scientific work through 1980” (item 30). Interestingly, what the list does include (as item 6) is one of the two missing scientific notebooks belonging to Crick. The item description reads: “Crick, Francis. Notebook containing his autograph notes of his attempts to prove base pairing experimentally. [July 1952].”¹³ How did it get there? Although the trail of the missing letters from Wilkins – which rapidly became the case of the colour photocopies – had run cold from documentary sources within the archive, sight of the list of papers that were to have been auctioned raised further questions. What was the origin of the colour photocopies? If Norman had acquired the original documents from which the copies were made, why were they not listed for auction? To take one instance, the holograph original copy of Crick and Watson's “The structure of sodium thymonucleate” is a notable (and monetarily valuable) document and would certainly have merited individual listing. (According to Olby, “Original with Crick.”¹⁴ According to Judson, “Crick has the original”¹⁵.) And what of the missing notebook from 1961? Where is

that?

An expert appraisal of Crick's papers, completed before the Wellcome purchase, states that the colour photocopies were “probably done by Aaron Klug,”¹⁶ but says nothing of the circumstances, nor the date when they were made. Recently, I asked Robert Olby if he knew anything further. His reply (18 August, 2004) confirmed that Klug had made the copies, and included a suggestion about one of the missing notebooks:

About the missing documents: the material I returned via Judson to Cambridge finished up in Perutz's office as Director. There it sat for a long time until Klug took over. Klug then planned to return it to Crick when he gave the David Marr lecture [1991?]. I guess he did not, but delivered them himself later. It is possible that before Klug handed them over to Crick, one of the notebooks got mixed up with Perutz's papers and that is how it finished up in Norman's collection. Klug fortunately had taken the precaution to copy those classic letters before parting with them.¹⁷

Olby's comments point to a chain of custodial history marked by accident and uncertainty, on which the laboratory dust of years has settled, and Crick's correspondence files tell, as we have seen, of brown box files casually misplaced. Although the letters were returned to Crick – the custodial chain stretched over some fifteen years and more, from Olby to Judson to Klug (in whose laboratory the letters seem to have rested for most of that period) – they did not reappear amongst Crick's papers when the papers were appraised for sale. Perhaps one, or some, of the missing items have been swallowed by a larger set of papers in the Norman Collection – Klug's, for example, or Perutz's – and were, thereby, hidden from description in the 2003 auction list. Perhaps they will appear amongst the newly purchased papers through another route entirely. Another option, least preferred, is that the missing items are elsewhere. Time, and a detailed catalogue, will tell.

In summary, a number of important items are either missing entirely from the Crick papers at the Wellcome Library, or are present only as colour photocopies. It seems fairly certain that at least some of these items will appear in the papers purchased by Craig Venter from Jeremy Norman in August 2005.

Whether they will all emerge from custodial limbo into the scholarly light of day can only be determined when that collection has been catalogued and its Crick material identified. It can then be established what remains outstanding, and what remains to be recovered.

I conclude with a glimpse of Crick in his Cambridge attic, on a summer's day in 1968, going through old papers. The passage below, from a letter to Olby, then embarked on writing his history of DNA research, returns us full-circle to the missing letters from Wilkins, to their moment of re-discovery:

I was going through some papers in my attic at the weekend looking for some share certificates and I found the enclosed letters. Some of them have dates on them and some can be roughly dated from their context. The letter from Maurice Wilkins that begins "Thank you for your letter on the polypeptides" arrived just as we finished building the structure. The one dated 18th March was, of course, written after we had told him about it.....Can you let me have them back after you have finished with them.¹⁸

Today, Crick's parting request can only be read ironically. Scholars, whose habitual perspective is a backward gaze, and scientists, whose professional attention is focused in a contrary direction, will always tend to view the documentary record with different eyes and different degrees of care. The status of that documentary record – those scraps of paper, as Crick characterised them in interview in 2001 – is also subject to change, as casual scraps come to acquire a significance unsuspected at their moment of creation. There are also occasions, however, when the scientist may want to look to the documentary record to support or refute an argument, as we have seen when Maurice Wilkins wanted to publish his diffraction sketch and looked to the archive for evidence preserved. The archive of Francis Crick's scientific papers is perhaps one of the last great scientific archives of paper records. The documentary robustness of the archive, its self-reflexive capacity, has made it possible for the archive to tell something of the custodial history of itself, so to speak. It may well be that the monetary value of the items that are missing – the form of value that has been, in one way or another, the engine of the archive's present custody – will be the factor that ensures both the preservation and the eventual reemergence of that which is missing.

Endnotes

1. Francis Crick in interview. "Francis Crick's papers helped by British Lottery" (12 December, 2001), available at: <http://www.signonsandiego.com/news/metro/morgan/20011212-9999_7m12morgan.html> (accessed 8 December, 2005).
2. Wilkins to Crick, undated [Spring 1952]. A digital copy is available at: <http://profiles.nlm.nih.gov/SC/B/B/W/T/_scbbwt.pdf> (accessed 8 December, 2005). Guided by the letter's heading, I assume that it was written en route to Zurich. However, Robert Olby, *The Path to the Double Helix* (New York: Dover Publications, rev edn, 1994, p. 365) refers to the letter being written shortly before Wilkins departed for his holiday (i.e. immediately after Wilkins had obtained his new results), whereas Wilkins, in *The Third Man of the Double Helix* (Oxford: Oxford University Press, 2003, p. 179) implies that he wrote to Crick after returning to London.
3. "Signer had misunderstood me on the telephone: arriving in Berne, I found that he had no DNA, nor plans to make it; he had given it all away in London, two years ago." Wilkins, *op. cit.*, p. 179.
4. For the catalogue, visit: <<http://library.wellcome.ac.uk/>>. Select "Manuscripts and Archives". Crick's papers have the catalogue reference PP/CRI. For an introduction to the archive, see Chris Beckett, "For the record: the Francis Crick archive at the Wellcome Library," *Medical History*, 48:2 (2004), 245-60, available at: <<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=546341>> (accessed 8 December, 2005).
5. Wilkins has quietly revised "sperm Squid" to "Sepia sperm". For the superimposed image, see Wilkins, *op. cit.*, Plate 24. The particular X-ray image of Franklin's that has been used for the superimposition has not been indicated, although it is clearly a B pattern. For comment on the import of Wilkins's sketch, see Olby, *op. cit.*, p. 367.
6. Compare the symbolic ring of scientist names around the plaque erected in the Quad at the Strand campus of King's College, in 1993, to mark the 40th anniversary of discovery of the structure of DNA. See Wilkins, *op. cit.*, Plate 39.
7. For this letter and the subsequent letters referred to from the Wellcome archive, see PP/CRI/D/2/47.
8. Brenda Maddox, *Rosalind Franklin: The Dark Lady of DNA* (London: HarperCollins, 2002), p. 204. In the context of access to Wilkins's letters, it is notable that Maddox's source for his letters is Olby, *The Path to the*

Double Helix.

9. For 1953c, see Olby, *op. cit.*, pp. 417-8. For 1953a, see p. 401. Several letters from amongst those available in the archive as colour photocopies also survive as rather poor black and white photocopies in PP/CRI/D/2/29 (a file of Olby correspondence largely concerned with the research progress of *The Path to the Double Helix*); amongst these is the first portion of 1953c.
10. For a complete listing, see the catalogue entries for PP/CRI/H/1/42.
11. In December 2001, the Wellcome Trust purchased, with the assistance of the Heritage Lottery Fund, the scientific papers of Francis Crick for the sum of US\$2.4 million. For the circumstances surrounding the purchase, and issues raised, see Rex Dalton, "The history man," *Nature*, 2001, 411: 732-3; Alison Abbott and Rex Dalton, "Wellcome bid sees Crick archive return home," *Nature*, 2001, 414: 678; Julia Sheppard, 'Molecular biology: the issues surrounding the purchase of the archives of leading molecular biologists by an American collector', available at: <http://www.bath.ac.uk/ncuacs/FP_Sheppard.htm> (accessed 8 December 2005). See also, for subsequent developments, 'Auction of DNA archive cancelled', *Nature*, 2003, 422: 102.
12. Press release, available at: <http://www.venterininstitute.org/press/news/news_2005_08_10.php> (accessed 8 December, 2005).
13. In typescript, without heading, six A4 sheets. The document is held at the Wellcome Trust (but does not form part of the Crick archive and is therefore not open to researchers).
14. Olby, *op. cit.*, p. 468.
15. Horace Freeland Judson, *The Eighth Day of Creation: The Makers of the Revolution in Biology* (New York: Simon and Schuster, 1979), p. 633.
16. Report (without date) prepared by Carol Sandberg (Michael R Thompson, Fine Antiquarian Books, Los Angeles), p. 4. Copy held by Wellcome Trust.
17. Private communication to the author (18 August, 2004), quoted with permission, as are all other letter-extracts in this paper from letters by Robert Olby.
18. Crick to Olby, 20 August, 1968. PP/CRI/D/2/29. There is no question mark to the final sentence quoted in the original letter.



