

15

Blood, Paper, and Invisibility in Mid-century Transfusion Science

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The World War II was just ending when the *British Medical Journal* announced the discovery of three new blood groups: “Willis,” “Levey,” and “Lutheran.”¹ Blood groups affect whose blood can safely be transfused into which patients, and during the war, blood grouping had become integral to Britain’s nationwide transfusion service. The Emergency Blood Transfusion Service depended on large-scale blood storage and a nationwide bureaucracy for managing donors—these had helped transform blood into a safe and reliable therapy, and simultaneously created a deluge of new knowledge about blood. The service depended on millions of volunteers across the country willing to give small but crucial regular donations of blood—donors took time out of their days, travelled to transfusion centres, were willingly punctured by needles, and patiently waited on beds while their blood was conveyed through rubber tubes to glass bottles. The wartime service and its postwar successor, the National Blood Transfusion Service (NBTS), were predicated on the notion that the identities of donors did not matter; they were largely interchangeable and subsumed into factory-scale systems of storage and mobilization.² Individual donors were invisible to the patients who benefitted from this therapy, and to the doctors delivering it.

Occasionally, though, donors were singled out for greater attention. After all, human blood was not *wholly* interchangeable. By the 1920s, it was well known that blood could be classified into four main groups (A, B, AB, and O), and that transfusing blood of the wrong group could be very dangerous for a recipient. By the 1930s, several more blood groups had been defined, and during the war, the complex subtleties of blood became even more apparent. Owing to robust bureaucratic procedures, adverse transfusion reactions could be followed up and investigated, and specific samples could direct attention to new serological complexities (“serology” is a field of research and practice concerned with immune reactions).³ As a result, understanding of blood compatibility soon went far beyond the four

original groups; the large number of people being tested and transfused brought into view a host of new variations. And this intensifying concern with the subtle differences of blood types went hand in hand with flourishing interest in people with “rare” blood—who might be called upon to provide donations for patients very sensitive to the more common blood types. In striking contrast to the public anonymity of most donors, individuals understood to have “rare blood” became the subject of many newspaper articles, radio plays, films, and even special clubs.⁴ In concert, new blood groups began to be named after donors—such as “Willis,” “Levey,” and “Lutheran.”

Discoveries of new blood groups were not only important for the safety of transfusion. They also promised new resources for scientists interested in the young but flourishing field of human genetics. In the 1940s, the blood groups were still some of the only human traits known to have clear-cut Mendelian inheritance (i.e., unlike most other traits, their inheritance followed a simple set of rules). New serological genetic discoveries built on the blood and paper records of donors and transfusion patients opened up all sorts of new research possibilities—including the mapping of human chromosomes and the study of “racial” differences (Burton, chapter 7; Vimieiro, chapter 9). Unlike in the United States, “racial” labels were not officially attached to donors in Britain, but the study of blood in the context of transfusion facilitated and helped to promote scientific investigations into blood and race.⁵ For mid-century scientists interested in the study of human genetics, the visceral donations to the transfusion service created new resources and methods for studying human inheritance, identity and difference.

As a historian narrating the history of human genetics and blood research, I have struggled with the relative invisibility of the motivations, experiences, and social circumstances of many of those who created and laboured within this infrastructure. Many of the sources available for telling this history are themselves structured by the system at the centre of the story. Transfusion infrastructure depended on invisibilities: large-scale extraction, storage, and transportation were only possible because of the efficiencies yielded by standardization and routine.⁶ The blood grouping technicians, clerks, and donors on whose labours the service depended were interchangeable as well as extremely numerous. The transfusion service kept careful track of its donors, but it mostly obscured their contributions as individuals owing to the sheer numbers of donors it recruited and massive volumes of blood it mobilized. Meanwhile, population genetic research into “racial,” geographical, religious, “tribal,” and national diversity, labelled, marked, and flattened donors into groupings that eclipsed other forms of personal identity.

