

DE LA TRANSFUSION DU SANG

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A TRANSLATION OF PAGES 7-22 BY PHIL LEAROYD

'HISTORIQUE DE LA TRANSFUSION'

The book 'Blood Transfusion' by Joseph Casse was published in 1874 in Brussels [by Henri Manceaux]. A copy of this 182 page book can be viewed or downloaded at:

<https://wellcomecollection.org/works/jh3v98g5>

https://books.google.co.uk/books/about/De_la_transfusion_du_sang_Extrait_des_M.html?id=tSeoGMQijcEC&redir_esc=y

The 'Table of Contents' is at the back of this book and a translated version is reproduced here for information:

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I have translated the 'History of Transfusion' section of this book, i.e. pages 7-17, which as described in the table of contents above is presented as being divided into three time periods (a system used by many authors). This 'historical' section, for the space it is given in the book, over-compensates in the amount of information given in the first part, especially given that the author recognises that this is 'mythology' and not fact, though this section also includes information on Libavius (1615) and Francesco Folli (1652). The author then moves somewhat vaguely into the second

period, heralded in by 'Christophe' Wren (1656) and Lower, Klarke [sic], and Boyle (1666).

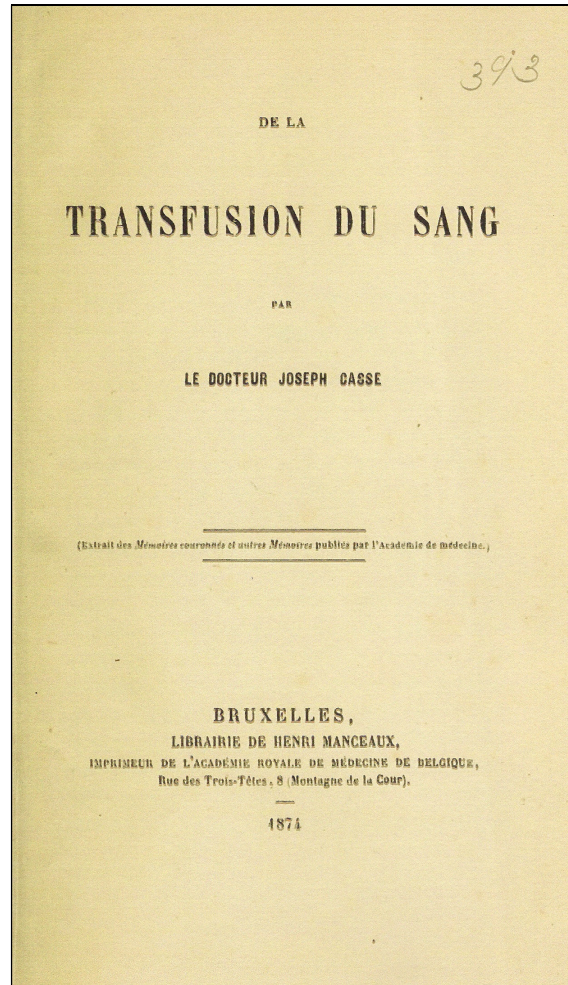
The second and third periods are somewhat disappointing in that the author provides at best, a broad resume of somewhat random pieces of information not necessarily presented in date order, rather than a logical review of the important work performed within these two time periods. Whilst some of the 'major players' are mentioned, the author also provides rather inconsequential information as well, e.g. the second-hand report of the apparent treatment of a case of rabies in Eye (Suffolk, England) in 1792. Whilst this somewhat dubious report is actually referenced, the author fails to reference a large amount of other material presented in the text. [Note: If interested, you can view the published rabies report at: <https://babel.hathitrust.org/cgi/pt?id=nyp.33433082434790&view=1up&seq=193>]

At the same time other people and their work, prominent in these time periods, such as Lower, Denis and Blundell, are hardly mentioned.

I have also translated the first part of the next section of this book, i.e. 'What blood should be used for transfusion?', i.e. pages 18-22, as I believe that this section contains historically interesting information in that the author discusses some of the pros and cons of using animal or human blood donors. In this respect, Casse presents some relevant practical points that other authors have ignored, i.e. the difficulty of obtaining a suitable animal donor in a large city, as well as the problems of being able to produce defibrinated blood in an emergency. He also interestingly, discusses points related to 'recruiting' human blood donors – again something that other authors of the period ignored.

