‘STADERA MEDICA’

By: FRANCESCO FOLLI (1680)

A TRANSLATION OF SECTIONS II AND V OF THIS BOOK BY PHIL LEAROYD

The book ‘Stadera medica, nella quale oltre alla la medicina infusoria ed altre novità, si bilanciano le ragioni favore voli e le contrarie alla trasfusione del sangue già inventata da Francesco Folli’ written by Francesco Folli was published in Florence by G.F. Cecchi in 1680. The sub-title indentifies that the work is dedicated to His Serene Highness, Prince Francesco Maria of Tuscany.

A copy of this book can be viewed or downloaded from the following website:

https://books.google.co.uk/books?id=nUFhAAAAcAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

The title literally translates as: ‘Medical steelyard, in which in addition to infusion medicine and other innovations, the reasons for and against the blood transfusion already introduced by Francesco Folli are balanced, i.e. the first word ‘Stadera’ translates from Italian to English as ‘Steelyard’, which makes little if any sense, especially as a medical term. As a result, some authors state that the translated title is ‘Medical balance in which, besides infusion medicine and other novelties, the reasons for and against blood transfusions are weighed’. It is interesting that the first section of this book is titled ‘Introduction to the Medical Stage’.

This book is of historical interest in relation to the history of blood transfusion because in it, even though it was written in 1680, Folli claims to have demonstrated, or expressed the idea of, the methodology of blood transfusion to the Grand Duke Ferdinand of Tuscany as early as 1665. The book includes a detailed description of the equipment and methodology for performing a vein-to-vein blood transfusion.

GENERAL COMMENTS

Some words and sections of text in the scanned version of this book have proved difficult to read due to the reproduction quality of some pages, which is not helped by a somewhat variable print format and spacing between words. This is especially true when trying to read the italicised text. These factors have resulted in not being able to actually read some words. Where this is the case I have represented this by the inclusion of ‘[-]’ in the translated text. In addition, there are a number of words that although they are clearly readable I have been unable to provide a suitable English translation equivalent. Where this is the case I have included the original word in square brackets within the translated text. Within the introductory ‘To Readers’ section of this book Folli identifies that it is written in the Tuscan dialect, and although one could argue that the language and spelling variations of 17th century and 21st century Italian is the reason why some of the translation does not make complete sense, I do not necessarily believe that this is always the case and may be the fault of the author. In addition, these issues are compounded by the fact that the original text contains a number of obvious printing and/or spelling errors. Where I have been

able to identify these I have used 'revised' versions of the words within this translation.

The text of course includes the use of the 'medical S', a second form of the lowercase letter s that looks like an extended letter f; as well as variably representing the letter u with the letter v (and vice versa), though these letters are not always clearly identifiable because of the print type/style used, especially when reading the italicised text. There are also a number of cases where the letter n has been used instead of the letter u.

I have reproduced all the original sections of italicised text within this translation and included the original page numbers (in blue font in square brackets) within my translation so that the comparative original text can be easily identified and referred to if necessary.

I have translated the two sections of this book that are related to blood transfusion in the hope that the content may be appreciated by a wider audience. Given the limitations of the wording within the original scanned document identified above, together with specialist terminology, a simple automated computer generated translation does not produce an accurate representation of the original text. Whilst some of the words / terms are obviously open to interpretation, I have attempted wherever possible to hopefully maintain the author's meaning, intent and detail. I have also avoided purposely altering the author's text to 'make it read better' or to provide a personal interpretation of the text on the lines of 'this is what I believe the author is trying to say'. As a result, the translated text may not 'flow' as well as it could. 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 Italian text.

