

**ARTICLES / LETTERS / EXTRACTS ABOUT BLOOD TRANSFUSION
PUBLISHED IN THE *JOURNAL DES SÇAVANS* IN 1667 / 1668**

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INTRODUCTION

Some of the earliest articles / letters on the subject of blood transfusion were published in the *Journal des sçavans*, in Paris, during 1667 and 1668. Four of these were by Jean-Baptiste Denis, a small number were reproduced extracts of articles from the *Philosophical Transactions*, the Royal Society's journal published in London, whilst the majority of others comprised critical evaluations and personal comments based on the medical beliefs of the time. As such, these are of great interest in relation to the history of blood transfusion in the 17th century. Although these documents have been referenced in numerous published papers and books relating the history of blood transfusion I have never seen complete English translations of these articles/letters, something which as far as I am aware has never been done before. I have attempted to produce translations that are hopefully 'un-interpreted', in that I wanted to maintain the original wording as much as possible, so as not to inadvertently change their meaning.

The 1667 edition of the *Journal des sçavans* is available to read or download from:

<https://gallica.bnf.fr/ark:/12148/bpt6k58122h/f1.item>

There is also a pdf version of the 1667 year available from:

<https://books.google.co.uk/books?id=i9NKAAAaAAJ&pg=PA183&focus=viewport&output=text>

The 1668 edition of the *Journal des sçavans* is available to read or download from:

<https://gallica.bnf.fr/ark:/12148/bpt6k58123v/f1.item>

There is also a pdf version of the 1668 year available from:

https://books.google.co.uk/books?id=yNIKAAAaAAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false

Note: Dependant upon which of these sources are chosen alters the page number reference. Therefore the references to the translations provided below contain two sets of page numbers; the first being from the Gallica website link whilst the second is from the Google Books website link. There are no blood transfusion related articles/letters published in the *Journal des sçavans* in 1666 or 1668.

On a few occasions, I have been unable to translate a word (as printed in both sources) or have found that the translated word does not make sense, in which case I have placed the original word in square brackets within the translated text. This also includes a small number of words that appear to be typographical errors as I have been unwilling to infer what the actual word should be.

Extract from the Journal of England, containing the way of passing blood from one animal to another.

Dr Lower was the first to put this method into practice at Oxford and reported it to Mr Boyle who communicated it to the Royal Society in the following manner. First you have to take the carotid artery of a dog or of any animal whose blood you want to pass into the body of another, and having separated it from the nerve of the eighth conjugation, hold it uncovered by about an inch. Then make in its upper part a strong ligature which cannot be untied, and an inch below, to know towards the heart, make there yet another noose tie which can be tightened or released as needed. These two knots being made, pass two threads under the artery between the two ligatures; then open the artery, and put a small feather pipe in it, and tie the artery tightly with the two threads over this pipe, which you will plug with a small plug. After that, discover, the length of an inch and a half, the jugular vein of the other animal, and make a slip knot at each end, and between these two slip knots pass under the vein two threads, as in the artery: then make an incision in the vein, and insert two tubes there, one in the lower part to receive the blood of the other animal and carry it to the heart, and the other pipe in the upper part, which comes from the test, by which the blood of the second dog can come out and flow into dishes. These two pipes being put in this way and being connected well, keep them closed with a stopper, until it is time to open them.

Everything being thus prepared, tie the dogs towards each other on their side, so that other pipes can be passed through the first two. Because as we cannot approach the necks of the dogs close enough to each other, it is necessary to put two or three various pipes in the first two to carry the blood from one to the other. After that unblock the pipe which goes down into the jugular vein of the first dog, and the other pipe which comes out of the artery of the other dog; and by means of 2 or 3 other pipes as necessary join them to each other, then release the nooses, and also soon the blood will pass impetuously through the pipes as through an artery, and at the same time as the blood flows into the dog, unblock the other tube that comes from the upper part of his jugular vein (having previously made a ligature around its neck, or at least pressing the other jugular vein with the fingers) and at the same time let the blood flow in dishes (not continuously but as you judge his strength will allow) until the other dog begins to cry, to weaken, and to fall into convulsions, and in the end die on this side.

Then pull the two pipes out of the dog's jugular vein, and having fully tightened the noose cut the vein above (which can be done without causing any harm to the dog, because one of the jugular veins is sufficient to conduct all the blood from the test to the upper parts, because of a large anastomosis through which the two veins unite towards the larynx). That being done, sew up the skin, and let go of the dog who will jump off the table, and shake himself, and run away as if nothing had been done to him.

I have often experienced it in front of various people in the universities; however, I have only used one dog at a time, for lack of spare time or not having several dogs at the same time. But when I return I will undoubtedly give you a fuller report, not only by passing the blood of several dogs in one, but also that of various animals, from the body of some to that of another, as you suggested to me before leaving Oxford; which will be very easy to do, and will be able to provide us with several beautiful experiments which will perhaps not be useless. But because it is necessary to observe several circumstances to make this experiment a success, and so that you can better have it done by someone else without putting in danger of death the dog who receives the blood, I will warn you of 2 or 3 things.

1. That it is necessary to tie the dogs at such a distance that the vein or the artery is not strained; for if they were too so, they could not receive or lead so much blood.

2. That we must continually notice beyond the tube in the jugular vein of the dog the beat caused by the impetuosity of the arterial blood. Because if this beat does not appear any more, it is a mark that the pipe is blocked by some lumps of blood, so that it is necessary to remove the pipe from the artery of the other dog and unblock them both with a probe, so that the blood will once again have its free passage. The same thing happens when the dog whose blood is drawn is almost completely exhausted, because then his heart which has only a weak beating, can only slightly push the blood which also curdles more easily and more quickly, so that in the end it is often necessary to remove the pipe and unblock the passage, especially if the dog is weak, as many are, that they are vigorous enough to endure an entire and continual draining of their blood until they convulse and die from it. To prevent this accident and come to a better end of the experience, you have to get the blood of a large dog to pass through the body of a small one, as I once did, and the little dog shed at least once as much blood as he should have had (the large dog remaining dead on the table) and after he was released he fled and shook himself, as if he had just been thrown into the water. Or you can hold three or four dogs prepared in the same way, and when one starts to weaken and no longer sheds blood, take another; and I am sure that only one dog will receive the blood of all the others and maybe more as long as the blood comes well, and until the dogs remain almost dead; provided that you let out the blood of the dog that you want to keep, in proportion to that which you bring in.

