

**RELAZIONE DELL'ESPERIENZE FATTE IN INGHILTERRA, FRANCIA, ED ITALI  
INTORNO ALLA CELEBRE, E FAMOSA TRASFUSIONE DEL SANGUE PER  
TUTTO MAGGIO 1668**

**BY: NICOLÒ ANGELO TINASSI**

**REPORT OF EXPERIENCES MADE IN ENGLAND, FRANCE, AND ITALY ABOUT THE  
CELEBRATED AND FAMOUS BLOOD TRANSFUSION THROUGHOUT MAY 1668**

**A TRANSLATION BY PHIL LEAROYD**

The magazine *Giornale de' Letterati* [Journal of Letters] was founded in Rome in 1668 by a group of scholars that was inspired by the French magazine *Journal des Sçavants* and the English periodical *Philosophical Transactions of the Royal Society*. From 1675 it appeared as both a quarterly as well as a monthly newspaper. N.A. Tinassi was the first printer / publisher of the monthly version and is the person credited with publishing the monograph *Relazione dell'esperienze fatte in Inghilterra, Francia ed Italia. Intorno alla celebre, e famosa trasfusione del sangue per tutto Maggio 1668*, though some authors have subsequently referenced/credited this work to the printer Emilio Maria Manolessi.

A copy of this monograph can be viewed or downloaded from the following site:

[https://books.google.co.uk/books?id=IOUm7KXMYSQC&pg=PP1&source=gbs\\_selected\\_pages&cad=1#v=onepage&q&f=false](https://books.google.co.uk/books?id=IOUm7KXMYSQC&pg=PP1&source=gbs_selected_pages&cad=1#v=onepage&q&f=false)

This monograph is reviewed in the *Journal des Sçavants* – see: *Relatione dell'esperienze fatte in Inghilterra, Francia ed Italia intorno la transfusion del sangue*. In Roma, appresso il Tinassi. *Journal des Sçavants*, 2<sup>nd</sup> July 1668, 50-52.

<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f55.item>

This document brings together a variety of publications by authors from France, England and Italy on the topic of blood transfusion, which having been published in 1668 contains some of the first comments on this topic. Since the aim of the monograph is to bring together publications on blood transfusion from different sources, some of the letters / documents have also been published in different journals. The details of the 14 different documents contained within this monograph are summarised below (titles reproduced as printed) together with their other publication details:

1. *Extract from a letter from Mr. N. Denys Professor of Philosophy and Mathematics to Mr. N.N. regarding Blood Transfusion*. Paris: 9 March 1667.

Originally published: *Journal des Sçavants*, 14<sup>th</sup> March 1667, 6, 69-72.

<https://gallica.bnf.fr/ark:/12148/bpt6k58122h/f70.image>

This is a description by Denys of his experiment of transfusing blood from the crural artery of a spaniel bitch to the jugular vein of a terrier dog and then transfusing blood from the terrier to a third dog.

2. *Copy of a letter written to Monsieur de Montmor, the King's Constable, and first Master of Requests, from Monsieur Denys, Professor of Philosophy and Mathematics, concerning a way of curing many diseases by the transfusion of blood, confirmed by two experiments carried out in men*. Paris: 25 June 1667.

See:

[https://books.google.co.uk/books/about/Copie\\_d\\_vne\\_lettre\\_escrite\\_%C3%A0\\_Monsieur\\_d.html?id=XcRjAAAAcAAJ&redir\\_esc=y](https://books.google.co.uk/books/about/Copie_d_vne_lettre_escrite_%C3%A0_Monsieur_d.html?id=XcRjAAAAcAAJ&redir_esc=y)

Denys recounts various dog-to-dog as well as calf-to-dog transfusion experiments that include comments on 'best' methodology. He comments on species blood differences and the various philosophical as well as medical-scientific arguments surrounding his work. This document also includes details of his transfusion of a 15/16-year-old boy with 'intolerable drowsiness' and a 45-year-old healthy man both using arterial lamb's blood.

3. *Summary of a letter written to Mr. Morea, Doctor of Medicine of the Faculty of Paris, &c. By Mr. Lamy, teacher of the University of Paris, against the claimed benefits of blood transfusion to cure illnesses, with the answer and reasons for the experiences of Mr. Denys.* Paris: 8 July 1667.

See:

<https://gallica.bnf.fr/ark:/12148/bpt6k1269952x.r=G.%20Lamy?rk=85837;2#>

This document contains arguments against blood transfusion based on the points made by Denys, that include such things as the differences expected in treating 'hot' or 'cold' diseases, the disadvantages of using 'hot' arterial blood, 'apprehension' being the reason why the 15-year-old boy recovered and not the transfusion, blood as a food being transferred directly into the circulation being dangerous and transmitted animal 'particles' corrupting the patient and being responsible for transmitting animal characteristics / temperament.

4. *Extract from a letter written to Mr. Abbé Bourdelot, Doctor of Medicine of the Faculty of Paris, &c. from Gadoys, which serves as an answer to Mr. Lamy, and as confirmation of blood transfusion.* Paris: 8 August 1667.

Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 16-19.

<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f17.image>

Gadroys identifies that Lamy is writing on behalf of another (unnamed) person and criticises his comments whilst proving counter arguments. This document also provides details of Denys's two transfusions of a 'foreigner' (i.e. Baron Bond) that provided temporary respite for a person who was dying of cancer.

5. *Extract from a letter written to Mr. Moreau, Doctor of Medicine of the Faculty of Paris, &c. by Mr. Lamy in confirmation of the reasons given in his first letter against the Transfusion, and response to the objections made to him.* Paris: 26 August 1667.

Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 19-20.

<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f20.image>

Contains comments on the points made by Gadroys, who is named only as 'Adversary', in the text, especially regarding the use/effects of 'hot' and 'cold' blood.

6. *Experiences made in Rome on Blood Transfusion.* [Undated]

The author of this document is not identified (but is possibly Tinassi). It includes details of Magnani's experiments on transfusing dogs, highlighting various practical comments on methodology including the need to accurately measure the volume of blood transfused, limiting the arterial flow rate and using a glass tube to be able to see that the blood flowing and provides a drawing of the equipment used. The report also includes the comment that transfusion can be used for 'the restoration of blood to those who have lost it through wounds or blood flows to restore life'.

7. *Extract from a letter from Mr. G. de Gurye de Montpolly to Mr. Abbot Bourdelot, Doctor of Medicine of the Faculty of Paris regarding Blood Transfusion.* [Undated]

Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 20-21.

<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f21.image>

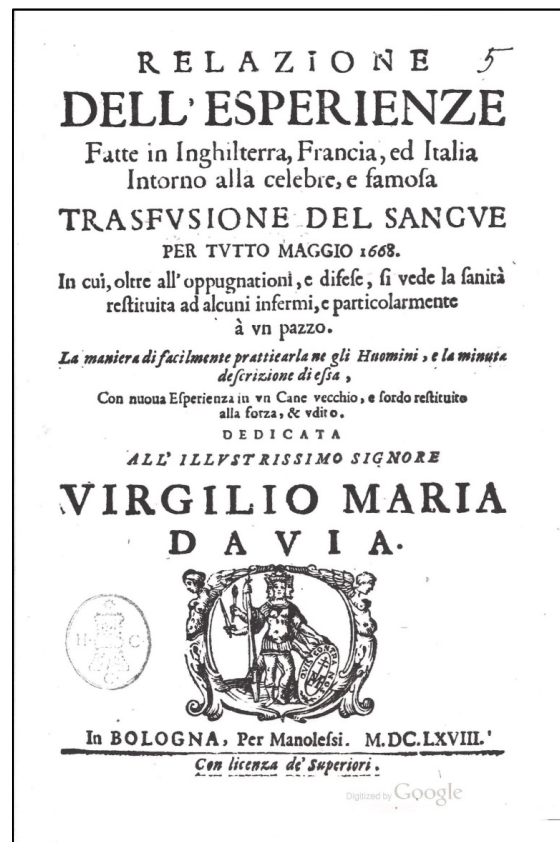
This provides a brief but more balanced argument for and against the use of transfusion.

8. *Extract from the speech of Euthyphro, philosopher and doctor, on the new way of healing illnesses with blood transfusion.* [Undated]  
Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 21-22.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f22.item>  
Identifies concepts of transfusion based on ancient medicine.
9. *Letter from Mr. Tardy, Doctor of Medicine of the Faculty of Paris to Mr. Le Breton, Doctor of the same Faculty regarding the issue of Blood Transfusion.* [Undated]  
Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 22.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f23.image>  
Provides only brief comments regarding blood transfusion.
10. *Extract from the Newspapers of England about some experiences of Blood Transfusion.* [Undated]  
Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 22-23.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f23.item>  
The 'newspapers' referred to in the title is actually the *Philosophical Transactions of the Royal Society*. This report provides brief details of the animal transfusion experiments performed by Edmund King and Thomas Coxe as well as mentioning Richard Lower's transfusion of a man (Arthur Coga) using lamb's arterial blood.
11. *Extract of a letter from J. Denys Doctor of Medicine and Professor of Philosophy and Mathematics about a long-time madman who was cured by Blood Transfusion.*  
Originally published: *Journal des Sçavans*, 6<sup>th</sup> February 1668, 2, 23-24.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f24.image>  
This letter contains brief details of the two calf blood transfusions given to a 'periodically mad' man (Antoine Mauroy) on the 19<sup>th</sup> and 28<sup>th</sup> December 1667 which identifies that he experienced heat along the arm where he was transfused and passed 'black urine' the day after.
12. *SUPERIOR LIBAVIUS*  
Provides a brief description of the possible / theoretical artery-to-artery blood transfusion method dating from 1615.
13. *Copy of a letter written by Mr. Doctor Montanari, Mathematician Professor in the Bologna Studio, to Mr. Cassini, Primary Astronomer of the same Studio, about a transfusion experience he carried out in Udine through which a deaf, decrepit dog recovered his hearing, and forces.* [Undated]  
This letter includes details of a blood transfusion on a dog using lamb's blood performed by the doctors Griffoni and the surgeon Ceraffini, after which it is reported that the dog regained not only its strength but its hearing as well.  
See also: *Journal des Sçavans*, 19<sup>th</sup> November 1668, 117-119.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f126.image>
14. *In another letter the same Mr. Montanari wrote to the aforementioned Mr. Cassini, among other things, the following.* [Undated]  
Further comments on the dog's recovery from Antonio Griffoni.

As identified above, the *Journal des Sçavans* includes a number of these documents on blood transfusion collected together in one section – see: 1668, Vol. II, pages 13-24.  
<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f14.item>

I have translated this monograph from Italian into English in the hope that the content may be appreciated 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 in producing a representative translation. In addition, an 'automatic translation' may purposely or inadvertently alter the wording to 'make it read better' but in doing so there has to be an element of personal interpretation involving something on the lines of 'I believe that this is what the author is actually trying to say'. I wanted 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 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 Italian text. I have maintained the original paragraph settings and reproduced the text that was originally printed in italics. The word 'Intemperie' (in various formats) is used within the original text that I translate as being 'bad weather' in English, though this is used within the original text of describing an 'illness of the blood'. I have therefore left this term as the original Italian and placed it within square brackets in the translation. The original contains one figure that is unlabelled and appears at the end of the document, but does in fact relate to references made within the section *Experiences made in Rome on Blood Transfusion* and I have therefore positioned it within this section in this translation. Note: The original text includes some numbered points that do not always follow sequentially (or necessarily include the number 1) – I have reproduced the original format.