THE AMERICAN PHILOSOPHICAL SOCIETY LIBRARY
Library Resident Research Fellowships
2007 – 2008

Scope: The American Philosophical Society Library offers short-term residential fellowships for conducting research in its collections. The Society's Library is a leading international center for historical and anthropological research with over 8 million manuscripts, 300,000 printed volumes, and thousands of maps and prints. Among its more prominent collections are the papers of Benjamin Franklin, Charles Darwin, Lewis and Clark, Franz Boas, and the Peale Family; and is noted for the depth and importance of its collections in:

- History of science, technology, and medicine
- Early American history and culture to 1840
- Travel, exploration and expeditions
- Anthropology, particularly American Indian history, culture, and languages
- History of eugenics and genetics
- History of astronomy, physics, and geophysics
- Natural history

The Library does not hold materials on philosophy in the modern sense. Interested parties unsure if the Library has materials related to their research are invited to inquire.

Eligibility: The fellowships, funded by a number of generous benefactors, are open to both U.S. citizens and foreign nationals who are holders of the Ph.D. or the equivalent, Ph.D. candidates who have passed their preliminary examinations, and independent scholars. Applicants in any relevant field of scholarship may apply. Candidates who live 75 or more miles from Philadelphia will receive some preference.

Award, duration: The stipend is \$2,000 per month, and the term of the fellowship is a minimum of one month and a maximum of three, taken between June 1, 2007 and May 31, 2008. Fellows are expected to be in residence at the Library for four to twelve consecutive weeks, depending upon the length of their award.

Deadline, notification: Applications are due no later than March 1. This is a receipt deadline. For additional information call 215-440-3443 or send an email inquiry to jjahern@amphilsoc.org. Fellowships are awarded in May.

Applications: Complete application information and forms are available at our website: www.amphilsoc.org/grants/resident.htm. Applications will be evaluated based on the quality of the project, the letters of recommendation, and the relevance of the Library's collections to the project.

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Looking Back on Lancelot's Laughter: The Lancelot Thomas Hogben Papers, University of Birmingham, Special Collections

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Introduction

Throughout much of the 20th Century, the name “Lancelot Hogben” was inevitably mentioned alongside “J.B.S. Haldane” and “Julian Huxley.” As geneticist Cyril Darlington recalled in 1976, “When I was very young, Galdane, Guxley, and Gogben, as the Russians called them, seemed to be the three Magi.”² By the 1930s, all three ranked among Britain’s elite biologists, founded (along with Frank Crew) the *Journal of Experimental Biology* and its accompanying Society for Experimental Biology, and criticized (to varying degrees)

Hogben was not born into this elite circle; he was born to a poor, Methodist preacher and largely self-educated at the Stoke Newington Public Library.

Britain’s growing eugenics movement. Hogben, however, was unique from his fellow-Magi even in regard to these shared features: Unlike Haldane and Huxley, Hogben was not born into this elite circle; he was born to a poor, Methodist preacher and largely self-educated at the Stoke Newington Public Library. This effort rewarded itself with a Major Entrance Scholarship to Trinity College, Cambridge; and, in turn, this self-motivated education and class-ascendance generated in Hogben an unmatched loathing for Britain’s eugenic attention to the genetic underpinnings of class.

Hogben’s early research at the University of Edinburgh (1922-1925), McGill University (1925-1927), and the University of Cape Town (1927-1930) was devoted primarily to experimental embryology and physiology.³ In 1930, though, Hogben was invited by Sir (later Lord) William Beveridge to become the first (and ultimately last) Chair of Social Biology at the London School of Economics, and it was during his seven years at the LSE that Hogben made his most lasting contributions to science and society. While there he wrote his first two, hugely successful, Primers for the Age of Plenty: *Mathematics for the Million* (1936) and *Science for the Citizen* (1938), which were designed to foster in his readers the self-education that he came to value in his own youth. Hogben also unleashed during these years a tenacious

attack on the science of eugenics, and in particular on the biometricians such as R.A. Fisher, who were developing the statistical methodologies used to justify eugenic conclusions (Herrman and Hogben 1933; Hogben 1931, 1932, 1933a, 1933b, 1933c, 1934). By 1937, though, Beveridge was leaving the LSE for Oxford, and Hogben was growing impatient with his inability to teach and carry on experimental research to the degrees he desired.

He spent the next four years at the University of Aberdeen, and then moved to the University of Birmingham from 1942 to 1944. The War drew Hogben back to London and the War

Office, but he soon after returned to Birmingham and finished out his scientific career there as Professor of Medical Statistics (1947-1961). He was briefly the Vice-Chancellor of the University of Guyana (1963-1964) but then retired to Wales, where his interests turned to linguistics. Hogben died on August 22nd, 1975.⁴

Archive Overview

The Lancelot Hogben Papers reached the University of Birmingham’s Special Collections in three accessions. The catalogues for all three accessions are available online now at www.a2a.org.uk, so this general overview will be kept brief. The first accession (CSAC 78.2.81) was a contribution from G.P. Wells, Hogben’s biographer for the Royal Society, and Kathleen Lloyd, the residuary beneficiary under Hogben’s will. It is the largest accession and is divided into 4 sections, which ultimately provided the structure for the future accessions as well: (A) Biographical and Personal, (B) Notes and Working Papers, (C) Drafts and Publications, and (D) Correspondence. The Biographical and Personal section contains items such as obituaries and tributes (A.1 and A.2), a typescript entitled *Journey Through Ghana* (A.22), and Hogben’s collected, published works contained in five volumes (A.30-A.34). The Notes and Working Papers section contains items devoted to mathematics

and physics (B.1-B.14) and also to Hogben's interest in languages, especially Welsh (B.15-B.24). The Drafts and Publications section holds, for example, the hand-drawn and colored diagrams for *Science for the Citizen* and also Hogben's *Interglossa Dictionary*, which was to act (ultimately unsuccessfully) as a vehicle for universal communication (see Figure 1). And finally, the Correspondence section covers the years 1964-1971 and is composed of letters from readers and letters with Hogben's literary agents and publishers.

The second accession (NCUACS 29.5.91), a gift from Wells' daughter, contains the material Wells amassed while preparing his biographical memoir of Hogben for the Royal Society. The majority of the material here includes correspondence Wells had with family, friends, and colleagues of Hogben (A.40-A.77) along with drafts and notes (A.78-A.103).

Finally, the third accession (NCUACS 53.2.95), another contribution from Kathleen Lloyd, adds to the Biographical and Personal section, including items such as photographs (A.130-A.136) and press cuttings (A.125-A.129). Also, the Correspondence section was supplemented with letters to and from Helga Green, Hogben's literary agent, from 1956 until his death (D.11-D.76).

Archive Highlights

Unfortunately, the most glaring feature of the Hogben Papers is more of a *lowlight* than a highlight. The usual items of interest for a researcher entering an archive, such as scientific correspondence and research notes or journals from famous work, are virtually non-existent. Indeed, the accession catalogues make no effort to hide this fact; the catalogue for the first accession begins, "Partly through temperament, and partly through external factors and the vicissitudes of war, Hogben led a peripatetic life and left few records other than his prolific and diverse publications." This void, however, by no means makes the Hogben Papers useless for the historian. In fact, what the archive lacks in this more traditional material is made up for with an abundance of biographical and autobiographical items, along with extensive material relating to Hogben's persistent devotion to reforming biological education.

In the last years of his life, Hogben wrote multiple, incomplete drafts of his autobiography—*Look Back with Laughter* (A.3-A.20, A.39, A.105-A.115). Following Hogben's death, Wells produced Hogben's biographical memoir for the Royal Society (Wells 1978). Wells drew heavily on the autobiographical drafts for his essay, peppering his text with references

to "*L.B.L.*," and afterwards felt that there was still much more to be told of Hogben's life than he was capable of conveying in the 40 pages he wrote for the Royal Society. This dissatisfaction motivated Wells to take on two notable projects. First, Wells attempted to write a follow-up piece for the Royal Society that provided a more complete picture of how Hogben's early life and, in particular, his father—Thomas Hogben—influenced the young Lancelot's development. The result was "Father and Son: The Genesis of Lancelot Hogben, F.R.S." (A.37). Wells submitted the essay to the Royal Society in 1980, but it was promptly declined because the content dealt largely with Hogben's father, not a Fellow. In response, Wells edited another draft, "Father and Son: A Supplement to the Royal Society's Biographical Memoir of Lancelot Hogben, F.R.S." (A.38), but this too was dismissed the following year. Wells' account sheds important light on the formative years of Hogben's life that helped shape his subsequent career and famously irascible personality. For example, Wells claimed that the "*Laughter*" in Hogben's autobiographical "*Look Back*" was a mask designed to hide his vulnerability (A.38, 15). Wells, having interviewed multiple members of the Hogben family, designed "Father and Son" to move this mask aside and generate a more objective picture of the Hogben family dynamic than can be found in Hogben's autobiography.