This 217 page book starts with a three-page dedication to Prince Francesco Maria of Tuscany, a four verse sonnet, followed by an introduction titled 'To Readers', together with a short number of endorsements by different people. Although it does not include a contents page, the book actually comprises five separate sections that are called 'ponderazione' (i.e. 'reflection' or 'pondering'). These different sections are:

SECTION	TITLE	PAGE
I	Introduction to the medical stage from Francesco Folli	1
II	Of blood transfusion	14
III	Of infusion medicine	102
IV	On some February, and on critical days	150
V	About the things written by Signor Bartolomeo Santinelli against blood transfusion	183

I have provided translations of the two sections relating to blood transfusion, i.e. Section II and Section V, and summary information of the translations of the other three.

The book does not contain an index but does provide a list the different quotations included within the margins of the book, the majority of which are either difficult or impossible to read in the original scanned text. I have included a list of these after the translations of Section II and Section V presented below. The book contains an illustration which provides six line drawn figures, five of which represent Folli's blood transfusion apparatus as well as an illustration of his infusion apparatus. This illustration is reproduced below and referred to where relevant in the translated text.

SECTIONS NOT TRANSLATED – SUMMARY INFORMATION

Section I: Introduction to the Medical Stage

This section is completely unrelated to transfusion or infusion in that it includes a somewhat general rambling discussion of the importance of different minerals and the supposed role of nature, the majority of which appears to be unsubstantiated thoughts presented as supporting information.

Section II: Of Infusion Medicine

Given the title this section disappointingly contains very little information about the types of materials that were used as a supposed form of treatment via infusion, but instead discusses different poisons and the types of fevers that they cause rather than how they were treated. Folli states that there are four different types of fevers, described as being hot, cold, humid and dry. These are identified as being associated with and resulting from different types of poisons, but Folli also states that these fevers vary in their presentation in the same patient over time, which he attempts to describe. The text is somewhat rambling and the content is not always about or even related to infusion medicine. In fact includes a lengthy description of the paper tape hygrometer instrument that he devised for measuring 'wetness and dryness', i.e. the *Mostra Humidaria*. This section does however include the following description by Folli of how to make an 'infusion instrument' from the quill of a feather that is tied to a bladder, which is identified in the illustration as Fig. 6, i.e.

[Page 145] And to better encourage them, I will tell them how easy it is to make the little instrument for infusing such liqueurs. Take a feather from the wing of [Columbus], or something similar, remove the tube, wipe it well, and without cutting it, pass a small pin through the tip; and if they wanted to thin it with a knife they can do it; from the wider part make a rim, and by touching it with a burning coal will immediately remain formed; similarly that tying the bladder does not come out; to this tube bind a bladder of lamb, dog, or other similar animal, well washed and dried, pierced in the bottom of this bladder, [Page 146] and here you tie the tube, and from the part of its neck it can be introduced through a tied channel to be screwed up, as in Fig. 6 we see that liqueur we like, and closed up above, the tube is introduced into the cut of the vein, and then the bladder is pressed lightly so that the liqueur, slightly mixed with the blood, goes to the heart; it is ensured that the liqueur is hot, so that the heart does not feel so much coldness that it died; then each one shows what they like, and how they want.

The absence of information regarding specific infusion liquors and descriptions of infusion treatments within this section is possibly explained by the fact that Folli describes himself as 'a philosopher rather than a teacher' with regard to infusion medicine (page 122) and in fact confirms his limited practical knowledge of the subject with the following passage (page 140): 'There will be other infinite liqueurs to be experimented with, infusing them into the blood while it is being extracted, and what effects follow, of which I have observed a few, which confidentially with others I hope to observe this future spring, if I am alive;'.

Section IV: Some February and Critical Days

This section is essentially a somewhat rambling and vague discussion of the types of treatments that are apparently used related to the different symptoms apparently seen in a patient on different days after the start of a fever / infection, which includes the varying c.f. competing roles of the apothecary and doctor.

