PRESENTATION D'UN APPAREIL POUR OPÉRER LA TRANSFUSION DIRECTÉ DE BRAS À BRAS, DU SANG VIVANT ET INTACT.

By: J. ROUSSEL

A TRANSLATION BY PHIL LEAROYD

The paper 'Presentation of a device to operate direct transfusion from arm to arm, living and intact blood' by Joseph Roussel, published in 1876 in the journal *Bulletin de l'Académie Royale de Médecine de Belgique* [Vol. 10, pages 624-641) can be viewed or downloaded from the following site

https://books.google.co.uk/books?id=9m01AQAAMAAJ&pg=PA17&hl=fr&source=gbs_toc_r&cad=4#v=onepage&q&f=false

As the title suggests, this paper documents a presentation by Roussel to the 'Belgium Academy of Medicine' in which he introduces and describes his transfusion device for the direct transfer of whole blood from the donor to the patient, without exposing the blood to contact with the air and external surfaces, thereby removing the problems of the venous blood starting to clot prior to it being infused.

As such, the printed version of this presentation makes most of the sentences into paragraphs and it can therefore be somewhat disjointed to read. Roussel does however not just describe the workings and use of his 'transfuser' but also expands the presentation by identifying the clinical effects that can expected to be seen in the recipient post transfusion.

Although Roussel identifies within the text that he believes that whole blood and defibrinated blood transfusions cannot be directly compared as they involve effectively different products, he is questioned at the end of the presentation with the point that defibrinated blood is a better product (as it lacks fibrin and is more oxygenated). Given that Roussel identifies that he has been invited to talk only about his transfusion device, he states the 'he does not intend at this time to discuss the question of the advantages and disadvantages of the two methods' (i.e. of direct whole blood and indirect defibrinated blood transfusions).

As such, this relatively short paper benefits from this fact, in that it essentially describes the composition and methodology of use of Roussel's 'transfuser' for performing a direct blood transfusion.

See also:
Roussel, J. (1881) Transfuseur pour la transfusion directe de veine à veine du sang entier et vivant [Transfuser for direct vein-to-vein transfusion of whole and live blood] *L'Union médicale*, 31, 81, 985-987.
https://archive.org/details/BIUSante_90068x1881x31/page/984/mode/2up

I have produced a translation of this article from the original French into English to enable its content to be appreciated by a wider audience. Whilst I am obviously aware that instantaneous computer generated translation is available, this process however struggles with accurately reading the original text and interpreting specialist terminology, as well as producing a 'colloquial style' not always representative of the original text. 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 in accurately identifying the original text and producing a true representative translation of 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 text.

I have reproduced the original paragraph settings, line spaces within the text and the general layout as accurately as possible, though I have moved the drawing of the 'transfuser' from where it is originally placed at the end of the presentation to the beginning of the section that described the device – where I think it allows the reader to more easily follow the description of the various parts of the device.

JOSEPH-ANTOINE ROUSSEL

Very little biographical information appears to have been published regarding Joseph-Antoine Roussel other than in the references listed below, which state that he was born in Geneva in 1837 and studied medicine in Paris. He travelled extensively as a marine surgeon, before returning to Geneva where he established a clinic that promoted alternative / non-standard treatments and devised his blood transfusion device in 1864, which was initially tested on animals and first used for a human transfusion in December 1865. Roussel died in 1901.

For additional information regarding Roussel and his 'marketing campaign' see:

Berner, B. (2020) Strange Blood: The rise and fall of lamb blood transfusion in 19th century medicine and beyond. Medical Humanities (Volume 5). Verlag: Bielefeld. (See pages 35-42 and 45-48)
https://library.oapen.org/bitstream/handle/20.500.12657/39503/9783839451632.pdf?sequence=1

Sergeeva, M., Panova, E. (2020) The studies of blood transfusion and the attempts of its implementation into medical practice in 1800–1875: the fate of J.-A. Roussel's device in Russia. Medicina Historica, Vol. 4, N. 2: p.1-9
https://mattiolihealth.com/wp-content/uploads/2020/11/Med-Histor-2-2020.pdf

