ZUR TIERBLUT-TRANSFUSION BEIM MENSCHEN

BY: Dr. FRANZ GESELLIUS

A TRANSLATION BY PHIL LEAROYD

A copy of this 17 page monograph titled 'On animal blood transfusion in humans' by Franz Gesellius, written in German and originally published in St Petersburg in 1874 by Eduard Hoppe, can be read or download from the following site:

https://books.google.co.uk/books?id=0i1qZlA8eN0C&pg=PP1&source=gbs_selected_pages&cad=2#v=onepage&q&f=false

This monograph, written during the period of transfusion history when it was believed that the major reason for not transfusing animal blood into humans was because of the larger size of animal red cells compared with human red cells, is one of the publications on this subject that appeared in Europe during the later part of the 19th century.

Initially Gesellius quotes and discusses the lamb blood transfusions performed by Oscar Hasse, who he identifies as a previous supporter of the use of defibrinated blood, but who he states has recently performed a number of direct animal-to-human transfusions.* He notes that Hasse's transfusions involved the transfer of 'large amounts' of blood whilst Gesellius argues for the use of smaller (less than ~4 ounces) volumes of lamb's blood as this avoids the patient producing "blackish (bloody) protein containing urine".

The content of this monograph basically identifies that the continued use of animal blood was based mainly on the supposed improvements in some patient's clinical conditions post transfusion, whilst at the same time conveniently ignoring the obvious other symptoms (such as haemoglobinuria). This 'selective' choice of what are or are not important aspects of the use of animal blood for transfusion to humans is characteristic of its day. Gesellius provides details of two of his own transfusion cases, the first patient suffering from post-typhoid fever who was transfused with ~2 oz of lambs blood on the 28th July 1873 and a second patient suffering from consumption who was transfused with ~4 oz of lamb's blood on the 2nd November 1873. By the use of some limited clinical details the author states that both patients showed initial improvement in their physical condition, whilst also identifying that that this was not maintained and that both patients experienced the "inevitable chills" post transfusion.

The second part discusses the transfusion equipment used by the author and also by Hasse, which also provides practical details of how the transfusions are performed, focussing especially on the need for a flexible connection between the donor lamb artery and the human recipient's vein. Gesellius states that one of the major causes of the blood clotting during the direct transfusion process is the rubber tubing that is used for the connection between donor and recipient. He then describes how to expose a length of the donor lamb's carotid artery, which together with a glass cannula, he states can be used instead of the rubber tubing as the means of connecting donor and recipient.

In the final part Gesellius discusses Roussel's transfusion apparatus blatantly noting that not only does it contain black rubber but that it also requires the use of 'hot water', the procurement of which he identifies to be somewhat at odds with Roussel's claim that his device can be used in 'battle conditions'. He then goes on to argue that animal blood is preferable to human blood if transfusion is to be used during wars.

* Hasse. O. (1874) Einige Bemerkungen über lammblut-transfusion und über den apparat des Herrn Dr. Paul Schliep. *Berliner Klinische Wochenschrift*, 11, 89.
https://books.google.co.uk/books?id=0kjlAAAAMAAJ&pg=PA43&source=gbs_selected_pages&cad=1#v=onepage&q&f=false

I have produced a translation of this booklet into English to enable its content to be accessed by a wider audience. Whilst I am obviously aware that instantaneous computer generated translation is available, this process struggles with accurately reading the original text and specialist terminology, as well as producing a 'colloquial style' not always representative of the original text. I have not therefore used this methodology and have taken great care in accurately identifying the original text and producing a representative translation. In addition, an 'automatic translation' may either purposely or inadvertently alter the wording to 'make it read better' but in doing so there has to be an element of interpretation involving something on the lines of 'I believe that this is what the author is actually trying to say'. I want to avoid that as much as possible and try to present what the author actually wrote and as a result the reader may find that the English text does not 'flow' as well as it could.

Although I have taken great care not to misrepresent the author's original wording I cannot guarantee that this work does not contain 'translational errors' and the reader is recommended to check specific details against the original German text. I have maintained the original paragraph settings and the text that is originally printed in italics. The original text includes a small number of references that are each identified by an asterisk and placed at the bottom of the page where they occur. I have sequentially numbered these and moved them to the end of the document so as to remove them from the bulk of the text.