As well as the invisibilities created by the transfusion infrastructure, archival sources have been shaped by recent privacy concerns about old paperwork pertaining to blood. The wartime transfusion services helped create the conditions for modern human genetics—a field that is now understood to offer powerful insights into our identities, history, and our health. My research depended on two vast archives carefully catalogued and made available by the Wellcome Collection, which sought to collect papers pertaining to the history of genetics. But because of the many new

meanings that can now be made from pedigrees and blood tests, and because of increasingly careful protections around the identities and medical data of donors and patients, the archival records of this early history were recently re-scrutinized by Wellcome archivists and many closed. Thus, the new meanings and uses of blood, including those relevant to present-day health insurance policies, have impacted the archival reclassification of records and correspondence relating to people who are part of the historical record.

The experiences and social worlds of donors and patients are crucial to the history of transfusion and genetics. Among the sources available, a handful of people stand out—including a small number of donors whose names became attached to blood groups. Blood group naming practices serve as an aperture for reflecting on how and why the institutions and procedures of the life sciences make some people visible in retrospect and others less so.

My case study describes the circumstances under which the donors “Lutheran,” “Willis,” and “Levey” were singled out for scrutiny. At the end of the *British Medical Journal* paper first announcing these new groups, its authors noted their gratitude to the donors, but also to a single patient, a “Miss F. M.,” who was suffering from an auto-immune condition that caused anaemia and who had received blood from all three donors (and several more).⁷ In the three sections of this chapter, I outline the structural conditions that made “F. M.” into such a valuable research subject; I describe why donors’ names became attached to the new antigens made visible using her blood, and conjecture how those names functioned. I then briefly reflect on how the archives I used in my own research both protect and erase the identities of people who were part of this history.⁸

A LIVING ARCHIVE

How did the living body of this young patient at Oxford’s Radcliffe Hospital become such a valuable resource for serological research? The conditions that positioned her as a research subject began taking shape soon after the outbreak of the war. The transfusion service first operated in London but soon expanded throughout the country. It quickly became a robust, distributed infrastructure of bottles, fridges, vans, and a vast paper bureaucracy. It depended on the labours of nurses, serologists, and clerks (figure 15.1), and of donors recruited and disciplined by national and regional publicity campaigns. Blood testing was crucial. In 1939 just a handful of blood groups were known: the clinically important ABO groups, and the less important MN and P groups. ABO testing was mandatory in Britain, necessitating the training of hundreds of serologists to work in transfusion centres across the country. But ABO groupings could not absolutely guarantee the safety of blood—sometimes unexpected reactions occurred despite careful testing. For that reason, doctors needed to be able to link the outcomes of all transfusions back to individual donations, enabling transfusion officers to investigate any problems. The transfusion service coupled donors and recipients across space and time using labels that could



Figure 15.1. A photograph of the North West London Depot, in the Slough Social Centre (c. 1940). At the centre is the well-known figure of Janet Vaughan (in glasses), one of the founders of the wartime transfusion service. She presides over clerks sorting registrations and calling up donors. To the left is a large map on which is marked the hospitals supplied from Slough. The depot was responsible for the blood supply of the North West quarter of London, which included Basingstoke, Buckingham and Aylesbury. Reproduced with the kind permission of The Bodleian Libraries, The University of Oxford.

be tied to and untied from bottles of blood. While the Regional Transfusion Centres carried out local investigations into puzzling blood, the Medical Research Council also established several expert laboratories devoted to blood research. One of these was the Galton Serum Unit in Cambridge (50 miles north of London), which set standards for testing reagents, and investigated intransigent serological problems.

The Cambridge Galton Serum Unit quickly became a passage point for puzzling samples that had been singled out by Regional Transfusion Centres. If depot serologists were unable to figure out why a transfusion had endangered a recipient, they sent samples to Cambridge for further investigation. Unit researchers would follow up particularly strange and fascinating specimens with further requests to the depots for blood, and in some cases they even visited distant parts of the country to sample donors in their own homes. The Regional Transfusion Officers became sentinels, scrutinizing for rare serological treasure among thousands of routine tests, drawing the most intransigent specimens to the attention of the Cambridge researchers. A regional transfusion officer in the Northern English town of Sheffield underlined his role when he described himself (to one of the Cambridge scientists) as “a lonely lighthouse keeper in a sea of problems . . . with between 2,000 and 3,000 samples

per week passing through the laboratory.”⁹ He saw himself as caring for and continually repairing a sophisticated instrument for making new blood group variants and systems visible.

