2. Ambitions and connections

Innovation, it is sometimes said, is the product of transgression. It entails crossing boundaries, challenging taboos, finding solutions not readily accepted by established hierarchies. It requires ambition and imprudence. The progress of blood transfusion in the 1870s – and its main protagonists – may be seen in this light.

Three medical men would in the early and mid-1870s put their mark on transfusion history: Oscar Hasse, Franz Gesellius and Joseph-Antoine Roussel. Their contributions were admired but also strongly contested: they were complicated, dangerous or simply bizarre. The three men were to a certain extent outsiders, a position they tried to overcome. They were daring and ambitious but otherwise quite different in character.

I will portray these men here and trace their trajectories up to and including the crucial year of 1874. In coming chapters, we will see how their ideas were put into practical (and sometimes not so practical) use at sickbeds across Europe and the USA. Later, I will reveal what happened to them when the transfusion enthusiasm of the 1870s waned.

The sanguine local doctor

Oscar Hasse was a local doctor who from one year to another achieved world fame for his allegedly successful treatment of very sick patients with lamb blood transfusion. He based these claims on his medical experience in and around the town of Nordhausen in central Germany. Dr Hasse, one con-

temporary wrote, 'was known in distinguished circles as a highly honourable though somewhat sanguine man'.[1] Meaning perhaps, as the dictionary says, 'optimistic or positive, especially in an apparently bad or difficult situation'.[2] This may have been a useful disposition given the storm that would blow up around him.

Hasse, born in 1837, was the son of a Protestant pastor in Quedlinburg, Harz. He studied medicine in Greifswald and Berlin, where he got his doctorate degree in 1861. He then worked at the protestant Bethanien hospital in Berlin. He learnt surgical techniques, including how to make tracheotomies on young children suffering from diphtheria, a daring operation. In 1864, he moved to Nordhausen to start a private practice in this small but fast-growing industrial town (18,500 inhabitants at the time), not far from Quedlinburg. He soon had to leave, however, to assist at the age of twenty-seven, like so many other young German doctors, in the 1864 war against Denmark. A couple of years later, he joined the medical corps for the second time in the Austro–Prussian war, and in 1870/71 he took part in the Franco–Prussian War, having been promoted to *Stabsarzt*, i.e. captain in the medical corps. Thus, he seems to have made his mark as a military surgeon, receiving military honours for his work.[3]

In between wars, he fathered several sons and attended to his clinic in Nordhausen with patients both from the town and the nearby countryside. He had professional ambitions, as witnessed by the publication of the results of his and his Berlin colleagues' tracheotomy operations some years earlier, and his articles received a prominent place in a leading medical journal.[4] Hasse then turned to another daring operation of great current interest – blood transfusion with defibrinated human blood. His first two cases were presented at the 1869 meeting of the Berlin Medical Society. Thereafter, he made another fourteen such transfusions, which made him somewhat of a specialist in this, still experimental, area.[5]

In 1873, Hasse read Gesellius' just published book on transfusion with, as its author claimed, historical evidence from successful transfusions with blood from lamb.[6] Hasse was impressed. His transfusions with defibrinated blood being only partly successful, he decided, in May 1873, to try this new – actually old – remedy. When he got positive results, he contacted Gesellius who encouraged him to write an account of his first fifteen lamb blood transfusions (of which only one had obviously failed). So he did. He sent the manuscript to Gesellius' publisher in St. Petersburg before going to a conference in Wiesbaden in September 1873. Until then, he later claimed, he had felt

Figure 6. Rautenstrasse, Nordhausen, in the mid-19th century, a street where Hasse lived until 1870. Engraving by Robert Geissler (Stadtarchiv, Nordhausen, StadtA NDH, Best. 9.1.1./ B4 R.01.17).

quite isolated in his endeavours. He had no insightful colleagues to consult about this non-standard intervention. At the conference, however, his presentation was well received, and he got support and encouragement from several well-known physicians.[7]

Hasse's book, *Die Lammblut-Transfusion beim Menschen*, appeared in early 1874 at the St. Petersburg publishing company. Soon thereafter, in April, he presented his results at the German Surgical Society's Third Congress in Berlin. This led to a lively debate, but the participants reached no consensus as to the advantages or drawbacks of the method. This uncertainty did not prevent a growing national and international interest. Hasse received hundreds of letters and inquiries. The popular press got wind of the good news and patients made veritable pilgrimages to Nordhausen in the hope of receiving this wondrous new medication. Doctors across Europe asked for his support, assisted at his transfusions or were inspired by his example to perform lamb blood transfusions themselves.