Dr FRANZ GESELLIUS – BIOGRAPHICAL INFORMATION

The son of a Neubrandenburg doctor, Franz Gesellius was born on the 8th September 1840 in Malchin, Germany. After studying medicine in Greifswald, Berlin and Breslau, he joined the Greifswald Corps in 1861 and the Berlin Corps in 1862. Following his time in the army he obtained his doctorate in Rostock. Initially living in Helsinki he went to Helsingfors and eventually settled in St Petersburg. He was instrumental, together with Oscar Hasse, for reviving experimentation and research during the 1870's on the transfusion of animal blood into humans. However, when he reviewed his own and other animal-to-human transfusions for which he could find records, this showed that 56 percent of patients died shortly after the transfusion and that many other patients were not helped by the procedure. He subsequently founded the St Petersburg Herald in 1875, of which he remained editor-in-chief until his death from meningitis on the 24th March 1900 in St Petersburg.


ZUR

Thierblut-Transfusion

beim Menschen.

Von

DR. FRANZ GESELLIUS.

Mit 3 Holzschnitten.

St. Petersburg, Verlag von EDUARD HOPPE. 1874. Leipzig, in Commission bei FRANZ WAGNER.

Title page of 'Zur Thierblut-Transfusion beim Menschen' (1874)
(Image credit: Google Books)

ON ANIMAL BLOOD TRANSFUSION IN HUMANS

BY
Dr. FRANZ GESELLIUS

When I had my monograph (1) published more than 8 months ago, I was sure that it would not only be well received, especially in my fatherland Germany, but also the truth that I have consistently carried out there: “Only animal blood has the future!" would have to find active supporters.

In this opinion, based on four years of animal experiments, I was confirmed by an equally recognized surgeon, the well-known medical author O. Heyfelder, as well as by W. Rautenberg, who was so highly deserving of transfusions, since immediately after my work was published they openly and unreservedly declared themselves to be the first known for “lamb blood transfusions”, which Heyfelder immediately confirmed in a review (2). - In his war surgery work, published by the same publisher, (3) Heyfelder, in complete agreement with me, gave an excellent place to "direct lamb's blood transfusion" in the field.

However, despite these valuable approvals, the practical requirements were still missing and I expected these first from my so energetic fatherland.

I shouldn't have been mistaken.

As early as June 1873, O. Hasse from Nordhausen wrote to me about three direct lamb blood transfusions carried out according to my principle: “since I agreed with your view immediately after reading your paper. I believe that the success of these three cases will meet your expectations."

So three transfusions - not one - and carried out by a surgeon who I knew to be my opponent - a supporter of defibrination that was so praised and so strongly attacked by me - who had already carried out sixteen transfusions with defibrinated blood with complete conviction, who so selflessly and enviously gave honour to the truth here!

This was more than I expected and more than I could expect so quickly!

But that's not enough. O. Hasse was not the researcher who could stop halfway; he continued transfusing, so much so that on September 18, 1873, at the meeting of German natural scientists and doctors in Wiesbaden, he was able to report on twelve direct lamb's blood transfusions, which he carried out with the most brilliant results - which caused a great sensation. (4)

With that, the ice was now broken and Hasse had the great merit, which cannot be appreciated enough, of having introduced direct lamb's blood transfusion into practice.

But Hasse's achievements are far from exhausted.

Hasse also became the founder of a new, surprisingly successful therapy against a terrible tyrant of humanity: pulmonary consumption. A therapy that, thanks to its almost miraculous effect, completely overshadows everything else that has been used against this disease.

The medical histories that Hasse wrote down in his groundbreaking work (5) are true triumphs for “direct lamb blood transfusion”.

In the same work, Hasse shows that direct lamb's blood transfusion is intended to bring about such an energetic change of mood in those cases of caries with poor pus formation, which are so desolate because of the high anaemia and exhaustion, and where resection therefore has such sad results that a bad pus becomes a “pus bonum et laudabile” and so the natural healing process can come into its own.

How often would resection or even amputation be rendered unnecessary by direct lamb blood transfusion?

After such colossal successes, it is understandable that Hasse performed a direct lamb's blood transfusion on a woman with tabes dorsualis with paralysis agitans. The strangest physiological phenomena occurred. Symptoms that are extremely promising for this otherwise hopeless disease, namely: *tonic cramps in the muscle groups that have been completely paralyzed for four years*. The case, of course, ended fatally after a few hours

due to a strange increase in temperature of 42.8°C, but, it gives both the specialist physiologist and the neuropath a lot to think about and research. I am convinced not to say too much - I completely agree with Hasse on this - that if, given the opportunity, one were to give a Tabes patient only one ounce of lamb's artery blood at a time, then on the same day after the heat stage is over, the second, third and fourth ounces, the success is not a lethal one, instead with such caution a lasting recovery should be initiated.

