

# BEITRÄGE ZUR TRANSFUSION DES BLUTES

By: Dr. L. LANDOIS

## A TRANSLATION BY PHIL LEAROYD (OF PART I)

A copy of the paper 'Contributions to blood transfusion' by Dr. Leonard Landois, published in 1878 in the journal *Deutsche Zeitschrift für Chirurgie* [Vol. 9, No. 19, pages 457-514] can be viewed or downloaded from the following site:

[https://books.google.co.uk/books?id=a6pRAQAAMAAJ&pg=PA457&source=gbs\\_toc\\_r&cad=2#v=onepage&q&f=false](https://books.google.co.uk/books?id=a6pRAQAAMAAJ&pg=PA457&source=gbs_toc_r&cad=2#v=onepage&q&f=false)

The following is a translation of the first part of this paper (pages 457-475), which contains five parts, i.e.:

- I. Blood transfer in the period before the discovery of the circulation.
- II. Transfusion between animals of the same sex (genus in the zoological sense).
- III. Centripetal artery transfusion.
- IV. Contributions to the knowledge of metabolism after transfusion.
- V. On the causes of capillary bleeding from fresh wounds after transfusion of heterogeneous blood.

The first section of this paper 'Blood transfer in the period before the discovery of the circulation', as the title suggests, contains an historical resume of the beliefs surrounding blood and the suggestions of 'blood transfer' from ancient times to the period prior to Harvey's discovery of the blood circulation.

Landois initially looks at the evidence relating to the 'role of blood' as believed by peoples of this period, based on the various writings and documented practices such as the sharing and mixing of blood, the drinking of the blood of another person and the sacrificial shedding of blood. He identifies that these had more than a superficial significance due to fact that in antiquity blood was in fact believed to be the seat of the soul and as such, its significance is established.

The author then provides evidence that ideas of this kind were transferred to the views of physicians, so that under their guidance, the drinking of blood or potions containing blood was practiced in the Middle Ages. This method of 'treatment' was, as it were, in direct opposition to the bloodletting practised since antiquity. While bloodletting resulted in a weakening of the body, the aim of ingesting blood was to strengthen and rejuvenate.

Landois then presents evidence of the subsequent interpretations of ancients writing that have been used to suggest that the 'transfer' of blood from one person to another. Landois concludes by critically examining and denouncing the assertions made in the 17th century, especially by Martin de la Martiniere, that 'transfusion' is ancient, stating his belief that transfusion could not have been performed prior to Harvey's publication of his discovery of the circulation of blood.

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

addition, an 'automatic translation' may either purposely or inadvertently alter the wording to 'make it read better' but in doing so there has to be an element of interpretation involving something on the lines of 'I believe that this is what the author is actually trying to say'. I want to avoid that as much as possible and try to present what the author actually wrote and as a result the reader may find that the English text does not 'flow' as well as it could. Although I have taken great care in accurately identifying the original text and producing a true representative translation of the author's original wording I cannot guarantee that this work does not contain 'translational errors' and the reader is recommended to check specific details against the original text.

NOTE: Due to the author including a large number of original quotations that are in Latin, I have provided translations of each of these that are placed immediately after the Latin text, italicised and contained within square brackets. Due to the very nature of the language, I cannot guarantee that the wording of these translations is completely accurate.

I have reproduced the original paragraph settings and general layout as accurately as possible. The spelling of the names of people is reproduced as originally printed. The original references are numbered and presented at the bottom of the pages where they occur. I have sequentially renumbered these and placed them together at the end of the translation, presented as printed, though I have also produced translations of the author's comments and titles of some of the quoted works (presented in italics within square brackets).

## LEONARD LANDOIS

Leonard Landois (1837-1902) was a German physiologist. He studied medicine at the University of Greifswald and later became a professor and director of the Institute of Physiology at Greifswald and a member of the German Academy of Sciences Leopoldina. Although his early work involved research in the field of parasitology, Landois was a pioneer in the study of blood transfusion. In 1874-5 he demonstrated inter-species incompatibility of blood by showing that the serum from one species of animal was capable of agglutinating or haemolysing the red cells of an animal of another species. He also linked this phenomenon with the appearance of black urine after a heterogeneous blood transfusion, establishing scientifically the dangers of transfusing blood of another species into humans. Extensive details of his *in vitro* inter-species experiments are included in a section of 'Die Transfusion des Blutes'.



Dr. Leonard Landois (1837 – 1902)  
(Photo credit: Wikipedia)

## CONTRIBUTIONS TO BLOOD TRANSFUSION.

By  
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### I. Blood transfer in the period before the discovery of the circulation.

The first hints which are found among the older writers concerning the transmission of blood from one being to another are intimately connected with the view which was generally held as to the nature of blood.

In the philosophical views of Pythagoras (born 580 B.C.), in which the beginnings of all physiology are rooted, we find the first information about the important relations of blood to the activity of the soul. This sage distinguishes three separate faculties of the immortal soul: the intellect (*νοῦς*), the mind (*φρόνησις*), and the courage (*θνμός*). The soul is nourished by the blood, courage has its seat in the heart, and from the heart the beginning of the understanding goes to the brain (1). Empedocles (born 473 B.C.) also placed the seat of the soul in the blood and even considered it to be equal to the warmth developing from the blood (2).

According to the teaching of Aristotle (384-322), the heart, the acropolis of the body, prepares the blood in its own cavities; it is the source of warmth and the seat of the sentient soul. The blood flows from the heart through the branching veins to all parts of the body, which, with the blood, receives the ability to feel and move. With every breath, the breath of life flows into the heart through the trachea and the lungs, from the latter through the veins leading from this into the heart, and so the breath of life travels with the blood to go onto all parts of the body.

Related to these views is the opinion of Diogenes of Apollonia, the contemporary of Socrates (3). According to him, the main seat of the soul is to be found in the posterior cavity of the heart, which is connected to the trachea. With the blood flowing out of the heart, thinking is distributed throughout the entire body with the help of the airy component mixed with the blood.

In the Stoic school, the soul itself was regarded as nothing other than the exhalation of the blood, and Chrysippus of Cnidus even rejected bloodletting on the ground that the seat of the soul was in the blood.

From these views communicated by the investigators of antiquity, it may be sufficiently clear that they transferred the seat of the living principle for the body and soul itself into the blood.

From this point of view, the much-quoted passage in Ovid, "Stringite gladios veteremque haurite cruorem, ut repleam vacuas juvenili sanguine venas," [*Clasp the swords and draw the old blood, that I may fill the empty veins with the blood of youth.*] must also be interpreted. The passage is of such great interest because it is the only one known in antiquity which speaks of a direct transfer of blood into the vascular system.