The Hogben autobiography itself was Wells' other post-memoir project. Having read and compiled Hogben's multiple drafts in preparation for writing the biographical memoir, Wells felt capable of editing this material with an eye towards finding a publisher (A.9 and A.10). This endeavor, however, was doubly-doomed. As Wells explained in his "Notes on my edited version of *Look Back with Laughter*" (A.11), publishers were uninterested in the text, pointing out that even *Mathematics for the Million* was no longer selling. On a more intimate level, though, even the Hogben family was uneasy with the project. More specifically, the Hogben family was also very familiar with the cynical "mask" Wells identified as permeating *Look Back with Laughter*, fearing that Hogben's protective laughter hid his very sincere scientific humanism and gave a misleading picture of his character. Thus, *Look Back with Laughter*, like "Father and Son," remained unrealized for Wells.

But unlike "Father and Son," *Look Back with Laughter* has not remained *entirely* unrealized. In the late 1980s and early 1990s, Adrian and Anne Hogben, Lancelot's son and daughter-in-law, edited *Lancelot Hogben, Scientific Humanist: An Unauthorised*



Figure 1. [left] Cartoon accompanying "Interglossa Thoughts" in The Birmingham Mail, Thursday, August 26th, 1943, (A.125). Reproduced with the permission of The Birmingham Evening Mail, who attempted unsuccessfully to identify any other copyright holders; any questions regarding the copyright of this cartoon should be addressed to the author.

from
The Cottage Hospital
Chicks
near Wrexham
in Wales

Dear Sir

I have no list of my scientific publications, 5 bound volumes of which are in the library of the Dept of the History of Science, Sussex University. The Royal Society Obituary File has the list, but it will save you trouble, if I mention my main interests.

1. A continuing interest in the role of the pituitary vis a vis the control of ~~the~~ chromatic change (summarised in my Croonian lecture 1943) led to my demonstration of the control of the ovarian cycle by the pituitary and, as a by-product, the Hogben Pregnancy Diagnosis Test, and methods of bioassay of two of the posterior lobe pituitary hormones. My interest in endocrinology led me to establish ~~the~~ age at which the thyroid, adrenal medulla and pituitary posterior lobe became functionally effective in the life of the human foetus.
2. My studies on the effect of adrenalin and two anti-pituitary hormones on invertebrate plain muscle and hearts, led me to what I think was the most technically satisfying of all my scientific careers, viz the study of the role of metallic ions in the maintenance rhythmic contraction.
3. In the later stages of my devotion to experimental enquiry, my interest in the control of chromatic behaviour led me

an extensive inquiry into the control of body temperature among so-called cold-blooded animals and to an investigation of the optical system of the ^{eyes} of fishes (demonstrated at an I.E.B. meeting in 1938).

to Pass with my experimental work between 1932 and 1936, my publications on mathematical genetics earned me the Keith Gold Medal of the Royal Society of Edinburgh, and, as Acting Director of Home Medical Statistics, ⁽¹⁹⁴³⁻⁴⁷⁾ at the War Office, I was first to establish conclusively that infective hepatitis and serum hepatitis are due to different viruses.

As you know, I discussed with your father the foundation and financing of a Tourist for Help Bid, long before I put the proposal before Crew, Julian, Huxley and J. B. S. Haldane. The proposal to organise a supporting society came from myself. Only ~~the~~ Crew gave it warm support through the Editorial Board with the help of students, I circulated by post all the lectures (biologists) in experimental work in the U.K. I myself arranged for procuring accommodation ^{for} the Conference, and saw to the printing of the circularised agenda and to inviting speakers for same.

Excuse this awful scribble. I am writing it in hospital.

Yours affectionately
Uncle Ian

Figure 2. [below] Letter from Hogben to Wells, 18 June 1974, (A.54). Reproduced with the permission of Leslie Hogben.

Autobiography (1998).⁵ In finally making this material available outside the archive, the editors' contribution is certainly to be appreciated, but this unauthorized autobiography's divergence from Hogben's own drafts should also be appreciated. In the Editor's Note, the editors readily admitted to having "drastically reshaped the material in *Look Back with Laughter...*" The editors, however, have done more than just reshape the material; some portions have been excised, and these portions may be of some interest to the historian. For example, *Scientific Humanist* does contain Hogben's chapter on a trip with his daughter Sylvia through Scandinavia; however, the following, caustic paragraph was cut out from text that would have placed it on p.166 of the published version:

To some extent in Sweden, with its by no means few Nazi sympathizers among the professional élite, and more so in Britain where the Eugenics Society was the spearhead of the intellectual fifth column, racialism of the Rosenberg genre was at that time a respectable creed. After the war, the Nuremberg justices of the peace had Rosenberg hanged. If I believed in hanging people for their opinions, the only extenuating circumstances I might enter with a clear conscience as a plan for mercy on behalf of the late Sir R.A. Fisher would be that he did not occupy a government post with responsibility for implementing his convictions. When the great purge of persons with Jewish antecedents began in the mid-thirties, the indecent hurry with which the leaders of the Eugenics Society clustered to talk their way through so agonising a reappraisal was an ever ready topic for merriment when Gunnar [Dahlberg] and I met (A.10, 213).

The paragraph may not necessarily constitute a holy grail for the historian interested in Hogben's work, but it certainly does give a powerful sense of the depth of Hogben's animosity for the eugenic biometricians such as Fisher.

The Hogben Papers also contain several shorter autobiographical pieces dealing more directly with his scientific accomplishments. Hogben typed a 44-page essay entitled "Professional Reminiscences" (A.21) and sent it to the Royal Society in April 1961; it was designed to accompany his 5-volume collected works. While this material was left out of *Look Back with Laughter*, the editors of *Scientific Humanist* fortunately attempted to include some of

it in their version. Hogben also wrote a brief letter to Wells just one year before his death emphasizing what he took to be his "main interests" (A.54) (see Figure 2). What is perhaps most surprising about these two reflective pieces is the fact that neither makes any serious mention of his publications attacking the British eugenics movement, despite the fact that it is exactly this work that has received the attention from historians and philosophers of science (Barkan 1991; Blacker 1952; Kevles 1995; Ludmerer 1972; Mazumdar 1992; Paul 1995, 1998; Sarkar 1998, 1999; Soloway 1990; Werskey 1978). But as the reader can see, no mention is made of this work in his letter to Wells, and "Professional Reminiscences" contains only this indifferent paragraph:

From 1930 to 1937 at the invitation of Lord (then Sir William) Beveridge, I occupied the newly-created chair of Social Biology at London University. In terms of academic research, this was at first very frustrating for me. I had no longer day-to-day contact with a medical faculty or with any professional biologist other than those of my juniors who came with me. In view of the terms of reference of the chair, I was under a moral obligation to do something in the fields of human genetics or population growth, and I embarked on a series of quasi-mathematical publications. On these I set little store in so far as they dealt with statistical issues involving assumptions still almost universally accepted but eventually repudiated by myself in my swansong, Statistical Theory (1958) (A.21, 15).

Hogben astonishingly dismisses his anti-eugenic work here as but the "moral obligation" of his chair.

In addition to these biographical and autobiographical items, the Hogben Papers also contain insightful material relating to Hogben's devotion to reforming biological education. For example, there is a syllabus (see Figure 3), a list of suggested readings and topics for home study, and lecture notes that Hogben compiled for a course on Social Biology that he designed for the University of Birmingham in the 1940s (A.91). Placed alongside Hogben's self-educating Primers, these educational items reinforce Hogben's gift for making biology relevant to the non-biologist. Take the syllabus for Social Biology: The course was designed not for the botanist or the biochemist, but for the "ordinary citizen." And biology was relevant to the

ordinary citizen because, for example, “The citizens of Britain must make a decision on the Beveridge Plan. It will be a biological decision.” The Beveridge Plan was the historic outline of Hogben’s old boss—William Beveridge—for transforming Britain into a modern welfare state. Students ultimately read, then, everything from Hogben’s *Science for the Citizen* (1938), to Haldane’s *The Causes of Evolution* (1932), and to Dahlberg’s *Race, Reason, and Rubbish: A Primer of Race Biology* (1942), which was translated from the Swedish by Hogben. With regards to developing the biological curriculum at Birmingham, a memo from the 1940s entitled “THE CLAIMS OF BASIC BIOLOGICAL STUDIES in the projected Reform of the MEDICAL CURRICULUM” and also a 1943 memo outlining the formation of an interdisciplinary social biology program are also included in the Hogben Papers (A.74-A.77).