3. I suppose that the dog whose blood must flow in the dishes, will resist it better, if the ones whose blood you want to supply are about the same age, and if the previous day they were fed in the same way, so that the blood of one and the other is more or less of the same temperament.

There are several things that I have noticed while drawing the blood of dogs until they die, and which I have experienced since you left Oxford, the particulars of which I will let you know another time. However, you will oblige me to communicate this experience to the Royal Society, etc.

This is what the letter contains, the instructions of which having been observed from time to time by those who have been employed in making this experiment, it has so far fortunately succeeded, not only in animals of the same species, as in two dogs or two sheep, but also in others of different species, such as a sheep and a dog, causing the blood of one to pass into the body of the other.

Note only that instead of a feather pipe it would be more appropriate to use a silver or copper pipe or channel, which is a little bent and so loose that an end can enter the feather pipe, and which has at the other end which must enter the vein or the artery, a small ledge to better attach it with a thread, because it will be cleaner than a straight and plain pipe, being much easier to adjust.

This experiment can be used for various purposes, such as passing the blood from a young animal to an old one, from a healthy to a sick, from a cold to a hot one, of a hardy in a timid, of a tame animal in a savage, and that not only in animals of the same species but also of different. That is why in order to make this experience more perfect, a few like minded people have already proposed some curious experiments and research which we will perhaps talk about another time, for the present we will add only a few thoughts on this experience.

1. We can observe there that the blood which one draws from an animal, can almost in a moment, by the means of the circulation, mix and flow with that of the animal which receives it. This is why in these experiments in order to be sure that the animal, in which the blood of others is passed, has lost all of its own, and only has what it received from others, it is necessary as noted above, prepare two or three animals and pass all their blood into that animal.

2. If we can refer to the conjectures, it appears that this blood transfusion will not alter the nature or the disposition of the animals on which this experiment is made; but to be sure of it you have to wait until you have experienced it. This way of changing the blood of animals seems different from that of grafting. Because the grafts convert into their nature the juice of the trunk on which they are placed; because their fibres so filter the juice that the trunk sends them, that they convert it into the nature of the grafts: whereas in this transfusion of blood it seems that there is no such filtration of the blood of animals that the blood of one may be converted into the nature of the other.

3. It seems that the most considerable benefit which will be drawn from this experiment, is that an animal can live with the blood of another, and consequently that for animals which have almost no blood or whose blood is corrupted, one can substitute those of the others in a sufficient quantity, and as will be judged advisable, provided that care is taken to renew this transfusion often on account of the prompt dissipation of the blood.

NOTE:

Richard Lower's original paper was published in the 17th December 1666 edition of the *Philosophical Transactions of the Royal Society* and has the following reference: Lower, R. (1666) The method observed in transfusing the blood out of one animal into another: and how this experiment is like to be improved. Some considerations concerning the same. *Philosophical Transactions of the Royal Society*, 1, 20, 353-358.

<https://royalsocietypublishing.org/toc/rstl/1666/1/20>

14th MARCH 1667

Volume VI, pages 69-72 / 87-96

Extract from a letter of Mr Denis, Professor of Philosophy & Mathematics, to Mr * concerning the transfusion of blood. From Paris this 9th March 1667.**

You know that having advanced in one of my lectures that the transfusion, by which the blood of one or more animals was passed into the veins of another, is a new and quite convincing proof to confirm the feeling of those who support circulation; several people laughed, and called this transfusion chimerical and ridiculous. And since you were one of those who spoke more seriously about it, and you tell me that it was perhaps only a supposition made at pleasure in order to give the exercise to a few; I have since wanted to make sure of it, and I am now willing to inform you of the circumstances with which the thing has succeeded us by means of Mr. Emmerez our surgeon, whose patience and skill to dissect you have often admired, when he was doing this yesterday with so much accuracy the demonstrations of the particularities that I explained on a human cadaver.

On Thursday, 3 March, two small dogs were brought to us which had never been fed together, and which in their faces seemed as different as certain animals of different species, one being a spaniel bitch, and the other a short-haired dog resembling a fox. The bitch was full and a little bigger and higher than the dog; for it was twelve inches high, and the dog was only ten.

We proposed to do not only what was stated in the extract from the Journal of England, which is to pass the blood of one animal into another, by killing the one who communicates it to conserve the other who receives it; but we wanted to preserve them both, and for that we resolved to open the crural artery of the bitch to pass its blood into the jugular vein of the dog, persuading us that by drawing the blood by the

artery which carries it from the thigh to the extremities, the convulsions would not be so much to be feared for the bitch as by pulling it by the carotid which carries it by the neck to the brain; apart from the fact that the crural artery is not so unbound or so deep as the carotid artery, we would not be obliged to use such loose tubes, which are liable to become engorged when the blood passes, and the dog does not suffer so much, it would be easier to have it reshaped.

In fact the thing happened in the presence of worthy people, as we had foreseen, in a very simple and easy way. Because having prepared our two animals, that is to say having uncovered the artery at the thigh of the bitch, and the vein at the throat of the dog, we made two ligatures on the artery at an inch apart followed by the vein of the other, of which the lower was a firm knot, and the upper one closest to the heart a noose, and between these two ligatures we introduce a very small thin [laton] pipe, an inch and a half long and curved at one end, in such a way that the curvature faces the heart to better receive the blood when the noose was loosened.

We also made two ligatures at the same distance on the vein of the other dog, but which were both a noose, and between these ligatures we introduced two pipes similar to the first, so that the curvature of one faced the heart to carry the blood there when the slip knot above is loosened: and the curvature of the other faced the head of the animal, to better receive the blood which comes from above and guide it into dishes, when the slip knot above, would also be loosened.

Then we strongly lay the bitch's artery on the end of her pipe, and the dog's vein on the two ends of the two pipes that we had introduced there, and after having put the dogs down next to each other, so that the thigh of the bitch responds to the throat of the dog, we made the first pipe to enter the second, that is to say that of the artery of the bitch in that of the vein of the dog which faced the heart, and having loosened all three nooses, we watched the blood flow from the crural artery of the bitch into the jugular vein of the dog, while the third pipe poured into a dish about as much of this dog's blood as it did receive.