Title page of 'Relazione dell'esperienze fatte in Inghilterra, Francia ed Italia. Intorno alla celebre, e famosa trasfusione del sangue per tutto Maggio 1668'  
 (Image credit: Google Books)

## REPORT OF EXPERIENCES MADE IN ENGLAND, FRANCE, AND ITALY ABOUT THE CELEBRATED AND FAMOUS BLOOD TRANSFUSION THROUGHOUT MAY 1668

In which, in addition to the objections and defences, health is seen restored to some sick people, and particularly to a madman.

The way to easily practice it among men, and the minute description of it, with new experience in an old, deaf dog, restore strength and hearing.

### ILLUSTRIOUS MASTER

*If well, great values often come to light, which with their remarkable size give rise to a concept of the great intellect of their author; nevertheless, sometimes little books are published which are small in body but great in value, in which there is more science than discourse, and from one side of which one learns more of solid doctrine than from the entire quintessence of the major books. Such is, in my opinion, this limited treatise on Blood Transfusion, a pilgrim and ingenious find of the most subtle England, which with the experiences of France and Italy, enclosed in these few papers I consistently present to Your Illustrious Lordships. I believe that the reading of it is suitable for whose youthful and lucid intelligence, since you are on the threshold of Philosophy, you will be able, to accustom your intellect to the progress of natural science through sensible procedures, which can be learned more from the admirable works of nature, than from any venerable philosophical writing in antiquity. If in reading the booklet your Most Illustrious Excellency, you will recognize this truth, and in the gift that I give it to you with the utmost respect you will realize the supreme desire that I have of being known to you as that true and most humble servant that I am, I will have perfectly achieved the goal I then proposed to myself, that I resolved to give you this small sign of my servitude. And trusting in the magnanimous courtesy of your Most Illustrious Excellency, may you wish to make me part of your grace and accept me under your most benign protection, with profound reverence I bow to consecrate myself with the book as well as  
By V.S. Illustrated.*

From Bologna on 6 August 1668

Humility and Obsequiousness Serves  
Emilio Maria Manolesi  
R.E.

### RELATIONSHIP

The Art of Notomy in our age is always seen to thrive & increase. Our Italians had already thought about the circulation of blood according to the testimony of famous anatomist Oltramontani Bartolino *lib. 1 de venis c 1 n 8* and Vvaleo *de motu Chyli apud Bartolin page 545*: but then published by the famous Harueio followed by others, who made it clear with many sensible and repeated experiences. The Verulamium Great Chancellor of England in the History of Life and Death, investigating various ways of maintaining and prolonging life in men, said that among other things, it would have helped a lot, if it were possible, to introduce youthful spirits into the bodies of the elderly, and Hippocrates in more than 15 places *di morbis lib. 2. n. 6. & 8. & de victus ratione in acute n. 37* states that many infirmities depend on the impediments that hinder the free movement of the blood in the vessels, just as a large part of them depends on the mass of the blood itself.

These and other similar principles, as well as the new use of Chirugia Infusoria, have been able to give motivation to others to the idea of blood transfusion, that is, to begin to draw its corrupted blood from an animal to infuse it with healthy, pure blood, of another

animal. However this may be; from England we have the use of this pilgrim invention, which then practiced in France and Italy, and particularly in Rome, gives material not only to the curiosity of the literati, but also brings notable benefits to the bodies of animals, and men to cure them of otherwise incurable illnesses, as everyone will be able to see in the following information, which will subsequently be published with the most important observations that will be made in the *Giornale de' Letterati*.

*Extract from a letter from Mr. N. Denys Professor of Philosophy and Mathematics to Mr. N.N. regarding Blood Transfusion.*

Paris 9 March 1667. Translated from French

You know, having spoken in one of my conferences, that the transfusion of the blood of one or more animals into the veins of another was a totally convincing proof to confirm the sentiment of those who support circulation, many they started laughing and considered this transfusion chimerical and ridiculous. And because you were one of those who spoke about it more truthfully, and who told me that it was nothing more than a supposition made as a beautiful study to give many people something to talk about; I wanted to make sure of it afterwards, and now I want to give you some of the circumstances, with which we managed to do this through Mr. Emmerez, our Surgeon, whose patience and dexterity in cutting you often admired, when this winter he demonstrated with such accuracy the particularities that I explained in a human corpse.

On Thursday the 3rd of March two small dogs were brought to us, who had not been bred together, and who in their appearance seemed so different, as are certain animals of different species, one being a Spanish bitch, and the other a short haired dog, resembling a fox. The bitch was full, and a little bigger, and taller than the dog, since it was 12 inches tall, and the dog was only 10 inches tall.

We determined to do not only what had been noted in the extract of the Journal of England, which is to transmit the blood of one animal into another, causing the death of the one who communicates it in order to preserve the other who receive; but we wanted to keep them both; and therefore we decided to open the crural artery of the bitch to let her blood pass into the jugular vein of the dog, and persuading ourselves that by causing the blood through the artery, which carries it from the thigh to the extremity, convulsions would not be so much to be feared for the bitch, as if it were caused by the carotid artery, which carries it by the neck to the brain; in addition to the fact that the crural artery is neither thinner nor so deep as the carotid artery, we would not be forced to use such thin tubes, which are subject to becoming blocked when the blood passes through them, and since the dog does not suffer as much, it would be easier to survive.

In fact, it happened in the presence of trustworthy people, as we have predicted in a very simple and easy way; since having prepared the two animals, that is, having discovered the artery of the bitch's thigh, and the vein of the dog's throat, we made two ligatures in the artery at a distance of approximately one finger from each other, of which the lower one was in a firm way, and the highest one, or closest to the heart, was in a sliding way, and between these two ligatures we introduced a very thin brass tube, about a quarter and a half long, and curved on one side, so that the bend faced the heart to better receive its blood, when the sliding knot was untied.

We also made two ligatures of equal distance in the vein of the other dog, but they were both with sliding knots, and between these two ligatures we placed two tubes similar to the first, so that the curvature of one regarding the heart to carry the blood when the sliding knot from above was untied, and the curvature of the other concerned the head of the animal to better receive its blood, which comes from above, and empty it into dishes, when the sliding knot from above, was also loosened.

Then we tightly tie the dog's artery to the end of its tube, and the dog's vein to the two ends of the two tubes, which we introduced, and after having harnessed the dogs one after

the other, so that the bitch's thigh responded to the dog's throat, we made the first tube enter the second, that is, that of the artery of the bitch into that of the vein of the dog, which concerned the heart, and having untied all these three sliding knots we saw the blood flow from the crural artery of the bitch into the jugular vein of the dog, while, that the third pipe poured almost as much of this dog's blood into a dish as it received.

And to ensure that the blood really flowed from the artery of the bitch into the vein of the dog without stopping in the smallest interval, which was only about three fingers; we often withdraw the first tube from the second, and we do not find the blood willing to stop, since it had too much motion, or heat; in addition, it was very easy to feel it running by placing the [finger] tip above the vein of the dog under the ligature; because there was a very noticeable heat and swelling which was not felt when someone simply pressed the artery of the dog with his finger and prevented by this means that the blood did not enter the communication tube.

Moreover, during this operation we observed that the third tube discharged a greater quantity of blood than usual through the dog's jugular; this was in my opinion, because this dog received arterial blood through the second tube, which entering abundantly through the middle of the circulation had to be let out as much.

Having drawn, through this third tube, nine ounces of blood from the dog into a dish, which is a lot for an animal of such size, the bitch, who had given back so much blood, and who consequently had little more, began to weaken, and therefore we immediately stopped its artery, tightening the sliding knot, and after having also made two tight ligatures to the dog's jugular vein in exchange for two sliding knots, which we had tied there, we detached the dogs: and here are the details, which we noticed.

The bitch who had communicated her blood was very weak and she had only enough strength to throw herself into a corner of the room on the side that had not been opened, but the dog that had received the new blood seemed very vigorous because having untied his legs he made a lot of effort to remove the muzzle, which had been put on him to prevent him from crying, and after having shaken himself a little, he immediately ran away from those who wanted to approach him, since his nature is totally ferocious.

It is therefore not necessary to believe that this dog was as sweet and as cheerful as before, since in fact it was a little dejected, and this change undoubtedly came not from the new blood it had received, but from the pain he could feel by cutting his skin and fleshing out his jugular vein to perform this transfusion; which can be confirmed, because we have prepared a third dog of the same size to make up for the one we were missing, but since we didn't need it, so that it would be there according to our plans, we sewed up its skin, and even though we hadn't opened any of his vessels, he was nevertheless more dejected than the one who had received the new blood; because the two dogs that took advantage of the transfusion ate very well, but not the third.

I then had these three dogs kept, and as their strength increased day by day in proportion to their appetite, we did not observe that any bad outcome could be feared from the blood transfusion.

The following Tuesday, 8th March, having found the dog who had received blood very vigorous and had a very good appetite, we thought of having it undergo a second experiment, not just to receive new blood, as it had been the case a few days before, but to take it back and make it pass through the veins of another, whom we destined to receive it, to test what the transfusion of blood, which had already changed vessels a few days before, could do; and therefore we took the third dog, which we had not injured in past experience, and having adjusted its jugular vein to the crural artery of the other with more diligence and warmth than the first time; we passed the blood of the first into the veins of the last, and then having reduced the first to the extreme, and having weakened him so much that he seemed dead and that his artery no longer gave out blood, that the last one who received it had in this time poured eleven and a half ounces of his blood into the dish, which if we believe it, the one who had communicated so much to him could not survive; nonetheless, here is what we particularly noticed in this new experience.

1. We are established in our first thought, that by opening the crural artery in place of the carotid artery, the convulsions of the animal, which communicates the blood, are released, and that it did not put itself in such danger of losing its life, since, although we had left ours in a corner as if dead, however I don't know which of the company, having poured wine down his throat, made him move a little, and then raise his legs up, although they were wavering in the extreme; we continued to feed him well, and we still have him alive.

2. We have seen that if those who prepare the animals have a lot of skill and diligence so as not to let them languish for a long time, the transfusion is done better and with better results.

3. That a fire is very useful in the room where the transfusion is done.

4. That tubes that are too long and too thick are not as suitable for this operation due to the difficulty in warming them.

Finally, if the transfusion is well practiced, it would not be as dangerous as many imagine for those who receive the new blood; since we observe in this experiment that the blood having been in three different bodies for less than six days did not in any way equal that which had last received it; but as soon as this animal was freed, it jumped down, shook its ears several times, and came to caress as usual those who called it; he still ate with great appetite half an hour later, and he gave us as many signs of strength as he had given us of weakness in the first experience, even though at the time the vein was not open to him, and that discovering it was enough for us to take the benefits we needed, as I noticed above.

All this happened to the great amazement of those who honour us with their presence, and especially of a great doctor of medicine, who naively confessed that he would never have believed it if he himself had not seen and examined all the circumstances.

We plan to carry out public trials as soon as possible, and to do this we will determine the first ordinary day of my circumferences, which will be next Saturday 19th March two hours after midday up the Augustinian bank, and to see what change this transfusion will make we will pass the blood of a young dog into the veins of another old and mangy one.