The custom among some peoples of mixing and drinking the blood of allies during alliances also suggests a similar view. This was not to be merely an outward sign, but represented a real exchange of souls. The passage in Sallust (4) seems strange in this regard: "Fuere ea tempestate, qui dicerent, Catilinam, quum ad jusjurandum populares sceleris sui adigeret, humani corporis sanguinem vino permixtum in pateris circumtulisse." [*It was in that storm that they said that Catiline, when he was leading the people to swear to his crime, had the blood of a human body mixed with wine in bowls around him.*].

Some writers also mention the custom of the victor drinking the blood of the overwhelmed and slain opponent in order to acquire his strength and bravery. Similarly, wrongdoers and

robbers are reported, that through the consumption of fresh human blood, they were able to display greater ferocity. Johannes Lang (5) published various communications about this in the 71st of his letters: "An Judaei sanguine humano utantur" [i.e. "Do the Jews use human blood"].

In complete harmony with these ideas, the idea of bloody sacrifices developed among the ancient cultured peoples. In the shedding of the blood, and thus in the devotion of the soul and the living principle of the one to be sacrificed, lay the real atoning power of the sacrifice, and therefore the blood was the main thing, the kernel and the centre of it (6). Among the Greeks, first of all, the term *αἰμάσειν βωυονε* is used simply for sacrifice in general, and Philo calls the sacrifice a *ψυχική σπονδή* in general, without reference to the Jewish sacrifices, because the blood is the outpouring of the soul: *ψυχῆς ὡς εἶπεῖν ἐστὶ σπονδή τὸ αἷμα*. - According to the accounts of Pausanias, a priestess proclaimed the oracles in the temple of Apollo Deinodotes, after she had been inspired by drinking the blood of a freshly slaughtered lamb.

The Romans, whose views in this direction were similar to the Greeks, give the designations "animam litare" and "sanguinem litare" equal importance. According to the ideas of the Persians, the deity in the sacrifice also requires only the soul, which is in the blood, and the Egyptians also consider the blood to be the carrier of the soul or of the animating principle. In Indian sacrifices, atonement is also attributed to blood, just as Nordic, especially Germanic, peoples regard blood as the seat of the soul and life. The same idea was also at the basis of the bloody atonement of the Hebrews and the passage in Leviticus. 17. 11: "For the soul of the flesh is in the blood, and I have given it to you as an altar to atone for your souls, for the blood makes atonement through the soul," is obviously to be understood in the last paragraph as follows, "that blood atones through the soul, which is contained in the very blood of the living being."

It may therefore be regarded as unquestionably established that in antiquity the view was quite universally held that in blood was in fact the seat of the soul.

Ideas of this kind had to be transferred to the views of the physicians. For in such diseases, in which a sudden disappearance of mental activities was conspicuous, the source was transferred to the blood, as is already evident from the treatise of Hippocrates on epilepsy, and from time immemorial a remedy was sought in the blood of healthy, strong individuals. Such a common disease, and well known to the ancient physicians, was epilepsy (comitialis morbus); for them, it seems, the drinking of healthy human blood was already considered an ancient folk remedy. It was imagined that by taking this into the diseased body, there was at the same time a transfer of the mental activities which disappeared in the epileptic seizure.

Pliny (7) says: "Sanguinem quoque gladiatorum bibunt ut viventibus poculis comitiales morbi: quod spectare facientes in eadem arena feras quoque horror est. At, Hercule, illi ex homine ipso sorbere efficacissimum putant calidum spirantemque et una ipsam animam ex osculo vulnerum: plagis ne ferarum quidem admoveri ora fas sit humana." [*They will also drink the blood of the gladiators as living cups of disease: that watching the wild beasts in the same arena is also a horror. But, Hercules, they think that it is most effective to drink from the man himself, hot and breathing, and together with the very soul from the kiss of the wounds: it is a human right not even to be moved by the plagues of beasts.*]

Cornelius Celsus (8) expresses himself in a similar way: "Quidam jugulati gladiatoris calido sanguine poto tali morbo se liberarunt. Apud quos miserum auxilium tolerabile miserius malum facit." [*Some of the gladiators, by drinking the warm jugular blood, freed themselves from such a disease. In whom the tolerable help of the miserable makes the miserable worse*]. Here, too, we are talking about epilepsy.

Aretaeus of Cappadocia also knows this remedy, he shudders at the terrible necessity of its application, and, moreover, is not able to name any case in which it helped. Scribonius Largus therefore rightly says: "Licet aliquibus profuerit, proscribendum tamen ejusmodi remedium extra professionem medicam" (9). [*Although it has benefited some, such a remedy should be prohibited outside the medical profession.*] M. Minucius Felix was also aware of drinking blood as a remedy for epilepsy, and the editor Christoph Cellarius (10)

adds in a note: *Vetus opinio, quae necdum vulgi esse desiit, poto hominis calido sanguine morbum tolli, quem comitiales dicunt, id est epilepsian* (11). [*An old opinion, which has not yet ceased to be popular, is that by drinking the warm blood of a man, the disease, which they call ecclesiastical, that is, epilepsy, is removed.*]

Strangely enough, these ideas seem to have been partly propagated in popular traditions up to the present time, for this is the only way to explain the analogous gruesome scenes performed by epileptics at public executions, which continue to take place in modern times. Yes, the cause of many crimes against blood and life may have its root in that delusion.