And to make sure that the blood was really flowing from the bitch's artery into the dog's vein without curdling in this small interval, which was only 3 inches long, we withdrew the first pipe from inside the second, and we did not find the blood willing to stop on the way, because there was too much movement and heat; besides that, it was very easy to feel it flowing by putting your finger on the dog's vein below the ligature; because there was quite a considerable heat and swelling there, which is not noticeable when someone presses with the finger on the artery on the bitch's side and thereby prevents the blood from entering the communication pipe.

Moreover, we observed during this operation that the third pipe was discharging through the dog's jugular a much larger quantity of blood than usual; which came to my mind the fact that this dog received arterial blood by the second tube, which entering in abundance must by the means of circulation, cause another to exit in the same quantity.

When we had drawn by this third pipe nine ounces of blood from the dog into a dish (which is a lot for an animal of this size) the bitch who had given it back as much, and who therefore had nothing left to do with the rest, began to weaken. This is why we immediately arrested her artery by tightening the slip knot; and after also making two strong ligatures in the dog's jugular vein instead of the two nooses we had made there, we untied the dogs; and here is what we noticed in particular.

The bitch who had shed her blood was weak enough and only had the strength to go and throw herself in a corner of the room on the side that had not been opened. But for the dog which had received new blood, he appeared vigorous enough, in that he having untied the [pates], he made several efforts to tear off a muzzle which had been put on him to prevent him from crying out; and after shaking himself a little, he immediately fled from those who wanted to approach him, because of his naturalness which is quite fierce.

We must not believe that this dog was as lively and as gay as before, for he was in fact a little more downcast; and this change was undoubtedly not due to the new blood he had received, but to the pain which he would have felt when cutting the skin and discovering the jugular vein to make this transfusion: which can be confirmed because we had prepared a third dog of the same size to substitute in place of the one that we would miss; but having had nothing to do with it, because we had succeeded according to our designs, we sewed up its skin, and although we had not opened any vessel in him, he was nevertheless more dejected than the one who received new blood, for the two dogs which had given the transfusion ate very well two hours later, and not the third.

Since then, I have had these three dogs together and their vigour has increased from day to day in proportion to their appetite, we have not noticed that there is reason to fear any harm from this blood transfusion.

The bitch eats extraordinarily, and she has now given birth to a little dog, which came into the world dead and in which only three or four drops of blood were found.

The Tuesday following 8 March having found our dog who received blood, very vigorous and with a very good appetite, we allowed ourselves to use it for a second experiment, not in truth to receive more new blood as he had done six days before; but to recover it and pass it through the veins of someone other than we intended to receive it, in order to experience what the transfusion of blood which had changed vessels a few days before could do. And for this escape we chose the third dog that we did not use in the previous experiment, and having adjusted its jugular vein to the crural artery of the other with a little more diligence and warmth than the first time, we made the blood of the first pass through the veins of the last, and after having reduced the first to the [abbois] and having it so distressed that it appeared to us as dead, and that his artery no longer supplied any blood, we found that the last one who had received it had nevertheless seen in a dish his own eleven and a half ounces; which made us believe that what was communicated so much to him could not escape. However, this is what we noticed in particular in this new experiment.

1. We confirmed to ourselves in our first thought, that by opening the crural artery instead of the carotid artery, we eliminated the convulsions of the animal which communicated its blood, and that we did not put it so much in danger of losing its life. Because what if we had left our [nostre] in a corner as apparently dead; nevertheless, someone from the company, having poured wine in his mouth, gave him back some movement, and after that he rested on his feet, only by tottering extremely. We kept giving him good food and we still have him alive.

2. We have clearly seen that if the one who prepares the animals has a great deal of skill and diligence not to let them languish for a long time, the transfusion is much better and more successful.

3. That the fire is used a lot in the room where the transfusion is done.

4. That the communication pipes, which are too long and too thick, are not so clean for this operation, because of the difficulty in warming them up.

Finally, if the transfusion were well practiced, it would not be as dangerous as many imagine it for the one who receives new blood. For we noticed in this experiment that the blood which was found in three different bodies in less than six days, did not in any way inconvenience the one who had received it last; but on the contrary, as soon as this animal was released, he jumped down, shook his ears several times, and came to pet those who called him as usual. He even ate with a very great appetite half an hour later, and made appear as many marks of vigour as he had shown weakness at the first experiment, that we had not opened his vein at that time, and that we are happy to discover it and to get away from it if we need it, as I have remarked above.

All this happened to the great astonishment of those who honoured us with their presence, and mainly a very skilled Doctor in Medicine, who ingenuously admitted

that he would never have believed the thing if he hadn't been able to examine all the circumstances himself.

We intend to give public proofs as soon as possible. And for this topic we will choose the first ordinary day of my conferences, which will be Saturday next 19 March at two o'clock in the afternoon on the Quai des Augustins. And to see what change this transfusion will produce, we will pass the blood of a healthy and young dog through the veins of another who is old and mangy.

25th APRIL 1667

Volume VIII, pages 96 / 125-126]

Extract from a letter of Mr Denis, Professor of Philosophy & Mathematics, to Mr * concerning the transfusion of blood. Of 2nd April 1667.**

Since the experiments which I wrote to you on the 9th of the previous month, we have passed the blood of three calves into three dogs, in order to assure ourselves of the effects which the mixture of two bloods so different could produce. I will tell you more about them in a little while, now I will just tell you that the animals in which the blood has been transfused, all eat as well as before, and that one of these three dogs from whom so much blood had been drawn the previous day, that he could hardly move any more, having received the blood of a calf the next day, instantly regained his strength, and showed a surprising vigour. We have found new ways to give the transfusion so easily, that Mr. Emmerez makes a point of doing it without any ligature with a single puncture similar to the one done in the bleeding.

13th JUNE 1667

Volume X, pages 117-118 / 157-158]

Treatise on the flow of the blood of a man in the veins of another and its uses, by M.C. Tardy, Doctor in Medicine. In Paris, at J. du Bray & Cl. Babin.