With great difficulty, as stated in my monograph, I had determined from animals how much foreign blood could be transferred directly before blood-coloured protein-containing urine appeared and I had similarly concluded that one could transfer 4 ounces of lamb's blood directly into a human without depletion before such troubling symptom occurs. Having been made fearful by Panum (6), I considered the occurrence of blackish (bloody) protein-containing urine to be so dangerous that it must be avoided at all costs. But Hasse threw this theoretical fear overboard. He transferred so much lamb's blood to each of his patients that this phenomenon occurred in several of them on the same day, only to disappear permanently the next morning. This was a very important advance for direct lamb blood transfusion; Hasse even goes so far as to intentionally pour so much lamb's blood into all of his transfused patients that not only do they not become apnoeic, but they even become dyspnoeic and cyanotic.

As Heyfelder, who was present at a lamb's blood transfusion carried out by O. Hasse in Nordhausen, told me that he was very afraid for the patient's life when he saw such disturbing symptoms (apnoea, dyspnoea, cyanosis) with heavily overflowing veins extended to such a degree due to Hasse's transfusion.

Without knowing Hasse's method of transfer, on July 28, 1873, I and my esteemed colleagues O. Heyfelder and W. Rautenberg, carried out the direct animal blood transfusion - the first ever in Russia - from the external carotid artery of a very fatty adult ram, to the printing company owner Fedoroff in St. Petersburg. This was a desperate case. The 35-year-old man had suffered from typhoid fever years ago and then pneumonia; and is said to have never fully recovered from these illnesses. He has been suffering from vomiting for a full three months, so much so that he finally vomits everything he eats or drinks after a few moments, and in the end he doesn't even keep small portions of ice water down. The patient is emaciated to the point of a skeleton; pulse: 116 - 120; respiration: 32 - 36; temperature: 38 – 39.8°C; between the 3rd and 5th ribs on the left, dullness and bronchial breathing; fleeting rhonchi throughout the lungs; liver and spleen not insignificantly enlarged; kidney area very sensitive; bronze-like colouring of the skin; colossal anaemia; extreme weakness; wishes himself dead; abdomen soft, no tumours to be found there. At 2 o'clock in the afternoon the direct transfusion. Unfortunately, the patient received only a small amount of blood, about only 2 ounces into the cephalic vein of the right arm. The success was nevertheless excellent; immediate surge of strength after the chills and the brief heat stage; decrease in temperature to normal; pulse 80; respiration 24; particularly noticeable is the complete cessation of vomiting, which had lasted for 3 months; he digested well and kept down the food and drinks he consumed almost greedily. Unfortunately, the success was short-lived; after 12 days, the incurable vomiting of the food and liquids he had consumed set in again with the same violence and since, despite all my efforts, I was unable to persuade him to have a second transfusion, saying that "God had decreed his death," death occurred in a full-blown attack of collapse 3 weeks after the “direct ram blood transfusion”. The section I urgently requested was refused.

We (Heyfelder, Rautenberg and I) performed the second direct lamb's blood transfusion on a 19-year-old phthisist from the practice of our colleague Dr. Lewis in the same hydrotherapy facility.

The case was also a desperate one. The young merchant, named St. André, comes from a “consumption family”; his father and mother succumbed to this illness at an early age; the patient's weakness was excessive; both lungs, especially the tips, with large island-like condensations; almost bronchial breathing throughout; the elongated neck is studded with highly developed scrophulous glands; severe emaciation; evening fever of constantly 39.6°C; then pulse 120; respiration 38; in addition, a two-month-old, extremely painful and

persistent neuralgia sciatica, which makes a mockery of all treatment, not only does not make any and all movement completely impossible for the patient, but does not even allow him to cough, which is all the more tormenting for him since during the day, as well as during sleepless nights, he is afflicted by attacks of sticky cough that cannot be suppressed, sputa mucous - purulent; plus strong, debilitating hectic sweats at night. This young man's life was a downright plague.

On November 2nd, 1873, out of caution, we let very little blood, namely only 4 ounces of blood, into the median vein of the left arm of the seriously ill patient from a strong 4-month-old lamb.