This was how, as the war went on, the routine testing of hundreds of thousands of investigations of curious samples yielded a remarkable array of novel blood groups. Also working in collaboration with labs overseas—especially with labs on the U.S. East Coast—British transfusion doctors and scientists transformed human blood into an increasingly complex fluid, both serologically and genetically. As such knowledge expanded, transfusion began to be used not just as an emergency treatment for shock, but also as a routine therapy in surgery, as well as in antenatal and neonatal care. By the end of the war, many hospitals were using human blood as a treatment for long-term conditions. Indeed, donated blood was now deemed safe and plentiful enough for patients suffering from chronic anaemia, like F. M., to benefit from repeated transfusions.

Multiply transfused patients opened up new lines of investigation for labs like the Galton Serum Unit. Sometime near to the end of the war, one of the unit’s researchers, Robert Race (by then, known internationally for his work on the “Rhesus” blood groups), started collaborating with doctors at Oxford’s Radcliffe Hospital to investigate the haematological crises experienced by F. M. The patient faced what would become a common problem for multiply transfused patients. Some people experiencing a transfusion will produce antibodies in response to the antigens in the donor blood. This may not be a problem for a first transfusion, and can be minimized with careful cross-match testing of blood types. But successive transfusions result in the build-up of antibodies in a patient’s blood, narrowing the kinds of blood available to them in the future. This was a dangerous predicament for patients, but for researchers wishing to study blood group serology, multiply transfused people were also an exceptionally rich resource of antibody types.

F. M. herself appeared to have exquisitely sensitive antibody reactions, and as a result the multiple transfusions that she experienced transformed her into a veritable archive of antibodies. By studying her blood, the scientists effectively made her body into an immunological instrument that could recognize novel antigens hitherto undetected in the blood of her donors. Thus, the wartime transfusion infrastructure had not just created new therapeutic opportunities for treating F. M.’s anaemia, but had also turned her blood into a resource for discovery. The institutions of the NBTs and the Radcliffe Hospital encompassed and positioned F. M. as both a treatable patient and a research subject.

The British wartime and postwar infrastructure enabled the systematic scrutiny of large numbers of samples and people, most of whom remained invisible within that infrastructure. But the administrative ordering and tracking of paper by large numbers of clerical staff enabled the singling out of specific individuals for investigation. Then there might be a flurry of excitement as researchers rushed to test a sample behaving in unexpected ways. In one letter a scientist remarked to a colleague about a particularly intriguing donor: “I wonder if Madame Kozyreff realises what a prize she is and how many serological laboratories will be wanting to bleed

her.”¹⁰ Amid thousands of routine tests, the spotlight of serological surveillance made some individuals exceptionally precious, both to doctors and researchers.

NAMING BLOOD GROUPS

Back in Oxford, the scrutiny of F. M.’s blood brought other individuals into view. During the course of her treatment, F. M. received pints of blood from several donors. Doctors regularly assayed the concentrations of specific antibodies in her bloodstream; by monitoring her reactions, the researchers detected the presence of several entirely new antibodies. By isolating those, and testing them against arrays of standard red cells, the researchers showed that F. M. had been exposed to several novel antigens carried in the blood of her donors. Those antigens were “novel” in the sense that they had not previously been defined by serologists (further research would determine whether they were common or rare). Using administrative records to find the origin of that transfused blood, Robert Race and his colleagues pinned those new antigens to individual NBTs donors, who all consented to further tests. Crucially the researchers persuaded donors’ families to give samples too.

With these methods, the researchers used F. M.’s blood to define several new antigens, and trace those to three living donors. The first was named after a donor called Willis and was found to relate to the already well-documented Rhesus (Rh) class of antigens. The second, named after a donor called Levey, was found to be exceptionally rare and unrelated to any existing group. The third, from another of F. M.’s donors with the surname Lutheran, was the real prize, in that the antigen appeared to be both novel and relatively common, and represented a whole new blood group system. Tracing Lutheran through the families of several additional donors, laboratory workers, and students, the researchers concluded that the antigen was inherited as a Mendelian dominant allele.