Experience having shown that the transfusion of blood is not only possible, but also easy; it remains to be seen whether it is advisable to practice it on men, and if some considerable advantage can be derived from it for the preservation of health or for the cure of diseases.

The author of this treatise claims that this operation must be even more successful on men than on animals. But to avoid the inconveniences which often follow when the arteries are opened, he believes that instead of transfusing from the artery to the vein, as has been practiced hitherto on animals, it would be better to do it from vein to vein, passing the blood from one of the veins in one man's arm to a vein in another man's arm. He teaches how to do this operation, and discusses the precautions that must be taken in order for it to be successful. However, he supposes that the person who provides blood donates only that which is superfluous to him: for otherwise this operation would be barbaric.

To use them that can be drawn from them, he only holds old people and those whose vessels are full of bad humor and corrupt blood; can by means of transfusion protect themselves from the ailments with which they are threatened, and maintain their natural constitution. He also says that this operation is very useful for the cure of the diseases which come from the acrimony of the blood, as are the ulcers, the [Eresipeles], etc. The drugs that one takes hardly cure these kinds of diseases, because they lose their strength before they can come to the place where the evil is:

but a new, well-tempered blood, going directly to the diseased parts by means of transfusion, should give much more prompt and assured relief. Besides, this author remarks that the blood of a man is not absolutely necessary for this operation, and that that of a calf and another animal can have the same effects.

28th JUNE 1667

Volume XI, pages 134-136 / 182-189

Letter from M. Denis, Professor of Philosophy and Mathematics, to M. de Montmor first Master of Requests concerning two experiences of transfusion made on men. In 4 A, Paris, at J. Cusson.

Finally, the transfusion of blood, which some people believed to be impossible, which many considered dangerous, and which most considered at least unnecessary, was fortunately carried out on men; and the first experience we have with it, it cured a person of a fairly annoying illness. We will see in this letter the account of these two experiences, with several arguments for and against this operation.

I will not go into the details of the objections that have been made against transfusion, nor of the answers that Mr. Denis gives; because they would take too long to relate. I would say that the main reasons that this author uses to demonstrate the usefulness of this operation are, that by practicing it we only imitate the example of nature, which in order to nourish the foetus in the mother's womb, make a continual transfusion of the mother's blood through the umbilical vein. To have the transfusion done is nothing other than to feed oneself, by a more than usual way, that is to say to put ready-made blood in one's veins, instead of taking food which only turns into blood after several changes. That this abbreviated way of feeding is preferable to the other, in that the food taken by mouth having to pass through several parts which are often badly disposed, can contract several bad qualities before it arrives in the veins, and is subject to several alterations which are avoided by immediately putting ready-made blood in the veins. That this operation brings together the doctors who approve of the bleeding and those who do not approve of it, those because it removes the corrupted blood and those because by putting new blood in the place of that which one draws, the patient's strength is not diminished. Finally, reason seems to teach that diseases caused by the bad weather and the corruption of the blood must be cured by the transfusion of pure and well-tempered blood.

After replying to those who reject the transfusion as useless, he replies to those who condemn it as barbaric. What gives them this bad opinion is that they imagine that in order to do well, the animal which provides the blood must be of the same kind as the one which receives it; and thus we can only prolong the life of one by shortening that of the other. But Mr. Denis shows that this is not necessary, and that on the contrary the blood of animals is better for men; than that of the same men. The reason he gives it is that men, being agitated by various passions, and little regulated in their manner of life, must have more impure blood than beasts, which are less subject to such disturbances; and that in fact we do not find any corrupted blood in the veins of the beasts, instead of always notice some corruption in the blood of men, however healthy they may be, and even in that of little children, because having been fed on the blood and milk of their mothers, they sucked corruption with food. Moreover, why shouldn't the blood of animals be suitable for men, then that it is the same kind as the milk and the flesh on which they usually eat? We could add that if what some authors have noticed is true, that these barbarians who eat human flesh are subject to several unfortunate diseases, from which those who eat the flesh of the beasts are exempt, it must be concluded that like the human

flesh is more unhealthy than that of beasts, their blood is also less suitable for transfusion. Besides that for the cure of diseases one needs blood sometimes warmer, sometimes colder, sometimes thick and sometimes subtle, and therefore as these qualities dominate more in various animals, their blood is cleaner for transfusion, than that of humans where the difference is not so great. Mr. Denis says that we still have this advantage in doing away with the beasts, that we do the operation more boldly, and that we can better prepare them by feeding them in addition to suitable food.

All these reasons that we read with pleasure, because they are written in a pleasant manner, serve as a preamble to the two transfusion tests which are the main subject of this letter. The first test was carried out on a young boy of 15 to 16 years who had suffered from a disease which was believed the transfusion would be good for. This boy, who by nature was quite ready and quite alert, since a obstinate fever with which he had been tormented for more than two months, and for whom the medicines had made him go to bed twenty times, was often so heavy and so drowsy, that he was quite stupid. He almost lost his memory; his mind was dull, and though he slept ten and twelve hours every night, he dozed off during the day, sitting down to table, eating, and doing all the things which usually dispel sleep. It was judged that this drowsiness was due to the fact that the little blood that remained in him was too thickened by the heat of the fever which he had had, and thus it was believed that he could be cured by giving him new blood. This remedy having been approved, Mr. Emmerez, who had a special skill for this operation, opened a vein at the folds of the elbow at five o'clock in the morning, and after he had drawn from it about three ounces of blood, which was extremely black and thick, he also gave, by the same opening, arterial blood of a lamb whose carotid artery he had opened. During the operation, this patient, who was often questioned about his condition, complained of nothing, except that from the opening of the vein to under the armpit, he felt a great heat (that came from the course of the arterial blood) and nevertheless allowed the operation to be completed, without testifying to being much inconvenienced. After giving him about eight ounces of blood, the opening of the vein was closed, in the same way as is done with ordinary bloodletting, and carefully observed what would happen to him. The first advantage he received from the transfusion was that he felt relieved from the pain he had in his side, for having fallen the day before, from the top of a ten-foot ladder. He was also in a short time perfectly recovered from his drowsiness, and on the same day, having risen at ten o'clock in the morning, he appeared much more gay than usual, and said very well without falling asleep. At four o'clock in the evening he seized through his nose three or four drops of blood; and having a good supper afterwards, he slept only from ten o'clock at night until two o'clock after midnight when he woke up, and could not sleep any more. But the next day he slept a little longer, and even more the following days, until he gradually regained perfect health, without having been inconvenienced since then with his drowsiness.