The success was excellent. The temperature is normal even in the evening so far; the pulse remained 75-80 beats, the respiration 20-24, for a full 3 weeks; the appetite became quite excellent; slowly but steadily his painful neuralgia sciatica left him, so that he can now leave his bed for several hours and walk around the room to the amazement of those around him. Even though his current favourable condition hardly bears any resemblance to the desperate condition before the transfusion, I cannot hide from myself that a second transfusion would be appropriate in order to make him completely and more quickly healed, since in the evening, albeit to a much weaker extent than before the transfusion, the night sweats have returned for about 8 days and the pulse has accelerated in the evening, despite a normal temperature of 36.8°C - 37.2°C, namely 98−100 pulse beats.

As soon as I have obtained the patient's consent, I intend to carry out the second direct lamb's blood transfusion on him as quickly as possible. (7)

I have included both briefly sketched case histories here because they prove conclusively how important it is to infuse as much lamb's blood as possible into patients of this category. These prove just how right Hasse is acting when he does not interrupt the inflow of the lamb's blood until all the veins in the body are brimming with the foreign blood, regardless of whether the symptoms such as apnoea, dyspnoea, cyanosis occur, which is so temporary after a few minutes and is of course not pleasant for the patient, because it would be like carrying owls to Athens if one didn't want to conclude from my case histories that the success in both cases would have been even more blatant and lasting if the patients had received more blood.

Here too one must follow the energetic hatred. An exception should only be made if the heart is very weak.

There is no question in my mind that Hasse, on average, underestimates the amount of blood that flowed in during his groundbreaking transfusions (L. c.). I believe that at least ¼ more blood enters the vein from a lamb in the first minute than in the second, because the animal heart has more propulsive power in the first minute than in the second and because it is impossible for me to think, based on my experiments, that such stormy phenomena can occur in adult humans if less than 4 ounces are allowed to enter.

Physiologically as interesting as it is puzzling, but explained very astutely by Hasse (L. c.), it is that all of his transfused patients complained of back pain and especially of pain in the sacrum. Our two transfused patients did not complain about this because they received less blood.

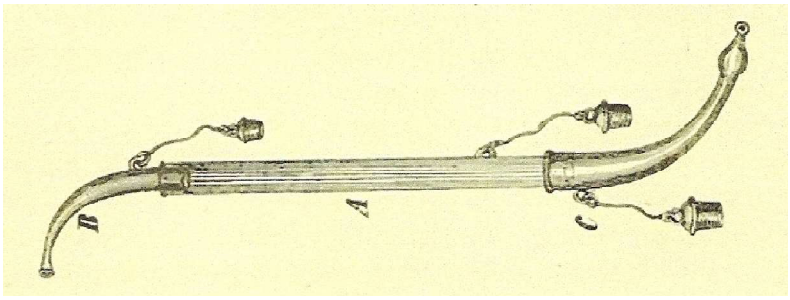
While the urticaria rash almost always occurred the next day in those transfused by Hasse, this symptom did not appear at all in the first of our transfused patients (Fedoroff = 2 ounces of lamb's blood); with the second (St. André = approx. 4 ounces of lamb's blood) exactly on the 21st day and lasted 2 full days and nights; however, both had the inevitable chills shortly after the transfusion.

In my experiments with lamb's blood in dogs, stated in my monograph, I always used two very short, silver cannulas that were ground precisely to each other, since I realized that when transfusing lamb's blood into people it was absolutely important to see the overflow from the outside I just looked at the glass interposition tube in a more exited monograph.

This somewhat clumsy device was now also used for our first transfusion (Fedoroff). Unfortunately, we found that it was very impractical: 1) because it was stiff and not movable - such an apparatus absolutely has to be movable - otherwise the slightest movement of both the human and the animal; in the case of the cannula integrated in the vein - this is very

important − is involved, the vein becomes too irritated and therefore the risk of phlebitis comes too much to the fore; 2) because the lamb's blood coagulates easily in the uncovered glass tube due to the colder external temperature. In fact, the clotting occurred, which is why our sick man Fedoroff only received 2 ounces of lamb's blood.