*Copy of a letter written to Monsieur de Montmor, the King's Constable, and first Master of Requests, from Monsieur Denys, Professor of Philosophy and Mathematics, concerning a way of curing many diseases by the transfusion of blood, confirmed by two experiments carried out in men.*

Paris, 25 June 1667

My Lord,

Being around 10 years ago in the illustrious and erudite meeting held in his house, the thought of transfusing blood from the veins of a healthy animal into those of a sick one was conceived, and by his goodness was kindly welcomed by Mr. Emmerez and I when we dared to discuss it, and to show its very considerable effects. It won't seem strange to you that today I take the liberty of bothering you with this, and come to give you clear information on what happened in an operation, in which you should have a greater part than anyone else, since it was discussed for the first time in your Academy, and the world owes it in this, as in many other ideas, all the advantages and usefulness that it will be able to derive from it.

But to give you an account of our work, and demonstrate to you that we are not guilty of the temerity that we could be accused of, give me permission, if you like, to briefly report the reasons that were used to thwart our plan, and compare them with those that pushed us to carry it out and reduce it little by little until it reached the perfection it currently finds itself.

You have heard of the experiment that we carried out for four months on dogs to transfuse the blood from the crural artery of one into the jugular vein of the other, and this operation was successful with all possible happiness, as was long known in the *Giornale de' Dotti* of last March 14th, we took courage to redo it several times in public and privately, and

by updating many things we reduced it to such a state that, for ease, it seems to us that we should not neglect it, but make many observations, which could greatly benefit practice.

In fact we performed the transfusion in many ways, now from the artery into the vein, now from vein into vein; both from the carotid artery and from the crural: in weak and vigorous dogs; small, and large, and finally in some, who have received and communicated blood in past transfusions. And of the ten not even one died; but on the other hand, having always noticed some wonderful circumstances in those who had received the new blood, we remained fully convinced that the transfusion could not be dangerous, as some tried to make people believe on every occasion.

We therefore wanted to take a step further, and not being satisfied with the procedure made in subjects of the same species, we resolved to try it in other different ones. Therefore we took a calf and a dog, since it seemed to us that the blood of these animals was totally different, we, in your presence, passed the blood of the calf into the veins of the dog on the 28th of March, and after that we did it other times, always adding something new to make the operation easier, and having never noticed any indisposition in the dogs in all these experiences, who had received blood that was not theirs, we established our first opinion that there was greater reason to hope that transfusion would have more beneficial effects than disastrous ones for man.

Nonetheless, in order not to promote anything to anyone without reason, we publish these experiences, and we were curious to understand the sentiments of the most learned philosophers and doctors on this matter. We examined whether some of them had sufficient reasons to dissuade us from testing them in humans as well. I beg you to collect here the main ones that have reached me; and judge for yourself whether they should hold us accountable, and whether we deserve praise or blame for the execution of the plan.

Some have said that this was chimerical and impossible. First because the diversity of complexions based on the blood presupposes that there is such a difference between the bloods of different animals that it is impossible for one not to be a poison compared to the other. Secondly, because blood that is overused, or blood that comes out of its natural place, must necessarily become corrupted, according to the opinion of Hippocrates. Thirdly because the blood coming out of its vessels and having to pass through inanimate ducts, like the tubes that are used in the transfusion, are infallibly described as quailed and once it has descended to the heart it causes a deadly palpitation.

All these reasons did not seem of great importance to us. Since as regards the first, we agree that there are as many different complexions and different qualities in the blood as there are individuals in each species, but we do not think that from this it can be inferred that the blood of one must be poison in regarding the other, just as it could not be argued that the foods on which we nourish ourselves, and of which our blood is but an ellipse, should corrupt and poison it; because they have very different qualities from his. On the other hand, as it is claimed that cold foods or medicines serve to temper the heat of the blood that boils in the veins, the heat rekindles the vigour in what numbs and freezes in the vessels of the man exhausted by malice or old age. We also say that the diversity of the bloods should make us hope for great advantages from their mixture, provided that it is made under the prudent conduct and direction of well-practiced doctors, and that if a warm blood can reinvigorate what is dead from coldness, what is already cold can still mitigate the excessive boils of the overheated.

As for the authority of Hippocrates, who says that blood in trauma corrupts, it is in no way opposed to our pretensions. Since to safeguard the honour of this great man it is necessary to explain his opinion well, saying that the blood necessarily corrupts when it is outside the vessels which conserve its heat and leave it free to move, or natural circulation, with which it is continually purified. For example, being placed in a dish, where all its parts are sealed and congealed, two in two, as can be seen from experience, but this does not prevent it from sometimes becoming corrupted, even in its own vessels against the aphorism *Quidquid corruptitur in loco alieno corruptitur*. Because if its movement were similarly interrupted in the veins, either by some obstruction or by division caused by some wound, it would soon become corrupted and putrefied and generate sequelae. In transfusion, therefore, the blood

passes from one animal to another in such a way that it is impossible for its natural movement to be interrupted: it actually passes through tubes which are not their own, but heated once, and as they do not receive any air in their cavities, they alter the blood nothing more than what the arteries and veins would do.

In short, when it is said that the blood that is to be transfused must coagulate in the process, and then cause some mortal palpitations, we predict an accident, which has never happened, and I want no other assurance than the same experience of all animals, who have served and still live.

Others, who are witnesses of many transfusions performed by us, or who have heard them from trustworthy people who have seen them, did not want to argue about the possibility, but in order not to authorize something which seemed new to them, they said that no matter what precautions were taken in the transfusion, it could never be successfully practiced in humans. And here are their main reasons.

1. The blood of a healthy body and of a sick person having very different qualities, one being pure, the other impure, could not be made into a perfect mixture; they are two opposites, which would wage continuous war that would only end with the ruin or destruction of whatever was done.

I would like them to be the first to understand what they try to persuade others, and to explain to us what device they conceive in the veins and arteries, so that a certain blood must pass through them, and another at the same time exclusion. As for myself, I confess that I cannot understand how the continuous circulation and rarefaction that occurs inside the heart from the heat of its ventricles are no more than enough to make a perfect mixture of these two types of blood, and very more because experience seems to flatter me greatly to a contrary opinion. For having in the past few days transmitted with the syringe a certain measure of milk into the veins of an animal, and after having opened it we found it so perfectly mixed with all the substance of its blood, that there was not a part which seemed the least vestige of the whiteness of the milk, and all the blood was generally more fluid, and more difficult to drain.

2. The second objection of the same author is that, when the pure blood was mixed with the impure, it would not retain its purity and temperament for a long time, thanks to the fact that it immediately reached the liver, which is the great builder, which forms the blood, and gives it all its qualities, would undoubtedly lose all its goodness, and would die in an instant similar to everything else, which we assume to be corrupt, and consequently, it could not bring any benefit with its mixture.

But this objection is very ill founded, since it supposes that the blood is made in the liver, and is contrary to the experiments which clearly show us that blood occurs in animals before the liver is formed there and the chyle reaches the heart, and is converted into blood before it enters the veins, which carry it to the liver. Therefore I leave aside this reason to examine another, which seems stronger, and which has been proposed to us by more sensible minds.

3. In this we are not concerned with determining the place where the blood is made; we want it to be made in different parts of the body, that is, to work on, perfect and replicate multiple circulations in the heart, veins and arteries: but it is expected that all these parts gradually reach, either through illness or old age, a certain degree of [grado d'temporie] and malignancy, which in the end is impossible to free them from, and that in such a state they can communicate their bad qualities to what is close to them, in such a way that they would quickly corrupt the good blood with which it was intended to water them, which is confirmed by experience. The example is taken from a barrel, which once filled with very strong vinegar, never again serves to contain good wine. But everything that is infused into it immediately spoils and turns sour. The experience is that an English doctor having recently transfused the blood of a mangy dog into the veins of a healthy one to test if scabies were communicated with blood, the first healed, and the other who received the blood, did not become mangy at all.

To answer all this in order, I say first of all that the [grand' intemperie], from which it is believed that blood cannot recover, is either rare or very common; if it is very rare there is no

need to worry much about it, and if the mixture of good blood is not capable of bringing about a temperament; I would like to be shown other means for this: and if this inclemency is common in all illnesses, and declining old age, I ask what use is then made of the foods which the medicine grants, or the medicines that it orders on every occasion, useful for? Can they enter the body without mixing with the blood an hour later? And if by mixing they contract its bad nature and do not communicate to it any of their good qualities; isn't it a waste of time to study medicine and reduce to practice what it teaches about the choice of the aforementioned things? For me I am very far from similar thinking. I have no doubt that the strength and goodness of the foods and drinks that we consume are not capable of correcting the [l'intemperie] of the blood and making it better, and if there was anything that could prevent it, I would not believe it so much in the blood, or in the parts that make it; as in those, through which the food passes, reaching the heart. For it is clearly seen, that if there is any indisposition in the stomach; if digestion is not carried out well, and the bilious humours, and those of the pancreas, which serve as dissolvents in the intestines, are not well tempered, if there is any obstruction or postema formed in the glands of the mesentery, which drain the plus part of the chyle; the best and most precious things will deteriorate so quickly that they mix with blood, that there will be no hope of any good nourishment or relief for the sick person.

Now the transfusion is not subject to this inconvenience, the blood that is communicated does not have to pass through so many turns, where the slightest corruption of one part destroys in a moment everything that the good disposition of the others could have produced. Good blood immediately enters the veins of the recipient; and by mixing and circulating with the other it can bring good nourishment to the main parts, which are ordinarily only altered in sickness or old age, except through vice or defect of the blood which waters them.

This is an opinion that I see many doctors adhering to, and if there was anything that would make me abandon it, it wouldn't be the example of the barrel of vinegar reported above. Because if vinegariness is the last quality into which wine degenerates, and so to speak its death, from which it never recovers, I do not believe that a similar quality is found in the blood, that is, that it corrupts it in such a way that it can no longer be purified: if this is not in some incurable disease, which we are not talking about here, but if we have to use similes, let us consider wine with all the other qualities rather than being strong, and then the comparisons will be to my fairer opinion. Because, just as wine that is too dry can be sweetened, wine that is cloudy can be brightened, wine that is weak can be made stronger, and wine that is large can be thinned out in a word, what is spoiled can be corrected with the mixture of certain liquors known to those who have the secret, and practices it daily; let's say again that a blood that is too thick could be softened and thinned; a too thin one could be fixed, and thickened; too cold to heat; and all this with the mixture of certain bloods, the particular qualities of which will be perfectly known to the doctors who order it.

As for the dog, who is said to have received the corrupt blood of another mangy without having contracted the mange, there are many things to be said which are of great consequence.

1. Is it certain that the blood of the mangy man was putrefied and corrupted in his veins? Could he not have purified himself further, discharging his impurities through the pores of the flesh, and converting into scabies in the last skin? And what most confirms me in this doubt is that mange very often leads to a greater illness, since if these impurities, which generate it, did not pass to the surface of the body, they would remain mixed with the substance of the blood, and passing to some noble party could not cause anything other than very dangerous effects.

2. When the blood of this mangy person had been totally corrupted in his veins, was it perhaps necessary that it would generate scabies in those who received it? Can it not be that a vitiated blood is purified when it is mixed with the best, that the great heat which caused it to escape from the vessels of one to form scab is tempered by the coldness of the other, with which is mixed, and so does it not produce the same effects?