This first experiment having fortunately succeeded, a second was made, but more out of curiosity than out of necessity; for the one on whom it was made, had no considerable indisposition. It was a strong and sturdy Chair Bearer, about 45 years old, who offered to endure this operation for a relatively small fee. As he was well and had a lot of blood, he was given a much larger transfusion than the first. For about ten ounces of blood was taken out of him, and was given back about once as much blood of a lamb, whose crural artery had been opened to diversify the experiment. This man, who by his nature was quite gay, was in a very good humour during the whole operation, made several reflections on his bearing on this new way of bleeding, whose invention he could not admire enough, and complained of nothing except that he felt, like the first, a great heat from the opening of the vein to the armpit. As soon as the operation was done, he could not be prevented from dressing the lamb himself, from whom he had received blood, after which he went to find his

comrades, with whom he drank a part of the money given to him. And notwithstanding that he had been ordered to rest for the remainder of the day, and that he had promised to do so, on the midday finding an opportunity to earn money, he carried his chair as usual throughout the rest of the day, he assured that he had never been so well, and the next day he begged that no one other than him be taken, when we would want to repeat the same operation.

This is the success of these first two transfusion trials, which must nevertheless be confirmed by other experiments, so that we are able to judge with certainty the usefulness that can be derived.

Thus the French have the honour of being the first to perform transfusion on men, as they had the glory of having been the first to invent it. Because, what the English before all the others, having put it into practice on the beasts; it is certain that it was the French who gave them the first thought. It is known, and there are several persons of honour who can testify to him, that it has been more than ten years since Dom Robert des Gabets, Religious Benedictine, made a discourse on transfusion in the assembly which was held with Mr. de Montmor, and there are still several copies. It is true that most of them scoffed at this proposal, and that it was believed to be impossible. The English seeing that no report was made in France of this invention, wanted to seize it as an abandoned thing, and have practiced it on beasts; but we have finally reclaimed it, and we have found a means of regaining possession of what belonged to us, by practicing it first on men.

6th FEBRUARY 1668
Volume II, pages 13-14 / 304-305

Various pieces relating to Blood Transfusion

We have spoken in the Journals of the previous year of several writings which have been made concerning the recently discovered invention of passing the blood of one animal through the veins of another. In the Journal III we gave the way in which the English first practiced this operation on dogs. We saw in VII and in VIII the experiences which have been made in France. We mentioned in X, of a writing composed by a Doctor of Medicine of the Faculty of Paris, in which it is treated of the manner of making the transfusion on men, and of the uses which one can draw from it. Finally we have reported in XI the experiments which have fortunately been made in this city on two men.

Since it has been recognized by these last two experiences, that this operation is not so difficult on men, that we had first persuaded ourselves; various authors have applied themselves to examining the uses that can be drawn from them. Some have provided reasons to show that it should not be of any use in medicine: the others have argued on the contrary that it can be used for the cure of several diseases: and during this argument we had new experiences, which have been talked about a lot in the world. As this matter is curious, and that it does the maintenance of the most of the scavans, it will not be useless to deal here with the writings that have been made on both sides, and to indicate what is more remarkable there.

6th FEBRUARY 1668
Volume II, pages 14-16 / 305-307

Letter from G. Lamy to M. Moreau, Doctor of Medicine at the Faculty of Paris, against the alleged utility of transfusion. In 4. In Paris, at Jean de Launay.

The author of this letter is the first to write against the transfusion. He claims that this operation is rather a new means of tormenting the sick, than of curing them; because the diseases which it is said, that it can serve as a remedy, are mainly those which come either from the excessive heat of the blood, or from its corruption: in those which are caused by too much heat of the blood, transfusion cannot take place. For the blood which is transfused being hotter than the patient's own blood, as experienced by the two people on whom this operation was performed, will increase the heat of the patient's blood, far from decreasing it. It seems that it will not be more useful in the diseases which come from the corruption of the blood, because the little foreign blood which one receives by this operation, will be much more corrupted by all the mass of blood which is in the body of the sick, than the badness of all the mass of blood will be corrected by this little foreign blood. Because if the corruption of the blood of a rabid or miserable animal is so great, that a little foam or a small vapour which leaves its body by perspiration, is capable of infecting the whole mass of the blood of another animal in good health; how will a little foreign blood not be infected by the mixture of all the blood of the animal which is attacked by these diseases?

He does not only say that the transfusion is useless: he even maintains that it is pernicious, and that instead of curing one disease, it will give birth to several others. The main reasons he brings, are firstly that as the seed of one animal cannot be used to form another animal of a different species; the blood, which is similar to seed, being transmitted through the veins cannot be used to nourish it either. Because like the blood of a calf or any other animal whatsoever, is composed of several different particles suitable for nourishing the different parts of its body; he asks, if this blood is passed through the veins of a man, what will become, for example, of the particles of this blood which nature intended to produce horns? It is not the same, he says, with the flesh of a calf on which we feed; because the parts which are not suitable for human food are separated or changed in the ventricle by means of coction. In the second place, since the spirit and manners usually follow the temperament of the body; and that the temperament of the body depends particularly on that of the blood; it is to be feared that the blood of a calf being transfused into the veins of a man, also communicates to him the stupidity and the brutal inclinations of this animal. He alleges several other reasons which would take too long to report and which must be seen in the letter itself.

6th FEBRUARY 1668
Volume II, pages 16-19 / 308-311

Letter from C. Gadroy to M. l'Abbé Bourdelot, Doctor of Medicine from the Faculty of Paris, to serve as a response to the letter written by M. Lamy against transfusion. In 4. In Paris, at J. Cusson.