Conclusion

Hogben’s bust now resides in the anteroom of the University of Birmingham Medical School (see Figure 4). All who enter the School pass under his gaze. The Hogben Papers at the University of Birmingham give the historian a unique opportunity to pass under Hogben’s gaze as well. Hogben’s devotion to empirical, unbiased science, to investigating the history of science, and to utilizing that history and that empirical foundation to educate and foster self-education in the citizenry is inspirational. Much is learnt and remains to be learned from looking back on Lancelot Hogben’s laughter.

Postscript: Digital Photography and the Future of Archival Research ⁶

All the figures included in this essay come from digital photographs taken while researching the Hogben Papers at the University of Birmingham, Special Collections. The availability and affordability of digital photography has the potential to revolutionize the future of research in the archive. However, this future remains unclear, for archives are still in the process of weighing the advantages and disadvantages of opening their doors to digital cameras. On the positive side, allowing digital photography in the archive frees up archive personnel from taking time out of their day to photocopy material for the reader. The long term effects of digital photography (without flash) are also much less damaging on archive items than repeated photocopying. Turning to the reader, the advantages of using digital photography are immense. Financially, if enough photographs are taken in an

archive, the money saved in photocopying costs (usually around 0.25\$/page) can quite literally pay for the digital camera. Having a laptop computer on hand also allows the reader to immediately download all photographs from the camera into a more permanent file (making the size of the camera’s memory card irrelevant) and organize that file in accord with the organization of the archive itself. Finally, if time in the archive is limited for the reader, the availability of digital photography allows the reader to review and record much more of the archive material than if items have to be transcribed by hand or even if items have to go through archive personnel for photocopy review.

The potential disadvantages of this new technology, though, are also profound. If the archive attempts to make money on photocopying services, then there will be a loss of income for every item that is digitally photographed rather than photocopied. Also, while archive personnel are freed up from photocopying responsibilities when digital photography is used in the archive, they in turn take on the responsibility of monitoring a reader’s use of the digital camera while in the archive. Furthermore, once archive items leave the archive (whether as a photocopy or as a digital image), the archive loses control over how that image is used. The digital image, though, is obviously much more amenable than the photocopy to illegal posting on an internet site or illegal attachment to an e-mail. And this last point about copyright violation naturally affects the reader just as much as it does the archive. Abuse of the copyright agreement between a reader and an archive damages that relationship for all readers and all archivists, and the illegal sharing of archive items does a great disservice to the readers who take the time to actually visit the archive and go through the appropriate steps for making information in archive items available to the public through professional publications.

This debate is current and ongoing. Some archives accommodate digital photography quite openly. The University of Birmingham’s Special Collections, for example, allows readers to photograph virtually all items that could be photocopied after signing a copyright agreement and documenting all items that have been photographed. Some archives allow a limited number of digital photographs. And others do not allow it at all.

At the very least, a potential archive reader should contact the archive before visiting in order to find out what the archive’s policy is on digital photography; because this debate is current and ongoing, this policy may or may not be announced

on the archive's website. But even more than this, archive readers should enter this debate while it is still unfolding. The decisions that individual or collective archives come to on this matter will have an enormous impact on the future of archive research. And as current and future archive readers, subscribers to the *Mendel Newsletter* have much to contribute to the discussion and gain or lose from the result.

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Endnotes

1. Anne Hogben kindly reviewed a draft of this essay and provided me with valuable comments on the text.
2. Darlington to Wells, 6 June 1976, Lancelot Hogben Papers, University of Birmingham, (A.44).
3. Hogben's extensive work on the amphibian pigmentary effector system with Frank Winton resulted in his 1942 Croonian Lecture on "Chromatic Behaviour" (Hogben 1942). His work on the endocrinology of *Xenopus* while in Cape Town also facilitated development of the widely-used Hogben Pregnancy Test (Gurdon and Hopwood 2000).
4. The most complete biographical essay on Hogben's career is Wells' (1978) biographical memoir for the Royal Society, which will be discussed below. Briefer pieces, however, can also be found in Gurdon and Hopwood (2000), Kevles (1995), Mazumdar (1992), Sarkar (1996), and Werskey (1978).
5. For reviews of *Scientific Humanist*, see Gratzer (1998) and Smith (1998).
6. In preparing to write this postscript, I benefited from conversations with archivists at the University of Birmingham, the American Philosophical Society, and University College London.



Book Collection on Human Genetics Donated to the University of Washington, Seattle

Arno G. Motulsky
University of Washington in Seattle

A collection of almost 1,000 items has been donated by Professor Arno G. Motulsky from the Departments of Medicine (Medical Genetics) and Genome Sciences of the University of Washington (UW) in Seattle, Washington to the Library of the UW Department of Medical History and Ethics for study and research. The collection is shelved separately as the Motulsky Collection.

Items are largely books and monographs (not reprints) dealing with human and medical genetics, human biology, physical anthropology, evolution, race, sociobiology, radiation genetics, eugenics, biomedical ethics, and policy matters that were published from 1950 to 1990 and reflect Dr. Motulsky's broad interests. Serial monographs of the Galton Laboratory (London), technical reports by the genetics branch of the World Health Organization (WHO), and proceedings of various human genetics meetings and congresses, as well as some older books relevant to the history of human and medical genetics in the early twentieth century are also in the collection.

The Motulsky Collection will be of interest to scientists, historians, and scholars interested in the history of human and medical genetics in the twentieth century. The collection is available for study in the library of the Department of Medical History and Ethics at the University of Washington. Inquiries should be directed to the chair of that department (Wylie Burke, M.D., 206-221-5482, wburke@u.washington.edu). All items are available in the library for reading and viewing and may not be borrowed through interlibrary loan.

Editor's Note: Professor Motulsky founded the University of Washington's Division of Medical Genetics. Because of his foundational work in human and medical genetics, Professor Motulsky is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the Institute of Medicine, and the American Philosophical Society.

CONTRIBUTORS WANTED

The Mendel Newsletter is always looking for contributors. If you have come across an interesting document, collection, or book in the history of genetics and allied sciences, and would like to submit an article about it, please contact Michael Dietrich at Michael.Dietrich@Dartmouth.edu.

Genetics at the University of Wisconsin, Madison: A Guide to Some Historical Resources

Erika Milam
University of Wisconsin, Madison

Genetics at the University of Wisconsin has a remarkable, if uncelebrated, history. The historical resources available in Madison for exploring this history consist primarily of personal collections and the University Archives Oral History Project. Michael Guyer, Har Gobind Khorana, Sewall Wright, Malcolm Irwin, Joshua Lederberg, Howard Temin, and James Crow all spent significant portions of their careers at UW-Madison. These men share among them three Nobel Prizes for Medicine or Physiology (Khorana, Lederberg, and Temin), and two coveted Lasker Prizes for basic biological research (Irwin and Temin).

Of these men, Michael Frederic Guyer, Malcolm Robert Irwin, and James Franklin Crow have their papers archived in the UW-Madison Libraries. Their papers represent the three gems of UW's archival collections in the history of genetics. Michael Guyer was Professor of Zoology from 1912 to 1945, and author of several influential eugenics texts, including *Being Well Born: An Introduction to Eugenics* (Indianapolis: Bobbs-Merrill, 1916, 1927) and *Speaking of Man: A Biologist Looks at Man* (New York: Harper & Brothers, 1942). Malcolm Irwin served as Professor of genetics from 1930 to 1967, and is recognized as one of the founding members of immunogenetics. James Crow joined the Genetics Department in 1948, and ostensibly retired in 1986, but still attends seminars and book discussions, and actively participates in the department's intellectual community. Their research and experiences at UW highlight three important aspects of genetical research in the twentieth century: eugenics, immunogenetics, and population genetics, respectively.

Michael Guyer's papers are the least complete of the three collections, consisting solely of three archival boxes of material. Box 1 (Manuscripts) contains material organized by subject. The eleven folders include material on Guyer's eugenic interests (Wisconsin's population problems, eugenics [including information about the reception of *Being Well Born*], reproduction, and sterilization), in addition to his correspondence, research notebooks, notes about his biological research (placenta penetration, rats and guinea pigs), and manuscripts of his publications. Box 2 consists entirely of unsorted research notes.

Box 3 includes the remainder of his correspondence from 1911-1959, arranged chronologically. He appears to have lectured the only 'eugenics' course on the books of the Madison campus, Zoology 6: Heredity and Eugenics, taught from 1912 until 1945, when he retired. Guyer's papers will be most useful if they are contextualized within the other resources documenting the history of eugenics at UW—namely material related to other eugenicists on campus, such as the collected papers of Leon J. Cole (Genetics), the publications of Edward Alsworth Ross (Sociology), and various addresses of Charles Richard Van Hise, the man who brought Guyer to Madison, (Geology Department's chair records from 1903-1941).