Under the guidance of physicians and scholars, drinking blood was practiced in the Middle Ages - while the Egyptian physicians used the fresh blood for invigorating baths, which the princes in particular were to use, raised to a special cure of blood-sucking, to which, as tradition shows, the same fundamental idea owed its origin. Marsilius Ficinus, born in Florence in 1433, the most famous Platonist of modern times, an adornment of the Medici court, says in his writings (12) in the chapter *de usu lactis sanguinisque humani pro vita senum*: [*on the use of human milk and blood for the life of the aged*] The old men should suck blood from a vein in the arm of a young man for their rejuvenation, and in conclusion says: *Nec forte diffidas juvenilem sanguinem a sene bibitum trahi ad venas membraque posse ibique prodesse quam plurimum.* [*Nor should you doubt that youthful blood, drunk by an old man, can be drawn to the veins and limbs, and there be of the greatest benefit.*]. And he further remarks that the blood of the youth could also be prepared beforehand before the old man drinks it. In a similar way, the same researcher speaks in the same chapter (*De vita sana longa et coelesti, Lib. 2. Cap. 2 de Studiosor. sanitate tuenda, Florent, 1489*, where Scheel (13) proved it): "Careful physicians," he says, "seek to strengthen persons emaciated with old age by medicines obtained by means of distillation from human blood. Why shouldn't such sick people be able to recover by drinking blood? According to an old and prevailing opinion, old witches or fiends, as they are called in common life, are supposed to suck the blood out of children in order to become young again. Why should not our old men, if there is no other help for them, suck the blood of a healthy, lively, moderate youth, who has very good, but perhaps too abundant blood? Let them therefore suck one or two ounces of blood from a small opening in a vein on the left arm, in the manner of leeches." He is also said to develop similar principles in his *Antidotus epidemiarum* (14). Marsilius Ficinus occupied himself in many ways with the problem of the rejuvenation of life, and his work on human life contains many precepts on how to achieve rejuvenation by the aid of astrology, magic, various medicines, and, as we have seen, blood. Moreover, as is evident from his own words, Marsilius Ficinus was not alone in his views on the rejuvenating power of blood, but they seem to have been generally widespread among the people since time immemorial, since he expressly says: "*Communis quaedam est ac vetus opinio, aniculas quasdam sagas infantium sugere sanguinem quo pro viribus juvenescant.*" [*It is a common and ancient belief that certain old women suck the blood of certain babies so that their strength will be rejuvenated.*].

However, a more refined procedure had already been carried out in part, in which efforts were made to prepare the drained blood by chemical means. According to the annals of Raynaldu, such an elixir of life, prepared from boys' blood, is said to have been prepared by a Jewish physician in the 15th century for Pope Innocent VIII, who was suffering from great frailty. Through the error of Villari and Sismondi, this cure in Raynaldu's communication was falsely passed off as a real transfusion. Errors of a similar kind are probably also the basis of the information which I encounter in L. Jullien (15). A century later - it is said - according to the chronicles (which?), cannulas were inserted into the carotid arteries by Italian doctors at the court of Catharina de Medici's children who had been picked up on the streets of Paris, which were then introduced into the vein of some great weakened old gentleman for rejuvenation.

This much, at any rate, is certain from the information given, that in the fifteenth century and earlier blood cures for rejuvenation (whether by sucking or by the preparation of an elixir) were known, especially in Italy, and that they were actually carried out (16).

Thus a method of treatment had been adopted which was, as it were, in direct opposition to the bloodletting practised since antiquity. While bloodletting resulted in a weakening of the body, the aim of ingesting the blood was to strengthen and rejuvenate.

If we now consider the view of Marsilius Ficinus "sanguinem a senes bibitum trahi ad venas membraque posse" [*the blood can be drawn from the old man to the veins and limbs*], it is certainly not a long step to pose the question as to whether there is not the possibility of sanguinem ad venas membraque senis trahi [*to draw blood to the veins and limbs of the old man*] directly from the arm vein of the youth? Certainly considerations of this kind have been entertained, and we are even in a position to cite the direct references from the writers. If one recalls those times in which mysterious enthusiasms and the frauds of the alchemists were in the greatest bloom, in which one sought the philosopher's stone and the elixir of life serving for eternal rejuvenation, it cannot be surprising that one also thought of the direct exchange of blood for the revival of the sunken with the power of youth. Of course, the flow of the blood in the vessels was not yet known, and so one had to grope in the dark about the manner of transition. This may have been the reason why we find only brief, almost incidental comments about the direct exchange of blood. Nor did it seem that any of the prudent researchers wanted to seriously put their name to the cause. So it is only said that these or those who were not specified in more detail made mention of the transition. However, it is quite certain from the information that follows that considerations of this kind were in vogue from various quarters.

In the writings of the famous defender of the new Platonism, Hieronymus Cardanus, born in Pavia in 1501, we find the first unequivocal information about the exchange of blood from the vein of one person to that of another. The works of this man partly contain a colourful succession of communications from the field of natural and medical science, often interwoven with superstitious and mystical reflections. In the writing, "Hieronymi Cardani Mediolanensis medici de rerum varietate libri XVII. Basiliae 1556 (preface) - 1581 (end of printing) we find in the 8th book, chapter 44, entitled "Cura morborum superstitiosa" [*The care of superstitious diseases*] - (p. 580) - the following extremely strange statement. He discusses the question of how morally corrupt and depraved young people could be reformed so that a "mutatio morum" [*behaviour change*] of them could be brought about. "Posse autem mutari ex hoc conspicuum est, quod etiam insani et stulti medica arte curantur. Quae igitur hoc possunt, sunt trium generum: humana, medica, divina." [*But that it can be changed is evident from this; that even madmen and fools are cared for by the art of medicine. Those that can do this, therefore, are of three kinds: human, medical, and divine*]. Of these three remedies, we are interested here in the "medical" ones, which he now further designates: Medica, ut sanguis detrahatur ad virium casum, atque id saepe, si oportet: sed hoc non absque periculo vitae: certum tamen: reficere autem oportet vino, in quo columbi juniores cocti sunt. [*Medicinal, that the blood be drawn to the fall of strength, and this often, if necessary: but this not without danger of life: certain, however: it is necessary to first restore the wine in which the young doves were cooked.*] Here, too, the view was evidently decisive that the blood is the seat of the soul and the passions, and that accordingly with the reduction in the blood mass, especially if this happens repeatedly, there must be a moderation of the bad instincts with the decrease in the forces. And now he continues: "Sunt, qui cum alio juvene bonorum morum duplici fistula, alii unica, commutare sanguinem posse sperent; quod si fiat, commutabuntur etiam mores." [*There are those who hope to be able to exchange blood with another young man of good behaviour with a double pipe, others with a single one; which if done, behaviour will also be exchanged*]. This passage is of such great interest because it shows us that even before Cardanus the exchange of blood was contemplated from different sides, as the indication of the two different methods with the single and with the double cannula clearly shows. What Cardanus himself thought of this procedure is still unclear, for the short communication suddenly breaks off here. Perhaps the brevity of the words indicates that Cardanus himself may have doubts about the possibility of its execution, and it is therefore not without reason that he says quod si fiat [*which if done*]. But that, admitting the possibility of carrying out the operation, seems to me

the success was evident to our author to include the strict version *commutabuntur etiam mores [behaviour will also be exchanged]*.