To the arguments which are alleged in the preceding letter, the author of this one first opposes the experience, to which everything gives way in physics and medicine. He says that it is no longer a question of knowing if an animal can feed on the blood of another animal of a different species, since in fact two dogs who have been given calf blood five months ago, in the presence of several people of quality still live, and that a little spaniel who was languishing with old age, after having received the blood of a kid, is not only well, but is even, so to speak, rejuvenated.

Then to satisfy the objections which one makes on the contrary, he answers first that although the blood which is transfused parish hot to the touch; however, it can refresh, just as a veal broth does not fail to cool if it feels hot when you swallow it. 2

That what is objected, that a little good foreign blood mixed with a large quantity of corrupted blood cannot correct its intemperance, does not prove that the transfusion is useless; because we can evacuate as much blood as we want before transfusing it again, and then nothing will prevent us from mixing a lot of good foreign blood with a small quantity of blood corrupted which will have remained in the veins of the patient.

3. That an animal cannot be begotten from the females of another animal of different species; nevertheless, as this reason does not prevent him from being nourished by his flesh; nor does it prevent him from being nourished by her blood. And that we must not fear that horns will come to those to whom we will have transfused calf's blood, or that the brutality of this animal is communicated with its blood; then that we do not fear that the same accidents happen to those who take cow's milk. Because there is not, he says, so much difference that one wants to make believe, between the food on which one is nourished, and the blood which is immediately transmitted in the veins. It is alleged that the food is prepared and changed by the coction which takes place in the ventricle. But is not the blood prepared and changed by another coction which is made in the heart, and by a third which is made in each part of the body? This third coction is sufficient to change the transfused blood, as we can clearly see by the analogy of trees. For example, when an apple tree graft is entered on a plum tree trunk, the juice which passes through the root and through the plum trunk is prepared to form plums, and contains all the particles which enter into the composition of this fruit. But coming to be filtered by the small fibres of the graft, it changes its nature, and is converted into apple. He prays to those who ask what will become in a man of the particles of the blood of calves which are intended to produce horns, to say what becomes in this graft of apple tree of the particles of the juice of the plum tree which are intended to produce plum kernels; and he says that their answer will serve as a solution to the difficulty they are proposing.

Finally, to confirm the usefulness of the transfusion, he reports an experiment which was carried out in this city on a patient reduced to the last extremity. It had been three months since he had eaten any more; he had lost knowledge and speech; and the doctors who treated him had abandoned him. However, after a slight transfusion which was given to him, of about two pallets of blood, his lungs also rose high, his belly flow stopped, and speech returned to him as well as knowledge. We were already beginning to conceive of some hope for health: but after having been 24 hours in this state, he relapsed into the same symptoms as before. A second transfusion gave him a little vigour; nevertheless it was not for long; because he died about 12 hours later. And it was recognized by the opening that was made of his body, that he could not live any longer, his intestines being found all gangrenous.

6th FEBRUARY 1668
Volume II, pages 19-20 / 311-313

Second letter written to M. Moreau, Doctor of Medicine at the Faculty of Paris by G. Lamy, to confirm the reasons he gave in the first letter against transfusion. In 4. In Paris, at Jean de Launay.

Somewhat plausible as the answers given to the objections of the first letter against transfusion seem; this author does not lack reasons to support what he has advanced. First, he says that he never claimed to fight the experiments of transfusion by reasoning; that he did nothing but examine them, and refute the inferences drawn from them. That it is true that these experiments show that transfusion is possible; but that they do not prove that it is useful for the cure of diseases, or that an animal can be nourished on the blood of another animal of different species. For he maintained that the subjects who have been transfused

with calf's blood, were not fed it, but that they purged themselves of it as of useless excrement; and that if they are then better off, it is to the evacuation of blood that was done to them before the transfusion, and not to the transfusion itself, that it must be attributed.

After that he examines the answers given to what he proposed against transfusion in the first letter. And first he says that the comparison of a broth that has been brought to show that the transfused blood, although very hot, can refresh is not fair. That a hot broth can cool the blood, because it is never so hot as the blood. But we will not find that what is currently hot can cool something nearly so hot. That the transfused blood always has as much or more heat than the patient's own blood; and that thus it cannot refresh it.

2. To what was answered, that in order to prevent the transfused blood from being corrupted by the mixture of that which is in the body of the patient, it is only necessary to draw from the patient as much blood as the one will want, before giving him the transfusion; he replies that these great evacuations are easy in speculation, but very difficult in practice, because they often put a patient in danger of his life.

3. As regards the comparison which one makes of the food taken by mouth, with the transfused blood; he says that they are two things so different that no consequence can be drawn from one to the other. That the transfused blood can be prepared by the second and third coction; it can never be well purified not having gone through the first one, which is, to the feeling of all doctors, if necessary, that the following coctions cannot repair the defects. That for the rest, the example of the transplants which one brought to establish the transfusion, serves much more to refute it and to show its dangerous consequences. But we reserve to propose this instance by dealing with one of the pieces which follow, where it is more fully discussed.

6th FEBRUARY 1668

Volume II, pages 20-21 / 313-314

Letter from G. de Gurye S. de Montpoli to M. l'Abbé Bourdelot, Doctor of Medicine from the Faculty of Paris, touching on transfusion. In 4. In Paris, at Jean Cusson.

The feeling of this author concerning the transfusion is that it is necessary to keep the middle ground between the two contrary opinions of which we have spoken so far. He says that this operation is not as safe and of such great use as some claim; that it is also not completely useless, still less, pernicious, as the others assure. But that it is a doubtful remedy, which can produce good effects if it is well managed, and which can have very unfortunate consequences if it is not used with great caution.

He bases his conjectures on that the blood of different animals being of a very different nature, and having many spirits, cannot be mixed in the body of the same animal without fermenting, and cannot be fermented without causing much alteration and igniting fever there, which is nothing more, as some doctors define it, than an excessive fermentation of blood. This is why if the transfusion is not done on a robust body, in a moderate quantity, and still very timely; it is to be feared that it will be followed by unfortunate accidents.

To strengthen this reasoning he adds that it is consistent with experience. Because if transfusion has had some happy successes, it has also had some which were not favourable. Among other things, he remarks that this operation having been very skilfully carried out in this city on a dog which one wishes to rejuvenate at the expense of the life of another dog whose blood was donated to him; the one that

we wanted to keep died five days later, while the other that was destined for death is still alive now.