Most of the references are numbered and listed at the bottom of individual pages. I have re-numbered these, together with the un-numbered ones that are included within the text itself, and placed them together at the end of this translation and are presented as written by the author. I have also not changed people's names and again these are presented in the translation as they appear in the original text.

I have translated these sections of Casse's book from the original French 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 possible, this process struggles with specialist terminology and also produces a 'colloquial style' not always representative of the original text. I have purposely produced this translation to be 'un-interpreted', in that I wanted to maintain the author's original meaning / wording as much as possible. As with any translation the wording may be purposely or inadvertently altered 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. Whilst some of the words / terms originally used are obviously open to interpretation, I have attempted wherever possible to hopefully maintain the author's meaning, intent and detail. Although I have taken great care not to misrepresent the author's original wording I cannot guarantee that this work does not contain 'translational errors' and the reader is recommended to check specific details against the original French text.



Title page of 'Transfusion du sang.' (1874)
(Image credit: Wellcome Collection)

HISTORY OF TRANSFUSION

The history of transfusion actually includes three periods:

The first one we can call mythological; the second application or transition; the third modern. More exact and in-depth knowledge of physiological laws now allows for real experimentation.

The data offered by the first period are confused; vague ideas of depletion and blood injections (Ovid) are wrongly interpreted as transfusions. If we examine this period we see that in none of the ancient authors we find traces of this operation, and it seems obvious that if it had been known to the Egyptians, the Greeks would certainly not have passed over it in silence. Moreover, ignoring the phenomena of the circulation of blood, which alone were to put them on the path to this discovery, they could not have exact data on the practice of an operation for which it was necessary to possess the laws of these phenomena beforehand.

Be that as it may, it is in Ovid that we find the first indications, or if we want ideas about transfusion. However, should it be considered as belonging to its history, the passage of book VIII of the *Metamorphoses* (verse 284), where Medea yielding to the prayers of the son of Eson, rejuvenates the latter.

... Stricto Medea recludit
Ense senis jugulum; veteremque exire cruorem
Passa, replet succis. ...

Succis, that is, the blood of a black sheep boiled with seeds, flesh and wings of the Stryx, wolf scraps, etc., etc.; and scarcely has she watered Eson's mouth and wound when he regains the vigour he had enjoyed forty years before.

The following passage (verse 332) is clearer:

... Quid nunc dubitatis inertes?
Stringite, ait, gladios; veteremque haurite cruorem;
Ut repleam vacuas juvenili sanguine venas.

But here the result is different from the first (verse 347):

Plura loquuturo cum verbis guttura colchis,
Abstulit, et calidis lanialum mersit ahenis.

It was therefore only a crime that Medea wanted by committing the daughters of Pelias to kill their father, and by promising them that by doing so they would give him back his early youth.

There is obviously in these two passages only the wonderful, and it cannot be seriously admitted that Ovid could have seen the possibility of employing an operation such as the transfusion to revive the life. Since then we find no trace of it until the 15th century, when the Florentine Marcus Ficinus, in his work *Vita longa et coelesti*, would appear to have discovered the mode of transfusion. But there are many sentences there, mixed with magic words, with puzzles, which make it impossible to extract, by reading them from, very accurate facts.

Peghelius Magnus, born in 1547, in his *Thesaurus rerum selectarum, magnarum, dignarum, utilium pro generis humani salute oblatus* (1604), speaks of a *ratio chirurgica insignis et rara homini communicans extera quae ipsi bona*. This *ratio insignis* should be interpreted in the sense of an operation that would be nothing other than transfusion.