Fig. I



A. The glass interposition tube.
B. The silver cannula for the animal artery
C. The silver cannula for the human vein

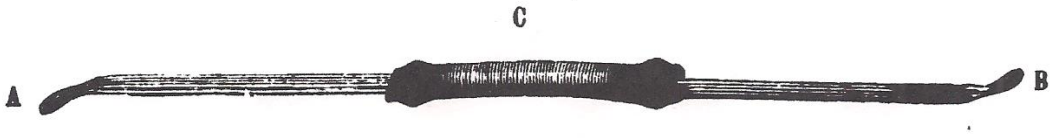
But Hasse's transmission apparatus depicted in his work, even if it is much more practical than the one I have specified, is, in my opinion, absolutely not without errors, as I will, I believe, convincingly prove in the following.

In the interest of a good cause, Hasse will forgive me if I unfortunately have to react negatively to the apparatus he specified and used. Nowhere is the unvarnished truth more appropriate than specifically about devices that are used for transfusions, because faulty devices endanger human lives. The honest saying of my teacher Middeldorpf, who died too early, which I put at the top of my monograph, is really appropriate here:

> “Truth in our science”
> “Conscientious in serious art!”

Hasse’s apparatus therefore consists of 2 glass cannulas, one for the animal artery, the other for the human vein, and a rubber interposition tube approximately 6 centimetres long; each of these cannulas is 7 centimetres long; the apparatus, fully assembled, is exactly 14 centimetres, or 7½ English inches.

Fig. II.



Hasse’s apparatus.

A and B. Glass cannulas for vein and artery.
C. The rubber interposition tube

In my monograph, which has already been mentioned here several times, I broke the rod about the use of rubber devices for transfusions because of the advance for easier clot formation; I regret that, despite Hasse, I have to completely uphold this veto.

We carried out the transfusion of the sick St. André using the apparatus sent to me by Hasse. We had placed Hasse's apparatus in hot water and finally filled the tubes with a warm, weak sodium solution, just as Hasse had done; I had tied one of them with a closed

rubber tube attached to it into the carotid of the lamb, which I had dissected, and covered this apparatus with a bladder filled with hot water. After this had been done, Heyfelder, after using Richardson's Aether-Douche, with his usual skill, painlessly and almost bloodlessly, completely exposed the median vein through a single 1½ inch long cut, after which Rautenberg quickly cut transversely across the lumen of the vein with the scissors curved, and the cannula, which was lying next to him in the warm water and filled with a weak sodium bicarbonate solution with a closed rubber tube attached to it, was brought into the vein, which Heyfelder immediately tied up. All this was the work of a few seconds with such tried and skilful hands. While I gave the necessary direction to the short board on which the lamb was tied, even with such assistance the transition was achieved in a few seconds. The sodium bicarbonate solution immediately went into the blood and the subsequent lamb's blood flowed over for 20 seconds. Then, to our horror, the overflow suddenly stopped - coagulation! - in order to hold back the elongated piece of clot, which was possibly exaggerated by the strong animal heartbeat, I immediately blocked the vein using digital compression, at the same moment my colleagues, who had been tried and tested in many dangers, removed the cannula from the vein. No blood flowed from Hasse's apparatus, which was now hanging freely from the lamb's carotid artery, an undeniable sign of coagulation. So we had no choice but to integrate a second Hasse reserve apparatus in the manner previously discussed. This time, however, we wrapped the rubber tube with a cloth soaked in hot water and continually poured hot water onto this cloth and only in this way did we manage to transfer approximately 4 ounces of lamb's blood.

Where did this rapid coagulation actually come from? It could not possibly have been due to the length of time, because with such assistance it was extremely minimal; so it can only have been due to the slight coagulation of the rubber interposition tube, which was not initially doused with hot water, because the cannula in the animal's artery as well as that in the human vein are kept sufficiently warm by the animal heat. All of this is certainly incontrovertible from the standpoint of logic. So, the lamb's blood first coagulates very quickly in the rubber tube.

What an unpleasant perspective to be able to lose a patient in an instant due to such a slight clot formation in the rubber interposition tube during the transfer! Shouldn't such an accident have already occurred recently, where the manipulation of the hot water pouring onto the rubber interposition tube remained unknown and was therefore neglected? I'm afraid we'll soon be reading about such an accident, because surgeons, other than Hasse, have recently been doing lamb's blood transfusions based on my monograph!