Let us compare with the above communications of Cardanus the following passage, hitherto unnoticed, from the rare and peculiar work (17) of Magnus Pegelius, professor in Rostock, born in 1547. "Rationes aliae et peculiare eaeque licet pleraeque prope obviae tamen hucusque non sic cognitae nec usurpatae quibus pueri inprimis seu juniores et illi si sic velis utriusque sexus tum et alii ad virtutes perducuntur et a vitiis avertuntur: sic ut voluntas et animi affectio et inclinatio eorum indecens prava et noxia corrigatur seu melior et perfectior reddatur et hinc mores vita actiones ad optima quaeque et salutifera conformentur." [*There are other and particular reasons, and these, although most of them are close at hand, have not yet been so recognised nor used, especially by children, first or the younger ones, if you will, of both sexes, as well as others, are led to virtues and are turned away from vices: in such a way that the will and the affection of the soul and the inclination of their unseemly wrong and noxiousness are corrected or made better and more perfect, and hence their manners, life, and actions are conformed to the best and most salutary*].

It seems to me that it is evident from these indications that Pegelius either knew the communications of Cardanus, or that both drew from other traditions, perhaps only from oral ones, which might have been connected with the teachings of the Paracelsians or Rosicrucians.

That Pegelius had in mind the same methods which Cardanus directly expresses, is also evident from the fact that the communicated passage adjoins another already proved by Scheel, in which the conduction of blood is undoubtedly mentioned. The fact that Pegelius indulges only in allusions is explained by the way in which his entire work was written. Only by considering the strange basic idea which dominates the whole book can one decipher the cause of the mysterious allusions. The whole book (18) consists only of allusions to all kinds of arts known to the author, without the author seeing himself compelled to indicate anywhere directly the means of carrying them out. The author, therefore, does not conjecture without reason: *Sed multos imo plerosque, imprimis fronte prima hoc culpatores video, quod rerum haec capita absque explicatione seu sine mediorum quibus in actum et usum haec ducenda forent additione in lucem emiserim. Praeterea has ipsas res effectum impossibiles plerique pronuntiabant etc. - (Praefatio. VII.) - [But I see many, nay, most people, especially on the first front, who are guilty of this, because I have brought to light these heads of things without explanation or without the means by which these should be put into practice and use. Moreover, most people will pronounce these very things impossible in effect, etc.]*. Anyone who was at that time familiar with the questions of the day in the field of sciences and arts, which were disseminated partly in books and partly by word of mouth, could easily recognize many things from the hints. And it is still possible for us to reveal the core of the matter with relative certainty in many places in the matter. Among the diverse problems that relate to schools, jurisprudence, administrative and financial science, politics, mechanics (including, for example, airships, diving, submarine navigation) and many others, they now also appears in the chapter *De philosophia tota et de partibus illius ... "quae corrigenda, quae alia danda" [Of philosophy as a whole and of its parts ... "what to be corrected, what else to give"]* ... various points touching on the field of medicine (19) come to light. And among these, the strange passage already noted by Morhof (20) and explained after him by Scheel, which aims at an exchange of blood between people.

*Ratio chirurgica insignis et mira Homini communicans Extera quae ipsi bona et Interna multa quae noxia avertens. Quae enim ratio alias varia agere et alterare in homine potest. [A remarkable and wonderful surgical system imparting to man external things which are good for him, and turning away many internal things which are harmful. For this reason can act and alter various other things in man.]*

*Modus omnino singularis, item hucusque plane incognitus, quo plurima et insperata in homine toto ejusque partibus effici possunt, sic ut bona acquirat et noxiis privetur. Sicut ex re ipsa revelata mox percipitur et unde frequentia inprimis postrema quatuor res ipsa docet per experientiam usum trahenda. [A completely unique method, also hitherto completely*

*unknown, by which many and unexpected things can be accomplished in the whole man and his parts, so that he acquires good and is deprived of harm. As it is soon perceived from the revealed reality itself, and from where the frequency first of all, the last four things itself teaches by drawing from experience.].*

I. Animi hominis et praecipue Voluntatis et Affectuum (et ex sententia recepta et magis ex re ipsa et varietate alias) mutatio, sic ut quis magnanimus seu animosus, excitatus, sedatus, placidus, benevolus, bonus, hoc aut illo modo affectus reddatur. Ut alterius virtus, bonitas, animositas etc. (idque etiam sine alterius in hisce minutione seu detrimento) transferatur in alium. Ut item affectio talis si quandoque velles iterum mutetur in pristinam seu in aliam. *Seni de juvenibus, Aegroti de Sanis communicetur. (!) [I. A change in a man's mind, and especially in his will and affections (and from the opinion received, and more from the fact itself and various other things), so that a person may be rendered magnanimous or courageous, excited, restrained, calm, benevolent, good, and affected in this or that way. As another's virtue, goodness, animosity, etc. (and that also without the other's diminishment or loss in these matters) be transferred to another. In the same way, if you ever wanted such an affection to be changed again into the former or into another. The old will be shared with the young, the sick with the healthy. (!)]*

II. Vitae ipsius seu per hominem totum seu in parte ipsius hinc inde instauratio, Motuum effectio, restitutio, fortificatio, etc. *[II. The restoration of the life itself, either through the whole man or in part, from here to there, the production of motions, restitution, fortification, etc.]*

III. Corporis vel totius vel ejusdem partis variae nutritio, mutatio, etc. et talis quam expetis. Utcumque etiam ventriculus, epar etc. virtute defecerint, nil vel mala egerint. *[III. Different nutrition, change, etc. of the body or the whole or the same part and such as you desire. No matter how the stomach, the liver, etc. they have failed in virtue, they have done nothing or evil.]*

IV. Unde Morborum et Affectionum fere omnis generis alias etiam curam respicientium curatio: postquam quid cui conveniat sic expertus fueris. *[IV. Hence the treatment of diseases and affections of almost every kind, even of those who refuse the care of others; after you have experienced what is appropriate to whom.]*

V. Unde item homo, licet corpore et animo sanus, majorem aliam et alias non consuetam et insperatam sanitatem et constitutionem acquirere poterit. *[V. Whence also a man, though healthy in body and mind, he will be able to acquire a greater and other unusual and unexpected health and constitution.]*

Magnus Pegelius, as he writes in the preface to his book, quite rightly suspects that he will be treated with hostility and heaped with reproaches for having everywhere only hinted at the problems, but never demonstrated the ways and means of solving them, and therefore even declaring some of his statements to be impracticable and insoluble. And so it was also the case with the preceding passage, which was decidedly obscure in itself, and which was only supposed to appear in a clearer light through the critic.

