8. Winding up

On the morning of May 18, 1876, the robber and murderer, Gustav Adolf Eriksson Hjert, lost his head. The event took place on the gallows hill in Vittlånge, a small community in southeast Sweden. Some 200 farmers from the neighbourhood had been commandeered to form a guard with long sticks around the condemned man to prevent him from escaping. At precisely the same moment, at a gallows hill on the isle of Gotland, his partner in crime, Konrad Petterson Lundqvist Tector, was executed. Thus ended the two men's dream to emigrate to America with the spoils of their robbery.[1]

Public executions were popular events in 19th century Sweden – some 3,000 persons had gathered at Vittlånge to hear the criminal draw his last breath and watch the broad-axe fall. What happened next was described by an eyewitness: 'A thick stream of blood gushed forth from the severed vessels and, in that very instant, several persons from the crowd rushed forward provided with glasses and spoons to catch the blood'.[2] The blood's vitality, according to the folklore of the time, could cure a number of severe illnesses: epilepsy, rickets, rabies. That was why the sick jostled at the scaffold with their mugs, pots and rags to gather the headless body's warm stream of blood. It was a not uncommon sight at executions in Sweden and elsewhere in northern Europe.[3]

Here is one account out of several hundred such collected stories from the south of Sweden:

> When a murderer was beheaded, a person could be cured from epilepsy by drinking three tablespoons of the executed person's blood and then walk backwards from the scene, as many steps as possible, since that many years you would be free from the disease […] Normally you tried to walk 100 steps backwards to be certain of being healthy for the rest of your life.[4]

Sometimes, the authorities gave permission to approach the headless body; at other times, the bailiff drew his sabre to prevent the sick or their helpers from coming too close to the scene.

Not any kind of blood was considered effective, however. It had to come from an executed criminal, from a soldier who had died in battle, from someone who had murdered but escaped justice, or from someone who had met with a sudden death. Such individuals possessed extraordinary powers or had experienced extraordinary events. They were outside the normal; therefore, their blood had a special and healing force. To drink it, would break the curse thought to lie behind, in particular, the epileptic fits with their frightening attacks of delirium, cramps and unconsciousness. With their blood, the evil or the violently dead, would give the innocent sick their life back.[5]

***

These two executions were the last ones in public in Sweden. Three years later, public executions were banned. Further executions would, until the punishment was abandoned in 1921, take place in the seclusion of prisons; the last execution was performed in 1910. After 1876, thus, sick people could no longer drink the presumably life-giving blood from a just-beheaded murderer.

The year 1876 was also one when virtually all animal blood transfusions disappeared from the scene. This procedure, too, had been seen by many as something almost magical. Transfusions were 'strange experiments' that sometimes made the almost-dead rise up as through a miracle.[6] The opening of the artery of a lamb to let its blood pour into a patient may have been done with medical, not mystic, arguments and taken place in a quiet clinic, not in the turmoil of a gallows hill. It used syringes, cannulas and rubber tubes, not the broad-axe or the mugs and spoons of poor people. But the end result of a lamb blood transfusion was often as illusory as that of the drinking of a murderer's blood. Transfusions were strange experiments that often failed; death could not be averted.

Now, this procedure, too, would soon be history. No further lamb blood transfusions were reported from Germany or Austria, and only a few additional attempts were made in Italy to cure the mentally ill with the blood of a lamb. The last one may have been done by Dr Ernesto Dallera in Genoa; he reported having made a lamb blood transfusion in early January 1876 to a mentally disturbed woman.[7] In 1878, there were two direct lamb blood transfusions in Sweden and three on a battlefield in Bulgaria, and in 1879 there was

one in Iowa, to a woman suffering from consumption.[8] Thereafter, nothing, it seems. Animal blood transfusion disappeared from the arsenal of therapy about as abruptly as it had appeared a few years earlier.

So, too, did soon virtually all transfusions with *human* blood. This is in many ways more surprising. How could that happen?

The condemnation

On August 2, 1883, Ernst von Bergmann, the renowned military surgeon and professor of surgery, gave a celebratory lecture at the Berlin Academy of Military Medicine. He had chosen as his subject, *Die Schicksale der Transfusion im letzten Decennium*. 'The fate of transfusion in the last decade' was obviously something that engaged both him, the military and the medical audience assembled. The lecture was later referred to as the nail in the coffin of 19th century blood transfusion.