TRANSLATED SECTIONS – SUMMARY INFORMATION

Section II: Of Blood Transfusion

In general, the text includes a variety of thoughts, statements and obscure quotes by Folli together with what can at best be described as speculative information regarding both the composition and roles of blood. The causes and effects of the age of a person's blood is discussed at length in relation to its supposed effects on health and life expectancy, suggesting that the cause of long life in different animals is related to their blood, i.e. 'viscous' c.f. 'thin'; as well as putting forward the belief that the composition of blood changes with age, seasons, disease, etc. Folli also includes a discussion regarding the alleged 'revitalisation' effects of the 'young blood' obtained from young blood donors, which is discussed in relation to different forms of 'nourishment'. Folli identifies (pages 35-36) that he read about the movement of the heart and the circulation of blood in 1652 and that he told the Grand Duke of Tuscany (but nobody else) about the transfusion of blood in 1665; speculating that his idea was 'stolen' from the court by someone present at the time. Folli then includes various quotations about transfusion extracted from the book written by 'Raimondo Gianforti' [i.e. Giovanni Raimondo Forti – PL] (pages 40-50) followed by a number of Folli's own comments about blood transfusion, such as venous c.f. arterial blood use, how blood loss does not endanger the life of the donor, the need to keep blood away from air, etc. (pages 51-77). The author then considers the quality and quality of blood needed for transfusion (pages 88-89) as well as providing a detailed description of the equipment required to perform a blood transfusion (pages 90-96). Crucially however Folli also includes the following statement (page 98): 'I know that I have said too much about the way of containment of the operation having not experienced it …' identifying that he has not actually used the equipment he describes to perform a blood transfusion himself.

Section V: About the things written by Mr. Bartolomeo Santinelli against blood transfusion

As well as including comments regarding blood transfusion made by Raimondo Gianforti [i.e. Giovanni Raimondo Forti – PL], this final section of the book mainly presents and discusses various comments made against the use of blood transfusion by Bartolomeo Santinelli in his book *Confusio Trasfusionis*. Folli states that he presents Santinelli's arguments against transfusion not to denigrate the author but to defend his own position in supporting blood transfusion. However, he first includes six brief statements regarding blood, made by Plato, Hippocrates, Aristotle, Galen, etc., that of course cannot be successfully argued against at the time, given their origins. He then presents Santinelli's writings against transfusion as a series of 14 selected extracted comments, each of which are responded to by the author. These include those topics that were believed to be of serious importance given the knowledge available at that time, i.e. such as the potential detrimental effects of mixing blood of the same as well as different animals; the volume of blood transfused and how such a relatively small volume can be effective in producing a change in the patient's condition, concerns regarding the belief that a transfusion can change the temperament, morals, etc., of the patient; that transfused blood loses its 'spirit' by moving out of the circulation, etc. The different points identified by Santinelli as well as the responses made by Folli provide an interesting insight into the opinions of people living in the 17th century regarding not only blood transfusion but the functions / roles of blood in the body.

BIOGRAPHICAL INFORMATION - FRANCESCO FOLLI (1624-1685)

Francesco Folli was born in Poppi in Arezzo, Tuscany, in 1624, the son of Domenico and Orsina Dombosi, who were originally from Sansepolcro. On 21 June 1648 he graduated in philosophy and medicine in Pisa and, after qualification (12 April 1650) he initially started his medical practice in Poppi but then moved to Bibbiena, where on 21 June 1660 he married Margherita Torsi, with whom he had a son, Roberto, and where he became a member of the Accademia Sperimentale [Experimental Academy] of Ferdinand II, Grand Duke of Tuscany, in front of whom he says he 'demonstrated' blood transfusion in 1654. After this however he appears, somewhat mysteriously, to have moved out of Tuscany and the Duke's influence to Citerna, Umbria. After a lapse of over twenty years and apparently mainly ignorant of the transfusion experiments performed by Richard Lower in England and Jean Denis in France that had taken place during that period, he decided in 1680 to publish his book in which he claims to have 'invented' blood transfusion. Many authors have discussed this 'priority claim' but it lacks actual documentation, though his description of the process is remarkably accurate for its day. In 1664 he invented the "instrument to know the degrees of wet and dry air" which he called 'Mostra Humidaria' and in 1665, having settled in Florence, he presented the instrument to grand Duke Ferdinando II de' Medici (1610-1670) who, as Folli himself wrote, "showed his likes, and had some made, which he immediately sent to various Princes of Europe". The 'original paper tape hygrometer' by Folli is held in the Museo Galileo Galilei in Florence. Francesco Folli died on 25 January 1685 in Sansepolcro, whilst he was visiting one of his brothers.