Sergeeva, I.M., Panova, E. (2021) Brilliant promotion for a doubtful invention – the blood transfusion device of Doctor Joseph-Antoine Roussel (1837-1901) in European medical science and practice in 1860-1880. Bylye Gody.
https://www.researchgate.net/publication/350374618_Brilliant_Promotion_for_a_Doubtful_Invention_the_Blood_Transfusion_Device_of_Doctor_Joseph-_Antoine_Roussel_1837-1901_in_European_Medical_Science_and_Practice_in_18601880

M. Roussel: I have the honour to present to the Academy of Medicine a device for performing the direct arm to arm transfusion of blood, living and intact. In 1865, I made a very happy transfusion with this apparatus, dating from 1864, in a case of puerperal haemorrhage. In 1867, the drawing and description of the transfuser were inserted in the *Gazette des hôpitaux* and the *Archives de médecine* de Paris; but I did not then have sufficient protection to be listened to in France. Even at the Exhibition, it passed unnoticed and, at the Academy of Medicine in Paris, although presented by Professor Robin, it was not examined.

This silence is regrettable; for during the wars of recent years thousands of wounded could have been saved, and transfusion would today be a classic operation, instead of still being postponed by too many surgeons.

From 1864 to 1876 the principles of the device and the method of operation have not undergone any modification; the construction alone has been slightly modified and improved by the use of hardened rubber instead of silver. This progress is considerable, for I posit as a principle, from experience, that any contact with metal, such as glass, ivory, etc., is harmful to the blood, and disposes it to coagulation, which even becomes inevitable, if this blood has been subjected for an instant to contact with the air.

The same is true of sulphured, vulcanised, grey or black rubber, a mixture of a host of foreign substances whose gases and dust contaminate and coagulate the blood. My transfuser is composed entirely of pure, natural, un-sulphured rubber and hardened rubber, a neutral body with no effect on the blood, and whose contact does not alter animal tissues or fluids.

I. CONDITIONS OF THE TRANSFUSION

In my opinion, the absolute conditions for a good transfusion are:

1) That the blood be of the same animal species and from the same organic source: from man to man, from vein to vein;

2) That it remains alive and unaltered in its most intimate composition, having undergone neither contact with air or altering bodies, nor lost its motion, temperature, gases or density;

3) The quantity and speed of flow are at the discretion of the operator;

4) That the operation is safe for both subjects.

These conditions have never been set or fulfilled; this is why the transfusion did not give the results that we have a right to expect; that attempts at operation have so often been the cause of considerable accidents which have brought transfusion into disrepute and undeserved abandonment, and that a crowd of devoted scientists have gone astray in search of the means of transfusing animal blood to man, or arterial blood of man, or defibrinated and artificial blood, or to practice the so-called instantaneous direct transfusion, in which the blood is in contact with the air for an instant.

My method and my transfuser fulfil, I believe, all these essential conditions. They have proved themselves in a number of very successful operations.

This method of direct transfusion consists:

1) In connecting the vein that will give the blood to the one that will receive it by an uninterrupted, direct motor channel, full of water; therefore empty of air well before the opening of the vein;

2) To open this vessel under a layer of water, that is to say, sheltered from the air, by means of a lancet, so as to have a sufficient stream of blood, by the simple prick of the classic bloodletting, thus avoiding the phlebitis which is certainly produced by the introduction and ligation of a cannula in the vein, as with the devices of Maisonneuve and Aveling.

Water. – The water which fills the apparatus at the time of transfusion, and in which it has been immersed, kneaded and washed, is at 20° or 25°, in order to avoid any change of temperature or density in the blood; I add a few grams of baking soda, in order to purify the inside of the device.

However, in an emergency, clean cold water can be used; this is what I have done several times without any inconvenience. This water is only used to expel the air filling the transfuser; it does not penetrate into the patient's vein, in the simple transfusion.

Drug transfusion. – But if the indication is given, we can very easily mix with the blood, in the device itself, a certain dose of medicated water in a titrated solution.