Later, in 1615, Libavius de Halle, doctor of medicine and professor at the Coburg Gymnasium, in his *Appendix necessaria synagmatis arcanarum chymicorum* (Frankfurt, 1615), called the inventor of the transfusion Empircio. The latter would be

none other than Peghelius himself. He also says, *Adsit juvenis, robustus, sanus, sanguine spirituosus plenus: adstet exhaustus viribus, tenuis, macilentus, vix animam trahens. Magister artis habeat tubulos argenteos, inter se congruentes, aperiat arteriam robusti et tubulum faemineum infingat, jam duos tubulos sibi mutuo applicet, et ex sano sanguis arterialis, calens et spirituosus saliet in aegrotum, imoque vitæ fontem afferret, omnemque languorem pellet.* This idea, which was to reappear in the nineteenth century, was soon rejected. Around this same period Giovanni Colle, of Padua, in his *Methodus facile parandi tuta et nova medicamenta* (Venice, 1628), mentions, while speaking of foods and medicines capable of prolonging life, transfusion as one of the means suitable for obtaining this goal. From medicinal infusion to that of perhaps the most heroic of drugs, there is really only one step. Anyway, he writes: *Denuo insurget aliquis, frustra haec esse tentanda, dum per pauciora aeque et bene valemus consequi optata, veluti si quis e vena exhibens juvenis admodum salubris, per fistulam in venam senis permeet, insufflante juvene et sene attrahente et inspirante; ut sanguis juvenis intus attrahatur a sene et ne hujus egrediatur. Nam hic sangnis potest reparare humidum primigenium temperamentum.* This is still only an imprecise and vague idea of transfusion.

Francesco Folli, of Poppi, in his *Stadera medica* (1), speaks of a reading given to Ferdinand II, of Tuscany; it had to do with his intention to do transfusion. He was writing, in fact, in 1652. "I read William Harvey's book, which deals with the movement of the heart and that of the blood. This reading, with some notions that I had by the transplant of plants, produced in my mind this third problem, that the circulation of blood being given, it would be possible to make the transfusion, by means of which one could not only cure, but rejuvenate and become robust (ingigantire)." [i.e. 'become gigantic']. It was he who indicated that this operation was possible by acting in a rational manner. Folli used two cannulas for the transfusion, one made of bone, the other of silver, which had to be inserted into the patient's vein. These two cannulas were united by a bladder, a piece of intestine, or even a prepared artery, having in its path a collateral through which, the air that could be contained in its interior had to escape. According to his research, it was no need to press on the intermediate part of the two cannulas for the blood to easily enter.

It is therefore to Folli that we owe this important discovery, whose honour, once again, goes to Italy. The second application period begins with Folli, also called experimental by De Cristoforis. From that moment on, we no longer limit ourselves to more or less imaginary statements, comments; tests are slow, first on animals, then on man. From this time transfusion enters a real phase, following the discovery of the circulation. The works of Michel Servet, Levasseur, Realdo Colombo, Andrea Cisalpino d'Arezzo, Rudio, De la Reyna, Paolo Sarpi, Carlo Ruini are brought together by Harvey, who, by bringing together the works of his predecessors, coordinated their observations and added new lights, by demonstration the valves of the veins and the contraction of the atria before that of the ventricles. But the greatest progress in transfusion is due to the application of the experimental method already recommended by Realdo Colombo, a method that made it possible to destroy preconceived ideas and to seek through experience the confirmation of the doctrines issued.

In 1656, Christophe [Christopher] Wren, of Oxford, experimented on animals and made his transfusion tests with a syringe or rather with a bladder attached to a cannula.

Lower, Klarke [Clarke], and Boyle continued the transfusion and infusion experiments, and in 1666 a commission, elected by the Philosophical Society of London, of which Lower and Boyle were members, attempted blood transfusion, which was unsuccessful due to imperfection of the means employed. That same year 1666, Lower described his process for easily and safely performing transfusion. We then enthusiastically fell in love with this operation. Lower and King had moreover carried it out with success on Coga, a young bachelor, who voluntarily

allowed himself to be transfused for a sum of money, and in 1667, Denis, doctor and professor of physics and mathematics, in Paris, the also performed it on man and achieved remarkable healing success.

At this time transfusion found support in Montmor, Tardy, Gaudrois, Bourdelot, de Gurye de Baril. It also had its opponents, and was attacked by Lamy and Pierre Martin de la Martinière, supported by the mass of envious doctors of the faculty of Paris who, by accumulating lies and slander against Denis, eventually discrediting the operation, especially since Denis' zeal was slowing down, especially since his appointment as the King's doctor. At the same time, on 17th April 1668, a sentence, handed down in the Chalelet, forbade transfusion. It was a terrible blow for it, which made it fall into complete oblivion in France.