Death can and must occur in just a few moments during the transfusion if, despite the weakened heart strength of a sick person - as has unfortunately recently happened - one carelessly overdoes the blood from a strong, adult ram that is positioned high up. In addition to the already very strong heart strength of the animal, a second powerful factor also comes into play: the hydrostatic pressure head. One should therefore not attribute such a death to someone else's blood, but rather to disregard elementary physical laws!

I cleaned the two Hasse rubber interposition tubes we used with boiling water and allowed them to dry for about 14 days, then I cut through them and put pieces of the inner lining under the microscope and found exactly what I had suspected, tiny dried lamb's blood clots.

It is obvious why they were not removed even by boiling water, because during the transfusion the elastic tube was stretched due to strain, weight and watering, after relief, such a tube contracts again and small clots are enclosed by the numerous small ring-like depressions, from this it can be concluded that completely fresh, unused and dust-free rubber tubes should be used for every transfusion.

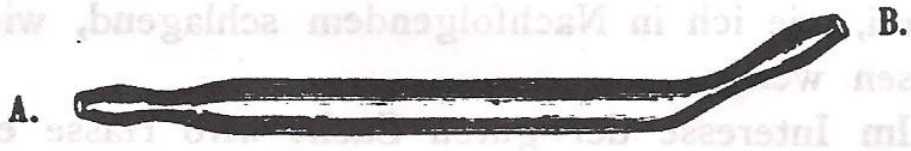
My saying: “Away with rubber for transfusions!” should have all its justification. But a flexible and elastic connection must be absolute, this is of the greatest practical importance; but this connection must be such that you don't need hot water to prevent clotting, because where in the world, for example on the battlefield, could hot water suddenly be available in an emergency? For every doctor, a medical soldier can easily carry one or two of the non-serious lambs, which must already be completely prepared for the immediate transfusion, in

a leather bag on his back, but to carry loads of hot water (in areas where there is often not even cold water) is practically completely impossible.

I freely admit that I thought for a long time before I managed to solve this puzzle in practice, and yet the solution was so annoyingly simple, as I show below.

You lay with a single 5 inch long cut, starting from the lower edge of the lamb's jawbone, to the clavicle, exposing the previously shaved neck of the lamb; the jugular vein is immediately visible, you bypass it and underneath it lies immediately on the edge of the sternocleidomastoid, the external carotid artery, it is best to separate the nerve, which is almost always close to the carotid, by tearing it with two anatomical tweezers, whereby the carotid is completely isolated over a length of about 4 inches, then tie this artery hard under the jaw of the lamb and close to this tie, use a small cross-locking tweezers to close this isolated artery for the second time - to the heart of the animal - now cut the carotid transversely between the ligation and the locking tweezers, then the carotid artery will hang out of the wound opening at a length of 4 inches like an elastic rubber tube; then a very short glass cannula is inserted into the cut lumen of the carotid artery. This cannula is ⅓ shorter than the one specified by Hasse, the only difference being that it is curved at one tip in the same way, but in order to be brought into the lumen of the carotid and tied there, it also tapers in the shape of a spindle, which end is not curved, but is straight. The following figure will make what has just been said clear.

Fig. III.



A. The tip, which is tied into the carotid of the lamb hanging from the wound.
B. The tip that is placed into the human vein.
(Natural size)

Then bring the lamb’s neck hard up to the arm of the person to be transfused, open the vein as is known, remove the small locking tweezers from the lamb's carotid, immediately the arterial jet will drive the atmospheric air out of the small glass cannula and then bring this cannula quickly into the vein - the overflow will begin immediately. Inexperienced people can even cut the human vein completely, because then inserting the cannula into the lumen of the vein, which is held apart with two tweezers, is even more convenient.

It is impossible to deny that this simple modification has solved every difficulty, because: 1) You only need a single small glass cannula, not an entire transfusion apparatus; 2) The elasticity is present without the use of rubber; 3) The use of hot water to prevent clotting is completely unnecessary; 4) *You can use fully prepared animals in the field - with the cannula in the artery - and so that everything stays quite warm, you sew up the gaping wound with a few stitches and leave the cannula in the artery wound for as long as possible; yes, you can go even further by tying this tube into the other lumen of the lamb's carotid - towards the head - in order not to stop the circulation of the blood, otherwise a thrombus could form in the blocked end of the lamb’s carotid - in order to pull out the end of the cannula intended for the human vein when the opportunity arises*.

Since I have already tried these two suggestions in practice on animals, I will carry out the next transfusion using this new method. Everyone has to agree with me that there can't be anything simpler for direct lamb's blood transfusion than this small 5½ centimetre long cannula, which any glassblower can make according to the above drawing for a few pennies.