The enthusiasm would reach quite astonishing heights, as in this review, by a colleague, of his book:

> Hasse's writing shows […] an originality that we find only among classical writers […] His patient histories are better propaganda for transfusion to both physicians and laymen than all previous authors' theoretical explications; they give living images. With no intention to do beautiful paintings, the author has portrayed [the transfusions] in such a way that we can see them before us, and the vividly unfolding scenes will encourage us to emulate them and their brilliant success.[8]

By Spring 1874, Hasse had made some 40 lamb blood transfusions.[9]

Despite caustic remarks by some physiologists about Hasse's scientific credentials (more about this in chapter 6), he was respected among colleagues. He was considered a serious and 'honourable' physician, his work was seen as technically adroit, convincing and bold.[10] 'Unselfish and free from personal ambition, simple and undemanding in his outward appearance, forgiving of human weaknesses, always ready to quietly help others', was the epitaph in the *Biographische Lexikon der hervorragenden Ärzte aller Zeiten und Völker* (1931).[11]

The polemicist

Was Franz Gesellius an 'honourable' man? Some contemporaries doubted it. He had, a colleague noted, '*eine eigenartige Persönlichkeit*', a peculiar personality.[12] His major publication, *Die Transfusion des Blutes. Eine historische, kritische und physiologische Studie* from 1873, was hailed by some as a solid piece of work. Others thought it an incoherent and unpleasant text, with invectives left and right, falsified quotes, faulty and misleading statistics.[13]

Gesellius was three years younger than Hasse, being born in 1840. The son of a physician, he studied medicine in Greifswald (where he was asked to leave after a duelling incident), then in Berlin and Breslau, where he obtained his exam in 1864. He moved to St. Petersburg, which had a sizeable German community. It is not clear whether he practiced there as a doctor. He wrote and lectured on various subjects, including the need for public urinals and the influence of weather on public health but his far-flung ideas were often greeted with ridicule. He became interested in blood transfusion, invented an odd apparatus for the extraction of capillary blood, and then wrote his 1873

history of transfusion leading up to an enthusiastic defence of lamb blood transfusion.[14]

When Hasse, inspired by Gesellius' book, contacted him, he suggested that Hasse should publish his results with his publisher in St. Petersburg. Hasse did not know at the time that it specialised in theatrical publications, a fact that would later earn him some mockery. After difficulties and delays (Gesellius misleadingly changed the title), Hasse's book finally materialized in 1874.[15] So did a small booklet by Gesellius on the same theme and with almost the same title, *Zur Thierblut-Transfusion beim Menschen*. He had by then performed a couple of lamb blood transfusions himself. They were only moderately successful, something that did not prevent him from considering the operation useful, both in civil and, as we shall see in the next chapter, military life.[16]

Hasse and Gesellius had studied at the same universities, albeit at somewhat different times and they apparently never met.[17] By 1875, and in light of the ongoing debate, Hasse came to regard Gesellius as somewhat of a fortune-hunter and swore to have nothing more to do with him.[18] The other two central characters, on the other hand, had both met and competed with each other. Gesellius saw Roussel in action, for example in February 1874, when he was present at one of the Swiss doctor's public demonstrations of his transfusion technique.[19] A couple of weeks later, they both entered a transfusion competition in St. Petersburg.

At stake was which instrument the Russian military authorities should choose for the army, an important decision since it promised both fame and financial rewards. Some twenty contestants showed their different procedures in front of members of the royal family, ministers, ambassadors and medical staff from all major hospitals of St. Petersburg. Gesellius' performance turned out to be both tumultuous and fatal. After numerous difficulties, a patient suffering from phthisis received blood from a sheep for about ninety seconds; he reacted violently and died a few days later. The attendant experts were appalled. Roussel's transfusion, also with blood from a lamb, was on the other hand (he reported himself) greeted with applause.[20]