This harsh critic was Andreas Libavius from Halle (born 1540, died 1616), director of the Coburg High School, physician and famous chemist. He tried to purify chemistry from the dross of theosophical enthusiasts and Paracelsists (21). He had sharply attacked the charlatans, including the swindler George Amwald, who sold a Panacea at a high price, against all kinds of ailments.

The secrecy of Magnus Pegelius was certainly repugnant to the strictly critical researcher Andreas Libavius, and without naming him directly, he goes with him in his work *Defensio syntagmatis arcanorum chymicorum contra Henningum Scheunemannum* (actione 2. p. 8) Editio Francof. Harsh punishment in 1615. He calls Magnus Pegelius a Paracelsist, although he later denies it, and now elaborates: *Hujusmodi diliriis se delectant Paracelsistae: erat tamen quidam, qui de grege Paracelsi esse nolebat, et nihilominus magnifica et admiranda proflabat ... Modus singularis hucusque plane incognitus, quo plurima et insperata in homine toto ejusque partibus possint effici, ut bona acquirat, malis privetur. [The Paracelsists delight in such delusions: there was, however, one who did not want to be of the flock of Paracelsus, and who, nevertheless, spoke magnificently and admirably ... A*

*unique method hitherto completely unknown, by which many and unexpected things can be accomplished in the whole man and his parts, so that he acquires good things and is deprived of evils.] This almost verbatim repetition of the words of Magnus Pegelius undoubtedly points to the latter. Consequens est - it goes on to say - ut animus hominum praecipuaeque voluntates et affectus mutantur. [The result is - it goes on to say - that people's minds and basic desires and feelings are changed.] The other passages are also clearly enough focused on their goal: Effici potest ut animus et vis juvenilis migret in senem et sana constitutio ex sano et optime valente in aegrotum ... Insuper totum corpus nutriatur aut mutetur ad votum etiamsi neque ventriculus neque epar officio suo fungantur et vel nil vel mala agant: ut omnes affectiones et morbi alias curam respicientes sanentur, postquam expertus fueris, quid cuique conveniat sine antipathia. Ita homo poterit esse animo et corpore sanus poteritque majorem insuetam insperatamque constitutionem acquirere. [It can be done that the mind and energy of youth migrate into the old, and a healthy constitution from the healthy and very strong into the sick ... Moreover, the whole body should be nourished or changed according to the will, even if neither the stomach nor the liver do their duty and either do nothing or do evil: so that all affections and diseases, rejecting other care, may be healed, after you have experienced what suits each one without antipathy. Thus a man will be able to be healthy in mind and body, and will be able to acquire a greater unaccustomed and unexpected constitution.]*

And now in the famous passage, well known to the Old English transfusers and to Paulus Manfredi, professor of medicine at the Roman Archilyceum, comes the mention of this miracle cure itself. *Adsit juvenis robustus, sanus, sanguine spirituosus plenus: Adest exhaustus viribus, tenuis, macilentus vix animam trahens. Magister artis habeat tubulos argenteos inter se congruentes. Aperiat arteriam robusti, et tubulum inserat munitaque; mox et aegroti arteriam findat et tubulum foemineum infingat. Jam duos tubulos sibi mutuo applicet et ex sano sanguis arterialis calens et spirituosus saliet in aegrotum unaque vitae fontem affert, omnemque languorem pellet. [A young man is present, robust, healthy, full of spirited blood: He is present exhausted of strength, thin, emaciated, scarcely drawing his soul. A master craftsman should have silver tubes fitting together. He should open the artery of the strong, and insert the tube and secure it; soon he also splits the patient's artery and injects the femoral tube. Now he will apply two tubes to each other, and from the healthy the arterial blood, hot and spirited, leaps into the sick, bringing together the fountain of life, and every languor pellet. But - he now adds, apparently with reference to Magnus Pegelius', "idque etiam sine alterius in hisce minutione seu detrimento": ... Sed quomodo ille robustus non languescet? Danda ei sunt bona confortantia et cibi [and that too without the slighting or detriment of the other in these matters": ... But how will that strong man not faint? He must be given good comfort and food] - [perhaps he is referring here to Cardanus' "vinum, in quo columbi juniores cocti sunt" [the wine in which the young doves were cooked]] - medico vero helleborum. [but of the doctor hellebore]. This last excellent conclusion already shows that Libavius is simply making fun of Magnus Pegelius' promising secrecy.*

In my investigations into blood transmission in the times before the discovery of the circulation system, I cannot ignore various information contained in an extremely rare script which dates back to the time of Denis' transfusion dispute. Scheel (22), who "only with the help of the local (Copenhagen) rich royal library and the famous Göttingen University Library and by searching in the other most respected libraries in Germany and Italy" was able to compile the history of transfusion with such great thoroughness, has written "I haven't seen this work myself" (p. 159), rather he only gives a report based on a reproduction in the Encyclopedie raisonné des connaissances humains [Neuchâtel 1746 Tom. XII. Article Transfusion], in which however, some errors and inaccuracies have crept in.

I found this certainly extremely rare text, which I had already tried in vain to find in the largest German libraries, in the National Library in Paris, where I was able to work through it in September 1877, along with many other older transfusion texts.

This work is entitled: "Les opuscles du sieur de la Martiniere, medecin et operator, ordinaire du roi, contre les circulateurs et transfuseurs de sang, ceux qui veulent que toutes Maladies proviennent d'intemperie chaude, que la Melancolie ne soit point une humeurs;

Mais bien le suc pancreatique et en faveur des medicamens vomitifs etc. A Paris, chez the author, ruë de la cantellerie à l'Esperance vis-à-vis le Bâton Royal. [*The pamphlets of Sieur de la Martiniere, doctor and operator, ordinary of the king, against circulators and blood transfusers, those who want that all diseases come from hot weather, that melancholy is not a mood; but pancreatic juice and in favour of emetic drugs etc. In Paris, with the author, rue de la cantellerie in Esperance opposite the Bâton Royal.*] (The privilege of June 16, 1668.)

I will now first list the main content of this pamphlet. After the preface, which is addressed to the Grand Duke of Tuscany and in which there is nothing worth mentioning, there follows: To Monsieur Colbert, king's councillor in all etc. on the subject of blood transfusion ... I take the liberty by curious researches to show your greatness the antiquity and inhumanity of this operation, as it appears in the history of the ancient Egyptians, who, after having practiced it, seeing a human creature die in his arms, and judging that the blood of a dying man was corrupted, and that through the void of the pores, the purest substance of the blood could be attracted, baths of human blood were made, as the most useful for curing the diseases of man, as is the case with the Phthisics and Cachexics, who was restored by means of the milk of women, rather than by that of asses.