Finally, is it certain that the blood of this mangy man did not cause any bad effects on the body of the person who received it? If you had to open it a few days later, you would have found the corruption inside, which could not be seen from the outside.

So far I have not found sufficient reasons or experiences to remove me from the thought that I have of the usefulness of the transfusion: and in the disagreement, in which I see the doctors, there being many of them, who approve this operation, and support, which could be prudently ordered to cure many evils; others rejecting it as useless novelty, and others finally remaining indifferent, waiting for the success that the experience will produce; I would willingly cling to the party of the former for the following reasons, as long as someone brings forward other ones which are contrary to them and have greater strength.

1. The transfusion of the blood of one animal into another is sufficiently taught to us by nature itself: and it must be conceded that if we practice it, we will do nothing other than imitate it. Since when she cannot yet administer nourishment to a fetus by mouth, and that his stomach is not disposed to digestion, makes a continuous transfusion of the mother's blood into the umbilical vein of the child to thus nourish all its parts, corroborate them, and equally increase them. Nor must we reply that the mother and the child in this state are considered to be the same body and the same substance: since it often happens that the seed of the father predominates more than that of the mother, the constitution of the fetus is very different from that which carries it in the womb; all that does not fail to be nourished with the transfusion of his blood.

2. Blood transfusion is only a very short way of the continuous transfusion of food, which is also taught to us by nature after we are born. Therefore, instead of restoring our strength and refreshing the parts which are heated, we take foods which have a lot of impurities mixed with the good sauces which seal them, which must be cooked by the heat of the stomach, and let the humours which continuously drip therein be digested, so that the purest part of these digested juices is converted into chyle, and that the chyle is pushed into the veins to mix with the blood, and heat inside the heart, which must give it the ultimate perfection. Blood transfusion is done more quickly and safely; since with it a very well seasoned liquor is introduced in a very short time, which by immediately entering the veins can compensate for the defect of the intestines when they are altered.

3. Doctors cannot deny that the majority of our ailments do not come from [dall'intemperie], or corruption of the blood, since the quickest and most common remedy they use in practice is to cure it with bloodletting and cool it with drinks, but they must also confess that, by wanting to prevent corruption, they decrease vigour and strength at the same time, and that for this reason great fevers are often followed by languor and hydropsia; for which reason some of them save the most that they do with bloodletting, they still have to allow, since the drinking must pass through the stomach and the intestines, before they reach the veins and arteries to mix with the blood, can be altered in a thousand ways by the fomentations that are encountered there, or they can alter these parts with the ferments that they bring there, and thus leave many weaknesses and intolerable crudities. Now in the transfusion the above things are revealed, and in a short time, all doctors agree. Those who are partial to phlebotomy in our operation see it practiced, since we do not pretend to infuse the new, except by evacuating the old and corrupt first. And those who are averse to drawing blood, as it weakens the sick too much, will have no reason to complain, it may happen that the new blood will be enough to strengthen them further.

Finally, everyone knows that many have died from the effusion of blood, and especially from the nose, which cannot be stopped, that many veins are weakened, so old age comes more quickly than it would from lack of blood, and of vital heat. Now who doubts that the transfusion of sweet and good blood could not heal some and prolong the life of others? Many advantages could also be derived from this operation for pleurisy, smallpox, leprosy, cancer, ulcers, erysipelas, rabies, madness, and other diseases which arise from the malignancy of the blood, but we must await the outcome of the experiments which will be able to be carried out shortly. In the meantime, allow me to tell you my thoughts regarding the selection that could be made of the animal, which must communicate its blood.

Most have believed that if blood transfusion were ever to be practiced in men, it would be necessary to use blood of the same species, in such a way that it would be a very barbaric operation to prolong the life of some by shortening that of others: but for me I am very far from this thought, and I remain convinced that it would be better to use the blood of animals than that of men for several reasons, of which here are the main ones.

1. It can easily be judged that the blood of animals must be less impure than that of humans, since disorders and irregularities in drinking and eating are not as ordinary as they are for us, sadness, jealousy, anger, melancholy, anxieties, and generally all passions are many causes that disturb the life of man and corrupt the whole substance of his blood. On the other hand, the life of animals is better regulated, and less exposed to all these miseries, which we must consider as fatal penalties of the prevarication of our first relative, and in fact our experience is that if it happens very rarely that bad blood is found in the veins of animals, it is almost impossible that some corruption is not always noticed in that of man in whatever state of health he may be in. There is not much good in it, not even in nursing children, because being fed on the blood and milk of their mother they have sucked corruption with the nourishment.

2. If doctors successfully use the milk of certain animals to which they reduce some sick people for entire years: if we nourish ourselves very well on the meat of some during our life: and if their juices are very useful for repairing the natural vigour, why cannot we hope for much benefit from the mixture of their blood with ours?

3. The operation will be carried out with greater courage and better results using animals. Since it is a question of taking the best blood that can be found, and the one least subject to coagulation, it is certain that arterial blood, due to its heat and thinness, contains these qualities more perfectly than venous blood. Now in opening the artery of a man there would be many difficulties and inconveniences which are not encountered in opening those of an animal.

4. Beasts can be better disposed and prepared for this use than men; therefore, in order to advise anyone who would like to use them more fruitfully, it is useful to feed them a few days before with more delicacy than usual. Because if taste lets us know that the meat of those calves, which feed for some time on milk and egg yolks, is much more delicate than that of others; reason must persuade us that their blood is also much better.

All these reasons combined with the experiments we have made, should move us more quickly to assure the public of the little danger that there is to fear, and of the notable effects that must be hoped for. It was not, it seems to me, reckless to make the statement in men again. Many equally wise and prudent people urged us, and some exhorted us to ask for a convict to make the first trial on him. But reflecting that such a man, greatly altered by the apprehension of death, could be frightened by this, and considering the transfusion as a new kind of death, this thought alone could cause him some disturbance and confusion, which would without fail be attributed to transfusion. We did not consider it appropriate to expose ourselves to this danger, nor to bother His Majesty about it without any need; and persuading ourselves that there would not be much to fear in people who knew us perfectly and trusted in our words, we wanted rather to wait for some favourable opportunity to present us with some such as we desire, than to risk losing everything for too much haste.

Having made this resolution, we did not omit anything that prudence obliged us to do, and finally, after waiting for some time, we found ourselves in a position to fulfil our desires and happily carry out what we had thought of doing. Here is in a few words how the matter happened, and I ask you to hear the particulars, since there are many authentic confirmations of all this that I have told you so far.

On the 15th of this month we found a young man aged 15 or 16, who had been tormented for more than two months by a stubborn and violent fever, which had forced the doctors to bleed him up to 20 times to alleviate his heat.

Before this illness no stupidity or slowness was seen in his intelligence, his memory was very happy, and he was still cheerful and energetic in body, but after the violence of this fever his spirit seemed completely dull, his memory completely lost, his body so slow and sleepy that he was no longer able to do anything. I myself have seen him fall asleep when

sitting at the table, while having breakfast, and in all the occasions, in which it seems to me he should be the furthest from sleep, if he runs at the early hours of the evening, it is necessary to go and wake him up several times to get him to wake up between 8 and 9 in the morning, and spent the rest of the day in intolerable drowsiness.

I attributed these changes to the great evacuations of the blood, which it was necessary to do to save his life, and I believed that the little that remained was greatly thickened by the arduous of the fever, which do not ordinarily dissipate, except the more so filthy in its vessels it was deprived of the motion and heat that it needed to convert itself into spirits and spread sufficient activity to the nerves and muscles. In fact, my conjecture was confirmed by the opening we made of one of his veins in the bend of the elbow during the transfusion; because we saw blood come out of it so black, and so thick, that it was difficult to form a small thread to fall onto the dish. We provided him with about three ounces at 5 o'clock in the morning, and at the same time we had a lamb brought in, whose carotid artery we had prepared, and we introduced three times more of this arterial blood into the young man's vein than that which he had poured into the dish; and then having closed the opening of the vein in the manner used in ordinary bloodletting, we sent him to sleep to observe what happened to it. And because I asked him from time to time about the state he was in, he told me that during the operation he felt a very great heat along his arm, and that afterwards he felt much relieved from the pain in his side, which he had due to fallen the previous day down a ten-foot ladder. He wanted to leave at ten o'clock, and seeing that he was very cheerful, I didn't object any further; after the rest of the day he worked with greater activity than usual, ate very well in his time, and showed his face totally serene and smiling; only three or four drops of blood came from his nose at four o'clock in the evening, and after having had a very good dinner I sent him to bed at noon, and having fallen asleep at 10 he woke up two hours later at midnight, and seeing that he did not could fall asleep, he got up at four. We noticed on this day that he was in a much better mood and that his body was much more agile than usual. In the morning you sleep a little more, and from now on he has achieved this against his lethargy what he had often attempted before without success, which is to moderate his sleep; as a rule at present he fails to raise at an early hour without the need to go to wake him up. He also carries out what is ordered of him with more promptness, and no longer has that slowness of spirit, nor that stupidity of body, which made him incapable of performing, he visibly grows fat, and for his brevity he is a subject of wonder and amazement to those who know him and dwell with him.

Now who does not see that all these marvellous effects proceed without fail from that little arterial blood of the lamb, which mixed with the mass of its thick blood has served it as a ferment and diluted to become rarer and thinner more than usual to produce greater quantities of spirits, and keep all the functions of the body freer and more rapid?

And this first experiment, thus regulated, required us to carry out the second one on a more robust man of about 45 years of age; and since this did not cause any imaginable indisposition, we decided to do a transfusion greater than the first, but having found his vessels very deep, and with a little blood we only got about ten ounces from him, and then we returned it once more from the crural artery of the lamb, which we had prepared, especially since it is larger, and easier, than the carotid artery, as to differentiate this second experience from the first. Moreover, this man did not lose his cheerful humour at all during the operation, and among the other reflections he made on the position of this lamb near his arm, he said laughing, that there were many strange ways of preserving life in medicine, that no one knew who had found this new fate of bleeding; but he felt a great heat from the opening that they had made up to his armpit, and this came from the flow of new arterial blood, which had to take this path towards the heart.

Once the operation was over we wanted him to rest; but not feeling any alteration in himself, it was not possible to reduce it, and we could not prevent him from slaughtering the lamb, every now and then, inflating it, and skinning it, since he is very practiced in this, and had practiced it throughout his youth. He then wanted to return to his house, promising to take some broth and rest for the rest of the day, but as soon as he left he went to find his comrades, and took them to the inn to drink part of the money given to him in payment of his

day; and feeling himself more vigorous at midday, both because of the blood he had received six hours earlier and because of the quantity of wine he drank, he undertook a very great effort, which a man could hardly withstand, since the horses themselves would have difficulty in resisting him. He worked hard all the time after lunch, and thus prevented us from making the observations on him which we had determined to make.

I met him the following day in the street, and having heard this operation from him himself, I was surprised, and I greatly disapproved of it, I blamed his imprudence; but he told me by way of excuse that while he felt vigorous he couldn't rest, that he hadn't felt any pain during the operation or afterwards, when he drank well, ate, and slept; that he had much more strength than before, and that if we wanted to start the same operation again, he begged us not to take anyone other than him, and that another time he would rest, and would punctually carry out everything that was ordered of him.