Malcolm Robert Irwin's papers document a very different component of genetics at UW. In 1930, Irwin became the fourth member of the oldest Genetics Department in the country (founded in 1910 by L. J. Cole). He remained at Wisconsin for the rest of his career, retiring in 1967. Irwin coined the term "immunogenetics" in 1936 to describe the emerging field that he sought to create with his research. Although Irwin was originally interested in understanding the genetic basis of immune responses, this proved infeasible at the time and required additional advances in molecular biology. The bulk of his research centered, instead, on using immunology to characterize genetic differences between species and individuals, as a way of understanding the nature of genes through their immunological properties—a kind of "one gene, one antigen" relationship.

The first accession of Irwin's papers (9/17/15) consists of a file box and an archival box. This series contains folders arranged alphabetically by topic. The material covers such topics as abortion, repeatability tests of blood types, blood grouping and its utilization in animal breeding, inbreeding and selection in chickens, a human serum research project, Soviet genetics vs. Mendelism, and G.H. Rieman's potato studies. The largest section of the papers (5 folders) concerns the Dairy cattle breeding project. The second accession (9/8/9) consists of 3 file boxes and one archival box. A large portion of these papers comprise Irwin's correspondence through 1955, arranged alphabetically by correspondent, with each letter of the alphabet

contained in a separate legal envelope (all of Box 1 and part of Box 4). In addition, there are several envelopes of letters devoted to a single topic: J. W. Steinbeck (breeder of pheasants, quails, and doves in Concord, CA), W. Elwood Briles (who worked at the Poultry Department of Texas A&M, and was one of Irwin's frequent collaborators), the Hamilton Manufacturing Company, Miscellaneous Birds, Prospective Grad Students, and Blood. Box 2 contains mostly the work of his students, both papers and research notes. Box 3 includes class notes, more student papers, reprints, manuscripts, folders on bovine blood typing, and a run of the Genetics Department newsletter, *Genotype*, from 1951-1963, which Irwin helped to edit. Box 4 contains files of Irwin's correspondence from approximately 1926 to 1933, and two volumes of papers published under the jurisdiction of the U.S. Trust: Army Ordnance Control Systems Laboratory, at the University of Illinois, entitled *Biological Control Systems*, Volumes II and III. As a whole, Irwin's collected papers emphasize the strong connection between genetical and agricultural research in the first decades of the Genetics Department at Wisconsin.

In contrast to the two biologists already described, James Franklin Crow has donated twenty-three file boxes of meticulously organized papers to the Steenbock archives. This voluminous and extremely complete collection of his papers contains information about his research in genetics, as well as his participation and interest in contemporary social debates. Other than the brief description of the papers that follows, Crow's papers are unindexed and await the attention of an interested researcher. My brief perusal of the boxes suggests they will be of great interest to any historian interested in exploring the history of population genetics during the second half of the twentieth century.

Crow donated his papers in two batches; the first accession of nineteen file boxes (04/50) contains subject files and general correspondence between 1960 and 1970, and the second accession of four additional file boxes (05/156) consists of chronologically arranged correspondence from 1971 to 1989. His original labels for these files are listed below:

Accession 04/50:

- Box 1. Old records 1960-65; mostly radiation; BEAR.
- Box 2. Conaes correspondence; NCRP-Miscellaneous. Committees, local and national.
- Box 3. Conaes correspondence; NCRP-

Miscellaneous. Committees, local and national; old PNAS manuscripts. [This box includes Crow's reviews of genetics research proposals solicited by the Biology Branch of the U.S. Atomic Energy Commission and the Department of Health, Education, and Welfare of the National Institutes of Health, manuscript reviews for the Proceedings of the National Academy of Sciences, and book reviews.]

Box 4. General files.

Box 5. Genetics, including 1976.

Box 6. Applications; Schilling Committee; Program in Integrated Liberal Studies; Academic Planning Committee; Medical School Research Committee; submissions to the National Academy of the Sciences.

Box 7. National Academy of the Sciences.

Box 8. National Academy of the Sciences.

Box 9. National Academy of the Sciences.

Box 10. National Academy of the Sciences. Jackson benchmarks.

Box 11. 1960s.

Box 12. Committees.

Box 13. Correspondence I A-Z [These folders contain letters grouped according to topic, and arranged alphabetically, for example abortion (a fascinating collection of ephemera from the call to legalize abortion), birth control, environment, environmental mutagens, epilepsy, genetics conferences, mutagens, peace, and theoretical population biology.]

Box 14. Correspondence II A-N [Organized according to name of correspondent.]

Box 15. Correspondence III O-Z; Manuscripts reviewed.

Box 16. Committees; University Hokin Committee; Biomedical research grants. [These files include correspondence surrounding grant applications to the Medical School Research Committee at the University of Wisconsin, lead by Mabel R. Hokin, and Crow's own research proposals to a variety of institutions.]

Box 17. Invitations.

Box 18. Invitations; Medical Genetics Symposium 1958.

Box 19. Medical Genetics Symposium 1958.

Accession: 05/156

- Box 1. Correspondence 1971-76.
- Box 2. Correspondence 1976-80.
- Box 3. Correspondence 1981-85.
- Box 4. Correspondence 1986-89.

An additional folder of Crow's papers is located at the Wisconsin State Historical Society (also located on the UW-Madison campus). This folder contains Crow's papers from the Committee on Science and Technology of the Democratic Advisory Council between 1959 and 1960. The letters and documents discuss disarmament and chemical and biological warfare, and include copies of letters from John F. Kennedy and Robert W. Kastenmeier. Although James Crow has authored many biographical articles about his colleagues' contributions to genetics, including co-editing the "Perspectives: Anecdotal, Historical and Critical Commentaries on Genetics" for the journal *Genetics*, almost nothing has been written about Crow's life and research.

Any historian of biology interested in exploring these collections should also take advantage of the Oral History Project on campus. As part of UW's continuing effort to document the experience of working at and attending the University, Stephen Lowe began in 1971 to collect oral histories of retiring faculty for the University Archives. Over the years, this scope has broadened to include faculty in the middle of their careers, janitors, secretaries, students—whomever the volunteer interviewers have been interested in interviewing. The oral history interviews are centered on a few large topics—two that are most relevant to this readership are "Life Sciences 1930-1970" and "Women in Science and Engineering." The first collection of interviews was intended to focus on "the development of the University's distinguished record in the life sciences and on the response of the life science departments to the changes in cell biology after World War II." The second collection of interviews includes the experiences of twenty-three women from a variety of scientific disciplines at UW. The content of the interviews varies widely, but generally cover the interviewee's personal experiences. For example, Cold Spring Harbor is discussed in several interviews, and Renata Laxova describes her educational experiences in post-WWII Czechoslovakia, like learning genetics in secret at a professor's apartment under the cover of night. As a whole, these interviews present a multi-faceted view of twentieth-century life science research, both at the UW-Madison campus and more globally.

For your information, here is a brief list of

several notable interviews for the history of genetics:

- R. Alexander Brink (1897-1984), Professor of Genetics 1922-1968 (interview #12, 1973, 1.5 hours), and an interview with his wife, Joyce Brink, including her help with his maize genetics work (interview #604, 2002, 0.5 hours)
- James F. Crow (1916-) Professor of Genetics 1948-1986. Crow has been interviewed twice: once in 1983 (interview #274, 4.5 hours), and once in 2005 (interview #274, part 2, 2005, 9.5 hours)
- Robert W. Hougas (1918-), undergraduate and graduate student at UW 1937-41, and Professor of Genetics and Horticulture 1946-1983 (interview #275, 1983, 4.25 hours)
- Malcolm Irwin, Professor of Genetics 1930-1967 (interview #57, 1972, 1 hour), and an interview with his wife, Margaret H. Irwin (interview #58, 1973, 1 hour)
- Renata Laxova (1931-), Professor of Medical Genetics & Pediatrics 1975-2000 (interview #669, 2004, 4.75 hours)
- Joshua Lederberg (1925-), Professor of Genetics 1947-1959 (interviews #126 and #529, 1998, 6 hours)
- Hans Ris (1914-2004), Professor of Genetics 1949-1984 (interview #285, 1984, 7 hours)
- Howard Temin (1934-1994), Professor of Oncology 1960-1994 (interview #430, 1993, 3.5 hours)
- Sewall Wright (1889-1988), Professor of Genetics 1955-1960 (interview #138, 1978, 8 hours)

Although most of the interviews have not been transcribed, the former head of the Oral History Project (Barry Teicher) made abstracts of these interviews available online, including the date and length of the interview, the interviewer's name, and a content summary (URL and contact information provided below).