In the book of wisdom of Tanaquila, wife of Tarquin the Elder, it appears as she had it done.

Herophilus, father of the Sybille Cumane, in his Treatise on Anatomy, speaks of it quite pertinently, as also of circulation.

The Sybille Amalthea on the sufferings of the gladiators, says (we will use their blood as a remedy).

Ben Israel Manasseh Rabin of the Jews of Amsterdam, among several curious things which were in a Recüel, he read to me these words taken from an ancient writer. Naaman Prince of the army of Ben-adad King of Syria, suffering from leprosy, had recourse to the physicians, who to cure him removed blood from his veins, and put back others. Now priests of the Foreign Gods entered his chamber, who said to him, the Gods be favourable to you: Rammon God of Syria says, that the blood that you receive in your veins can only purify your blood and not your flesh, in which the venom of your evil is, for which to remedy it, said that you must bathe in a vat of blood. Naaman having done this remedy several times without having received any relief, despairing of recovery, a little girl of the people of God who was in the hands of his wife, told him, at my will that Monsignor wanted to go to the man of God who is in Israel, I am sure, would cure him, which having waited for Naaman, he went there and remained at the gate of the man of God until there came to him a messenger from him to tell him to wash himself seven times in the Jordan, he was healed after having washed there and recognizing that the God of Israel was the Physician of Physicians and the God of Gods, protested to no longer worship anyone but him. –

In the sacred book of the Priests of Apollo, mention is made of transfusion and of several other operations which are no longer in use, both because of their uselessness and cruelty.

At the Recherches des Eubages it is widely discussed.

Pliny, Celsus and several others cry out against it.

Ovid by the rejuvenation of Aeson and the death of Pelias shows that he was aware of it.

Maximus in his principles of Physics taught it.

Libanus on the sacrifices of the Emperor Julian, says he saw it done.

Marsil Ficino only served.

Father Tritheme did it.

Franco, speaking of useless operations, shows the cruelty and inhumanity.

Aquapendente, Hervaeus and Fra Paolo experimented with it, reporting on a few individuals.

Following this communication, I add a second publication by the same Martin de la Martiniere, which I also found in the Paris library, which also points to the age of transfusion. There is a flying sheet titled, "Les sentiments d'un vray medecin faisant voir les inutilitez et cruauté de la transfusion du sang etc. à M. l'abbé Bourdelot. Paris 14 April 1668.

First of all, it is characteristic of our researcher's references that, with regard to the age of transfusion, he says that some have told him that Aquapendente was the inventor of transfusion, others that it was Fra Paolo or Harvaeus. He then announces again that the surgeon Franco has already reported the transfer of blood from the arm artery of a young man into the veins of a rich man. There is also the information here that Languius (apparently Joh. Lang) says that the surgeons give those who faint during bloodletting their warm blood to drink, because they believe that with the drained blood the soul has also left the body (23).

If we proceed to a critique of the foregoing, it will first be important to shed light on the personality of the author. In the bitter transfusion dispute we see on the one hand Jean Denis, Dr. of Montpellier, professor of philosophy and mathematics at the Royal University of Paris, later also professor of medicine and personal physician to the king, with a few loyal followers, and on the other hand the majority of the members of the Parisian faculty and their followers. To appreciate the nature of this war of feathers, consider that the opponents of transfusion partly appeared pseudonymous, as we know from Pierre Petit, who rides into the barriers as Eutyphron. Others, on the other hand, chose a squire to fight the battle for them. Such are the various feud letters of the Guil. Lamy, a young, rash master's degree who was conspicuous by his arrogance, can be traced back to Moreau.

A puppet of a similar kind is most likely our Martin de la Martiniere. The parliamentary advocate Louis de Basril (24), who had been close to the scandalous Mauroy transfusion trial, calls him a tooth-breaker who sold secret remedies in a public barker's booth on the Pont Neuf in Paris, and accuses him in the same way that he did not act out of his own knowledge, but as a squire for Dr. St. Jaques, the feather leader. This certainly extremely strange type of feather war can only be explained, on the one hand, by the enormous sensation that Denis caused with his transfusion cures, and on the other hand by the bitter resentment and doggedness of his opponents.

In particular, the year 1668 seems to be the year in which this battle was the fiercest. In addition to the two writings by de la Martiniere already mentioned in the Paris library, I also find three more of his from the same year 1668: a fly sheet A messire Molé, in which it is said in particular that the third transfusion to Mauroy went differently than Denis stated, then another document *Medée resuscitée, affirmant l'utilité de la transfusion du sang, ensemble la réponse à la lettre du sieur Denis sur la Folie guerrie par de la Martiniere*, Paris, finally a pamphlet: *Remonstrances charitables du sieur de la Martiniere à M. Denis*, Paris. So by the same author there are five counter-writings against transfusion in the same year 1668, added to this in the same year are Lamy's letters and de Montpoly's polemics. The key is where some of the strongest work is done, especially by de la Martiniere. So you actually see a widespread and extremely heated feather fight (25).

There seems to be no doubt in my mind that Monsieur de la Martiniere is in fact a fake personality who merely perceives the words of his prompter without any independent study. He wants to prove that transfusion is an old surgical method. Can there be anything more naive than his confession (26): some had told him that the inventor of transfusion was Aquapendente, others that it was Fra Paolo, others that it was Harvaeus? In the writings of Harvey and Aquapendente, which I searched particularly for this purpose, I did not come across a single syllable about this. The information regarding Peter Franco, the famous inventor of the high stone carving, can also be described as incorrect. I have searched through this important man's extremely rare book *Traité des hernies etc.*, Lyon 1561, which apart from Greifswald, is perhaps only found in one copy in the whole of Germany, namely in Göttingen, and have not found anything about transfusion or related cures anywhere. I can report the same about Herophilus, whose fragments Marx collected for us (27). So initially there is incorrect information here.

The story told of the transfusion with the Syrian general must certainly remain doubtful in view of the mysterious nature of its communication, until it is possible to find the said ancien escrivain, in whose writings the conspicuous communication is supposed to be found.