This is where we have reached with our experiences, which have not yet sufficiently advanced; but I could not hide them from his curiosity any longer, knowing full well that from these few observations you will predict the consequences and advantages well. I didn't talk to you about the way we practice it in humans, which is very different from the way we use it in animals, because this story would be nothing but annoying and useless to you. You will see more in an instant, if some day it will be convenient for you to see us I can give you an idea of what I could not tell you in more words here; and I assure you that you will admire the dexterity and vigilance of Mr. Emmerez, and that he will confess that his industry makes him as happy in this operation as in many other surgical operations, which are much more difficult, since this is done so much like an ordinary bloodletting, and that the person receiving the new blood does not feel no pain.

But I realize that I am abusing your patience, and that the length of my letter has exceeded the limits prescribed by the respect I profess for your person; forgive me, if you like, this freedom, and do not be disgraceful that I use this opportunity to be able to consecrate to you my most humble service, and assure you, that I am

Humiliss. & Obbligatiss. Servant  
J Denys.

*Summary of a letter written to Mr. Morea, Doctor of Medicine of the Faculty of Paris, &c. by Mr. Lamy, teacher of the University of Paris, against the claimed benefits of blood transfusion to cure illnesses, with the answer and reasons for the experiences of Mr. Denys.*

Paris 8 July 1667

The author confesses that blood transfusion would be an intervention of great importance, if its usefulness could be derived, that he imagines, but doubts to our misfortune, that the practice could rather harm than help.

And as a basis for his discussion, he notices and proves that a very small quantity of the blood that is transmitted mixes with that of the man at the time that it flows into the heart, where it has its main effect.

2. That all illnesses, the cause of which is internal, generally come from impurity or from the abundance of the blood, and for the latter I consider it ridiculous to want to remedy with transfusion, which would increase the disease much more, increasing the cause.

3. Under the diseases which arise from impurity, those which proceed from its bad nature or from some particular malignancy are also said to be included. For the former, as the majority originate from excessive heat encountered there, he believes the transfusion is useless; since, if it is made from the artery into the vein, the warmer arterial blood will have to ignite the venous blood with which it mixes more: if then it goes from vein to vein, he says that either it will heat up along the way, or if it doesn't it will be almost as hot as the man's, and thus it will not be useful to temper it; and since it is less hot, it is more probable that the large mass of blood itself, added to the excessive heat that is in the heart, instead of being

cooled, warms the little that is transfused. And because from this it could be inferred that no food or drink that is given to refresh is to produce its effect, it shows the difference between blood and chyle, attributing to this greater coldness, to the latter than the former.

4. That it will not help the old, and that the blood of young animals, not being in conformity with the temperament of the old, will cause more harm than relief. He doesn't talk about cold illnesses, believing that there are none, or at least very rare ones. As for those which come from malignancy or corruption of blood, he gives the same reason, that a small part of good blood cannot correct a large quantity of blood, with which it mixes totally corrupt.

5. He reports the infirmity, which Mr. Denys conjectures can be helped by transfusion, and denies it; indeed, he attributes the health achieved by that fifteen-year-old boy oppressed by extreme drowsiness, not to the transfusion, but to the real apprehension of the unused remedy, and the success of which could have been doubtful to him, which dissolved and set in motion all the spirits, and from this dissolution he says, all the advantages attributed to the transfusion arose.

6. He gives some reasons why transfusion can cause a lot of damage. The first is that blood is a food to be converted immediately into our substance, which conversion is believed to be impossible in the blood of others. Because, just as an animal cannot be generated from the seed of another different species, even though both were similar in colour and consistency; thus he says it is probable that an animal cannot feed on the blood of another of a different nature, even if their blood appears similar to our senses. And for greater intelligence you will notice that generation is the first formation of the future, and nourishment is a necessary means to repair the loss which incessantly made the particles from which it was formed; and from here it follows that the matter of its generation is absolutely similar to that of its nourishment.

Furthermore, you will notice that blood actually contains different particles, some of which serve to form and nourish the bones, others the nerves, others veins, etc. and these, being found abundantly in the blood, flow into the spermatic vessels and form the semen, which is nothing other than a heap of those different particles; where the particles made to nourish the flesh of a calf cannot nourish that of a man; and thus the blood transmitted, not nourishing the man, will become corrupted in his vessels, and will be the origin of many evils. Furthermore, certain parts are found in animals which are not found in humans, such as feathers in birds, wool in sheep; and so it is clear that since the particles which serve to form the aforementioned parts are necessarily in their blood, they would either be corrupted or at least produce similar parts in us.

The second reason is that by introducing transfusion into us, doctors will use the blood of different animals just as they want, which mixed in a body will produce similar pernicious effects. And it is noted that the different bloods (like wines) ferment in a certain season of the year, one more quickly than the other, and thus man will need he will necessarily fall ill when a portion of the blood in the veins ferments, and the other does not.

3. That animals, from which it is taken, last less than man, and since the length of life depends on the goodness of the blood, it concludes that their blood is not as good as ours.

4. That it is difficult to know the complexion and temperament of the animals from which blood must be transmitted. In short, he claims that the transfusion can produce the aforementioned evils and cause Nabucco to suffer the punishment without having committed the sin.

*Extract from a letter written to Mr. Abbé Bourdelot, Doctor of Medicine of the Faculty of Paris, &c. from Gadoys, which serves as an answer to Mr. Lamy, and as confirmation of blood transfusion.*

Paris 8 August 1667.

After having traced who the true author of the letter against transfusion is, he realizes that there are always reasons to counteract and defend any opinion, and that there is none that

experience alone is enough to give the final decision, and to break down the sophisms of the most obstinate, mainly in physics and medicine. He says that for a hundred years there has been no proof that antimony or emetic wine was poison, and now it is a powerful medicine. He adds that there is no remedy which is not approved by some doctor, who thinks he has reason on his side, and disapproved at the same time by others, who consider it to have greater foundation, that in truth no one should be considered more sensible than someone who yields to experience alone. Therefore, since transfusion is a new way of healing many evils, those will have more judgment who will wait for many experiences before taking any side.

2. It is surprising that Mr. Lamy does not wait for what was promised in the title of the letter, which is to respond to the reasons and experiences of Mr. Denys, and indeed he realizes that one can do as much evacuation as one wants of one's own blood before the others is transmitted, and thus the fundamental reason of Mr. Lamy falls; since very little blood is given it has to be corrupted by the much it is mixed with. He adds that even if there is no evacuation of the blood which enters from the artery of the animal into the veins of the man towards the heart, it is enough to retard the movement of the blood from the other veins, which carry it everywhere. And so the new blood would make more and more room in the heart, which Mr. Lamy could not imagine.

3. That the lack of blood is as fertile an origin of evils as the abundance or impurity of the same, to which alone Mr. Lamy generally attributes illnesses caused internally; and therefore there is a member missing from its division. He then adds that many doctors are of the opinion that blood never fails in quantity, but only in quality; and that when it is believed that a man has too much blood from the fullness of his vessels, from the colour of his face, from headaches, it is not that in fact he has more blood than he should, but it cannot be warmed up. And the great agitation which it has in its vessels is sufficient to produce all the effects which are attributed to abundance, which being the case, infers that in such cases the transfusion of less warm blood after bloodletting is not useless, in the way that to prevent the water that boils in a boiler from spreading, a little of the hot water is removed and the same amount of cold water is added.

4. He proves that there are cold illnesses, but given to the opponent that they are all hot, he denies that the consequence he draws is good, that the transfusion cannot be used to temper them, because the men in whom it was practiced felt great heat in their arms; therefore, says he: 'It cannot be said that veal broth should warm the patient more so that he feels warm when drinking it'. He then shows with examples that everything that feels hot does not heat up, but very often cools, and on the other hand, everything that seems cold does not cool down, but sometimes heats. Nor does he want to concede that the new blood must be heated to the same degree as that of the already heated man, without this being partially tempered, otherwise refreshments should not be ordered for those whose blood is inflamed by fever, since the a little chyle, even if it were cold, would be immediately heated by the man's blood, and I cannot see why chyle such as it is, can reduce the heat of the blood, and not the transmitted blood, which is mixed with it in greater quantities.

5. I blame Mr. Lamy for feigning great fear of transfusion among those who supported it, even though it turns out that Mr. Denys's only aim was to ban it completely. And for this reason alone he did not want to risk the operation on the condemned. He adds that the young man oppressed by lethargy not only did not know what the transfusion was, but imagined that the lamb placed on his arm was used to suck his bad blood, moreover that shortly after three ounces were placed around him. of blood, and compared with the previous one it appeared a little more red and more fluid.

6. To Mr. Lamy's reason, that just as an animal is not generated with the seed of another of a different species, so an animal cannot be nourished by the blood of another of a different nature; he replies that it often happens that female animals nourish in their matrices with the transfusion of their own blood fetuses of different species, generated by males of equally different nature. Second, that a man cannot be generated from the seed of other animals, of apples, or other plants, on which he ordinarily feeds; and you notice that the flesh and blood of animals are so felt, cooked, and processed passing through the heart, veins,

and arteries of man, that all the smallest particles change shape, and take the most appropriate one to convert into its substance, and thus there is no need to fear that those who are transfused with the blood of the lamb will have to cover themselves with wool, nor that they will sprout horns, although the proper particles to form the aforementioned parts are present in the blood. Furthermore, like cotton, which is made of the juices of the earth in the roots, and in the heart of the trunk, does not need to produce certain fruits, like the final filtration, which makes these humors into the small fibres of the graft; so it may be that the preparations which are made in the stomach, heart or liver of animals do not serve so much to give the food particles the shape necessary to form them into the substance of man, as the diversity of the pores which ultimately form them, are different in bones, meat, cartilage, and other parts. Therefore, although the transmitted blood does not make its first cooking in the stomach, it nevertheless passes by circulating with its own blood in the heart and liver, where it is prepared for consistency in the substance of man.

7. That transfusion should not be despised, even though the doctors, as Mr. Lamy predicts, were willing to use the blood of different animals according to their whim; since one must not reject a remedy which can be misused by the whim of a doctor; nor because animals live less than us: otherwise we would have to feed on turkeys, cows, and other animals, which live long: nor because it is difficult to know the constitution of the animals whose blood should be taken. Therefore, there would be no greater difficulty in achieving very exact cognition than that in learning the nature and quality of many plants. And finally it makes us believe that by communicating the blood of a beast to man, bestial inclinations cannot be communicated.

8. He recounts the experience followed in a patient, which made many doctors confess that the transfusion could produce very significant effects over time, here it is *ad verbum*.