Electrified transfusion. – We can also enclose a current of direct electricity in the transfuser, and conduct it with the blood to contact with the heart itself, to awaken it in the event of apparent death. Simply connect the positive pole of a direct current to the rod of the lancet, and prick the respiratory muscles with an acupuncture needle placed at the negative pole.

II. PREPARATION OF THE PATIENT'S VEIN

In a subject anaemic by haemorrhage, the superficial circulation is suspended in favour of the central organs. The veins in the arm or leg are empty, flattened, colourless, and invisible through the skin. In a chronic anaemic, these veins are contracted, of small calibre. It is a manifest error to pretend to plunge a trocar or a canaliculated needle into such vessels, and to penetrate safely into such vessels, without piercing them further, or without losing oneself in their tunics or in the ambient cellular tissue. Using a lancet as for bloodletting and inserting a cannula into the prick is just as random; the most skilful surgeons have often missed this little operation and pushed into the sheath an injection which should have penetrated the vessel. Even on a subject whose blood mass is intact and whose vein can be inflated by the circular link of the bleeding, it still requires careful practice and particular dexterity to plunge a trocar into the lumen of the vessel. This is the difficult part of the intravenous injection of chloral, this new method of anaesthesia, which deserved to be seriously studied, since in the skilful hands of Belgian and French operators, it has, by great success, proved that chloral has the right to be sometimes preferred to chloroform, despite the opposition of the too violent antagonists, who have accused the method of accidents for which their hands alone seem to me responsible.

Fearing such a mishap, I ask that, in order to carry out a direct transfusion with the operational success that I have the right to expect from my colleagues, since I have never failed, a serious preparation of the subject's vein is carried out. This one is in a serious condition, since he needs a transfusion, and the incision in the skin of the arm in an area of two or three centimetres, the edges should not even come together by first intention, is light in the balance, if on the other side weighs imminent death.

Does the surgeon who has to save a child through a tracheotomy stop at the inconvenience of the wound to be made in the skin of the neck?

To perform the small operation that I am proposing, without fearing of thrombosis, ecchymosis, phlebitis, return haemorrhage, or interruption of the ascending venous current, an operation necessary for the complete penetration of the transfused blood, it is necessary to make a fold of the skin and incise it with a scalpel, in the direction of the vein, so as to see it clearly, but without damaging it or stripping it; prick the outer tunic with a fine erigne or tenaculum, and with the tip of small curved scissors, incise the vessel obliquely; a small V-shaped flap is thus cut which, remaining raised by the erigne, serves as a guide and allows the certain and harmless introduction of a blunt cannula which is pushed two centimetres into the vein. The finger of an assistant, placed across the middle of the cannula, fixes it and closes the small door formed by the flap falling back into place after the transfusion.

If the invisibility of the vein has required a somewhat long incision, a suture pin passed through the skin will ensure the occlusion of this vessel and its healing by first intention.

I usually choose one of the veins of the arm, which is more convenient; but on a delicate subject, a saphenous vein may be used, which, being farther from the heart and the lung, makes the impression of the jet of transfused blood less sensitive to these organs.

If the transfusion was necessary due to a haemorrhage resulting from amputation, it could be done directly into one of the veins of the stump.