It must then appear to be highly striking that de la Martiniere describes the blood-bathing, drinking of blood and blood-sucking together with the transfer of the blood as "transfusion"

throughout. In this regard his statements concerning Pliny, Celsus, and Marsilius Ficinus must be corrected, according to my statements given above. After these points have been eliminated, all that remains is to provide a few details, but these are so vague that finding the relevant places will only be possible after a great deal of effort. Nevertheless, I have given de la Martiniere's information in his own words. I cannot help but suspect that things are bad with these quotes. –

If, after the above discussions, we take another look at what was known regarding blood transmission before the discovery of the blood circulation, then it can be considered certain:

1. That even in antiquity the drinking of blood was common practice for certain healing purposes;

2. That in the Orient blood-baths were known for strengthening and refreshment;

3. That in the Middle Ages rejuvenating remedies were prepared chemically from the blood of young individuals;

4. That already about 100 years before the discovery of the circulation, certain methods for the direct transfusion of blood were envisaged.

This was the view when, in the second quarter of the 17th century (1616-1628), the great Briton's immortal discovery of the circulation of blood sent all educated circles of the world into tremendous excitement. Now the paths of the blood flow were known, now it was known where the blood should be directed from the vein of the strong and morally pure youth into the vessels of the weak or depraved fellow human being. The fatherless problem of the transfer of the blood, which had previously been thrown aside among other theosophical enthusiasms, began to gain solid ground. Nothing was more natural than that this idea was now taken up again with greater sharpness. And perhaps it is not by chance that the theologians, who could be most familiar with the above-mentioned mysterious significance of blood as the seat of the soul from the doctrine of sacrifice and the improvement of man through the offering of good blood, once again pointed out the blood conduction with emphasis. For those theosophical speculations may have seemed a little too hazy to the physicians before.

Thus, in England for example, about the year 1638, the theologian Potter, on the occasion of Harvey's demonstration of the circulation of the blood in the "invisible philosophical society", suggested the idea whether it might not be possible to replace the blood of one animal with that of another (28).

As soon as the news of Harvey's discovery had reached France, a Benedictine monk Freyer and, according to others, Father Don Robert de Gabet - not to mention Abbot Bourdelot - emerged with the idea of the transfer of blood (1658). Priority claims were even made. But success was by no means considered assured: *La plupart se moquent pour lors de cette proposition et qu'on crût que la transfusion estoit impossible* (29). [*Most of them laughed at this proposal and believed that the transfusion was impossible.*]

In Italy, where the idea of blood exchange was not uncommon thanks to the widely read Cardanus (1556) and even before him, shortly before the discovery of the circulation, Johannes Colle, professor in Padua, had in his work *Methodus parandi tuta et nova medicamenta. Venetiae 1628*, reported on the blood transfer in a non-approving manner, which he mentioned as a matter of common knowledge - as it was in fact in Italy.

In his book he had thought about extending the life of drugs and chemical medicines and now comes to the objection that has been made to him. "Denuo insurget aliquis (30), frustra haec esse tentanda dum per pauciora aequae et bene valemus consequi optata, veluti si quis sanguis e vena exsiliens juvenis admodum salubris per fistulam in venam senis permeet, insufflante juvene et sene attrahente et inspirante; ut sanguis juvenis intus attrahatur a sene (31) et ne hujus egrediatur. Nam hic sanguis potest reparare humidum primigenium et temperamentum, docente Aristotle: si senex haberet oculum adolescentis nun videret ut adolescens? non sentiret et rationaretur ut juvenis si cor et cerebrum juvenis possideret? ergo etiam si sanguinem juvenis obtineret, viveret ut juvenis." Respondendum, haec minime veritatem attingere! [*Again someone will rise up, (30) that this should be attempted in vain, while we are equally well and well-wished for by the few, as if some blood, leaping from the vein of a very healthy young person, permeates through a tube into the vein of an old man,*

*infusing the young and the old, attracting and inspiring; that the blood of the young may be drawn inward by the old (31) and that it may not come out of it. For this blood can restore the original moisture and temperament, as Aristotle taught: if an old man had the eyes of a youth, would he not see as a youth? would he not feel and reason like a youth if he possessed the heart and brain of a youth? therefore even if he obtained the blood of a youth, he would live as a youth. The answer is that this does not touch the truth at all!*] And now he argues his reasons against the benefit of the transition.

Even the astute Paulus Sarpi was certainly not unfamiliar with the transfer of blood. After the Harvey circulation became known in Italy, Franciscus Folli endeavoured to point out that, prompted by the discovery of the circulatory system, he had stimulated blood transfer in 1652.

This soon led to many discussions about the priority of the invention.

Only after the discovery of the circulation could we speak of blood transfer, transfusion, as a truly scientific problem and the priority undoubtedly goes to the English for having laid the scientific foundation for the theory of transfusion. Those numerous suggestions previously encountered, especially in Italy, about blood transfer without any knowledge of the circulatory system are, from a scientific point of view - as even more insightful contemporaries may well have seen - completely worthless: - they are on the same level as the suggestions about the elixirs of life, gold tinctures and the like. It was not until Harvey that a completely new, strictly scientifically based period began for transfusion (32), and Timothy Clark, the excellent researcher in the English Transfusion Committee, was certainly right when he announced in a cohesive manner to the priority disputers who emerged at the time: *Hoc tamen audacter assero, nos in Anglia inventionem hanc a nullo accipisse peregrino. [However, I boldly assert that we in England have received this discovery from no foreigner.]*

## REFERENCES

1. Kurt Sprengel, Versuch einer pragmatischen Geschichte der Arzneikunde. Halle 1821. Bd. I. S. 294. - Diogen. 8. 30. 31. - Plutarch. plac. phil. 4. 4. 5. 7.
2. K. Sprengel Bd. I. S. 317.
3. Kurt Sprengel Bd. I. S. 469.
4. Catilina, Cap. XXII.
5. Joan. Langii Lembergii epistol. medic. etc. Hanoviae 1605. p. 378 sq.
6. Näheres hierüber in C. Ch. W. F. Bähr, Symbolik des mosaischen Cultus. Heidelberg 1839 und 1874.
7. C. Plinii sec. Nat. hist. Lib. 28. Cap. 1.
8. De medic. Lib. 3. Cap. 23. Edit. Alb. Haller. Lausannae 1772. p. 183.
9. Nic. Tulpii Observationes medic. Amstelodam. 1672. p. 284.
10. M. Minucii Felicis Octavius etc. rec. a Chr. Cellario. Halae 1699. p. 117.
11. Auch gegen Liebeswahn scheint das Bluttrinken im Alterthume angewendet. Joh. Lang schreibt in seinen medicinischen Briefen: ... *Nec ex humano sanguine Magicae vanitatis contra amorem remedium laudo: quamvis Julius Capitolinus referat, Faustina illustrem Antonini Pii imperatoris filiam, ac tandem Marci Antonini philosophi uxorem, tali cruento remedio ab amoris affectione vindicatam. Nam quum ea gladiatoris amore flagrans fere contabuisset, Marcus imperator ad Chaldaeos et mathematicos, qui suis nugis medicinam conspurcarunt, id retulit: qui suaserunt, ut occiso gladiatore, Faustina partem tepidi cruoris absorberet ...* Und weiterhin sagt er: *Haec certe, ut Tertullianus in Apologetico pie docet, sunt daemonum praestigia, quos Magi, eorum antistites, caede humana et sanguinis effusione delectari noverunt: qui ob id ex hominum sanguine pharmaca et sacrificia instituerunt et finxerunt. (Joann. Langii Lembergii etc. epistol. medic. Hanoviae 1605. - Lib. I. epist. XXIV. p. 103. 104.) [Drinking blood also seems to have been used against love madness in ancient times. Joh. Lang writes in his medical letters: ... Nor from human blood do I praise the magic of vanity against love: although*