6th FEBRUARY 1668
Volume II, pages 21-22 / 315-317

[Eutyphronis], a new dissertation on the curing of diseases by the transfusion of blood. In Paris, with Andrew Cramoisy.

[Title in Latin]

Unless you overturn all of the old medicine, you cannot, this author says, admit the transfusion. This is why he claims that it must be absolutely rejected; and to show it, he brings in this dissertation several reasons which he proposes with as much erudition as elegance. As there are too many of them, I will choose here only a few of the main ones.

1. He proves by the example of transplants that it cannot be done that the blood of a calf being transfused into the veins of a man does not cause much alteration in his body, and so to speak, does not metamorphose him into a beast. Because if we see that an apple tree grafted on a pear tree produces a fruit which does not hold less of the pear than of the apple; isn't there reason to believe that the blood of a beast being mixed with that of a man will in some way degenerate into a beast.

2. He does not care that in order to authorize the transfusion it has been argued that it is an abbreviated means of nourishing oneself by putting ready-made blood in the veins, instead of having fun doing it in the ventricle. He says that in truth it is the shortest way, but not the safest, and that it is almost as if a person who is in a third floor, wanting to come downstairs does not bother to descend by the degrees, but takes the shortest, jumps out of the window. For nature has shown no other way to conduct the food in the veins, than to make it pass through the ventricle; there is recklessness in taking other routes.

3. It is to overwhelm the sick and not to relieve them, to give them blood by transfusion, since the greatest secret of medicine is to remove it from them by bleeding; experience having shown that the abundance of blood is nature dependent in almost all diseases. It is true that it is said that the transfusion is always accompanied by the bleeding, and that no blood is given that one has not previously offered. But this author replies that it is destroyed what the bleeding has done; that this is not unloading nature, but only making it change its burden; & that a sick person will be no more relieved, than a porter would be unloaded from a sack of peas, to immediately reload it with a sack of beans.

4. But even supposing that the transfusion was of some use; he says that to do it one would have to use the blood of a man and not the blood of a beast. For woman's milk is undoubtedly better for children's food than that of any other animal; it follows that human blood is also preferable to any other for transfusion, since in the very principles of those who support transfusion, blood and milk are of the same nature.

6th FEBRUARY 1668
Volume II, pages 22 / 317-318

Letter from Mr Tardy Doct. in the Faculty of Med. of Paris, to M. le Breton Doctor in the same Faculty, concerning the use of transfusion. In 4. In Paris at J. du Bray & Claude Barbin.

This author agrees that the blood of men is better for transfusion than that of the beasts, because the coctions which are done in the beasts are not well completed, as one sees by their urine which is always cloudy and similar to that of a man who is in bad health; their blood can never be very pure. That if corruption appears more in the blood of men than in that of beasts, it is said, for the same reason that stains appear more on fine fabrics than on those which are very coarse.

He also admits that transfusion is not good for all kinds of illnesses, and especially for pleurisy, and for other hot illnesses, in which it is more useful to offer blood than to give it.

But he claims that this operation is not entirely to be rejected, because it can be useful for several other diseases. Moreover, as the external coction greatly relieves the stomach, and helps in the digestion of meats which are much easier to digest when cooked, than when they are raw. In the same way, he says, it is very similar that the external blood formation which will have been made in the veins of another animal will advance and will greatly facilitate that which will be done in the veins of man. He adds that transfusion is necessary for the perfection of medicine. For as this science remedied by bloodletting the superfluity of blood; it would be imperfect if it did not also remedy the defect of blood by transfusion.

6th FEBRUARY 1668
Volume II, Pages 22-23 / 318-320

Extract from the Journal of England, containing some experiences of transfusion.

Several experiments have been made here with transfusion, from vein to vein, which have fortunately succeeded.

Doctor King having drawn 49 ounces of blood from a sheep, and having given it back about as much blood from a calf whose jugular vein he had opened; the sheep after the operation appeared as strong and as vigorous as before. But as they wanted to kill him, they opened his vein a short time later, and let the blood flow as much as it could. They took out 65 ounces of it before it died, and having opened it afterwards, it was found only in the body.

The same doctor drew 45 ounces of blood from another smaller sheep; and this evacuation having greatly weakened this animal, he gave it back almost as much calf blood. When we had closed the wound of this sheep and had untied it, no sooner did he did feel that he was at liberty, than seeing near him a spaniel, which had previously been transfused with sheep's blood, he went to give him three or four big [teste] blows, since then he has always done very well.

Mr. Thomas Coxe made a similar transfusion, from vein to vein, on a very healthy young dog, to which he transfused 15 or 16 ounces of blood from another old mangy dog, to see if the mange would communicate with the blood. The [sucez] was that the young dog did not feel the worse for it, and that the mangy dog was perfectly cured in ten or twelve days; the evacuation of blood which had been made there, having undoubtedly been the cause of the cure.

Recently, Drs. Richard Lower and Edmond King have performed a transfusion on a man, but from artery to vein, and not from vein to vein as in the three previous experiments. They first removed six or seven ounces of blood from him, and afterwards he was transfused about 9 or 10 ounces of blood from the carotid artery of a lamb. This man did not complain of the great heat felt by those who have been given the transfusion in France. It is true that as the pipes were long enough, it appears that this blood had lost as much heat in passing as was necessary to be

reduced to the temperament of the blood in the veins. He found himself so well after this operation that he earnestly requested four days after that it should be repeated. But it was judged more appropriate to defer for some time.

6th FEBRUARY 1668
Volume II, pages 23-24 / 320-322

Letter from J. Denis, Doctor of Medicine and Professor of Philosophy and Mathematics concerning an inveterate madness which was cured by the transfusion of blood. In 4 A. Paris, at the house of Jean Cusson.

It is from experience rather than reasoning that we must expect the decision of most questions of Physics. This is why as Diogenes believed that the best solution that one can give to the arguments of Zeno who maintained that everything is still in the world, was to walk around. Likewise, the author of this letter says that without stopping to refute all the reasons of those who have written against transfusion, he only wants to fight them by experience; and for any answer to their conjectures, he gives in this letter the account of what happened to the cure of a madman who was put in his good sense by means of this operation.