It's been fifteen days since a foreigner was abandoned by four doctors who had treated him for three weeks for a hepatic and mixed enteric flu with bilious diarrhoea and a very violent fever, but after having ordered bloodletting of his arms, feet, purges and numerous in the number that their prudence had deemed necessary, he remained so weak that he could no longer move; he lost his speech and his feelings; and since the continuous vomiting of all that he had added to his flow, they left him completely in despair, and said that there was no longer any remedy, since they could no longer bleed him or give him any nourishment. His relatives and friends, seeing him in this state, decided to make every attempt and resort to a transfusion. They ran to Mr. Denys and Emmerez, imploring them for this last aid, but these gentlemen, seeing the state in which the sick man was, absolutely refused to carry out the transfusion, arguing that it could not cure the corruption of the solid parts, nor remedy to gangrene, which was evidently in the intestines; and that if they had thought of helping him with the transfusion, they should have notified them sooner, and at the same time that the blood evacuations were carried out, since the veins had infallibly filled with serum, and humors destined to water the parts, the which could easily be judged by the great dryness of the skin. Notwithstanding the above-mentioned reasons, and many others, which these gentlemen used as an excuse, they were again urged three or four times to give this satisfaction to the friends of the patient of not seeing him die without having tried all the possible remedies, and seeing themselves extremely stimulated, they planned to ensure his honour by saying that it was necessary to call the doctors who had treated him, and that if they wanted to declare that they were abandoning him, and also allowing the transfusion to be attempted, it would be done by their order at their own risk. The ordinary physician, esteemed as a man of great prudence in the faculty of Paris, immediately came to assure in the presence of many qualified people, that four of his companions had abandoned the patient with him, and that there was no other remedy than the transfusion, would willingly allow it to be done in his presence, especially because in his opinion this operation could not hasten the death of a man who had only two hours to live.

Upon the faith, which the stated doctor ratified in writing, the transfusion of calf's blood into the veins of the patient was undertaken, and although he was already buried in a mortal lethargy with great convulsions of limbs, and a deep, tingling pulse; here is the sudden change that followed after the transfusion of approximately eight ounces of blood given to

him this morning. His pulse immediately rose and became strong; the convulsions stopped; he looked fixedly at those around him, and after having given all the possible signs of a perfect knowledge, answering on purpose, and in different languages to those who spoke to him, he fell into a very peaceful sleep, and woke up after three quarters, the rest of the day he enjoyed many broths, orgeat, jellies without putting anything outside or below, even though it had been three whole days since he had taken anything by mouth, and his enteric flow had never left him; and after having continued in this state for around 24 hours, the strength began to decline, the pulse disappeared, and the intestines became completely empty. His friends, who had seen such a great change after the transfusion the day before, longed for it to be done again: after many instances it developed so slight that the first, since it was confirmed, there was a very great corruption in the viscera, which could not be repaired with the transfusion, nor with all the other remedies. After this transfusion given at six o'clock in the morning, the sick man regained a little strength, which did not last long: because although he took the broths without vomiting them, he never stopped throwing himself down, and at midday he began to faint. Little by little, until the last sigh, which he gave at five o'clock in the evening without any convulsion. It was considered appropriate to open the body in the presence of the doctors, which *once done*, the intestine was found to have retracted into itself from top to bottom and from below the knot to the end, the guts were liquid, ulcerated, and had an intolerable stench. The pancreas was extremely hard with obstructions, which did not allow the basal humor to flow into the intestines, the spleen was square in shape and restricted to four parts, the liver was large and fluid in certain parts, the heart was dry, and all burned. The vein through which the transfusion had been performed was discovered, from the opening of the arm to the heart, no more blood was found there than in the other veins and in the ventricles of the heart; since the little given to him had been drunk by his flesh due to their ardour and dryness. All this, and many other circumstances, can be confirmed with the testimony of twelve trustworthy people who witnessed the opening, and with the certificates that the doctors sent to the relatives of the dead man.

*Extract from a letter written to Mr. Moreau, Doctor of Medicine of the Faculty of Paris, &c. by Mr. Lamy in confirmation of the reasons given in his first letter against the Transfusion, and response to the objections made to him.*

Paris 26 August 1667.

Conjecture, since the Adversary is not satisfied with simple discourses, he claims from experience, that is, that five or six people should be made to die with the transfusion to clearly prove that it is pernicious. And as for the reproach, who does not keep the promise in the title of the letter, and does not reply to Mr. Denys, note that there are two strong objections, some oppose the possibility of the transfusion, and it does not affect them, as experience shows: the others deal with utilities, among which he says he has found only one worthy of consideration; but I kept silent about it so as not to disgust Mr. Denys: and it is that the objection against the transfusion has been made, that the parts, through which the blood circulates, cannot be repaired when they are damaged, and have the strength to communicate their bad qualities to the good blood. In the answer he only speaks of the [dell'intemperie] and malignancy of the blood, proving that it can be corrected with transfusion, without explaining how this blood does not become corrupted by passing through the already damaged parts, which was the proposed difficulty. He adds that all diseases, when the internal parts are not noticeably injured, are easily cured with ordinary remedies.

3. He thinks he has sufficiently responded to the reasons of Mr. Denys, with which he persuades in general the benefits of the transfusion, having proved in his letter, that the blood of an animal cannot nourish a man: and although it seems to the Adversary that nature teaches us transfusion in the way it is used to nourish the fetus in the mother's womb; not for

this reason, he says, should it be considered useful, since there is a great proportion between the blood of the mother and the fetus, which is not found between the blood of an animal and that of man. Nor does he want to concede that he can remedy the lack or loss of blood, not believing that other people's blood stops more quickly inside the open vessels than the patient's own blood.

4. All that remains is that one can do as much evacuation of blood as one wants; because if it is made excessive in an instant, perhaps the patient will die, if in several times he recovers from bloodletting without the need for a transfusion. He then defends that all illnesses caused internally generally proceed from impurity or abundance of blood, and so that the lack of blood added by the Adversary should not be counted among the first internal causes of evils; since it is always never preceded by some other disease, such as a continuous solution, which comes from an external cause, or from the abundance, and impurity of the blood; and therefore claims to be its legitimate division. Furthermore, it is believed that the transfusion cannot help those who have shed a lot of blood from the wounds: since the doctors are obliged to have them bled due to the fever, which almost always accompanies them, or for another reason known to them, it is credible, that the transfusion would be harmful.

5. He is opposed to the opinion expressed by the Adversary that the blood never varies in quantity, and he has not generally denied in his first letter that there are no cold diseases, but very rare ones.

He certainly claims that there are no veins that arise from the cold weathering of the blood, but not that some cannot be found that cause cold due to their combined cause, although heat is almost always an antecedent cause.

6. He says he concluded in his letter that the blood transmitted by making the veins feel hotter, which they do not feel from their own, was hotter, and this was demonstrated to follow reasonably, since it was more likely to heat one's own blood than to cool it; which cannot be said of the broths you drink, which are always less hot than the blood in your veins.

7. He considers it impossible that since the blood of an animal is so hot, that of man, or perhaps more, can still cool it with virtual frigidity, and does not believe that what is currently hot can cool something almost equally hot to the same degree, and after having refuted the reasons of the Adversary, who asserted this in the letter he went on to defend that the transmitted blood, when cold, must heat up to the same degree as the man's body, with which it mixes, and using the Adversary's comparison, he says that it is like a pan of water, which has five or six degrees of heat placed in five or six jugs of boiling water, the heat of which is conserved by the fire, so it would not be able to cool it, but on the contrary it would warm it up as it was; thus the blood of an animal which is always very hot, being found in small quantity in the heart of man together with its own blood, which is hotter, and is increasingly maintained so by the fire, which makes us live, it will heat equally in exchange for tempering it. He then thinks that fever is nothing other than an extraordinary fermentation of the blood, which can be stopped with altered medications, just as wine can be stopped with milk. Therefore he cannot see that this fermentation can be stopped by the blood of others, just as a little good wine cannot stop the fermentation of another nearby one from becoming corrupted, which, he says, a chyle made of remedies proportioned to this effect.

8. He responds to many other objections raised by the Adversary, and says that the eyes of the young man taken from that lethargy were blindfolded, a circumstance which was enough to disturb him, and make him believe that the outcome of this remedy could make him unhappy, and with this claims to confirm that the health restored came from the patient's real apprehension. Finally, it confirms that the blood transmitted from an animal cannot nourish man, although fetuses of different natures, and generated by males of equally different species, are nourished in the matrix with the transfusion of the blood of animals of different species. It is clear that the animal generated by two others different in species shares the nature of one, and resembles the other externally.

9. That the animals generated by two different species participate more in the nature of the mother than that of the father, because in addition to being partly formed by her seed, as by that of the father, they have been more nourished by her blood in the matrix, and after

birth from milk. And from all this he concludes that since the seed is appropriate for generating an animal similar to the one from which it came, without the mixture of another of a different nature being able to prevent it from giving clear-cut signs, so the blood is a compound, which can restore the parts of the animal from which it is formed, without another of a different species being able to take away the form, or qualities, which adapt it to this. And finally he claims that the particles of this blood characterized and shaped to repair the loss, which the solid parts make daily from the animal that gave it, needed to be able to change shape and receive another one of their own to compensate for the loss that occurs in the parts of the man by being mixed with his blood, which seems impossible.

### *Experiences made in Rome on Blood Transfusion.*

From the information provided so far regarding blood transfusion, everyone can recognize that a large number of experiences are sought, either to facilitate the operation for surgeons, or to protect themselves against the dangers of causing damage, or finally to clarify the benefit that is hoped for either in healing infirmities, or in prolonging life, or in restoring it with new blood to the wounded, who without it would undoubtedly be on the verge of dying. It was therefore the aim of whoever translated the hitherto written copies of France to have some sent to Rome for the instruction of doctors and to remove the difficulties that some had imagined. In fact, it has succeeded that many have applied it, and among the others the first was Mr. Ippolito Magnani, a very diligent surgeon, of eight, and the one who is most important in similar cases, prudent, cautious, and circumspect; who, thanks to the many experiments carried out since October on animals of different species, as we will report later, assures us of showing, every time, that it brings about the need, in men themselves with the simple cutting of an ordinary bloodletting manner mentioned in the aforementioned letters from France. Here is the story of his operations, and of the advances acquired so far.

1. The first was in a dog, which received the blood of another in the manner which occurs in France; it still lives without any damage.

2. In the following the dogs, which gave blood one day, received it the next together with new strength, so that when confirmed they still lived, or when they fled they gave a clear sign of their regained strength.

3. Among these, one was so weakened by the previous loss of blood that those around him were advised to reject him as useless; nevertheless he immediately reinvigorated, and went on.

4. Another that it was necessary to remove him bodily, once the operation was finished, lay him on the ground, after twenty-four hours, he was taken back bodily, and carried to the designated place without moving at all on his own, and having received the new blood he also fled, and the following day he was found again in the city, and then many days later found well again.