As soon as one knew the possibility of doing transfusion, at the same time as the happy results that it had given, the spirits were heated; a crowd of individuals believing themselves to be the inventors of this operation claimed for themselves the first idea of the discovery. This is how Mayor, a professor at Kiel (*Deliciae hiberniae sive tria inventa medica*, Kiliae, 1667), claimed to have found transfusion which he called *transplantatio nova*. To do so, he used a cylinder terminated by a tip introduced into the patient's vein, let the blood flow in, and added a few grains of deer horn salt or ammonia to avoid coagulation. After that, by a piston adapted to the cylinder, the liquid was pushed into the vessels of the individual. De Graaf claimed that it was found in Holland, and Klein (1680) reports that Moritz Hoffmann, professor at Allors, is the inventor. Finally Tinassi and Manfredi advocated it in Rome. On the other hand, through the bad faith of their opponents who denied their assertions, great obscurities arose in the history of transfusion. Among its detractors, we must above all blame Santinelli, who, in his *Confutatio operationis transfundentis sanguinem de individuo ad individuum* (Rome, 1668), violently attacked transfusion, declared it contrary to the bases of religion, opposing the laws of God, and thus succeeded in defending the practice of it in man.

Soon this operation, which has not been spared neither ridicule, nor lies, nor slander, will live only by memory for a long period of time. It is still cared for at the end of the 18th century in Italy and England, but only from afar. Thus, in 1788, Michel Rosa (*Lettere fisiologiche*, Napoli, 1783), professor and president of the Faculty of Medicine in Modena, through his experiments, shed some more light on transfusion. He proved, among other things: 1) that the vessels of a living and healthy animal may admit a greater quantity of blood than they contain, without being filled; 2) that one can, without harming life, mix the blood of one species with that of another species; 3) that the revival of an animal drained of blood and consequently becomes inanimate, may be achieved by the introduction of the arterial blood of an animal of another species.

Shortly afterwards we see that Haarwood, in 1792, at Cambridge College, revived, before his listeners, a bloodless dog. The same Haarwood, hearing that an individual in the neighbourhood was bleeding heavily from a gunshot wound, went to his home to do a transfusion, but he was dead by the time he arrived. He wanted to do the operation with the blood of an animal, because he had brought with him a calf from which he intended to take the blood he would need. (2)

Darwin (3), in 1796, advocates transfusion by means of the blood of man, sheep, or donkey, in putrid fever, cancer of the oesophagus or in obstacles to nutrition. He also says that the blood should maintain its normal temperature and not be in contact with air. For this purpose he made an instrument composed of a hen's intestine one inch [sic] long and of known capacity. At one end of the intestine was attached a cannula the size of a goose feather, and at the opposite end another cannula the size of a crow's feather. The vessels of man were put in communication with those of the animal, one had to let the intestine fill up and push blood into the veins of man. To prevent cooling, it was necessary to operate in a hot chamber and to keep under the apparatus a vessel containing water heated to 98° Fahrenheit. We see that it is

Folli's apparatus, plus the surge of blood that he deemed unnecessary, added to a mistake by Darwin who believed by heating it to be able to keep his blood fluid for a longer time.

A few years earlier, a transfusion had been made at Eye, Suffolk, in 1792, by Russell, who regretting the powerlessness of the means employed to cure rabies, of which twenty people had died in this one place, resolved to deviate from the ordinary methods of curing a young boy with hydrophobia. He opened his veins and let out so much blood that he fell inanimate. Then opening another vein, he introduced little by little by direct transfusion the blood of two lambs. The patient soon recovered and regained his health and strength (4). Here ends the second epoch in the history of transfusion. During this period the experiences were confused and indeterminate; despite their empirical purpose, the poor conditions in which they were done and their poorly interpreted results, it must be recognized that certain laws have been established that have remained true until today and that a real advancement of science has taken place. (5)

It is certain that if the knowledge of the circulation had been complete, if the studies on blood had been more advanced, we would have arrived at infinitely superior results. Let us add to these two facts the accidents that occurred, which attracted to them slander and detractors, and finally the humorous doctrines that did it the greatest harm.