Transfusion, von Bergmann told his audience, was an operation that, until very recently, 'had been hailed as the most significant and important of modern surgery, one that would inaugurate a new era within the whole of medicine and that more than any other method had seemed capable to sustain the receding life of the wounded'.[9] Animal blood transfusion, especially, had received a triumphal reception in the hospitals and was predicted to have a glorious future within surgery. But now, the transfusion instruments collected dust, the exalted expectations were abandoned, the enthusiasm had waned.

To von Bergmann, it was particularly difficult to understand why anyone could think that animal blood transfusion – so terrifying in its effects! – was worth trying at all. Certainly, some attempts had seemed successful – at least the patients had not died! – but such clinical successes were worthless, if they did not rest upon a solid foundation of physiological knowledge. In this, as in other medical matters, science must have the last word.[10]

Von Bergmann's physiological arguments against lamb blood transfusion had been heard before, from Panum, Ponfick, Landois and others; we learnt about them in a previous chapter. But von Bergmann went one step further. Based on research done 'in the last decade', he dismissed transfusion also with defibrinated *human* blood. It destroyed the recipient's blood cells and brought about a shock to the organism. The only transfusion worth doing was one that moved blood directly from the artery of a human being into the vein of a

needy patient – but then, von Bergmann added, it was uncertain whether 'an intervention that requires so much sacrifice from a fellow human being will ever come into general use'.[11]

Von Bergmann could have quoted (but did not) the French professor of clinical medicine, Georges Hayem, a pioneer in the field of haematology. He had done extensive research on the nature of blood, and as recently as the year before – 1882 – published a more than 500-page volume about the effect on blood of various medications and therapies, including transfusion. Hayem had arrived at much the same conclusions as von Bergmann gave vent to. Animal experiments and clinical experience had convincingly shown that transfusion with animal blood was terrible. But the use of defibrinated human blood was almost as harmful. In both cases, reactions were too unpleasant, even lethal, and indications too uncertain for a transfusion to be of any clinical use. Hayem's conclusions were as categorical as those of von Bergmann: transfusion could be recommended only in cases of severe haemorrhage menacing the very existence of the patient. But since the physician then must use whole, and not defibrinated, human blood, the operation was so unwieldy that it was scarcely worth attempting at all:

> How could we ever, on the battlefield, in an accident or even in a surgical ward manage to do a whole blood transfusion to an individual suddenly close to death, when in a laboratory, where everything is organized for the operation, some of our dogs have succumbed before our very eyes before we had the time to perform a transfusion?[12]

The fate of transfusion, with human or animal blood, seemed sealed.[13]

The medical needs, however, were still there. This raises the question of what the alternatives were. To approach this issue, we must make a detour. Why do a blood transfusion at all? What exactly was the rationale for moving the blood of others into sick people? This had been a matter of contention ever since Blundell re-introduced transfusion in the early 19th century. Blood was indeed 'a very special fluid', as Goethe let Mephistopheles say in *Faust* – but what kind of fluid was it and what did it do in the body?

Understanding blood

In the beginning of the 19th century, an old *vitalistic* notion still lingered stemming from Hippocrates. Blood was one of the four central humours, per-

haps the most important one. By then, the idea that a person's personality expressed itself through the blood may have disappeared in medical circles; still, many thought that blood in itself had a life-giving capacity. A transfusion would transfer vitality in an almost magical way. This notion was expressed in the rhetoric of 'reawakening' lifeless experimental dogs and 'reviving' patients with transfusions of blood. It could be heard even in the mid-19th century. Accounts of transfusion then regularly mentioned that the donor (if it was not a sturdy lamb) was a 'robust young man', a 'flourishing young women', 'two strong seamen' and the like. This was most likely meant to underline that donating blood was not for the weak but could also be interpreted as an implicit wish for the donor's strength and vitality to be moved into the waning patient.

Over the years, a *biological*, or functional, view of blood took over.[14] The blood's recognized components were seen as separate biological entities; especially the red blood cells were essential. They had the biological function to transport oxygen from the lungs to all parts of the body and waste products back to the lungs. The role of a blood transfusion would then be to replace the missing red blood cells in patients suffering, for example, from anaemia or intoxication. It might even, some physicians argued, stimulate the production of new blood cells in the recipient. Italian psychiatrists, for example, maintained that since mental patients had a deficiency of red blood cells, a blood transfusion, even one performed with the blood of a lamb, would have a both stimulating and nutritious effect. Hasse initially saw the transfused animal blood as a curative as well as a palliative drug for a variety of afflictions; later he changed his mind to consider it mainly as a nutritious agent.