However, I would like to point out that when carrying out transfusions using this method of mine, one must ensure that the protruding carotid is not bent too much during the transfusion

due to incorrect positioning of the lamb, otherwise the blood supply from the heart would be blocked and then, of course, coagulation would occur in the kinked piece of the carotid.

In an admittedly non-medical journal, “Daheim”, year 1874, no. 4, there is a gracefully written popular essay about transfusion by Paul Niemeyer. Although my monograph and Hasse's lamb blood transfusions have not remained unknown to P. Niemeyer, as he mentions both of our names with praise, he is still a supporter of transfusions with human blood and mainly because Roussel invented such an apparatus in Geneva that, for example, on the battlefield, any military doctor, even any somewhat experienced hospital assistant or field pharmacist, could easily carry out the life-saving transfusion!

This wonderful Roussel's apparatus was awarded a prize at the Vienna World Exhibition and "this invention of the highly deserving Geneva doctor has already been considered by the Austrian Imperial and Royal War Ministry for general introduction into the official healing apparatus." (?)

This apparatus, which I have known for a long time, is made of *black rubber*, with the exception of a single piece, the cupping head, which is made of glass. The latter is now placed on the arm of the person giving blood and deflated by pumping it out using a rubber balloon. If it is seated firmly, *warm water* is fed in through a side tube in order to completely expel the air still in the cupping head. A lancet located in the outer part is then set in motion from the outside and the vein is opened. The blood comes out under water in an airless space, gradually displaces the water and continues to flow through the apparatus to the spray tube. At the appropriate moment, the surgeon introduces this into the patient's vein and now transfers a quantity of around 150-200 grams of blood in eight to ten bursts! (?)

In addition to this article, “Daheim” brings two pretty fantasy pictures “based on sketches by Dr. Roussel in Geneva.” One picture shows how a young doctor uses the Roussel apparatus, which is connected to the arm of a beautiful bloodless young woman resting picturesquely on the bed, to *thrust subcutaneously into the bloodless vein in the elbow crook of the arm*. (!)

The second picture shows us an otherwise completely desolate battlefield. In the distance are two stretcher bearers carrying a wounded man on a stretcher. In the foreground, under a tree, a wounded warrior who has fainted from blood loss rests in the lap of a robust medical soldier. A tourniquet is tied around one of the unconscious man's wounded thighs and "just holds back the rest of the blood that had recently escaped from the wound." The arm of the half-undressed medical soldier is already happily attached to Roussel's device and apparently a military doctor (if not the honest hospital assistant or the even cleverer field pharmacist) is trying to insert the tip of the device subcutaneously into the bloodless vein in the arm of the defender of the fatherland.

What an interesting picture? However, in this famous sketch by Roussel, I miss a field fire with a cauldron filled with water hanging above it, because where else did these “Emissaries of the Red Cross” get the absolutely necessary warm water for Roussel's apparatus? A spirit or petroleum flame to boil water is likely to be used in an open field exposed to any wind, but inconvenient due to rain? The surgeon must also have unprecedented skill to be able to correctly insert the device subcutaneously into a bloodless and therefore invisible vein. Since, as is well known, in war the feeling of pity among ordinary soldiers, including among medical teams, is naturally dulled by the mass misery, by the many scenes of blood, etc., will, I wonder, a single medical soldier consider himself up to this "victim"?, or perhaps Roussel wants the war ministries to order “the giving of blood” order according to regulations? Anyone who does not willingly give his blood and life in an open and honest fight for his emperor and his fatherland is a wretch, but he is absolutely not a wretch who refuses to let his blood be beaten for friend and foe if necessary - especially in war still - to die miserably of phlebitis, or possibly to retain a paralysis of the arm and, in the best case scenario, to be weakened for days and unable to work. In my opinion, even making such a request - despite O. Leisring (8) - is an inhumane attack on the health and life of those around you. Human blood transfusion will and must - thanks to animal blood transfusion - quickly become a part of the history of medical aberrations!

One could reply to me that if, in a moment of danger, noble people volunteer to give blood to a woman who has recently given birth and is bleeding to death or a person who has been suffocated by coal fumes, should the doctor not accept the offer, especially if a lamb cannot be obtained? I answer: No, one should not accept such a sacrifice, because in every house at least one mammal can be found at any moment, whose blood cells, as I have convinced myself, are also significantly smaller than those of humans. It is this animal, the most loyal and proven friend of the human race: the dog!