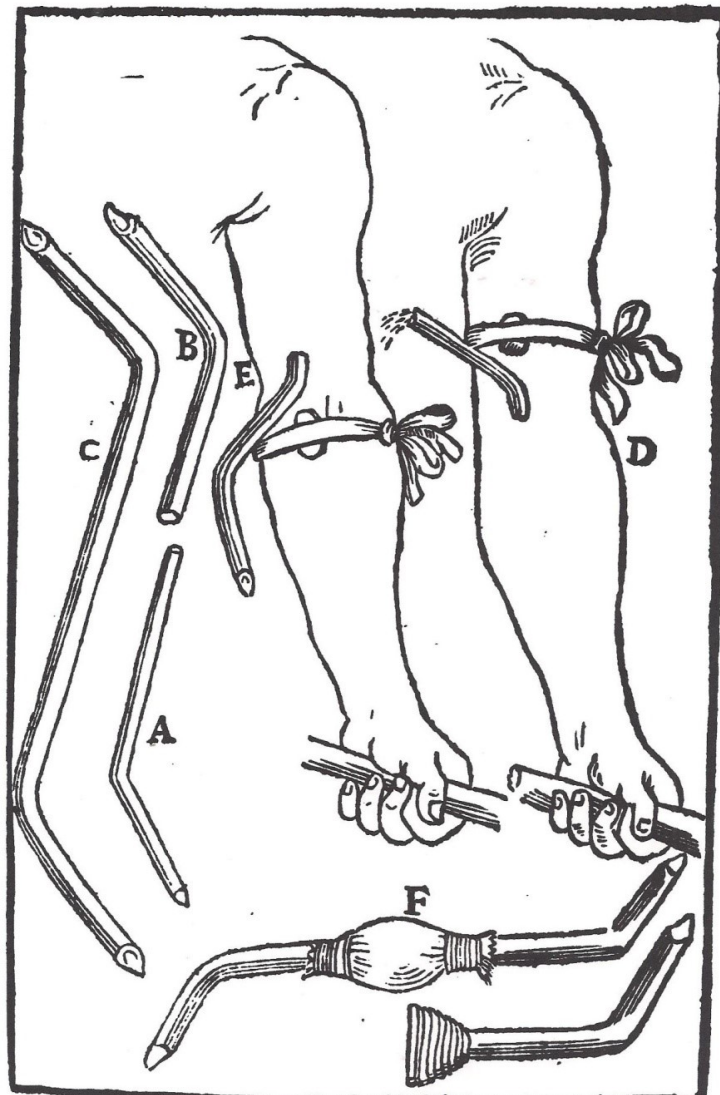
And therefore from here we learned that the restoration of blood to those who have lost it through wounds or blood flows also restores their life.

5. It happened that in one dog too much blood was transfused from another, and therefore it caused vomiting, sweat, and very copious urine the following night; all three essences of the repletion of the blood, therefore in some vomiting recommends Galen, who cuts his vein, and the experience there demonstrated the additional benefit.

6. We then proceeded to give the blood of a gelding to a dog, and perhaps because it exceeded the quantity at the request of many onlookers present, it urinated blood, died, and when opened, not only were the blood vessels extraordinarily swollen, but the bladder was still full.

However, one must be careful in the measurement to be taken from the capacity of the tubes, from the velocity of the blood, and also to be measured with the pendulum, even though it was believed that it should not be enough to have the right quantity; because the speed with which it passes through such a pipe into the free air will not be the same inside the vein in which it finds resistance. However, I should think about the use of a tube of

sufficient thickness in the middle, and known capacity to let it fill, and then loosely pass inside the vein; but it was Mr. Baldassar's best thought. You should use a small blister tied at the two ends with two small tubes, filled with a full ounce of blood, opening and tightening the access by means of compression with the fingers and with clips allows the blood to pass little by little, as in figure F later perfected by the aforementioned Mr. Ippolito Magnani in using three fragments of still soft intestines one inside the other for greater safety and ease; there was fear of freezing of the blood, but being arterial it did not suffer this accident, as perhaps would happen in the venous. It is difficult to stop the natural movement of the blood in order to transfuse it slowly, but above all this one must wait for experience, or a more certain and perfect way, which one will think of.



7. Glass tubes were placed in them because having their internal, clear surface makes the blood flow better and their transparency makes it possible to see their passage and to know their cleanliness better after having used them; indeed, one need not fear offense when touching glass or metal. Two of them were used to insert them in the French way, curved in the figures A B to adapt them to the veins, and only one whole one was used in the two ends, and cut with a pen to better insert it, as in figure C so that the spirits do not rise, and for continuous equality; nor should the diligent craftsman fear breakage; because in many trials so far, only one of them broke due to the failure of someone who let a dog loose.

8. To get closer to the human way, and outside of inhumanity, one of the said small tubes of curly glass, and made like a pen to the lamp, was inserted into the veins of many people from whom blood was drawn, and not only did they not experience greater pain, but they could see the blood better.

Hence we learn that in men of fat and full build, it is difficult to cause blood, because it forms in the fat and in the lips of the cut, which narrows, if one of the aforementioned tubes is introduced up to the vein, it cannot be less, that the blood does not flow out freely, as in figure E, and that even greater difficulties may be encountered by those who know how to introduce small tubes into the limb of transfusion in men, as in figure D.

9. In small animals, it has been learned, as also by letters from Bologna, that the carotid artery sends out blood in abundance, and is capable of taking tubes, so that in dogs it is almost always taken from it, and transfused in the jugular vein, but we must not therefore refuse the cruel one in any case by the example of the most learned French, to whom we are obliged for the instruction to carry out this operation, and from gratitude, as a desire, which increases their reputation by making such an invention more enjoyable.

10. On the 6th Gennaro transfused the blood of a gelding into a medium-sized dog, old, extremely scabious, and so astonished that he seemed to be senseless; once the operation was over he was much looser than before, he walked and collapsed several times, but he also urinated blood, and suddenly breaking his vein with his paws again, he died.

11. When introducing the blood it has been observed that the heart changes the order of the pulsations, and makes them more frequent and harder, by stopping the flow a little with the pulse, or by discharging the blood through another vein, the heart also returns as usual; hence we learned that we had to proceed slowly for less alteration, so that the flow can be distributed with the ordinary movement of the heart.

12. Bandaging animals too tightly makes it more difficult for blood to come and pass, because circulation is impeded.

13. On the evening of the 15th Gennaro performed a transfusion from a gelding into a dog, which had first given a large part of its arterial blood to another, and it was also transfused into this one just to satisfy the researchers, that when the operation was over, although he gained spirit, nevertheless began to move around the circle, and then stopped in a corner of the room: the same night he urinated a lot of serous blood, as he did the following day and evening; and walking around, and quickening his pace as if to trot, he made a certain noise heard in the intestines, like a jar full of water being shaken, hence it was said that the quantity of blood could be shed, or exuded in the cavity of the abdomen. There were those who attributed the dizziness to weakness caused by the ligatures of the vein, the jugular artery, and the carotid artery, but similarly many others did not try to relate to this accident. Others, however, liked to assign the cause of the fumes to the arterial blood transfused in too much quantity, which also made him urinate so abundantly, and of a blood-red colour, while nature tried to transmit what was repeated without being able to digest it first. Others also said that the thin blood of the castrated, rather than that of the dog, because it is arterial, as from the comparison made with the eye and with the touch, would close up the dog's meatuses, through which the urine leaks, to be greater of those of the neutered in accordance with dog number 5, although he suffered vomiting, sweating, and copious amounts of urine, this was not mixed or tinged with blood.

14. On the morning of the 17th this dog died, and when it was opened the abdomen was seen full of a red but dark serum: the ventricle was full of the same material, but blacker and a little green; the intestines, and the kidneys, but more sanguine; the bladder and the heart, but denser; and it was also seen in the left cavity of the skull: so that there was too much blood transfused, the matter extracted in the abdomen, and the probability of dizziness resulting from copious fumes, if not from the blood retained in the skull.

We enjoyed this operation in having given satisfaction to some, who still denied the fact of the transfusion, because even though the truth appears, this however happens in various people with various means according to their capacity; and the necessity of moderation to avoid the error of excess was better understood.

15. The same transfusion of blood from a gelding was then carried out in an old and very thin greyhound dog with the aforementioned measure, and it did not suffer any of the aforementioned accidents, on the contrary it gained strength, and was nevertheless better.

16. The experiments in animals will be continued, and the diversity of blood will be observed to give very faithful advice on the follow-up, both in favour and against the transfusion. Whoever does this does nothing other than trace the truth and make it known that although cuts and ligatures are necessary in animals, in humans they must be used and can be used with the ease mentioned above; and whoever did otherwise rather than advance would lose, would make himself ridiculous to the experts, would frighten the sick, and would cause horror, especially among idiots, to nature. Therefore, every prudent doctor and surgeon should be aware not to allow this remedy to be administered in another more painful form by means of cuts or ligatures of the vein, such as in animals, because the industry of the craftsman and those who assist can make up for everything.

While the information reported above is being read from 7777 under the press, some extracts from letters and books on the same subject arrive from France; and furthermore, P. Egidio de Cottignez, Mathematician of the College of Rome, shows a beautiful glimpse of Libavius, from which it is gathered that blood transfusion was thought of up until the year 1615. It is considered good to add everything here, to give greater food to the readers' curiosity.

*Extract from a letter from Mr. G. de Gurye de Montpolly to Mr. Abbot Bourdelot, Doctor of Medicine of the Faculty of Paris regarding Blood Transfusion.*

The feeling of this author is that this operation is not as safe and as useful as some claim: nor is it as useless and pernicious as others assert: but rather that it is a dubious remedy which can produce good results and bad effects according to the prudence and skill with which it is practiced.

Its foundation is that, since the blood of different animals is of very different nature, and has many spirits, it cannot be mixed in the body of the same animal without fermenting; nor can it be fermented without causing much alteration and inflaming fever, which is nothing else, according to the opinion of some doctors, than an excessive fermentation of the blood. So it is that, if the transfusion is not done in a robust body, and in moderate quantities, and with prudence, one must fear that annoying accidents will follow.

He confirms his argument with experience: because, if the transfusion has had some successful results, it has also had some unfortunate ones. Among others, note that having been practiced on a dog that wanted to rejuvenate at the cost of the life of another, the one that was wanted to be preserved died within five days, and the other one, who was destined for death, lived.

*Extract from the speech of Euthyphro, philosopher and doctor, on the new way of healing illnesses with blood transfusion.*

According to this author, transfusion cannot be allowed without turning ancient medicine upside down. Therefore he demands that it must absolutely be rejected; and in proof of this he provides many reasons with as much cruelty, as elegance. Some of the main ones are:

1. Because it is impossible that the blood of a calf transmitted into the veins of a man should not cause great alteration in his body, and, so to speak, transform him into a beast. Because just as an apple grafted onto a pear tree produces fruit which is no less of a pear than of an apple; so it is credible that the blood of a beast mixed with that of man will in a certain way cause him to degenerate into the beast.

2. It is mocked that to authorize the transfusion it has been said that it is a shorter means of feeding, sending the blood already made to the veins, instead of having it work in the ventricle. He says that the road is actually shorter, but not the safest; and it is almost as if

someone were on a third floor to shorten the path and jumped down from the window instead of going down the stairs; because since nature has not taught any other way to convey food to the veins than those of the ventricle, it is reckless to take any other way.

3. Giving the sick new blood with blood transfusion, he says, rather oppresses them than relieves them. Therefore, the greatest secret that medicine has is to remove the blood with bloodletting, experience having demonstrated that the abundance of blood aggravates nature in almost all diseases. It is true that as soon as the transfusion of new blood takes place, one's own blood is taken from the sick person. But this author replies that he is destroying himself by making use of the advantage he has gained from falsification; since nature is not discharged, but its weight is changed; and the sick person will be no more relieved than a porter who, having unloaded with a sack of peas, immediately reloads with another sack.

4. Supposing that the transfusion was to be used: he says that it would be necessary to use the blood of a man, and not of an animal. Because, just as for feeding children, women's milk is, without exception, better than that of any other animal; thus in transfusion the human blood should be preferred to that of anyone else; since according to the principles of those who support transfusion, blood and milk are of the same nature.