Another resource available within the UW Library system is the 'Biographical File' kept for many UW-Madison faculty. Biographical files are located at UW's central archives in Memorial Library. Most are brief, but contain hints as to the faculty member's valued role within the UW community. A typical file contains official UW News Releases and newspaper clippings announcing awards, promotion, retirement, and death. In some instances, Faculty Information Sheets, collecting miscellaneous professional and

biographical data, have also been saved. Of the genetics faculty already mentioned, biographical files are available for the following individuals: Alexander Brink, James Crow, Robert Hougas, Malcolm Irwin, Hans Ris, and Howard Temin.

Archival resources for the history of genetics in Madison are located at three different libraries: the Steenbock Library of the experimental life sciences, the UW Archives located in Memorial Library, and the Wisconsin Historical Society. Only some of the University's holdings are listed online, so in planning your visit, it will be worth your time to contact each archive.

Bernard Schermetzler, Archivist
432 Steenbock Library
550 Babcock Drive
Madison, WI 53706
Oral History:
608-262-2277,
oralhist@library.wisc.edu
Archives and Iconography:
608-262-8899, bschmertzler@wisc.edu
<http://archives.library.wisc.edu/ORAL/oral.htm>

David Null, Archivist
University Archives
B134 Memorial Library
728 State Street
Madison, WI 53706
608-262-5629
uwarchiv@library.wisc.edu
<http://archives.library.wisc.edu>

Wisconsin Historical Society Archives
816 State Street
Madison, WI 53706
608-264-6472,
<http://www.wisconsinhistory.org/libraryarchives/>

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- Devlin, Dennis S. and Colleen L. Wickey. "'Better living through heredity': Michael F. Guyer and the American eugenics movement," *Michigan Academician: Papers of the Michigan Academy of Science, Arts, and Letters* 16 (1984): 199-205.
- Irwin, Malcolm R. "The beginnings of immunogenetics," *Immunogenetics* 3 (1976): 1-13.
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H-Eugenics Goes Online

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In May 2005, H-Eugenics was launched as an affiliate of H-Net, an online consortium of scholars and teachers in the Humanities and Social Sciences. The purpose of H-Eugenics is to provide a forum for the discussion of the history of eugenics. This includes the exchange of information and ideas on various aspects of the history of eugenics, usually as they relate to a subscriber's current research project; consideration of materials regarding courses and course materials; review of books related to eugenics; and debate on the relationship of 21st century biomedical procedures and genetic modification to eugenics (i.e., "neo-eugenics"). Currently, about 230 scholars subscribe to H-Eugenics. Over one-third of the subscribers teach or conduct research at institutions abroad. While most of the subscribers are university professors, the membership of H-Eugenics also includes secondary school educators, medical professionals, peace and disability activists, legal experts, journalists, and independent scholars.

H-Eugenics has facilitated a wide variety of intriguing discussions in the seven months since the list's inception. Some of the most popular topics included a discussion of eugenics as depicted in Hollywood horror films (which is more frequent than one might imagine!), the use of blood type to predict personality characteristics (which is quite popular in Japan), variations in U.S. state sterilization laws, and the history of premarital eugenic medical examinations. A number of book reviews have appeared on our list which have prompted discussions (such as Gretchen E. Schafft's *From Racism to Genocide*). We have also seen frequent posts of conference announcements; panel proposals searching for additional papers; job, grant, and fellowship announcements; and posts regarding availability of archival documents.

Currently, the advisory board of H-Eugenics is discussing the possibility of adding several new features to the website. This would include a "Conference Reports" section, where the comments made by chairs of conference panels relating to eugenics would be posted. Such a feature would allow H-Eugenics subscribers the opportunity to learn about the most current work being accomplished in the scholarship on eugenics. A "Scholars Abroad"

section would provide a listing of scholars currently working in overseas archives. This would aid others in navigating specific libraries or archives and in finding fellow scholars with similar research interests.

H-Eugenics' website address is <http://www.h-net.org/~eugenics/>. The discussion logs can be immediately accessed at this website without subscribing. Those who believe that their own scholarship would benefit from joining the list are strongly encouraged to apply for a free subscription at the above address.

BACK ISSUES OF THE MENDEL NEWSLETTER

Historians are always interested in what came before. Back issues of the Mendel Newsletter from 1996 to the present can be found online at: <http://www.amphilsoc.org/library/mendel>. There are also a limited number of back issues still in print. To inquire about hard copies, contact jjahern@amphilsoc.org.

George Harrison Shull Acquisition at APS

Charles Greifenstein
American Philosophical Society Library

The Library of the APS this year received a small but important addition to the papers of botanist and geneticist George Harrison Shull (1874-1954). The papers were donated by George Harrison's daughter-in-law Mrs. Willa Shull, widow of Harrison Shull, a chemist and academic administrator. The donation includes a variety of material, such as a picture of G. H. Shull riding a bicycle at Antioch College, and a letter from Julian Huxley in which he asks Shull for a picture to "illustrate a biggish popular book on Biology I am doing with H. G. Wells." But the most significant material is a folder of letters between Edward East and G. H. Shull, and several diaries from when Shull was a young man.

G. H. Shull's productive career is highlighted by his enduring contribution to plant biology: his pivotal role in the development of hybrid corn. It was Shull who first demonstrated the principle of hybrid vigor. Inbred strains of corn, which steadily decrease in utility with inbreeding, can, when crossed with each other, result in better adapted, more nutritious, higher-yielding strains. The results of Shull's work, published in 1908-09, laid the foundations for nothing less than a transformation in agricultural practices, culminating in the Green Revolution of the middle 20th century.

For a scientist of such accomplishment, G. H. Shull started with few advantages. Born on a farm in Ohio, Shull's early education was irregular. Greatly encouraged by his mother, an avid reader who, after raising her children, became an accomplished horticulturalist, George Harrison eventually received a B.A. from Antioch College and a Ph.D. from the University of Chicago—without having graduated from high school.

The journals—five in all—date from the 1890s, with one from 1908. The four early diaries, from 1893-1897, show that while Shull had no advantages of money, culture, or education when young, he was obviously bright, hardworking, and he took full advantage of every opportunity. Indeed, the diaries document what reads as a remarkably full life of work, family, reading, experimenting, all set in a rural world asking to be explored and studied.

The earliest diary (more accurately in this case a journal), from 1893, consists mainly of short entries written almost every day. Entries typically

mention farm work, intellectual work of some kind, then a family or other event. A sample entry:

Tuesday June 27.

Plowed corn this forenoon. Hauled two loads of hay this afternoon. Studied agriculture and botany. Sam bought Samantha at Saratoga and read several chapters aloud this evening. It was very good and comical¹

The diary from 1895 follows a different pattern. Entries are all done on Sunday, chronicling the week's events. Shull is still at home, but in this year having turned 21, he takes on more adult responsibility. Farm work is still done, but in April Shull becomes an "essence pedler" as he puts it—presumably selling perfume and related articles, and doing so door-to-door using his horse Pat for transportation. Pat has an unfortunate encounter with a hive of bees, which effectively terminates the endeavor.

There is less recounting of reading and experimenting in 1895, but more mention of meeting people, including young women. However, Shull is taking occasional classes and studying for a teaching certificate. Eventually he receives one and toward the end of the year begins teaching in a local school. And the scientist-to-be is still studying plants. In fact, Shull has begun publishing scientific papers. On July 28 he writes:

I have written another article for the Botanical Gazette, on "Accessory Buds" with a plate. It contains 1329 words and is the result of more than a year's observation on the buds of species of *Spiraea*, *Prunus*, *Cercis*, *Armorpha*, *Gleditschia*, *Diervilla*, *Sonicera*, *Vitis*, *Ampelopsis*, *Jughans*, and *Carya*. I made the plate myself this time, and though the lines might some of them be smoother I think I have done right well. I cannot write literary work, so must write purely scientific or not write at all.²

The third diary is from 1897, the year he began in earnest at Antioch College. This one does not contain daily entries or entries recounting the

week. Rather, entries, done on Sundays, are vignettes, telling the particular circumstances of a specific event. Entries bear titles: "A Trip to Dayton," "Astronomy," "Mass Meeting," "Another Surprise." The matter-of-fact charm of Shull's vignettes may not be "literary work," but he was too hard on himself (and on science writers, for that matter) in thinking himself only fit for writing scientific papers.

Entries cease soon after Shull enters Antioch. The last complete entry, a short one, is from September 26:

My work by means of which I have to pay my board has started out quite arduous. I have been mopping floors, washing windows, and apparatus, sweeping and dusting during almost all my spare time thus far; but I am about through with the special work necessary at the beginning of the term and until cold weather comes I can perform my manual duties in about 1/2 to 3/4 hours each morning in making fires and passing books in chapel and a little over half of each Saturday in sweeping, dusting, and cleaning up generally. This with the fact that two of my studies require laboratory work makes me probably the busiest student in college at the present time.