I notice that it is eight years ago that this poor man, who previously had several good qualities, lost his mind. It is true that his madness was only periodic, and that not a year has passed since he has not had a few good intervals. But his fits were always very long, and lasted no less than eight or ten months without giving him a break. His last attack had resumed about 4 months ago, with so much violence that since that time he had been running the streets without sleeping, night or day. And we despaired of being able cure him, all the remedies that we had done for him until then having only irritated his illness. Nonetheless on the proposition that was made that the transfusion might bring him some relief, or that at least it would cause him no harm, M. de Montmor, first Maistre des Requestes, touched with compassion, had him arrested, and put him in the hands of Messrs Denys and Emmerez to do this operation.

All things being prepared, on Monday, the 19th day of December in the year 1667, ten ounces of blood was drawn from a vein in the right arm, and so soon he was transfused in the presence of several doctors about six ounces of blood from the crural artery of a calf. This first transfusion moderated his outbursts a little. This is why the doctors, having decided to reiterate it, the following Wednesday he was transfused with more than a pound of calf's blood.

During both operations the patient testified that he felt a lot of heat along the arm and under the armpit in the places where the blood passed. But the second operation was further followed by sweat all over the face, a violent back pain, a great evacuation from above and below, and finally a deep sleep which lasted ten hours without interruption. The sick man on his waking seemed much quieter than before, and little by little his mind recovered so that there is now no remnant of madness. What is remarkable is that the day after the second transfusion he saw a large glass of urine that was all black, and the next day he gave it back again, and bleed a lot from his nose; which obliged him to draw two or three [palettes] of blood. We will see in this letter all these circumstances more fully explained, with many other remarkable particularities.

2nd JULY 1668
Volume V, pages 50-52 / 359-361

Relation of the experiences made in England, France, and Italy around the transfusion of blood. In Rome, near Tinassi.

[Title in Italian – some of the text in Latin]

It is treated in this book of the origin of the transfusion, of the experiences which were made of it, and of the usefulness that can be received from it.

As for its origin, we discover every day that it is older than we thought. When it began to be practiced in the year 1666, it was referred to as an invention newly found in England. Then we [scent] that from the year 1658, it had been proposed in Paris in a famous assembly. And it has recently been claimed that an Englishman thought about it thirty years ago. But the author of this book says that there are more than 50 that it is known to in Germany. And indeed he reports a passage from Libavius where the transfusion is so well described that it is impossible to speak of it more clearly. Here are the terms. *Let there be, said Libavius (1), a young strong man, healthy, full of spirited blood. Let him stand, being drained of his strength, thin, emaciated, scarcely drawing a breath. The master of the art has silver tubes corresponding to each other. Let us open the stout artery, insert and fortify the tube; then he splits the patient's artery and implants the female tube. Now attach the two tubes to each other, and from the sound of the arterial blood, a warm and spirited man will jump into the patient, and it will bring together the fountain of life, and pelt all kinds of sickness.* It is true that Libavius only proposes this operation to make fun of it. Because when one asks him, what will it be necessary to do to prevent who has supplied blood from falling into weakness; he says that it is necessary rather to think about what one will do to cure the doctor who will have advised this operation; and that for him he is of the opinion that we give good broths to the one who will have provided blood to make the transfusion, and hellebore to the doctor who ordered it. *But how, he said, will not that strong man languish? Comfort and food must be given to him; the physician indeed hellebore.*

The author of this book is not nonetheless of Libavius' feelings. He says that we have tried to decry all beautiful inventions in their beginnings; that the circulation of the blood would have appeared as ridiculous to Libavius as the transfusion; and that he even judged the transfusion impossible only because he believed that the circulation was. But that if this chemist now returns to the world, he would change his mind seeing the experiences that we have made of one and the other.

Then he makes the relation of several experiences of the transfusion, which it would be useless to report here, because it has been widely spoken of in the previous journals.

(1) Libavius in Defensione Syntagmatis Arcanorum Chemicorum, contra Henningum Schneumannum, Actione 2. p.8. Edit. Francof. anni 1615.

19th NOVEMBER 1668
Volume X, pages 117-119 / 455-457

Extract from the Journal d'Italie containing two experiences of blood transfusion.

On the 28th day of May in the year 1667, the transfusion experiment on two lambs was carried out in Boulogne at the house of M. Cassini. The carotid artery of one was opened, and the blood was passed, as long as it could flow, through the right branch of the jugular vein of the other, which had previously been drawn as much blood as it was judged to be able to provide for a lamb of such size whose blood

would be allowed to flow until it died. Two ligatures were then made quite close to each other, to the vein of the lamb which had received the blood; and this vein was cut entirely between the two ligatures, to see what would happen. After that, this lamb was released, who without appearing more feeble, began to follow those who had performed the operation on him. He has lived a long time since, and his wound having recovered, he grew like the other lambs. But on the 5th day of January in the year 1668 he died suddenly, and his stomach was found to be full of corrupt food. Having dissected his neck, to see what happened to the vein which had been cut; it was found to have joined to the next muscle by some fibres, and that the upper part of this vein had a communication with the lower one by means of a small branch which could in some way make up for the defect of the entire trunk.

On the 20th day of last May, we went to the house of Mess. Griffoni in Udine, we had another experience of transfusing the blood of a lamb into the veins of a [bracque] dog, which was of mediocre size in his species, 13 years old, and quite deaf for more than three years, so that whatever noise one made he gave no sign of hearing it. He walked very little, and he was so weak that, unable to lift his feet, he only dragged himself along. After he had been given the transfusion and untied, he remained for an hour on the table where he was: but then on coming down he went to find his masters who were in other rooms. Two days later he left the house, and began to run in the streets with the other dogs, without dragging his feet as he did before. His appetite also returned, and he began to eat more and more greedily than before. But what is more surprising is that from then on he gave [marques] which he began to hear, sometimes turning to the voice of his masters. On the 13th day of June he was almost cured of deafness, and he appeared without comparison more gay than he was before the operation. And finally on the 20th of the same month he had completely recovered his hearing, with this defect nonetheless, that when he was called he turned back as if the one who called him had been very far away. But this did not always happen: and yet he always heard when he was called.