*Julius Capitolinus relates that Faustina, the daughter of the illustrious emperor Antoninus Pius, and finally the wife of Marcus Antoninus the philosopher, was vindicated by such a bloody remedy from the affection of love. For when he had almost embraced her with the love of a gladiator, Marcus the emperor reported this to the Chaldeans and mathematicians, who had defiled medicine with their nonsense: who urged that Faustina, after killing the gladiator, should absorb part of the warm blood ... And further he says: Surely these, as Tertullian piously teaches in the Apologetics, are the tricks of the demons, whom the Magi, their predecessors, knew to delight in human slaughter and the shedding of blood: who for this reason instituted and invented medicines and sacrifices from the blood of men.]*

12. Marsilii Ficini Opera. Basiliae (Ende des Druckes 1576) T. I. Fol. p. 518. Lib. II. Cap. XI.
13. Die Transfusion des Blutes. Kopenhagen 1802. S. 8.
14. Kurt Sprengel Bd. 2. S. 653.
15. De la transfusion du sang. Paris 1875. p. 4.
16. In Hartmann von Aue's armen Heinrich (Ende des 12. Jahrh.) sagt der Meister von Salerno: Mit dem Blute von ihrem (des Mädchens) Herzen wollte ich Euch wohl heilen. [*In Hartmann von Aue's Poor Heinrich (end of the 12th century), the master of Salerno says: I wanted to heal you with the blood from her (the girl's) heart.*]
17. Thesaurus rerum, selectarum, magnarum, dignarum, utilium, suavium, pro generis humani salute oblatus, authore Magno Pegelio, germano Megapolitano Rostochiensi. Vana vel impossibilia ne pronuntientur Media haud perspecta. Tu meliora, fronte capillata est, post est occasio calva. - Typis haec expressa Anno 1604. - (Das vorgedruckte Privilegium ist datirt vom Jahre 1593.) [*A treasure of things, selected, great, worthy, useful, and sweet, offered for the salvation of the human race, by the author Magno Pegelius, a German Megapolitan of Rostoch. Vain or impossible things should not be pronounced by the media without understanding. You are better, the front is hairy, the back is a bald opportunity. - These were printed in 1604.*]
18. Das Werk ist sehr selten; ich habe das Exemplar der königlichen Bibliothek zu Berlin vor mir; es befindet sich ebenfalls auf der königlichen Bibliothek zu Dresden. [*The work is very rare; I have the copy from the Royal Library in Berlin in front of me; it is also located in the royal library in Dresden*]
19. Interessant erscheinen besonders: Ratio partem corporis noxiam seu quae tollenda sit sine dolore et affluxu amovendi et consolidandi. - Bruta ne mactando ut fit misere excrucientur, sed ut dolorum nihil sentientes momento tollantur, et ut inde nobis salubriora et sapidiora esuique suaviora eveniant. - Sodann p. 111 eine verschleierte Andeutung über eine Geburtszange. - An a professoribus medicis praxis exercenda? - Methode unfruchtbare Frauen fruchtbar zu machen etc. etc. [*What seems particularly interesting is: Reason for removing and consolidating a part of the body that is harmful or that needs to be removed without pain and swelling. - Brutes should not be tortured by being slaughtered, so that they may be pitiful, but that they may be removed for a moment, feeling nothing of pain, and that they may become healthier and tastier and more pleasant to eat for us. - Then p. 111 a veiled reference to forceps. - Or to be practiced by medical professors? - Method of making infertile women fertile etc. etc.*]
20. Polyhistor. 1, 1, 2, 27.
21. K. Sprengel Bd. III. S. 551, 515.
22. I. c. Vorrede VI. ff.
23. Es finden sich auf der Pariser Bibliothek in zwei grossen Quartbänden, welche diese Schriften von Martin de la Martiniere mit enthalten noch verschiedene andere Flugschriften von diesem Schriftsteller sowohl als auch von Zeitgenossen, theilweise sogar als Manuscripte. Ich habe selbige durchgearbeitet und finde sie völlig bedeutungslos. [*There are two large quarto volumes in the Paris library which contain these writings by Martin de la Martiniere and various other pamphlets by this writer as well as by contemporaries, some even as manuscripts. I've worked through these and find them completely meaningless.*]
24. Réflexions sur les Disputes etc. (ohne Ort und Jahr).

25. Die Einzelheiten siehe in meinem Transfusionsbuche, sowie bei Scheel. [*For details, see my transfusion book and Scheel*]
26. Les sentiments etc. Paris 1668 und Les opuscules etc. Paris 1668.
27. Marx, K. F. H., Herophilus, ein Beitrag zur Geschichte der Medicin. Karlsruhe und Baden 1838.
28. Vgl. L. Landois, Die Transfusion des Blutes. Leipzig, Vogel, 1875. Geschichtliche Einleitung. [*See L. Landois, The Transfusion of Blood. Leipzig, Vogel, 1875. Historical introduction.*]
29. Journal des Sçavans 1667. p. 184.
30. Auch hier wie bei Cardanus der beliebige irgend Jemand. [*Here too like with Cardanus the random anyone*]
31. Vgl. die oben angeführte Stelle des Marsilius Ficinus "sanguinem a sene bibitum trahi ad venas membraque posse." [*Cf. the above-mentioned passage from Marsilius Ficinus "The blood of the old man may be drawn to the veins and limbs."*]
32. Vgl. mein Buch "Die Transfusion des Blutes", geschichtliche Einleitung. [*See my book "The Transfusion of Blood", historical introduction.*]