STADERA MEDICA
Nella quale oltre
LA MEDICINA INFVSORIA,
ED ALTRE NOVITA'
SI BILANCIANO LE RAGIONI
FAVOREVOLI,
E LE CONTRARIE ALLA
TRASFVSION DEL SANGVE
Già inuentata da
FRANCESCO FOLLI,
ET ORA DAL MEDESIMO DESCRITTA,
E DEDICATA
AL SER.mo PRINCIPE
FRANCESCO MARIA
DI TOSCANA
IN FIRENZE

Title page of *Stadera Medica* by Francesco Folli
(Image credit: Wood library museum.org)

Francesco Folli – line drawing from *Stadera Medica*
(Image credit: Himetop-Wikidot)

Additional information about the life and work of Francesco Folli can be found at:

https://www.treccani.it/enciclopedia/francesco-folli_(Dizionario-Biografico)

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See also:
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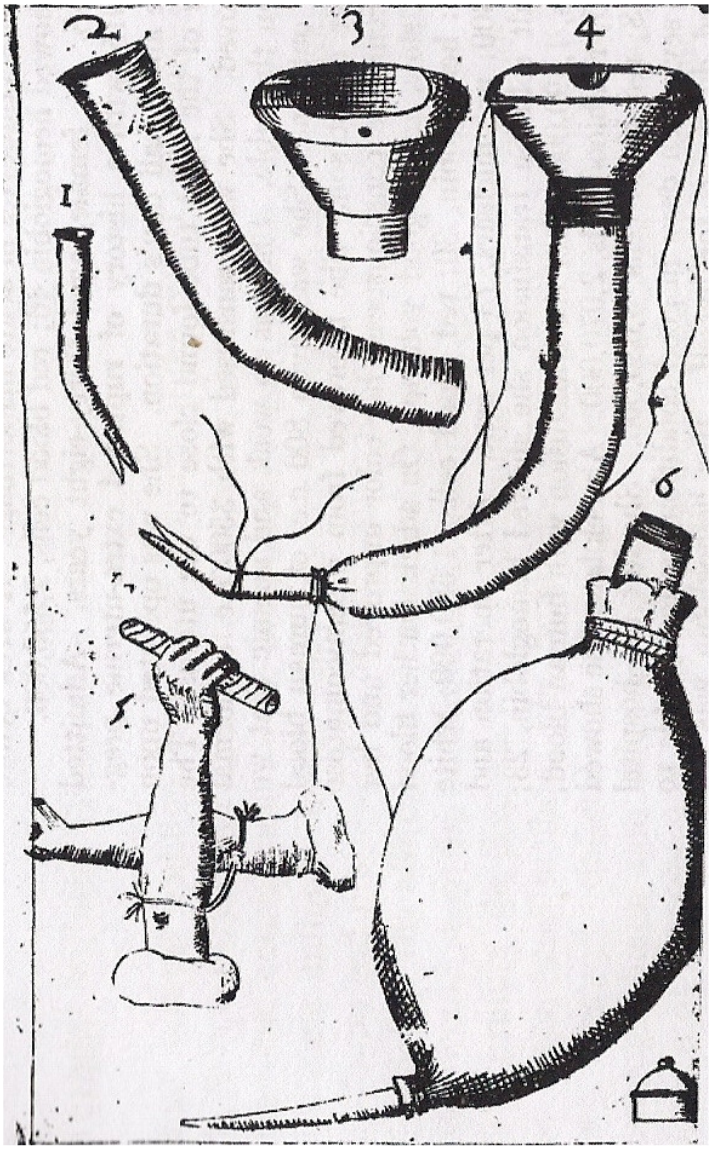

Illustration included at the beginning of *Stadera Medica* by Francesco Folli.
(Image credit: books.google.co.uk)

Figs 1-4: the components of the transfusion apparatus; Fig 5: illustration of the transfusion technique; Fig 6: infusion apparatus.