Blood group antigens had not always been named after donors. Karl Landsteiner had named the earliest in 1900 using first two letters of the alphabet (A and B), and, reportedly, “O” for the German word “ohne,” meaning “without” (“O” individuals lacked A or B antigens). In the 1920s, the practice of using letters continued with the “MN” and “P” groups. The move to naming blood groups after donors coincided with the intensification of serological research within the 1940s wartime infrastructure. Within this new world of planned, routine surveillance, some novel groups were named for the antigen-carrying donor—as was the case for “Willis,” “Levey,” and “Lutheran.”¹¹ Others were named for the person who had made the relevant antibody—such as (to name three of many) “Duffy,” “Lewis,” and “Colton.”¹²

The wartime and postwar practice of naming blood groups after individuals was directly related to the system of testing, scrutinizing, and singling out interesting samples from the thousands generated nationwide.¹³ Adverse transfusions, like those

experienced by F. M., could be monitored thanks to careful record keeping. The labour of thousands of clerical staff, who kept track of donors and their blood across the country, made it possible for researchers to pursue people with interesting and valuable blood. Unusual specimens, like those given by F. M.'s donors, would be investigated and moved between hospital or transfusion centre and research lab. The most promising of those samples would be shared between serologists in different labs, sometimes even between labs on different continents.

With this constant movement and scrutiny of specimens, one reliable system of naming—one that could clearly distinguish one sample from others in the cohort—was the surname of the donor, or a shortened version of it.¹⁴ A personal name was mobile, transportable, and (often) unique and potentially more immediately legible than a number or combination of letters.¹⁵ It also speaks to what researchers found charismatic. One blood group serologist later spoke about his experiences of handling donor names in laboratory settings: "It made it more personal that you were working with a real person's specimen. Quite different from, say, sample 4567–89."¹⁶ And of course, just as with the donors Lutheran, Willis, and Levey, it was necessary that researchers often struck up ongoing relationships with donors' families, obtaining repeat samples for genetic analysis. Thus, a name likely had affective resonances to the scientists engaged in the study of blood. Besides, if specimens *had* been labelled using arbitrary numbers or letters they could only have been shared successfully if institutions had decided on a system of standards. The name of the donor provided a readily distinguishable marker that was evocative, memorable, and (usually) easy to write and say aloud.¹⁷

This was a very partial kind of visibility. For example, the donors whose blood yielded new groups that took their names were treated differently from donors who were able to provide "rare" blood under emergency conditions. The latter often provided sensational stories of pursuit and redemption. However, the visibility accorded to Lutheran, Levey, Willis, and others was important within the British public projection of the altruistic donor.¹⁸ Since the outbreak of war, those organizing the modern, large-scale, highly distributed transfusion service had simultaneously projected an image of precisely the opposite: donation that was local, face-to-face, and personal.¹⁹ In this respect, the move to an expansive infrastructure of transfusion cohered with the practice of naming groups after (relatively invisible) donors.

DONORS IN THE ARCHIVE

I came to the story of blood groups and transfusion via an interest in the history of human genetics. My historical field of vision was shaped by the acquisitions department of the Wellcome, which, in the late 1990s and early 2000s, amassed a formidable collection of papers from the blood-grouping labs of Robert Race, and

his colleagues Ruth Sanger and Arthur Mourant. The archival spotlight on the lives and careers of these scientists brings out from the shadows particular individuals who contributed to the labour of studying blood. In 2010, ten years into the “post-genomic era,” the Wellcome put new emphasis on the genetic dimension of those papers, when it incorporated them into a program to make its materials relating to human genetics freely available online, a digitization effort that it dubbed “Codebreakers: Makers of Modern Genetics.”²⁰

This venture resonated with other efforts by the Wellcome to make its buildings and collections (in both the museum and library) more widely accessible; it was also consistent with the Wellcome’s promotion in the 1990s and 2000s of freely accessibly genomic data and its highly public leadership of the open access publishing movement. But as commentators of genomics have pointed out, efforts to be more “open” (and visible) in one respect often create the conditions for new kinds of closure.²¹ Just as the free sharing of genomic data is managed within structures of governance that include funders, data storage infrastructure, ethical laws, and institutional review boards, so the archives relating to those endeavours are subject to data protection. The Wellcome is one of the richest and most influential biomedical research funders in the world, and is particularly sensitive to the privacy conditions pertaining to biomedical data (Keuck, chapter 21, on the archival sensibilities of diverse institutions). As the Wellcome archivists started the process of digitizing the “Codebreaker” papers, they were rigorous in their re-evaluation of the privacy conditions around the papers relating to blood groups.