By then, Gesellius' erstwhile collaborator in transfusion, Oscar Heyfelder, a German physician who was a medical officer in St. Petersburg, had transferred his loyalties to Roussel. Heyfelder had visited Hasse in Nordhausen to learn more about lamb blood transfusion techniques but soon became an ardent supporter of Roussel's device. He assisted Roussel at several public demonstrations of this apparatus. He also used it to make some transfusions

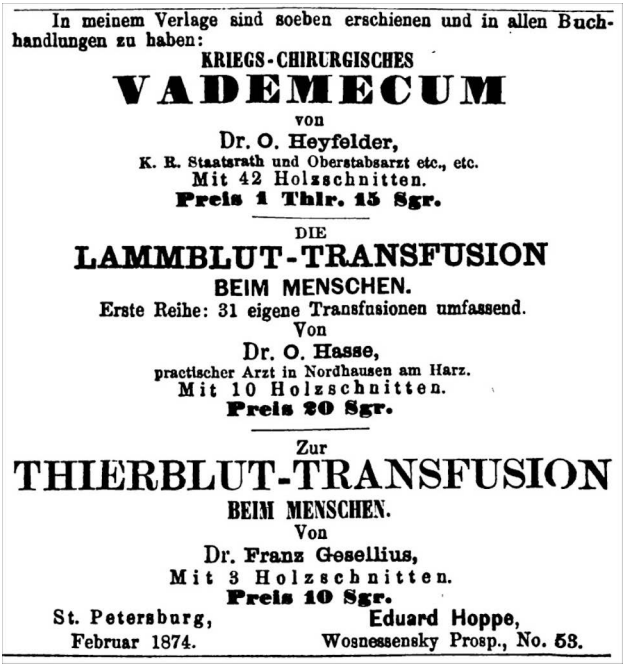
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Figure 7. Advertisement for books by Hasse, Gesellius and Heyfelder at the Eduard Hoppe Verlag, St. Petersburg, 1874 (Allgemeine Medicinische Central-Zeitung, 1874, 275). Note that Gesellius' small pamphlet gets the largest text!

himself with human as well as lamb blood. He was, in fact, the officer responsible for recommending the instrument to the Russian military authorities, something that he did in quite celebratory terms.[21]

The entrepreneur

Joseph-Antoine Roussel is credited with being the most ardent advocate of blood transfusion in the late 19th century.[22] Born in Geneva in 1837, he studied medicine in Paris and then travelled the world as a marine surgeon before returning to Switzerland. He practiced in Geneva and established a clinic in

the mountains where patients, according to an advertisement, could benefit from 'hygienic and electro-galvanic treatments, cures with grapes and goat-milk, cold baths and hot air'.[23] This interest in non-standard treatments would distinguish him over the years.

Roussel was a quite ingenious inventor of medical instruments. In 1864, at the age of twenty-seven, he designed the transfusion apparatus that would later earn him fame. It had only been tested on animals when Roussel, on a winter's night in December 1865, was hastily called to the home of a young woman. She had miscarried, become unconscious and, it seemed, was rapidly bleeding to death. There was blood everywhere. Present at the bedside were only the girl's sister and a midwife.

Roussel has given several dramatic accounts of what happened then. I have merged them in the passage below.[24]

> No breath, no pulse, no consciousness, but I could hear a faint sound from her heart and decided to try my apparatus. The sister immediately offered to be the blood donor. The various parts of the instrument were assembled, the patient's bloodless vein found with some difficulty, and the donor's vein punctuated. The blood now rushed forward into the dying girl. Nothing happened and I was seized with a terrible anxiety. More pressure on the transfusor's pump and, behold! The girl's heart began to beat somewhat more noticeably. I slapped her face, breast, stomach with a towel immersed in cold water. Finally, the girl's cheeks reddened somewhat, her nostrils widened and suddenly, she took a deep, prolonged and noisy breath. She then had a violent and bloody cough. Still, she did not move. At that very moment, her sister fell brusquely to the ground, fainting more from emotion than from having lost some blood.