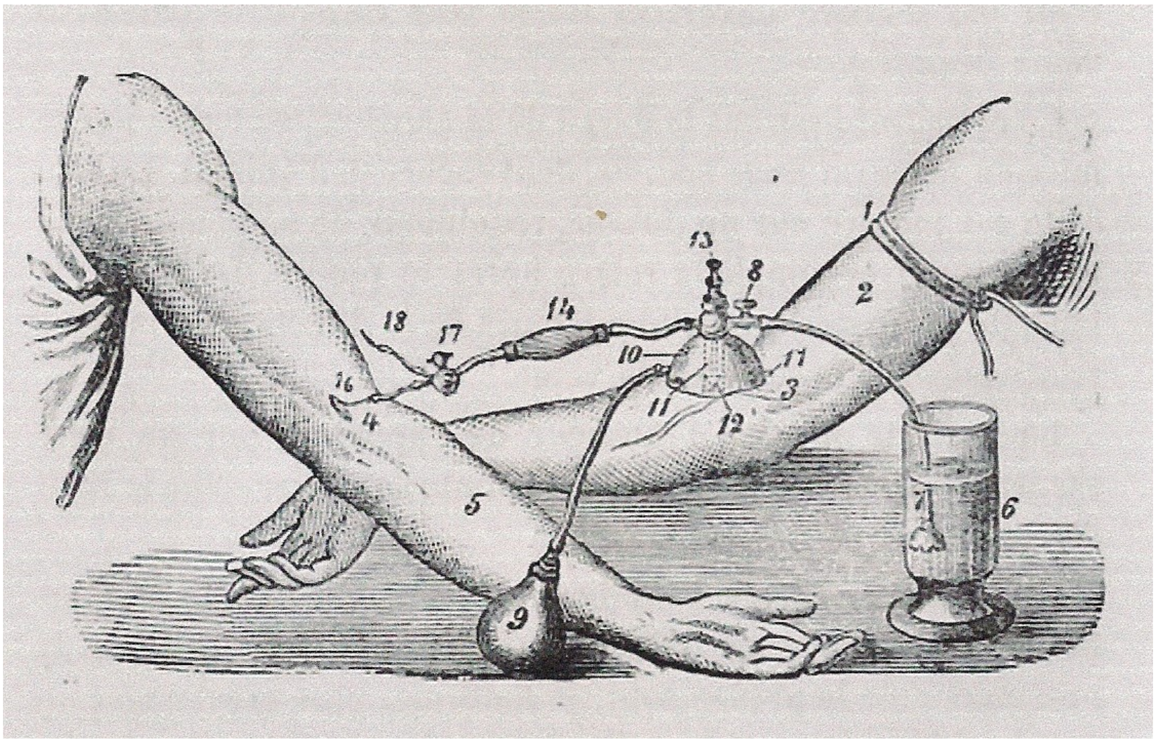
It goes without saying that before thinking of a transfusion the surgeon has already dried up, as far as possible, the source of the haemorrhage.

Temporary ischemia. – If the subject has been raised on the battlefield, bloodless, in syncope, and appearing dead, but not yet invaded by rigor mortis, one must not try to awaken him from that syncope which has suspended the loss of the last drops of blood. Temporary ischemia must be performed with the Esmarch apparatus, not only on the injured limb, but on the arms and legs free of lesions, from the extremity to the root, in order to push back to the central organs the blood which is at present useless in the limbs.

In this way, there is a tendency to raise the hydrostatic equilibrium broken by the haemorrhage; then the limbs are untied, one after the other, during the transfusion, in order to allow the new blood to spread throughout the body.

Depletive bleeding. – On the contrary, if it is a case of asphyxiation, drowning or poisoning, a wide opening must be made to the vein, even to the artery of the opposite arm, in order to make room for new blood, to eliminate as much of the altered blood as possible and to allow the heart, in cases of apparent death, to beat more easily, natural consequence of the section of an artery.

III. DESCRIPTION OF THE TRANSFUSER,



1. Bloodletting band.
2. Arm that gives blood.
3. Turgid vein to bleed.
4. Prepared vein of the injured.
5. Arm that receives the blood.
6. Vessel containing water.
7. Water aspirator bell.
8. Tap closing the aspirator.
9. Round balloon of the suction cup.
10. External envelope of the suction cup.
11. Internal cylinder of the suction cup.
12. Lancet inside the cylinder.
13. Lancet regulator cursor.
14. Pump balloon of the transfuser.
16. Cannula inserted into the injured person.
17. Bifurcation valve.
18. Cannula that rejects water outwards.

[NOTE: There is no number 15 shown or listed – PL]

The transfuser consists of a motor balloon (14) of elastic rubber which serves as a pump that sucks blood from the vein of one of the subjects and introduces it into that of the other, by an uninterrupted movement in order to avoid the slightest stoppage of blood. This oval balloon, meticulously manufactured, is perfectly polished on the inside, without any roughness that can promote coagulation. It contains 10 grams of blood, which makes it possible to measure the amount transfused very precisely, according to the number of movements of the balloon.

It is in the hand of the surgeon, who can thus assess the resistance offered by the transfused body and rush or slow down the flow of blood according to the indications.