This historiographic reframing combined with biomedical developments to impact archival policies and create new partial invisibilities, whereby some records were no longer accessible as empirical sources for historical research. The Wellcome now framed the Race and Mourant papers as central to the history of human genetics. Moreover, now that the papers were accessible online, they had a far wider visibility and potentially much bigger audience, so the archivists were rigorous in their assessment of “sensitive personal data,” in compliance with the Wellcome’s access policy.²² During that labour-intensive revision process, the archivists changed the access conditions of a large number of the papers that I had used during the earlier phase of my research. They marked some records “restricted access,” meaning I could look at but not photograph or quote them, and others as “closed,” which meant I was unable to access them, in some cases, for several more decades. The latter included letters regarding scientists’ pursuit of certain donors and family pedigrees. The archivists perceived that in some instances a whole series of letters might be capable of attaching a blood group to a disease, and then to a personal name, pedigree, and family.

Many countries have legally enshrined the right to privacy regarding medical conditions.²³ Concerns about personal, sensitive data have intensified in concert with the expansion and power of genomics—a field subject to the powerful logics of “informatic capitalism” and its prolific markets for personal information.²⁴ Blood

and data freely given in the 1950s and 1960s can now potentially be tethered to data-gathering practices that affect a family's access to health care or insurance. This requires that the donors and patients who made some of the very earliest corporeal contributions to genetics and serology are closely protected. Also closed are materials pertaining to those donors who, in the 1950s, explicitly consented for their names to be published in journals. This put out of my reach many sources with potential clues as to who chose to be part of such scientific and medical projects, why they participated, and how they cultivated their relationships with researchers.

Thus, the ease with which names and personal data can today be connected together has created gaps in what historians can learn about the past. In my own research, many of the donors and patients who gave their blood to the transfusion service and to serological genetic research have been hidden twice over. They were obscured by a "big data" enterprise made possible by a vast transfusion bureaucracy that anonymized its contributors and research subjects through the sheer numbers of donors and massive volumes of blood involved. And in addition, many of the paper trails with clues to the experiences and contributions of postwar donors and patients have been partially hidden by new privacy regulations—regulations that have directly responded to the later success and proliferation of the scientific fields they contributed to. The visibilities of the past are dynamic, and are produced by scientific and cultural change; the erasures of mid-century blood genetics have helped me to better understand what I can see and why.

NOTES

1. Sheila Callender, R. R. Race, and Z. V. Paykoç, "Hypersensitivity to Transfused Blood," *British Medical Journal* 2, no. 4411 (1945): 83–84.

2. This was in stark contrast to blood transfusion in interwar Britain: Nicholas Whitfield, "A Genealogy of the Gift: Blood Donation in London, 1921–1946" (PhD diss., University of Cambridge, 2011).

3. The search for and study of blood groups was an international enterprise. By the end of World War II, many countries had transfusion services that yoked together serologists, geneticists, and transfusion specialists, who shared blood and data through international societies, organizations like the Red Cross, and local personal and professional networks.

4. Susan E. Lederer, "Bloodlines: Blood Types, Identity, and Association in Twentieth-Century America," *Journal of the Royal Anthropological Institute* 19 (2013): S118–29.

5. On the many ways that research subjects were racialized by British scientists investigating the genetic complexities of blood: Jenny Bangham, *Blood Relations: Transfusion and the Making of Human Genetics* (Chicago, IL: University of Chicago Press, 2020).

6. On the (partial) invisibility of infrastructures: Susan Leigh Star and Karen Ruhleder, "Steps toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7 (1996): 111–34.

7. Callender et al., "Hypersensitivity" (1945); "Miss F. M." was given this identifier in a second paper published the following year.