The operation was now interrupted, but Roussel calculated that he had moved enough blood, almost 320 grams, into the girl. She regained consciousness, her heart beat more strongly, her lungs moved. She had a stunned look in her yes, as if 'returning from another world'. Soon she smiled, said some words to her sister, and drank half a glass of the warm punch offered by Roussel. Some weeks later she could leave her bed. She later married her lover, and when Roussel saw her she was in excellent health.[25]

Given the particular circumstances of this case, Roussel did not write about it until ten years later and only twenty years later did he reveal why. The situation had arisen, not from a miscarriage but from an abortion, an intervention that in Geneva was punishable by law. The case had been taken

Figure 8. A blood transfusion with Roussel's instrument (Niemeyer 1874, 61).

to court and the midwife was expelled from the country.[26] Roussel had tried to publish the successful experience with his apparatus at the time, but the publication was suppressed, due, Roussel claimed, to the intervention of a rival.[27] Accusations of unfair competition, obstruction and counterfeit would, indeed, follow him and his apparatus throughout his career.

This first dramatic experience caused Roussel to change some aspects of his instrument. In 1867, he presented it at the Exposition Universelle in Paris and, in 1870, just before the war, he demonstrated it to the French War Administration but with no success. He would later mourn the lack of interest since 'the lives of thousands of wounded men might have been saved if the value of transfusion had been fully recognised.'[28] He tried again, unsuccessfully, in 1872, blaming the failure on his lack of influential patrons and connections in France.[29]

Roussel's Austrian colleagues were more interested. In the early 1870s, Roussel spent two years in Vienna perfecting the instrument. He then went on a veritable public relations tour across the continent and made more than a hundred public demonstrations of his apparatus to military and civil authorities as well as to the general public. His transfusions, too, were often public affairs with hundreds of spectators. There, he performed like a life-saving magician 'in the presence of famous doctors, princes, ambassadors, generals, medical candidates and midwives, etc.', one impressed Swedish physician reported.[30] Even the Russian tsar showed an interest and visited patients saved by Roussel's transfusion skills.[31]

Things did not always work out as planned, however. In one unfortunate demonstration in St. Petersburg, and in the presence of an audience of physicians and a visiting English prince with retinue, Roussel's apparatus annoyingly failed. Its valves were not tight enough. A new instrument had to be rapidly fetched from Roussel's hotel. The German physiologist, Leonard Landois, could not refrain from commenting when he got wind of the incident. He ironically predicted that a 'future profound scientist, using all his geniality, may be able to construct an even more complicated instrument […] with a device to directly measure the amount and speed of the transmitted blood, with an attached thermometer, an electrical self-regulating heater for the blood passing by, a timer to start the whole device, and God knows what more'. Landois' own motto was instead: 'the simpler, the better'.[32]

Roussel's instrument *was* complicated. It included a cupping cup to raise the vein of the donor and a pump to let tepid water into the cupping cup and via a cannula into the receiver's vein. Then there was a lancet to swiftly cut open the vein of the donor, and a tap to let out the water mixed with some blood. With the turn of a stopcock and the help of a balloon pump, the physician could then let the blood flow towards the recipient. This arrangement, Roussel claimed, would prevent the blood from ever encountering air, thus avoiding the problem of blood clots. And the donor would not have his skin and vein cut open.[33]

Despite the complexities, some military authorities were impressed. In January 1874, the Austrian military surgeon Josef Neudörfer suggested Roussel's apparatus for use by the Austrian military authorities. It would, he argued, 'enable the safe transfusion of lamb blood to a large number of patients in only an hour'.[34] Neudörfer thus wanted the apparatus to be used with both human and animal blood. The latter was performed a couple of times by both Neudörfer in Vienna and Heyfelder in St. Petersburg. Roussel, too, twice used

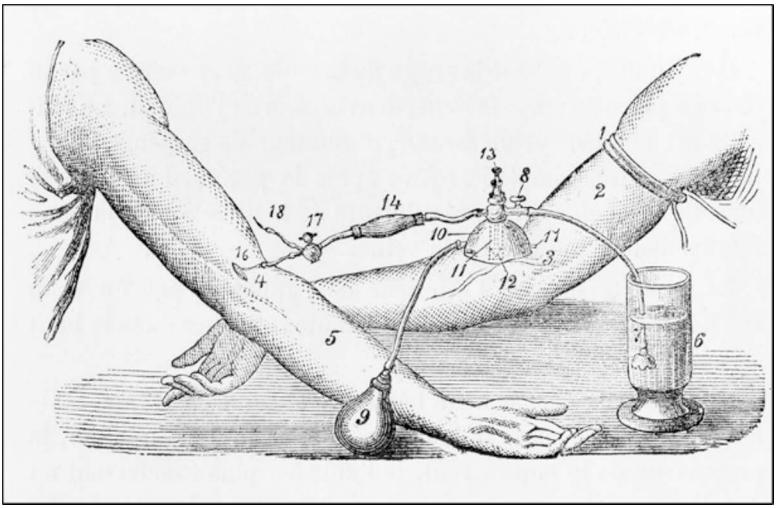

Figure 9. Roussel's *Transfuseur Direct* (Roussel 1877, 44).