Some of the records from 1893-95 of Shull's scientific explorations and experimentation made it into what he termed a "scientific journal," that contains "all which will be pleasant to me to read in future days concerning researches, failures and every act or event of my life which has any bearing upon my favorite subjects of study." And what does Shull recount? His reading, taking notes for a botanical dictionary, grafting and chemistry experiments, examining plants, analyzing a gyroscope's movement, his corresponding with botanists and his sending them specimens, buying Gray's Manual of Botany and using it, studying optics. In a foreshadowing of his later career, Shull notes that the iris is "most beautifully adapted to cross-fertilization."

After Antioch, Shull was employed for a time by the federal government, but eventually found his way to the University of Chicago, receiving his doctorate in 1904. Soon thereafter he joined the Station for Experimental Evolution at Cold Spring Harbor. Portions of most of his years with Cold Spring, Shull spent in California with Luther Burbank. Shull showed that Burbank's claims were unreliable

because of unsound experimental practices (the Shull Papers at the APS document this period).

It was when associated with Cold Spring Harbor that Shull did his great work with hybrid corn. In 1908, when his results were being published, Shull took a trip to Europe, documented in another journal. The journal ends before his trip is completed, but it covers Shull's activities from August 15 to September 25.

Shull's trip is not filled with dramatic events, though he socialized frequently, took in many tourist sites, and saw many people and places of interest to a botanist and geneticist. The most exciting event for Shull was probably meeting, while on the ship bound for Europe, his future wife, Mary Julia Nicholl, who was traveling with her mother; they "consecrated [their] lives to each other in the confession of [their] love" in the St. Étienne-du-Mont church in Paris on September 21, and married in 1909.

But for the historian of science, other events are of more interest. Shull provides details of visits to nurserymen and plant breeders and their establishments in several countries: Alexander Dickson in Belfast, Edward Laxton in Bedford, C. C. Hurst and Son in Burbage, Arthur Sutton in Reading, T. A. H. and H. Somers Rivers of Thomas Rivers & Sons of Sawbridgeworth, M. Vilmorin of Vilmorin-Andrieux et Cie near Paris, and also near Paris Louis Blaringhem. Breeding techniques and results are explained. Other interesting details emerge. Arthur Sutton, for instance, was "broadly humanitarian in his interests, and he [allowed] this spirit to dominate over the purely mercenary." Workmen are provided "play grounds" and time to use them, and Sutton employs "married women or widows" to sort seeds, "though it would be much cheaper to employ girls" (September 12).

Shull also meets William Bateson at his home, Merton House. Bateson "came down in his dressing gown thinking [Shull] was the postman or boy with a telegram." As he was going to a meeting of the British Association for the Advancement of Science (BAAS) in Dublin, Bateson had tried to head off Shull, but Shull is invited to stay, taking a walk with Bateson's ill-fated sons John and Martin, and touring the garden. Since Mrs. Bateson had broken her ankle and couldn't go to the BAAS, Shull became the recipient of a reduced-fare railroad ticket, thus enabling him to go to Dublin.

In Dublin, Shull managed to find a room at Trinity College. Shull meets a number of people, including William Praeger of Kalamazoo College,

whom Shull knew; Praeger's brother, R. Lloyd Praeger; I. Bailey Balfour of Edinburgh, H. H. Dixon of Dublin, and A. G. Taunsley of Cambridge. Nettie Stevens of Bryn Mawr College came at the special invitation of Bateson. On September 7, Shull attended the "Symposium on Sex" at which, among other presenters, Stevens summarized "the cytological studies of McClung, Wilson, Morgan, and herself, mainly with the Hemiptera, Aphis, and Tenebrio, showing that in these forms the sex is determined by the movement of certain odd chromosomes, idiochromosomes." Bateson presented a paper on "a sort of 'spurious allelomorphism' [that] gave clew to the Mendelian character of sex."

It is thus by serendipity that Shull is present during some of the early, significant discussions about the discovery of what are now called the X and Y chromosomes.

In 1915 G. H. Shull accepted the position of professor of genetics and botany at Princeton University, and remained there for the rest of his career, accepting emeritus status in 1942. At Princeton, he founded the journal *Genetics* in 1916. The new Shull acquisition has some correspondence with Edward East about editorial work at *Genetics*. The letters contain material on Shull's work to establish the Galton and Mendel Memorial Fund to help pay for expensive plates in papers in *Genetics*. The two men also debate what should go into the journal. Although relatively routine, the correspondence does offer insights into editorial decisions and professional standards. For instance, in recommending for publication a paper on heterosis by Howard Frost, East wonders if *Genetics* should "ask for conciseness." East goes on to say:

I think [Karl] Sax's wheat paper is a model. I don't believe you can cut out a word of that without injuring it. . . . Sax's paper had more new stuff in it than half a dozen average genetics papers and his two plates were absolutely necessary for adequate postulation. (September 18, 1922)

Shull writes back five days later and concurs about Sax, saying that the galley proofs for his article are on Shull's desk. (Shull is clearly referring to parts two and three of Sax's paper, "Sterility in Wheat Hybrids," published in *Genetics*, Vol. 7, No. 6, Nov. 1922; the first part had been published in July 1921.)

In a classic editor's lament, Shull writes East about conciseness:

I feel much the same as you do regarding the desirability of condensation of articles, especially when they are corroboratory rather than presenting new principles, but the practical side of this proposition I must confess rather "stumps" me. I have not the time to rewrite the articles for publication in "Genetics" though I have done this in several cases for foreign contributors whose unfamiliarity with English made it necessary. For American authors it seems to me that we are under the practical necessity of accepting or rejecting contributions offered for publication in "Genetics," even though we do not think that this is the ideal way to handel [sic] them. (September 23, 1922)

While I was pleased to receive this collection of George Harrison Shull's correspondence, diaries, and notebooks, Mrs. Shull told me a regrettable story about G. H. Shull's other diaries. Apparently he kept them throughout his life. Upon his death, his papers were divided among the family. One relative asked for and was given custody of most of the journals, which she put in a storage locker. She traveled a lot, leaving the journals in the locker, safely kept, but unfortunately neglecting to pay the bill for the locker. As a result, the journals were either thrown out, sold, or given away. The journals that documented many years of G. H. Shull's life are probably lost forever.

Thanks to Willa Shull, however, researchers will be able to gain new insights into the formative years of one of the 20th century's best plant geneticists.

Endnotes

1. Sam is G. H.'s brother. *Samantha at Saratoga* is a novel by Marietta Holley, a hugely popular writer whose books used dialect and rural humor to express feminist, temperance, and anti-racist views.
2. The article, called "Accessory Buds," was indeed published in *Botanical Gazette*, along with Shull's plate, in the March 1896 issue, pp. 166-169.

The History of Genetics Online

Michael R. Dietrich
Dartmouth College

In past issues of The Mendel Newsletter, we have featured articles on new online resources for the history of genetics and the history of biology more generally. At the request of interested Newsletter readers, we include in this issue a general overview of online resources in the history of genetics.

Timelines

One of the most popular forms for presenting the history of genetics on the internet is the timeline. Of the many timelines available, the top five are summarized below.

- Dynamic Timeline

<http://www.genome.gov/Pages/Education/Kit/main.cfm?pageid=1>

This timeline is featured on the Human Genome Project website. It offers narrative explanations of key events from Darwin's publication of *On the Origin of Species* to the announcement of the working draft of the genome in 2000. While it is not as easy to browse as other internet timelines, it offers substantially more information.

- History of Genetics Timeline

<http://www.accessexcellence.org/AE/AEPC/WWC/1994/geneticstln.html>

This timeline was written by Jo Ann Lane in 1994 for Access Excellence. It offers a chronological list of important scientists and their discoveries from Charles Darwin's and Alfred Wallace's theory of natural selection in 1858 to the invention of the FlavrSavr tomato in 1993. This timeline is also available at <http://www.woodrow.org/teachers/bi/1994/geneticstln.html>

- Landmarks in the History of Genetics

<http://dorakmt.tripod.com/genetics/notes01.html>

This timeline was created by M. Tefvik Dorak and was last updated in 2005. It offers a chronology of events from Robert Hooke's description of cells to the sequencing of the human y-chromosome in 2003. Some references and links are included in this lengthy list of events.

- Landmarks in the History of Genetics

http://cogweb.ucla.edu/ep/DNA_history.html

This timeline was created by Francis Steen at UCLA in 1998. It offers a chronological list of events and their theoretical implications from Maupertuis' account of organic design to the Human Genome Project. The timeline is complemented by a bibliography of relevant sources and a set of links.