As to the other components of blood (the fibrin, the white blood cells, the platelets) physiologists were uncertain and sometimes disagreed strongly about their function in the body. Most hotly debated was fibrin. To lamb blood enthusiasts, defibrinated human blood, coming from a vein and subsequently 'beaten to death', was terrible – an argument resonating with vitalistic overtones. Physiologists took a more biological view. In the 1830s, the French physiologist, Magendie, had found that fibrin was central for blood circulation since it helped the blood pass into the capillary system. His results were contested by Panum and others, favouring defibrinated blood to avoid transfusing dangerous blood clots into the recipient, but were re-instated again as fundamentally correct by, for example, Hayem.[15]

Thus, the very same blood component could be seen as either nutritive or destructive, just as animal blood could be considered as either useful or

dangerous. Many medics agreed, however, that for blood to be harmless it should be transfused slowly and in only small amounts at a time, in line with how strychnine and morphine were administered when used as remedies.[16]

In the 1880s, a more *mechanical* view of blood came to influence medical thinking and therapies.[17] Chock and anaemia were now diagnosed as the result of there not being enough liquid in the vessels. The patient's blood pressure was insufficient to keep the body's machinery going; the blood became stagnant and did not circulate at a sufficient pace. Since blood was now considered a mere transport medium, it could be replaced by other substances to keep up the volume and pressure of the vessels and get the circulation working again. So, why not try milk, Gum Arabic or a saline solution? Milk was used in the US; Gum Arabic, here and there, and saline solutions had, with some success, been tried in cholera epidemics since the 1830s.

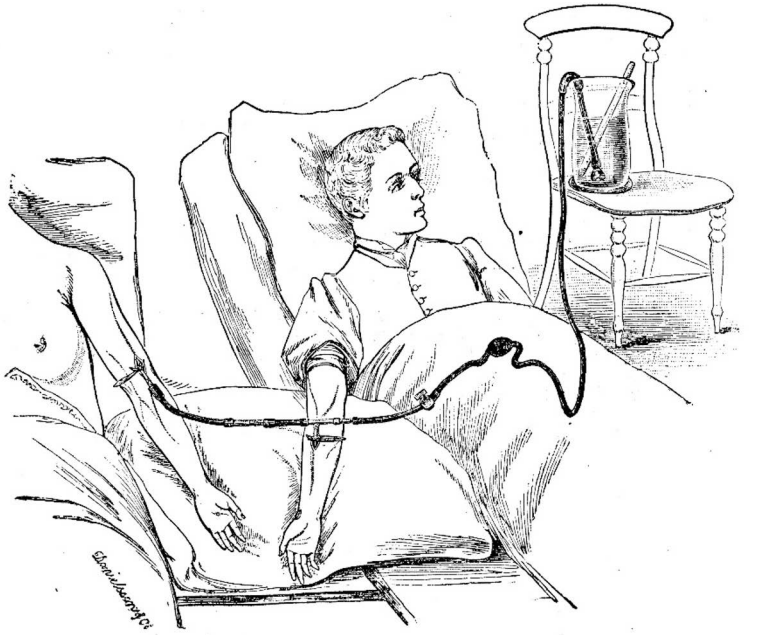

Figure 27. Charles E. Jennings' combination of transfusion of blood and a saline solution (Jennings 1896, 331).

Extensive animal studies from the 1880s onwards supported the utility of various varieties of saline solution and practicing physicians eagerly embraced this new therapy against shock, anaemia and other afflictions. A saline solution was easier to obtain and less risky than blood; it did not coagulate and did not require troublesome surgical incisions in the donor's body (since no donor was used). By the turn of the century, saline infusions prevailed, and blood transfusion was, as one historian phrased it, 'relegated to the quaint pages of medical history'.[18]

Thus, ended the 19th century story of blood transfusion. Occasional and isolated transfusions would still be performed in desperate situations. In the US there was even, in 1890, an allegedly successful transfusion with blood from a lamb.[19] But blood transfusion had not become part of standard hospital interventions; it was considered useless, cumbersome and, often, dangerous. It was seldom mentioned in medical handbooks and professional journals, and lamb blood transfusion only as an anomaly.