With the 19th century, the third epoch in the history of transfusion begins. It is especially then when the advances of physiology guide doctors and that it takes its true essence. In 1821, the work of Dumas and Prevost again called attention to this issue. They prove by their experiments that the shape of blood cells differs in the various animal species. They repeat what had already been done in reviving an animal drained of blood by transfusion. They further demonstrated that sometimes blood from one species injected into a different species restores life only temporarily and the transfused individual quickly succumbs.

However, they end their memorandum by saying that transfusion is absurd, as long as one does not know in a more intimate way the constituent elements of blood. Other eminent physiologists still dealt with it shortly after; they prove that red blood cells are the building blocks of blood, that they are not altered by beating and that defibrination prevents the introduction of blood clots into the circulation. (6) Brown-Sequard demonstrates that the effectiveness of the blood used depends on the nature of the gases it contains, that venous blood has the revivifying force of arterial blood when it has absorbed oxygen, and that arterial blood acts as a poison if it is left under the influence of carbonic acid. (7) Panum (8) confirmed, in 1863, the observations of Bisschoff and Brown-Sequard, he proved that defibrinated blood of the same species replaces normal blood and fulfils all its functions.

But it was James Blundell who, in the 19th century, had the honour of putting this operation into practice on man. Following experiments that he made on animals, he succeeded by a transfusion made with Doubleday, in 1825, in a woman who had given birth and was in danger of death, to revive the patient, who recovered soon after. The operation, by the great success obtained, attracted the attention of the learned world, and Blundell succeeded in removing from oblivion transfusion, hitherto covered with ridicule. Later a crowd of doctors, in the presence of the happy results obtained, put it into practice in patients suffering from various ailments.

It was thus that after the acute anaemia treated by Blundell, Doubleday, Uwins, Waller, we see the transfusion taking place in the slow anaemia brought on by long-lasting illnesses; Neudorfer does it in prolonged suppurations, Blundell in puerperal fever; Prejalmini and Blundell make the first attempts in chronic diseases, however promising only an extension of life without cure. Polli obtains remarkable success in neuropathies and confirms in a striking manner the happy results already obtained in chronic anaemia, at the same time that he proves the uselessness of heating the blood to normal temperature before it. In hydrophobia, it is applied by Dieffenbach.

Traube uses it in carbon monoxide poisoning, where Martin and Bart have the first success and prove the usefulness of the globular element introduced into the circulation. Josenhaus uses it in morbus maculosus; Blasius, in leukocythemia; Concato, of Cristoforis [sic], in anaemia following malaria. The inventive genius of Belina sees, in the blood expressed from the placenta of the mother, a means of treating asphyxia of newborns, and at the same time proves the effectiveness of transfusion in eclampsia.

And today the experiments continue, the new facts accumulate, transfusion receives new indications day by day, this time rational. Human blood is not the only one used, that of animals, and especially of sheep, tends to enter the practice concurrently with it. Direct transfusion alone still struggles with transfusion by means of defibrinated blood, and day by day the use of blood as it comes out of the veins tends to lose its importance.

WHAT BLOOD SHOULD BE USED FOR TRANSFUSION?

It is advisable, when doing a transfusion, to use the blood of the same species for a species; because, if the diameter of the blood cells is greater than the lumen of the capillaries, the latter will not be able to give passage to the former, and accidents will inevitably have to occur. If, on the contrary, the blood cells of the individual whose blood is to be used for the transfusion are of a smaller diameter than those of the individual who undergoes it, we arrive at consequences that have given happy results.

The first operators often used the blood of animals since the blood cells are smaller than those of humans. This is how Denis, on 16th June 1667 and in February 1668; Lower and King, 23rd November 1667; King, 12th December 1667 (9); Kauffmann and Parmann in 1668 (10); Russel, in 1792 (11), took lamb's blood for transfusion. Riva (12) used sheep's blood on 10th, 11th and 15th December 1667; Manfredi (13), on 2nd January 1668, used ram's blood, and Bliedung (14), goat blood.

At other times calf's blood was used, namely: Denis, 24th July 1667; the same operator and Emmerets, 19th December 1667; Sokolow (15), in 1847 and Esmarch, in 1860 (16).