- Genetics in Context

<http://www.esp.org/timeline/>

This timeline was created by Robert Robbins as part of the Foundations of Classical Genetics section of his Electronic Scholarly Publishing website. This website was described in the 2005 issue of *The Mendel Newsletter*. While the Foundations of Classical Genetics site is dominated by an amazing array of primary sources, the comparative timeline places these sources in context. Unlike other timelines that offer a chronology of scientific events, these timelines offers side-by-side timelines of developments in genetics and other historically significant events, notably the succession of US presidents. The events in this timeline are rich and frequently linked to primary sources or more descriptive webpages. Navigation can be slow, but the content is very good.

I would be remiss if I did not mention that the Electronic Scholarly Publishing site has a complete copy of A. H. Sturtevant's *A History of Genetics* available. This is only one of many items available at this site, but Sturtevant's history is probably the most extensive source on the history of genetics available online at this time.

<http://www.esp.org/books/sturt/history/>

Online Histories

Where timeline websites tend to offer an overview of the history of genetics, there are a number of other websites offering histories of specific topics. These range from fairly scholarly treatments of Gregor Mendel to histories of laboratories and institutions. Many of these sites are both digital archives of primary sources and historical analysis.

- Mendel Web

<http://www.mendelweb.org/>

The best source on all things related to Gregor Mendel's research on hybrids. This site includes Mendel's original papers with very useful historical commentaries, such as Robert Olby's "Mendel, Mendelism and Genetics", Vitezslav Orel's "Heredity Before Mendel", Jan Sapp's "The Nine Lives of Gregor Mendel", and Diane Paul and Barbara Kimmelman's "Mendel in America: Theory and Practice, 1900-1919."

- Eugenics Archive

<http://www.eugenicsarchive.org>

This site is an Image Archive on the American Eugenics Movement sponsored by the Dolan DNA Learning Center at Cold Spring Harbor Laboratory. With contributions from eleven different archives, this site offers hundreds of sources on various aspects of the eugenics movement in the United States during the twentieth century. The site is organized by virtual exhibits ranging from Social Origins to Immigration Restriction. Within each exhibit, explanatory text is presented with thumbnail images of primary source documents. The entire collection is also searchable by keyword or object identification number. The 2,500 objects can also be browsed by topic, type, or time period. Without question this is the best site on the history of American eugenics available today.

- State Eugenics Sites

Recent scholarship on the eugenics movement in the United States has revealed the details of eugenic enactments in different states. Recent efforts to seek reparations for eugenic sterilization are documented at North Carolina's Eugenic Past (<http://www.inclusiondaily.com/news/institutions/nc/eugenics.htm>), a site sponsored by the International Disability Rights News Service. Eugenics in Indiana (<http://kobescent.com/eugenics/>) presents a history of eugenics in Indiana in a series of webpages that include biographies, a timeline, bibliography, and text of the 1907 Indiana Sterilization statute. The most extensive collection of documents on a state eugenics program is offered by Vermont. The Vermont Eugenics: A Documentary History Collection (http://cit.uvm.edu:6336/dynaweb/eugenics/@Generic__CollectionView;cs=default;ts=default;pt=eugenics) presents a set of primary sources from the 1890s to the 1990s. Many of these documents concern Vermont's sterilization program, but this site also includes letters to national eugenics leaders, such as Charles Davenport. Because the Vermont Country Life Commission played a significant role in the Vermont eugenics movement in the 1930s, this site contains a large number of documents concerning the efforts of the Country Life Commission.

- History of Eugenics Bibliography

<http://www.healthsystem.virginia.edu/internet/bio-ethics/bibliographylombardo.cfm>

This site offers an extensive bibliography of both primary and secondary sources on the history of eugenics. Assembled by Paul A. Lombardo and Gregory M. Dorr, the bibliography is preceded by a short bibliographic essay.

- RaceSci
<http://www.racesci.org/>
This site is dedicated to the history of race in science, medicine, and technology. This very rich site has interpretive and historical essays, syllabi, bibliographies, and links. Of special interest are its bibliography of genetics (http://www.racesci.org/bibliographies/current_scholarship/genetics_new.htm) and its bibliography of eugenics (http://www.racesci.org/bibliographies/current_scholarship/eugenicsnew.htm), which can be searched by time period or nation.
- Institute for the Study of Academic Racism (ISAR)
<http://www.ferris.edu/ISAR/homepage.htm>
Created by Dr. Barry Mehler at Ferris State University, the ISAR website contains articles and bibliographies that offer a critical perspective on academic racism, biological determinism, and eugenics. This site offers a number of valuable document collections and profiles of individuals and institutions.
- Profiles in Science
<http://profiles.nlm.nih.gov/>
The National Library of Medicine maintains a growing collection of digital history resources of interest to historians of genetics and molecular biology. Organized biographically, each profile includes a history of that person's research as well as relevant documents and images. This site currently hosts profiles of Christian B. Anfinsen, Oswald T. Avery, Julius Axelrod, Francis Crick, Donald S. Fredrickson, Joshua Lederberg, Salvador E. Luria, Barbara McClintock, Marshall W. Nirenberg, Linus Pauling, Martin Rodbell, Florence R. Sabin, and Albert Szent-Gyorgyi.
- R. A. Fisher Digital Archive
<http://digital.library.adelaide.edu.au/coll/special//fisher/papers.html>
The University of Adelaide in Australia has created an impressive digital archive of the papers of renowned population geneticist, R. A. Fisher. Fisher's collected papers and books have been digitized as have some of his notes and a significant portion of his correspondence. Sadly, this may make it unnecessary to visit Australia to research Fisher's history.
- A History of the Human Genome Project
http://www.ornl.gov/sci/techresources/Human_Genome/project/hgp.shtml
This history is part of a web site maintained by the Human Genome Management Information System (HGMIS) at Oak Ridge National Laboratory for the U.S. Department of Energy Human Genome Program. It includes a detailed timeline of the history of the Human Genome Project and a good selection of documents on various aspects of the human genome project. The emphasis is on the contributions of the Department of Energy.
- The Human Genome: Genetics and Society
<http://www.wellcome.ac.uk/en/genome/geneticsandsociety/hg13f001.html>
Sponsored by the Wellcome Trust, this site offers a different perspective on the history of the human genome project. Although this site is not as document oriented as the DOE's website, it offers a more complete historical narrative.
- The History of Recent Science and Technology
<http://hrst.mit.edu>
With funding from the Sloan Foundation and Dibner Fund, this site was created to try to capture some of the history of recent science. Two of the five areas researched here were relevant to the history of genetics; namely, the site on molecular evolution and the site on bioinformatics. Each of these sites features an archive of documents, interviews, historical analysis, bibliographies, and timelines. Within the next year both sites will also migrate to new homes. The bioinformatics pages will be hosted by Stanford University and the molecular evolution pages will be hosted by Dartmouth College and the University of Massachusetts.

- Genetics Society of America

<http://www.genetics-gsa.org/>

The GSA website has a number of features of interest to the historian of genetics. First, the journal *Genetics* is available without charge. The pages of *Genetics* of course contain great scientific articles, but they also have a number of short biographical articles and more recently each issue has opened with a perspectives article addressing some aspect of the history of genetics. The GSA website also carries links to webpages on key model organisms in genetics. Many of the model organism webpages, such as Flybase (see the next entry), contain bibliographic databases that can be extremely useful for historical research.

- Flybase

<http://flybase.bio.indiana.edu/>

Flybase is a database for *Drosophila* genetics. From a historian's perspective, it includes a searchable bibliography of research on *Drosophila* genetics from its beginnings in the early twentieth century. It also has information about current researchers and a partial historical pedigree of relationships between *Drosophila* researchers.

- APS Archive Guides

<http://www.amphilsoc.org/library/guides/glass/>

It is fitting to end this survey with the online resources offered by the APS itself. The Guide to the Genetics Collection published by Bentley Glass has been updated and put online. This guide provides an overview and finding aids for the many archival collections of geneticists' papers held by the APS. In addition the APS site offers two image collections. The first is the scrapbook of the American Eugenics Society (<http://www.amphilsoc.org/library/guides/eugenics.htm>) and the second is the Genetics Image Archive (<http://www.amphilsoc.org/library/guides/genetics.htm>). The latter collection includes hundreds of photographs from five different APS collections: the Columbia University Department of Genetics papers, the Charles B. Davenport papers, the Theodosius Dobzhansky papers, the Barbara McClintock papers, and the Curt Stern papers.

There are undoubtedly many websites on the history of genetics that I have yet to discover and hopefully more that will be created. As a result, the sources and links listed here may become dated rather quickly. I will maintain an updated list of history of genetics links at <http://www.dartmouth.edu/~bio70/>. If you have suggestions for websites to include, please email me at Michael.Dietrich@Dartmouth.edu.





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