This motor balloon sucks the blood through a rigid cylinder (11) applied to the skin. To fix this cylinder in such a way that the air can never penetrate it I have surrounded it with a sort of rigid shell which becomes a suction cup (10) animated by a special balloon (9).

This annular suction cup, which is an absolutely original design, is nevertheless the cause of the silence which was maintained for ten years by the author of my transfuser. When the *Hospital Gazette* gave the description, a manufacturer, wanting to appear to be the author of all past, present and future surgical instruments, without having understood or even seen my device, published in the same journal this complaint: “I, Mathieu, invented, a long time ago, a transfusion device starting with a suction cup, and it was a bad device; Doctor Roussel invents a sucker: so it is my sucker that he copies; so it’s nothing good etc.” It was believed without examination; he was influential then, but since... Many others besides me have had to repel his unjust claims – I wasted ten years. – The so-called suction cups of Mathieu, Moncoq and others are enlargements of the inlet tube for the blood, enlargements which are applied to the open vein, and which cease to act as a suction cup since they fill with blood. This liquid coagulates very quickly in a suction cup; Mathieu was right to say that his device was bad.

My suction cup is a sleeve outside the transfuser; neither blood, nor water, nor air can penetrate it; it serves as a stand for the device and fixes it on the skin.

The initial cylinder is opened from above, which makes it possible to choose and see very precisely the bleeding point that it is to envelop.

When, by means of the suction cup, the device is placed on the arm of the blood donor, the cylinder is closed by the introduction of the lancet holder (12).

This lancet is mounted on a millimetre screw cursor (13), by means of which the penetration of this instrument is regulated mathematically, according to the thickness of the skin to be crossed, the diameter and depth of the vein, which we must not be afraid to open widely.

The direction of the blade is changed at the discretion of the surgeon by means of two metal points attached to the head of the lancet.

The latter is driven out by a sharp blow given with the fingertips; then it rises by the action of a spring in the top of the cylinder.

But the transfuser is still full of air; if the blood were introduced, it would be altered, as it is in the Moncoq, Maisonneuve, and Aveling hematophores, placed at each end of the cannulas or trocars introduced into the two veins.

To expel this air, the transfuser must be filled with water by immersing the aspirating tube (7) in a hot water vessel (6).

This water fills the cylinder, bathes the skin and the lancet; it advances into the oval balloon and exits through the final cannulas, pushing the air inside in front of it.

These cannulas, made of hardened rubber, are of different diameters; to adapt to the calibre of the anaemic veins, the largest one (16) should be preferred, as far as possible, which is introduced closed and full of water, into the pre-prepared vein.

Between the two cannulas is a bifurcation valve which closes one by opening the other, and allows the water contained in the transfuser to flow outside.

No ligation around the vein containing the cannula: the finger of a helper is enough to fix it and prevent the reflux of blood.

The small drop of water, contained in the cannula closed in the vein, is indispensable; it prevents any introduction of air, much better than the mandrel of a trocar; in addition, it distances the blood from the person being operated on, blood which could coagulate when at rest and in contact with a foreign body.

At this moment, the wounded person and the blood donor are really united by a hermetic channel, direct, full of water, empty of air.

It is then that the surgeon closes the water suction tube and opens the vein by a sharp blow given to the head of the lancet.

The blood gushes out in the cylinder full of water, which it drives out before it, as the latter had driven out the air; this water comes out through the bifurcation with the first drops of diluted blood, and when this liquid appears pure at the bifurcation, it is enough to turn it to conduct it into the vein of the injured.

The motor balloon sends blood into the vein of the anaemic, as it draws it from the turgid vein, of which each particle has remained only less than a second outside the human vessel.

This blood is conducted through an artificial vein and heart, hermetically sealed, moist, warm and soft like vessels, far from contact with any altering body.

This blood is not modified either in its fibrin or in its globules; it has lost neither its gases, nor its temperature, nor its density. It passes from one body to another with all its original vitality. It continues to live, producing in the patient all the effects that it would produce in the vigorous man who provided it.