*Letter from Mr. Tardy, Doctor of Medicine of the Faculty of Paris to Mr. Le Breton, Doctor of the same Faculty regarding the issue of Blood Transfusion*

This author grants that the blood of men by transfusion is better than that of beasts. Because the cooking is not well done in animals, (as urine collected from is always cloudy, similar to that of a sick man) their blood cannot be perfectly purged; and if corruption is seen more quickly in the blood of men than in that of beasts, this arises, he says, for the same reason, that stains appear more on fine clothes than on rough and coarse ones.

He also states that transfusion is not useful for all illnesses, especially pleurisy and other serious illnesses, in which drawing blood is more useful than giving it.

But it is claimed that it does not have to be completely rejected, although it can be of benefit in many other infirmities. Furthermore, just as external cooking comforts the stomach greatly and helps the digestion of foods (which are digested better cooked than raw), it is equally likely, he says, that external bleeding done in the veins of another animal will help and facilitate that done in the veins of man. He adds that transfusion is necessary for the entire profession of medicine; because if it remedied the excess of blood with bloodletting, it would be imperfect if it did not also remedy the lack of it with transfusion.

*Extract from the Newspapers of England about some experiences of Blood Transfusion.*

Many vein-to-vein transfusions have been done here, and they have been successful. Doctor King, having removed 49 ounces of blood from a gelding, and shortly after restoring the same amount of blood from the jugular vein of a calf, the gelding, once the operation was finished, appears as vigorous and as strong as before. But since he wanted to kill it, his vein was opened and all the blood came out; about 65 ounces were taken from him before he died, and having then opened it, no more was found in his body.

The same doctor gave 45 ounces of blood to another smaller gelding, who, greatly weakened by such a large evacuation, was left shortly afterwards with the same amount of veal. He closed the wound, and untied him when, as soon as he felt free, seeing a Spanish dog near him, to which the blood of a gelding had been transmitted, he gave him three or four blows on the head, and afterwards he was fine.

Mr. Thomas Coxe gave, from vein to vein, the blood of an old and mangy dog to a young and healthy dog to see if the disease was communicated with the blood; the result of this operation was that the young dog did not suffer any harm, and the mangy dog completely recovered within ten or twelve days.

Messrs. Richard Lower and Edmund King performed an artery-to-vein transfusion in a man, from whom they first removed six to seven ounces of blood, and gave him nine to ten from the carotid artery of a lamb. And this man did not feel the great heat felt by those who received the transfusion in France. It is true that, since the tubes are very long, it is probable that the blood in passing lost as much heat as was necessary to reduce it to the temperament of the blood in the veins. He received such an advantage from this operation that four days later he made a great demand for it to be done again; but it was considered better to postpone it for some time.

*Extract of a letter from J. Denys Doctor of Medicine and Professor of Philosophy and Mathematics about a long-time madman who was cured by Blood Transfusion.*

The decision of most physics questions must rather be expected from experience than from discourse. Therefore, just as Diogenes believed that the best solution that could be given to Zeno's arguments against motion was walking, so the author of this letter says that he wants to combat the reasons of those who they wrote against transfusion, and therefore reports in this letter what happened in the treatment of a madman cured by means of the aforementioned operation.

Note that he was crazy for eight years. It is true that the madness was periodic, and that every year there were some lucid intervals: but the attacks were always very long, and did not last less than 8 in 10 continuous months; the last one had already resumed four months ago, with such violence that from now on he had been running through the streets without sleeping night or day: and there was no longer any hope of being able to cure him, since all the remedies used up to that point had only served to irritate his illness. Nonetheless, given the proposal that the transfusion could help him, or at least not harm him, Mr. Montmor had no compassion for stopping it, and placed it in the hands of Messrs. Denys and Emmerez.

On the 19th of December 1667, about ten ounces of blood was drawn from the vein of his right arm, and about six ounces of calf's blood from the crural artery were immediately transmitted to him, in the presence of many doctors. This first transfusion somewhat mitigated his fury. Therefore, since the doctors thought it best to repeat it, the following Wednesday more than a pound of calf's blood was transfused.

In both operations he showed that he felt very hot in his arm and in his armpit, where the blood passed through, but the second operation was accompanied by sweat all over his face, and by a great pain in his kidneys. , from an evacuation above and below; and finally from a deep sleep, which lasted ten hours. When he woke up he seemed much more composed than before, and little by little he regained his sanity completely.

It is worth noting that the day after the second transfusion he made a large glass of black urine, and the following day as much, he had a lot of blood from his nose: which caused him to have a little blood.

It is worth noting that the day after the second transfusion he took a large glass of black urine, and the following day as much, he had a lot of nosebleeds: which caused him to suffer a little. In this reading we see all the circumstances explained in detail with many particularities worthy of consideration.

## SUPERIOR LIBAVIUS

[From Latin]

*Andreas Libavius, in defence of the syntagma of the mysterious chemists, publishes from Frankfurt in 1615 where he speaks of magical medicines, and the like, he says: our one true thought that by some means he could obtain these unexpected results: "He is a young man robust, healthy, full of spirited blood: He is exhausted of strength, thin, emaciated, scarcely drawing his soul. A master craftsman should have silver tubes fitting together. Let him open the artery of the strong, and insert the tube, and secure it: soon, and the artery of the patient, and fix the female tube. Now he will apply two tubes to each other, and from the healthy*

*arterial blood, hot and spirited, will jump into the sick, and one will bring the fountain of life, and drive away all languor.” But how strong is he, do not languish, he must be given good comforts and food: a true physician hellebore.*

It seems that Libavius does not approve of the transfusion, and is worthy of excuse, because the circulation of the blood was not yet discovered, and it was a question of practicing it from man to man, and from artery to artery, that is to say, of removing the blood of one to give it to another, and cutting both with terrible cuts until the arteries were found; but on the other hand those who still disapprove of it today deserve great blame, perhaps because

*--- they think that it is shameful  
The beardless to learn, the old to perish.*

*Copy of a letter written by Mr. Doctor Montanari, Mathematician Professor in the Bologna Studio, to Mr. Cassini, Primary Astronomer of the same Studio, about a transfusion experience he carried out in Udine through which a deaf, decrepit dog recovered his hearing, and forces.*

Very Illustrious and Most Excellent Mr. my Most Honourable Master

The transfusion of the blood of one animal into the veins of another, the experiences of which have already been made famous in many parts of the world, is a matter, both in itself and for the consequences it brings with it, so worthy of the attention of the philosophers, which cannot be denied to Your Excellency; a succinct narrative, that I hereby bring to you an experience that I recently had in Udine del Friuli in those days that I remained there enjoying the favours of the illustrious Mr. Co. Girolamo Sauorgnano del Monte, the most important knight of those parts, and my most esteemed Lord.

We find ourselves after lunch on the day of Pentecost, 20 May 1668, we met again with the aforementioned most illustrious Mr Co: Girolamo, the most excellent Mr. Doctor Gio: Battista Coris our Bolognese, and I in the house the most excellent doctors Antonio, and Giuseppe Griffoni, men of that city, present, and with the assistance of Mr. Andrea Ceraffini, the most excellent surgeon, who assisted not only with his tools, but also with the most diligent work of his hands, we prepared in the first place a lamb, of which having discovered the crural artery, and having made the necessary ligatures of which the one facing the heart was a sliding lace, we fit the tubes inside with all possible diligence, which we have prepared and turned with the orifice towards the heart, and above that we tie the artery itself very well, after which we discover the jugular vein of a Pointer dog (whose conditions I will shortly describe), and tied it with a sliding lace in two places, in the middle space, opened with a lancet, we inserted another small tube also directed with the orifice towards the heart, and around it we tied the vein sufficiently; then, adapting the lamb in a proportioned place, we grafted the tubes together, which done, we first untied the ligature of the dog's vein, which concerned the heart, and we observed that it therefore did not come into the tube, (which was made of glass) any portion of blood, but once the ligature of the lamb's artery on the part closest to his heart was loosened, the blood suddenly flowed through the tube into the dog's vein, and in that transfusion, we also immediately untied the ligature of the vein of the dog, which connects the head, from which we let his blood flow out, although not so continuously, as through the small tube or entrance, since that vein is considered to be much larger of the artery of the lamb, to the effect, so that no more of it came out than was given to it, we tied it together with the finger, and finally when it seemed to us that little more remained in the lamb, which had already failed, we tied one and the other ligature of the vein of the dog, and we took the tube out, after which, having washed the wound, we sewed it up in part, leaving a little opening so that it could be purged and healed, and from the lamb we took as much blood as we could to the advantage, so as not to fill an eggshell.

However, it should be noted that during the operation a little bit of the lamb's blood was extracted from the tube due to the fact that the tube could not be grafted as well as would

have been desired, since in the absence of more suitable ones we had to loosen a piece of a blowpipe detached from one of those glass instruments which latent women use to empty their breasts, although we proceeded so by repairing it with our finger, that we did not judge that an ounce had escaped from it in this way, so that the remainder of the whole lamb was transfused in the dog.

This was a poodle pointer dog bred in the house of Messrs. Griffoni, not very big among the others of that species, thirteen years old, already completely deaf for more than three years, so that for noise, whistle, or call to another voice he gave no sign even with his eyes to hear, he walked very little, and, due to weakness, unable to lift his feet, he dragged them in such a way that he could hear their noise throughout the rooms with the drag of his claws on the floor; he ate little and with little desire, and for a long time he had abandoned the habit of caressing his patrons, not even with the movement of his tail.

After the transfusion, when he was freed from the wooden cross to which he had been tied, he remained for about an hour on the same table where the operation had been performed, at which time, having gone down to other rooms, he finally appeared, having descended by himself from the table where he was, and the ladder, but did not want food, except at another time; the following day he began to feel much happier, in fact on the third day he left the house on his own, and against his usual behaviour ran with other dogs around the square, no longer dragging his feet, as before, but having manifestly become more robust, returning to house made unusual caresses to the owners, and what seems most noteworthy to us, in addition to eating more and with more clarity than before, began to show clear signs of recovering his hearing, because in fact many times at the whistle or at the voice of the owners he turned, However, on the sixth and seventh day, starting to vigorously overcome the wound, he seemed to become more melancholy and weak again, which was attributed to the symptoms that came from the wound itself. I then left those parts, and I am now in Bologna, where I await daily further news from those Most Excellent Griffoni, of what will follow, of which I will know in due time Your Most Excellency.

*In another letter the same Mr. Montanari wrote to the aforementioned Mr. Cassini, among other things, the following*

I then received letters from Mr. Doctor Antonio Griffoni, in the first of which dated Udine 13 June 1668 he says so.

*We are about to soon carry out a new operation of transmitting blood into another old dog, to then move on to that of humans; certifying them with truth, that my dog, in which Your Excellency performed the first transfusion here, has recovered almost as much as before his hearing, which was completely lost for three years, and is stronger beyond compare than he was before the operation. Little by little he will be healed of the wound, which forced us to do some work because he was unable to lick it, &c.*

And because in the meantime I have sent him a copy of the letter written to Your Excellency in relation to this experience, he replied to me on 20 June with the following words.

*Your Lordships, in the information given to the Most Excellent Cassini, you have represented the pure and simple truth, but you should add that my dog hears, walks behind his owners, and is made brave, since before he barely left the house, he struggled to walk and eat, due to weakness, that he is not brave, and hadn't heard anything strong for more than three years, nor is there any other difference other than that being close to me, calling him, or whistling at them, he turns back, as if the person calling him was further away; this, however, does not always happen, as always when calling him he undoubtedly hears, &c.*

THE END