[Page 14]

OF BLOOD TRANSFUSION

REFLECTION II

Having discovered and understood this grand order of nature around the things of the soul, we will be able to understand those of the body with greater clarity: for that among the minerals gold, although made of mercury, is almost eternal; among the plants the cedar is of similar duration; but not only in their duration do plants tend to perfection, but overcoming their nature and producing insects of themselves, they concur to constitute the first degree in the genus of animals; among which the most perfect man, with his noblest part, that is with the soul, can enter the first choir of blessed spirits.

But with the body part it is not already the hardest, as from the S. Carti we mean, [Page 15] that it was already in the early years, if however the most disbursed had not been lost due to dilution, or due to intemperance in the course of nearly 60 centuries it has diminished.

Now a good opportunity is offered here to consider the cause of the greater or shorter length of life: and returning to order I begin to say, that the silver is produced as the blood of metals, the more it is less hard, and physical, according to the greater purity, and fixed virtue, or better union of humid and dry, of this mercury, and of sulphur, that compose them; glue which good union they defend each other, they allow themselves to be separated, because the little sulphur is recognized in good lead, but a lot of mercury is impure; in the tin, mercury is good, but impure, and the sulphur badly united; copper is made of good substance of mercury, but of weak virtue of sulphur; the iron is of earthly substance [Page 16] very impure, and very fetid, both of mercury and of sulphur; silver has much substance of sulphur, but little of its virtue, and has little substance of mercury, but much of its virtue; but gold is perfect because it is very well purified, and its substance mixed, increasing much virtue of sulphur, which is the fixed part, but little of its substance, and at the meeting it has very much substance of mercury, but very little of its virtue, so that their durability follows from the pure and tenacious complexion of them.

The plants that are composed of different parts, such as wood beards, rind, leaves, flowers, fruits, juice that nourishes them, have more, it is different causes of their duration, and it is now legitimate for me to reply here some things written by me in my booklet titled *Recreato Phisica, cap. de vita, & morte*; since plants such as peach, almond, poplar and others which are among the first to sprout in the first year, are still of shorter duration, [Page 17] and soon die; and the reason Hippocrates points out: for their wood, is soft, rarely brittle, and the juice, watery; and this can be recognized in burning them, being composed of three substances, that is, of aqueous, oily, and salty parts; the first to smoke is the watery part, which resists and prevents it from easily igniting, when consumed it ignites, and the oily part flames; and thus these three subjects correspond to the three principles of mercury, sulphur and salt.

Those plants, therefore, which participate more from the water, sprout first, because it is the first to smoke, and easier to use, and therefore the first to die; but the oaks, firs, palms, cypresses, pines, elms, and the like are of great duration, because they abound with oily and bitter lust, conservative of the heat that defends and preserves from corruption, and from the injuries of the times, they soon dry up; one could therefore say [Page 18] that, like animals, others are more, others less, that is, they can proceed from the different substance of their parts, organic components and contained.