Transfusion doses. – To be neither in excess nor insufficient, a good transfusion in an anaemic adult must provide him with 200 to 300 grams of blood.

In the past, we stopped at lower doses, because of the malfunction of the various hematophores: syringes or 'clysopumps used; it even happened that with 60 grams formidable accidents were produced.

This dose is exceeded by the blind arterial transfusion of sheep's blood, which, as soon as it is introduced, is eliminated in the midst of a painful procession of disturbing phenomena.

In order not to engorge either the heart or the lungs of the person operated on, it is necessary to give him only 60 to 80 grams per minute, or less than one gram per diastole of the heart, a moderate quantity which restores to the anaemic organ the mechanical fulcrum of its movements, by gradually reaching the brain, and which revives and maintains the physiological excitability necessary for vital functions.

If a skilful co-operator takes care of the preparation of the bloodless vein and the introduction of the cannula, a good transfusion can, in 8 to 10 minutes, restore enough blood to a bloodless person to recall him to life.

The operation is precise and easy after studying the transfusion, and its results are heroic.

Phenomena following transfusion. – During the operation, the transfused person remained calm; if he were in syncope, the heart begins to beat again and the lungs to breathe; the face and chest, which are uncovered under the eyes of the operator, have become coloured and moistened with a light sweat arising at the roots of the hair. Along the arm, even under the armpit, the vein is seen to swell as by a pulsation with each movement of the motor balloon.

The patient experiences a current of heat in this arm which quickly spreads to the chest, face, head and entire body.

The pulse and respiration became full and deep; towards the end of the operation there may be very slight dyspnoea, with cyanosis and some excitement.

The arm being then bandaged and placed back in the bed, it is a good idea to warn the patient that he will have a shiver, and that he will then have to immediately drink a large glass of hot, alcoholic drink (rum tea).

Shivering begins 20 minutes after transfusion; it lasts 30 minutes and is sometimes violent, but never excessive. It is a sort of thrill of digestion of new blood; it is the action of the vaso-motor system distributing the blood throughout the organism which has just distended the veins. The shivering is followed by a stage of profuse sweating and general heat during which the patient falls asleep.

He sleeps for one or two hours, his face a little vulturous, his pulse and breathing agitated. The temperature, which had dropped in the skin during the shivering, to concentrate and rise in the rectum, balances out and becomes normal. When you wake up, there is an urgent need to urinate and have a bowel movement, followed by a great desire to eat.

The urine is neither bloody nor albuminous, if it was not previously; but it is abundant, fragrant, straw-yellow and loaded with normal salts.

The stools are abundant, often old; they indicate the awakening of a lazy organ.

It is the time to change the patient's bed, to inspect the dressing of the operated arm, and to congratulate each other all together on the common happiness.

It is necessary to give food to the patient who asks for it, and to encourage him to drink another cordial.

Soon he falls asleep again for several hours, and his sleep is calm and restorative. When he wakes up, he asks for food again. If all is well, the breathing should be ample and easy, the pulse full, the skin hot and clammy, the intelligence whole.

Very rarely has a little dejection been observed at this moment; an excellent moral or physical stimulant, a glass of Champagne wine, for example, will soon have raised the strength.

Since my too recent arrival in Belgium, I have not yet had the opportunity to give the transfusion, despite the good will of the various heads of hospital departments; I am happy to be able to thank them publicly for their warm welcome. I regret that I do not have some good opportunities to operate at hand; but I believe that I should not compromise my nascent method by employing it on subjects that are manifestly incurable, because of the diathesis or the lesion of an important organ from which they are affected.

I do not have to defend transfusion here; everyone admits that transfused blood can prevent a bloodless man from dying.

As for the other indications, they will present themselves naturally when a good operating method has been adopted.

It is therefore simply a new method and *modus faciendi* that I have the honour to present to the Academy. I hope that, by the demonstrations I have made here and elsewhere before your eyes with human blood, taken from the arms of devoted people, I have been able to prove to you that the blood passes through my transfuser, preserving its fibrin, its globules, its temperature, its gases and its density; that it springs from the final cannula as pure and alive as from the vein itself, and that it is very easy to conduct it in this state, in the desired quantity and with a known velocity into the vein of the patient; finally, that I take from the devoted man only the quantity that I want to give to the patient, and that I take it by a simple classic bleeding, and therefore quite harmless.