Sheep or lamb blood is usually used for arterial transfusion. In this case, the animal's carotid artery is brought directly into contact with the individual's veins through a rubber or glass tube. This means is employed not only because the blood cells of the lamb, smaller than those of the man, can easily pass through the capillaries, but also, because in removing in this case any instrument, one makes use of a physiological pressing pump for the introduction of blood.

Experiments made on animals using the blood of one species for another do not give such satisfactory results. If a bloodless dog is injected with calf or sheep's blood (Panum) or calf's blood in a rabbit (von Belina), muscle activity is restored, respiration and heat increase, the beats of the heart are activated; but these phenomena last a short time, and soon the animals succumb.

In de Belina's case, an autopsy found infiltration of the lungs, phlegm, blood in the stomach and intestines, blackish kidneys, hyperaemia, contracted bladder, bloody brain and characteristic dark coloured muscles. Dieffenbach proved that mammalian blood, although introduced in small quantities into the circulatory system of birds, kills birds in seconds, with the same accidents as the most powerful narcotics, such as CyH. However, Brown-Sequard injected and revived a dog with pigeon blood. The same dog was still alive three months after this operation.

In cases of asphyxiation of newborns, de Belina has successfully used expressed and defibrinated placental blood. In certain circumstances where a depletion must be done before the transfusion, it could be possible to re-inject to the individual the

blood that would have been removed from him, after it has been beaten and defibrinated. This would be the case in the asphyxiated, the poisoned by chloroform and ether. But in other cases where the blood cell itself is, so to speak, killed, as in carbon monoxide poisoning, it seems at least reckless to us to do a similar thing. We can therefore see how important this fact would be if it were possible to use it under certain conditions. It is up to experience to prove the truth of this assertion made by Eulenburg and Landois. (17)

One will object to transfusion made by means of human blood, the difficulty which one could have to find this liquid. In a desperate and pressing case, no one would hesitate to donate a small amount of his blood to save his fellow man; it must be said in this case courage comes to the most cowardly. Other times, when the indication is not urgent, we will turn to goodwill, friendship for the person, and, when these two means do not succeed, we will appeal to other feelings, and one will always find and in all the countries of the world a man venal enough to let himself bleed for a few pieces of silver. On the other hand, transfusion is infinitely less practical by means of animal blood than by means of human blood. In cities, can we easily find in a case of severe uterine haemorrhage, for example, a sheep or a calf? While the animal is being collected, the patient will be dead if the indication to operate is urgent. Transfusion has indications that must be fulfilled instantly, and this is what authors, friends of animal blood transfusion, even state in their writings; and, putting themselves at odds with themselves, they say that transfusion has such urgent indications that defibrination is not possible, since in this case the loss of time that results from it can cause the death of the patient. So let us go and look for animals in the middle of a big city; bring them to the floors of the houses, and we will see if the transfusion done in this way is possible.

When it comes to frequently repeated transfusions, where we only need relatively small amounts of blood, when time is not running out, we understand that if we have days, almost weeks in front of us, I understand, I say, that one can use the blood of animals. From there to the circumstances, of which we have spoken, there is almost an abyss. It seems to us that it was wrong, therefore, to say that the use of animal blood was to open a new era for transfusion, and until the time when living conditions will remain in the cities what they are now, the only rational means, the only practice in a multitude of cases, is the use of human blood. Besides, we do not see in what way this use is so dangerous; let us even suppose that we come in a most unfortunate case, against all the rules, against all the most formal indications of science, to inject the lifeless, such as that of a syphilitic (and this is one of the things that are the most common), we declare that, if by means of this infected blood one succeeded in saving from death an individual who would be exposed to it by imminent accidents, the preservation of life would be worth syphilis, which after all is a curable disease.

As for the danger of phlebitis that we fear for those who allow themselves to bleed, if we notice the conditions in which these accidents occur, we will see that the doctor, however careless of the cleanliness of the instruments he uses and who has had some bloodletting in his life, will very rarely encounter phlebitis in individuals from whom he has drawn blood. Moreover this fact is extremely rare, and it is only in particular circumstances that one meets it. If the accident happened so easily, we believe that bloodletting medicine would not have made Broussais as many followers as this famous doctor could have had, and he would certainly have encountered obstacles on this point, the greatest obstacles for the adoption of his ideas.

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