Lessons learnt

It is time to sum up the lessons learnt from the short and confused episode of lamb blood transfusion. So much hope had been invested in this therapy by physicians and patients alike, so much scorn heaped upon its use. Perhaps the story is typical of what happens when a new intervention is proposed within medicine: there is an often tortuous process before it is accepted or dismissed as a standard therapy, with successful trials and failed attempts.

The lamb blood experiment was unique, however, in its scope and intensity. It was no local German affair but a novelty that spread with surprising speed across the European continent and to Scandinavia, England, the USA, even Chile. It arose great public interest, was suggested by military surgeons and tried out by renowned physicians and psychiatrists. Its benefits and drawbacks led to heated discussions at meetings and in medical journals. For a while, it seemed to promise salvation for such terrible afflictions as phthisis and pellagra. Then, it was dismissed as useless by physiologists and disappointed doctors alike.

Transfusion in general was an experimental therapy during the 19th century, difficult to perform and based on incomplete physiological knowledge. Indications varied, so did methods and techniques. This theoretical uncertainty paved the way for physiological and clinical experimentation with de-

fibrinated blood, arterial transfusion, capillary transfusion – and for the re-introduction of lamb blood transfusion.

For the German medical historian, Barbara Elkeles, the central question concerning lamb blood transfusion was the naivety of doctors. Why were they so enthusiastic about a therapy that was so painful for their patients? She does not answer this question but notes the scepticism and reluctance among many practicing physicians.[20] However, and as we have seen in this book, this is not the whole story. Many doctors claimed success. They saw their phthisis patients improve, their mental patients recover their speech and appetite and their anaemic patients gain a new strength. They reported their good results and other doctors followed suit. Perhaps very little blood was transfused in each transfusion – something that may account for the patients surviving the intervention. Perhaps they would have recovered anyway, given the food and care they received in hospitals and asylums. Still, for desperate patients and physicians, and at least for some time, lamb blood transfusion seemed a beneficial, albeit often painful, last recourse – and sometimes, it worked!

The experience of lamb blood transfusion also highlights the difficulty to draw a line between, on the one hand, cutting edge therapies based on theory and animal experiments, and audacious sickbed experimentation, on the other. It is not easy today, as Elkeles notes, but it was, as I have discussed in this book, even trickier in the 1870s. The results of animal experiments were not automatically relevant for sick human beings, the physiological nature of blood and its function in the body were still largely unknown and clinical experience, too, was contradictory and incomplete. When the good results became fewer and fewer, and initial patient recovery turned into *status quo ante*, transfusion was abandoned in favour of other, less contentious, fluids than blood.

Still, the account of the rise and fall of 19th century blood transfusion cannot end with its condemnation and medical abandonment. It is indeed a story of how a contested medical therapy was used and argued about, and its social circumstances. But it is also, and importantly, a story of human ambitions, emotions and ingenuity. We have got to know some central actors involved in the struggles for or against lamb blood transfusion. Before ending, I therefore want to reconnect with the main protagonists of this story. How did they react to the denunciation and disappearance of transfusion from the therapeutic arsenal? What happened to them afterwards?

Human trajectories

By the late 19th century, the dust had settled on the lamb blood controversy. Most of those involved were either dead or had left the transfusion scene. Panum died in Copenhagen in 1885 at the age of 65. Landois, too, was 65 when he died in Greifswald in 1902. Von Bergmann lived on until 1907, Ponfick until 1913, Hayem until 1933. These men had been prominent within their respective scientific fields, had published widely and received honours of various kinds.

Of the Italian lamb blood transfusionists, Livi died in 1876, Ponza in 1879 and Manzini would soon use other means of redress for his patients in the Brescia asylum. His colleague, Rudolfo Rudolfi, got involved in various public health initiatives, especially for the care of poor children, and Lombroso became the founder of the controversial Italian school of anthropological criminology. Manzini and Rodolfo died in the 1890s, Lombroso in 1909.

This leaves us with our three central characters: the still unknown until the early 1870s but from then on internationally famous physicians, Oscar Hasse, Franz Gesellius and Joseph-Antoine Roussel. Their lives after the crucial year of 1874 took quite different paths.

By 1875, Hasse had made some 60 lamb blood transfusions. He hoped to make 200 in order to publish a more complete account of the therapy.[21] Of this no more was heard. After the attacks by Landois and Panum, Hasse returned to a more anonymous life as a local doctor in Nordhausen. There, he would become famous for saving lives through tracheal surgery, an operating skill learnt in Berlin in the early 1860s.[22] He initiated a popular hiking club for walks in the nearby Harz Mountains and became its first president.