There is really no reason why dog's blood should not have the same effect as lamb's blood; it could even be possible that the effect of the dog's blood is still more excellent than that of the lamb's blood, for the dog's diet is as mixed as that of man's. Given the danger, I would not think for a moment about carrying out a direct transfusion with canine arterial blood. Even where, in healthy days, prejudiced and mocking comments should be made against the introduction of dog blood into the human body, dog blood transfusions will inevitably be permitted in moments of life-threatening danger. I note here that the smaller and leaner the animal, the cheaper and more convenient it is for the transfusion, just be careful and blindfold the animal's eyes and snout. The latter is for the sake of howling, the former because the animal's almost human eyes look at everyone present in a way that is too pitiful and pleading for help, which makes a deep impression on both healthy and especially sick people. For the sake of consistency, I also did blood tests on the other domestic animal - the cat. The result is that cat blood cannot be used because the blood cells are larger than those of humans.

Whether rabbit blood could be used has not yet been investigated, nor whether the rabbit has enough blood for a successful transfusion into humans and whether the heart of such a small rabbit, even with the help of the hydrostatic pressure, is strong enough to transfer the blood into the vein of a larger organism. Questions which in my opinion I think will be of interest to decide.

Be that as it may, for the sake of a larger, un-judgmental public, it is absolutely important if we first and only let lamb's blood transfusions take its victorious path. (9)

If the last words in my monograph were: "The lamb's blood transfusion will inaugurate a new era in medicine − that of blood donation!" so after just a few months, thanks to Hasse's admirable energy and activity, I have the joy of being able to change my words into:

"*Animal blood transfusion has inaugurated a new era in medicine - that of blood donation!*"

1) Franz Gesellius. The transfusion of blood. A Historical Critical and Physiological Study. St. Petersburg 1873. Published by Eduard Hoppe.
2) In the German Journal of Surgery [Deutschen Zeitschrift für Chirurgie] by B. Bardeleben, Hueter and Lücke. 1873.
3) Oscar Heyfelder. War-Surgical Vademecum. St. Petersburg 1874. Published by Eduard Hoppe.
4) Conf.: Criticism of my monograph by C. F. Kunze in the "German Journal for Practical Medicine." [Deutschen Zeitschrift für practische Medicin] 1874. No. 1: "Gesellius has the satisfaction that practical doctors have recently followed his advice and methods. This is how Dr. Hasse from Nordhausen at this year's meeting of natural scientists and doctors reported on 12 transfusions that he had successfully carried out according to the Gesellius principle and none of those present, although there were certainly supporters of the opposite principle in the surgical section that had gathered in large numbers, took a stand for it the opposite view. It almost seems as if the question of transfusion in the sense of Gesellius had already been decided and, if we are not mistaken, the present work has had a resounding effect."
5) *O. Hasse in Nordhausen*. Lamb blood transfusion in humans. First row: comprising 31 of our own transfusions. With 10 woodcuts. St. Petersburg 1874. Published by Eduard Hoppe.
6) P.L. Panum. Experimental studies on the transfusion of blood. Berlin 1863.

7) A few days ago, the patient left against my will to visit relatives in Moscow in icy cold weather.
8) O. Leisring in Hamburg. Criticism of my monograph in Schmidt's Year [Schmidt's Jahrgang], 1873, issue no. 8. Leisring's criticism is the last flare-up of the supporters of defibrination and the use of human blood for transfusion, which I have fatally affected; that's why I forgive him for all the statements he made against me, which all more or less belong to the area of "insolent sayings"; Leisring also made me very amused by finally denouncing me as a “false apostle of transfusion”; nevertheless, I live with the certain hope that I will turn this “unbelieving Thomas”, this “Saul”, into a “Paul”.
9) Apart from Hasse with his groundbreaking 21 direct lamb's blood transfusions, partly on the basis of my monograph, [theis] under Hasse's instructions, Albini in Naples, Busch in Bonn, Clüvermann in Cologne and others have undertaken "direct lamb's blood transfusions" with great success.

St. Petersburg, New Year's Day, 1874.
Dr. Franz Gesellius.

Printing House of the Imperial St. Petersburg Theatre (Eduard Hoppe),
Voznesensky Prospect, No 53.