a modified version of his apparatus for a lamb blood transfusion. Later, he became more averse to such use, at least with other methods than his own.[35]

In early 1874, after his successful demonstration, Roussel got his instrument recommended for use in the Russian army. This was important, since the Russian authorities would now manufacture the device in such large numbers that Roussel could use them for further demonstrations and sales. Perhaps other armed forces, including the French military, would be interested, at last? I will return to Roussel's efforts in this area.

The context

These three physicians – Hasse, Gesellius and Roussel – were different in character and social position. All three, however, were more or less marginal to the hospital- or university-based establishments of their time. In fact, only Hasse was an integrated member of a national community of physicians. It is unclear whether Gesellius practiced at all as a doctor, and Roussel was a cosmopolitan medical entrepreneur with, it seems, somewhat irregular med-

ical practice. Those following their lead held very different positions within the medical world of the time: they were private practitioners, hospital doctors, asylum psychiatrists, military surgeons… In chapter 6, I will discuss what this diversity meant for how lamb blood transfusion was judged by different medical communities.

To promote their ideas, the three transfusionists employed quite different strategies. Hasse used the channels of professional meetings and journals to demonstrate his surgical acumen and results. He was a modest country doctor, though a fairly established one, given his earlier work in Berlin and his strong military record. Roussel, being a Swiss national, was initially outside professional networks, even in France where he had studied. He therefore turned elsewhere where the interest seemed greater. He exhibited his apparatus at international exhibitions and managed to get both prizes and support from highly placed military surgeons in Austria and Russia, and eventually elsewhere. His tenacity and flair earned him public notoriety, which he used to promote his apparatus. As to Gesellius – he was even more of an outsider to established medical networks. He instead used his connections in St. Petersburg's publishing circles to make his version of transfusion known to the world.

All three were helped by the expansion of both mass and medical media during the mid- and late-19th century. 'English, French and German journals have been teeming with reports of [transfusion] cases, experiments, &c', one observer remarked in 1874.[36] Local and national newspapers, weeklies and magazines geared toward the general public described transfusion experiences in details and with some awe, as did the professional press. The number of medical journals, too, expanded greatly in the mid-19th century to report on meetings at the growing number of regional and national medical societies, as well as on medical reform and on the rapid expansion of medical knowledge. Local doctors had to keep up with clinical and scientific advance. 'Not only was there more science to cover, there were more meetings, more ideas, more politics, and more means', a later historian summarized the situation.[37]

This media – and travel – expansion was made possible by infrastructural investment and innovations: railways, steamships, transatlantic shipping, postal reform. 'Countless magazines, national and international medical congresses, personal contacts of the most varied kind have created a lively intercourse also among surgeons', reported the Austrian military surgeon Theodor Billroth in 1869.[38] Articles were translated, abstracts and reports of experiences in different countries reproduced. Thus, news of new therapies

spread surprisingly fast. Italian psychiatrists soon referred to research published in Swedish medical journals and American doctors (especially those with German origin) would imitate what recently had been tried out in Germany. More specifically, Hasse's good results with lamb blood transfusion in the treatment of phthisis and a Viennese physician's use of Roussel's apparatus to cure a mentally ill patient would shortly intrigue and – as we shall see in the following chapters – inspire local doctors far away.

Yet, as Roussel well understood, the real market for transfusion instruments was within the military. The 1860s and early -70s was a period of war. Bloody battles were fought with modern, ever more destructive weapons but under pre-modern medical conditions. The effects were appalling. Limbs were shattered, innards torn, eyes blinded. And blood was shed, gushing violently or trickling slowly towards the soldier's certain death. Military surgeons were desperate. How to save those left dying on the battlefield? Could Roussel's apparatus help? Or would the blood of a lamb carried on the back of a medical orderly bring the seemingly dead soldier back to life? To these visions we will now turn.