Hasse died in 1898. He is today remembered as a prominent son of the city. There is a street named after him and an imposing memorial in the Nordhausen town park.

As for Gesellius, he abandoned transfusion altogether after his debacle at the St. Petersburg competition in 1874; his transfusion (with lamb blood) had been messy and painful, and the patient died. He left the medical field in 1875 to start a German language newspaper, *St. Petersburger Herold*, and be its chief editor. Based on somewhat questionable journalistic methods, it was a success, and Gesellius became a well-known, though disputed, figure in the city's social life. In the 1890s, he had to abandon newspaper ownership due to financial problems. In 1914, the paper ceased publication because of the war. By this time, Gesellius was long-since dead; he passed away in 1900.[23]

Figure 28. The Oscar Hasse-Medallion on the Hasse-Gedenkstein in Nordhausen (Photo: the author, May 2019).

And Joseph-Antoine Roussel? His fate and that of his ingenious transfusion apparatus were closely tied to military demands. This situation merits a somewhat longer account. It was, after all, military surgeons who had first entertained the idea of animal blood transfusion and who had eagerly defended it in the early and mid-1870s.

We last met Roussel in 1874/75 when he made energetic tours across Europe to demonstrate his apparatus both in civilian hospitals and to various armed forces. He was quite successful in this endeavour despite acrimonious comments from competitors.[24] By now, he had influential and highly placed allies in several countries. In January 1874, the Austrian military surgeon, Neudörfer, endorsed the Roussel *transfuseur direct* to the Austrian war ministry and soon thereafter, Roussel's collaborator Heyfelder recommended it to the Russian War Ministry. Here, too, it was adopted and a large number of transfusors were reportedly ordered and paid for by the Russian govern-

ment. As an added bonus, Roussel received the prestigious, Order of Saint Vladimir.[25] He then demonstrated his apparatus in Belgium whereafter the Belgian army adopted it in July 1876 and Roussel was appointed, Chevalier de l'Ordre de Léopold.[26]

Roussel's good fortunes continued across the channel. He may have lamented in 1877, 'I hope that the English Government will not be the only one which in case of war would allow their wounded soldiers to die of haemorrhage from the want of their surgeons being instructed in the practice of transfusion'.[27] But soon thereafter, and on the recommendation of several leading British surgeons, his apparatus was introduced into the ambulances of the British army and marine.[28] No real cause for complaint, thus.

The French Ministry of War was more difficult to persuade. It had waited until after the 1870/71 War to adopt a French instrument, the Colin transfusor.[29] In 1879, due to complaints about its suitability, it was deleted from the reglementary register. By then, a committee consisting of, among others, Claude Bernard had recommended the Roussel apparatus as the best alternative but it was still not acquired by the French authorities.[30] In 1881, the question came up again and Roussel complained: despite petitions from esteemed physicians and surgeons (this time including Hayem), despite the approval given by the commission in charge of the selection of surgical instruments for public authorities as well as by the *Conseil de santé militaire*, 'not a single *transfuseur direct* had yet been acquired for the ambulances and the French hospitals'. But, he added, 'I have fought for fourteen years, still I am not discouraged'.[31] Some years later, Roussel's apparatus was part of the French military supply.[32]

By this time, Roussel, seeing the decline in transfusion interest, had abandoned it for a new therapy – hypodermic injections. It could be restorative or calming or used as a purgative. In the 1880s, he experimented with himself, injecting iron, arsenic, mercury, phosphates, eucalyptol, menthol, even phosphor; he also tried out various dissolvents. Hypodermic injections could, he argued, be used for a variety of indications.[33] He invented a new type of syringe for the purpose and in 1888 started a journal, *La Médicine Hypodermique.* It was published with, what seems, some success for about ten years. Roussel died in 1901.[34]