8. For thoughtful reflections on the demands of knowledge and privacy faced by historians: Susan C. Lawrence, *Privacy and the Past: Research, Law, Archives, Ethics* (New Brunswick, NJ: Rutgers University Press, 2016).

9. This quote comes from some years after the war: Dunsford to Race and Sanger, May 9, 1956, SA/BGU/F.5/3/1, Wellcome Library.

10. Fisher to Race, April 15, 1948, SA/BGU/E.7, Wellcome Library.

11. In another case, the “Kidd” group was named after a child suffering from erythroblastosis fetalis with this novel antigen: “Medical Research Council Progress Report, 1950–1953, of the Blood Group Research Unit,” 2–3, FD8/18, National Archives, London.

12. Richard Duffy was another multiple transfused patient—in this case, his name was attached to the blood group revealed during studies of his blood: Stephen Pierce and Marion Reid, *Bloody Brilliant! A History of Blood Groups and Blood Groupers* (Bethesda MD: AABB Press, 2016), 562.

13. On eponymous disease-naming practices in medicine: Andrew J. Hogan, “Medical Eponyms: Patient Advocates, Professional Interests and the Persistence of Honorary Naming,” *Social History of Medicine* 29 (2016): 534–56; disease characterization often depended on large numbers of patients over many years; blood group “discovery,” by contrast, could often be pinned to a single donor or patient. Thanks to Andrew Hogan for thoughts on this comparison.

14. The need for unambiguous, mobile, and writeable blood group names is consistent with the fact that many such terms were shortened versions of donor names, for example, “Kell” from “Kelleher,” and “Ok” from “Kobutso”: George Garratty et al., “Terminology for Blood Group Antigens and Genes—Historical Origins and Guidelines in the New Millennium,” *Transfusion* 40 (2000): 477–89. See also: Jenny Bangham, “Writing, Printing, Speaking,” *British Journal for the History of Science* 47 (2014): 335–61.

15. Serologists recounting the history of their field claim that “Lutheran” was a misspelling of the name “Lutteran” and the result of an incorrectly labelled specimen: Marion E. Reid and Christine Lomas-Francis, *The Blood Group Antigen Facts Book*, Second Edition (San Diego and London: Academic, 2004), p. 193, a story traced to the eminent Patricia Tippet: G. Garratty et al., “Terminology for Blood Group Antigens and Genes,” *Transfusion* 40 (2000): 477–89.

16. Steven Pierce, personal communication, October 2020.

17. One apparent exception to this tendency to use personal names for blood groups was “Bombay.” But though an important phenotype, it turned out not to represent a new antigen as such, and the term remained in inverted commas in Race and Sanger’s textbooks. Nevertheless, provisionally naming a group for an entire city suggests a distinctive shift in granularity when the London-based researchers attended to specimens from donors located overseas.

18. Some antigen-naming narratives can be found in *The Blood Group Antigen Facts Book*; many such narratives are passed informally through successive generations of serologists.

19. Nicholas Whitfield, “Who Is My Donor? The Local Propaganda Techniques of London’s Emergency Blood Transfusion Service, 1939–45,” *Twentieth Century British History* 24 (2013): 542–72.

20. The “postgenomic era” is a phrase used to denote genetic research after the publication of the “Human Genome Project.” The title of this digital collection presumably alluded to efforts to “crack” the genetic code: Simon Chaplin, “Codebreakers: Makers of Modern Genetics,” March 1, 2013, <http://blog.wellcomelibrary.org/2013/03/codebreakers-makers-of-modern-genetics/>. Accessed October 28, 2020.

21. Jenny Reardon et al., “Bermuda 2.0: Reflections from Santa Cruz,” *GigaScience* 5 (2016): 1–4.

22. Toni Hardy, private communication with author, June 20, 2016; August 5, 2016.
23. For a cultural history of privacy in Britain: Deborah Cohen, *Family Secrets: Shame and Privacy in Modern Britain* (Oxford; New York: Oxford University Press, 2013).
24. On the landscape of genomic capitalism: Jenny Reardon, *The Postgenomic Condition: Ethics, Justice, Knowledge after the Genome* (Chicago, IL: Chicago University Press, 2017).

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