This is only what I wanted to submit to your appreciation.

To doctors who show some hesitation in adopting my hidden lancet and its mechanical movement, I would point out that this is the only possible procedure if one wishes to be absolutely certain that the blood will not be in contact with the air, either before or during the transfusion; for me this is a crucial point, and it is the only way to be protected from any cause of coagulation and any loss of the precious liquid.

I could practice bleeding by hand and fix the cylinder wrapped in its suction cup on it; but, except for phlebitis, I would make the same mistake as those who introduce a cannula into the vein. Even if the device were filled with water, at the first jet, the blood would be in contact with the air, which, by making it adhere to the walls of the transfuser, would expose it to coagulation in part.

Moreover, by moving away from the artery and observing the lancet, we run no risk. To be extra careful, one can successively lengthen the lancet on the spot and dissect layer by layer; but one must boldly prick a vein of large calibre, and even if it were to happen that it was pierced, which has never happened to me, there would only be an absolutely insignificant wound, in view of the great goal to be achieved.

To the supporters of defibrinated blood, I would respond that there is no parallel to be drawn between two different things. They do not perform *blood transfusions*, because transfusion means the passage of blood from one body to another, *without interruption of current*; but their artificial liquid is no longer blood. To use truly scientific and grammatical terms, they must say that they practice the intravenous injection of a medicinal liquid prepared with blood.

They raise the difficult question of the best artificial fluid to inject into the veins: will it be defibrinated blood, plain or with added salt? Will it be pharmaceutical artificial serum or albuminous water, or alcoholic water, or just milk?

These studies are currently being carried out in physiology laboratories in Germany, England and Italy; they are important, and I am far from wishing to criticize them; I declare myself incompetent for that.

I restrict myself to the direct transfusion of living human blood, the only operation in which I place my confidence, well justified, I think, by the good results I have obtained in the numerous researches to which I have devoted the greater part of my time.

Mr. Burggraeve was given the floor on this communication. He first points out that the question it raises is extremely important. Mr. Roussel does not defibrinate blood; however, according to Mr. Burggraeve, it is a question of life and death.

He recalled that recently a transfusion of defibrinated blood was carried out in Ghent, using Mr. Casse's device, which is very simple, and that this operation, carried out on a person who no longer gave any sign of life, as a result of a haemorrhage caused by a railway accident, was perfectly successful.

Mr. Burggraeve is of opinion that there is danger in introducing non-defibrinated blood into the vein of an individual, as clots may form in the vessels to which they are drawn, and produce embolisms very compromising to the patient.

What does it take, adds the honorable member, to revive an anemic person? Red blood cells must be introduced into the veins; these are the only elements that can spread the oxygen that is necessary throughout the economy. Fibrin is useless, he says, and can pose a serious danger. It is therefore necessary, in his opinion, to extract it beforehand from the blood to be transfused.

In support of the considerations presented by Mr. Burggraeve, Mr. Thiernesse observes that, in Mr. Roussel's transfusion process, it is necessary to take into account not only the disadvantages pointed out by his honourable colleague from Ghent, but also of the circumstance that venous blood is infused, therefore very impure, and whose globules, stripped of oxygen and impregnated with carbonic acid, cannot revive the body. To achieve the goal, it is necessary, he says, that these anatomical elements are as oxygenated as possible, and this is what is obtained naturally by defibrinating the blood to be infused.

Mr. Roussel replies that his aim was only to submit to the Academy the new transfuser that he had imagined, and to demonstrate to it that, by means of this device, vein-to-vein transfusion is carried out easily and without danger, the rapid passage of blood from the vein from which it is extracted into that of the person who receives it, not allowing, according to him, the slightest clot to form there.

He does not intend at this time to discuss the question of the advantages and disadvantages of these two methods: direct transfusion from vein to vein, and that of blood previously defibrinated; but he cannot admit that fibrin is useless in this organic fluid, and he persists in thinking that it is preferable to transfuse the blood not stripped of this matter.