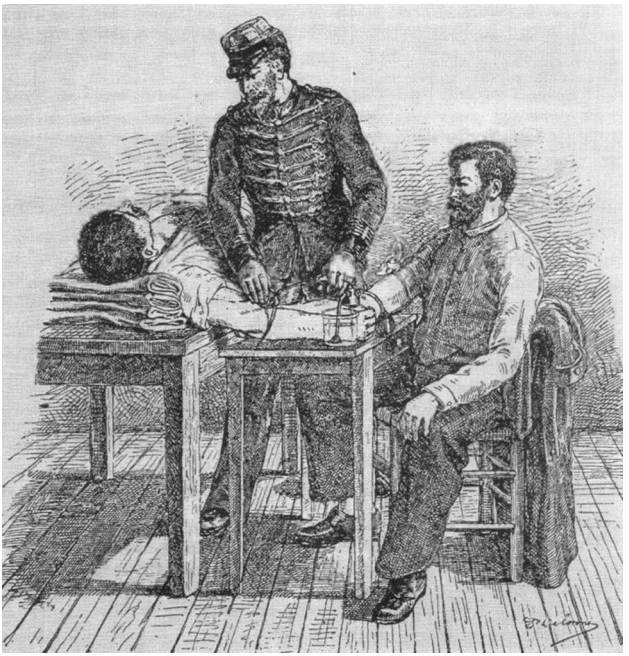

Figure 29. Blood transfusion in the French army using Roussel's instrument (Delorme 1888, 529).

No more blood on the battlefield?

One large, belligerent nation did not adopt the Roussel transfusor – Germany. This is somewhat surprising given the 'great, widespread enthusiasm for the transfusion of blood' in its military circles after the Franco-Prussian War. But it waned quickly due to condemnations by von Bergmann and others. The lamb blood alternative was relegated to the realm of the improbable and so was transfusion of human blood. Just as in the 1860s, military surgeons thought it difficult to get hold of human blood in war conditions: donors had to be healthy, rested and strong. Even the newly invented methods of injection or infusion with a saline solution seemed to them unworkable on the battlefield. Salt and hot water were difficult to get hold of there, and how would a

surgeon find the necessary time to infuse the liquid as slowly as was deemed necessary?[35]

The introduction of antiseptic and aseptic procedures also meant that secondary or late haemorrhages, upon which almost all transfusions had been made during the 1870/71 war, were now less likely to occur. A transfusion would therefore not be called for.[36] For acute interventions, some military surgeons suggested a new remedy – autotransfusion. The legs of a wounded soldier could, already on the battlefield, be tightly wound by elastic ribbons. This manoeuvre would concentrate the blood in the rest of the circulatory system and thereby keep up the pressure and give the heart enough blood to work with until a transfusion with a saline solution could be performed in the field hospital.[37]

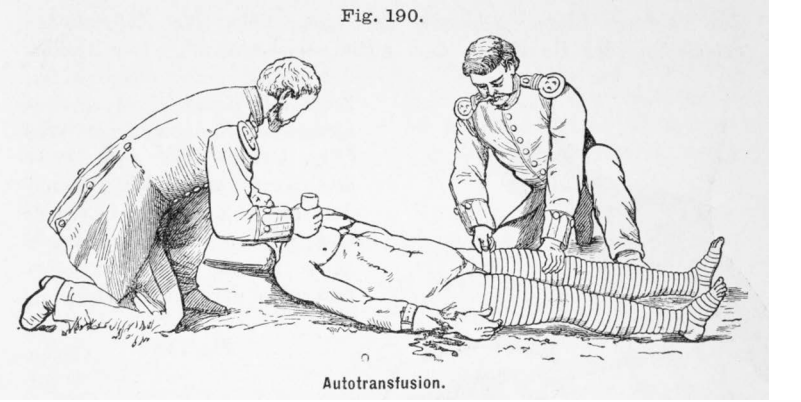

Figure 30. Autotransfusion on the battlefield (von Esmarch 1894, 117).

***

A final word, for now, about the diminishing need for transfusion on the battlefield, using a citation from the German doctor Friedrich Wilhelm Hertzberg. Referring in 1869 to the butchery of the 1866 Franco-Austrian War and the impossibility of providing all the wounded with new blood, he laconically stated:

If 'you really wish to eliminate the bad effects of bloodshed in war, well, then abolish war'.[38]

After the Franco-Prussian War and the Russian-Turkish War of 1878, this prophecy indeed seemed to have become true, at least in Europe. There were no more major wars on the European continent until 1914. Then, as we know, blood inundated the battlefields. Once again, blood transfusion returned, this time to stay. It now came in the form of indirect transfusion using bottles where the donated blood had been mixed with a citrate solution to prevent its coagulation. The procedure was introduced by Canadian, then British and American physicians, and thus *not* by the German or Austrian military surgeons whose predecessors had been such ardent advocates of blood transfusion some forty years before.[39]