Neither size alone is the cause of longer life, as Aristotle hinted at; because the oxen are less than deer, and if it is good to last hard, and the use of Venus dulls their life, not therefore by being at rest, like healthy donkeys, they greatly transcend the

nature of their own species; and the size of the body, I believe, is the cause of the long life, in regard to the blood, which can circulate better, and is more difficult to obstruct, assuming, that the blood is of the same existence in all, and that therefore the ancients, who lived so long, were giants, as I intend to be found in our days, the skeleton; therefore the size of the body is not enough, not the continent life, and rested are the real cause of [Page 19] living a very long time, but only that more than their species gives them; never a continent flounder that snores, and kept in a cage, without lack of food will be able to survive as much as a crow, a parrot, but which I said of a crow, no less than an ape; therefore the cause of the length of life is another, and I have repeatedly considered myself several times, and desired to understand, and by the authors, and by the reasons why, I finally concurred in this opinion, that is, that the different quality of the blood makes the time of the life of the animals different, the difference of the sauces, the plants, and the different mixture of mercury, and the metals of sulphur.

And to say something about it, we will observe the bees, which among the insects, as I said, there are a great deal, because being fed on honey, their blood has acquired a viscous humor, which hardly dries up, and better than the others preserve [Page 20] the natural heat; so the ravens, parrots and the like, such as crows, parakeets, live a long time; the deer and fallow deer likewise, live to hundreds of years, because you find, that a year a thin blood, difficult to congeal, due to the second nature of the spirits, which it contains in itself; so the blood of young men is thin, warm, ruddy, fertile with moist radical, and yet sweet, clear and consequently less able to congeal and dry, it is more capable of preserving life; and this is the conclusion, which if I do not try hard enough, I will at least show a great desire to understand it.

Mercury, which is like the blood of metals, is composed of very pure water and sulphurous earth, and so well mixed and united, that it is difficult to separate one from the other; and therefore it is vaporisable, like water and sulphur, and is unsociable because it is earthy; and the more it is mixed with the virtue of sulphur it develops [Page 21] the more it fixes itself, and holds up to the fire.

The plants, which make the juice by blood, the more it participates in the bituminous and the sulphur, the harder they are; it seems probable to me the opinion of those who believe that in the earth there are as many kinds of juices as there are species of plant; that is, that the peach tree does not pull with its roots any other food than that which was originally created for its specie, and that the sweet plants produce the sweet juice, and love the bitter; so Iacopo Silvio left it written, I believe it was extracted from Hippocrates, and it seems to me that I can do this for two reasons, and first if this were true it could not be grafted, nor a lemon of Naples grafted in a strong orange his sweet apples could produce; and how the roots of an oddity would choose, and thus precisely distribute her own juice, to each part of her apple, is it so bizarrely varied, and very different in flavour?, in the second place [Page 22] I will say, that when an earthen pot, which has served a cedar for 10 years, will still be able to nourish a pear tree, it is after another 10 years a cedar, and so will all the plants; which may be true I leave to the consideration of any even mediocre genius.

But I do not believe the diversity of flavours, which consists in the juice pulled from the roots, but by those prolific and germinating eyes, which prepare, cook, taste, and finally with their own flavour they ferment the attracted juice, and give them that specific quality of it, for which they differ from any other plant species.

It could therefore be said that the same juice of the earth is born to nourish any plant, but more is less however according to the ability of the attractant, and sending internal heat of it, and of the external environment.

But when now talking about the blood [Page 23] of animals, and particularly of man, I long to be excused by the discreet reader if I will not satisfy his and my curiosity, knowing the difficulty of the problem, which I intend to promote, not to

propose, but only, I will say what little about it that passes through the imagination of probable, because it is red, yes, it separates itself from serums when it gets cold; because it is changing with age, seasons, diseases, and finally to be as the principle, and main tool of life, the origin, the mixture, and the differences are little less than hidden; not knowing that any author (or even who did not know me) [-] prophecy, has, as it were, made the [notomia] of it; and what effect the admixture of stronger poisons causes in it, that is, if it precipitates him, if it assort them, swell, discolour, lose his flavour, dissolve its component parts, or other accidents, who can discover themselves with experiences, by which he makes himself unable to confer [Page 24] of life, and that by participating in his harmful and malignant acquired quality, suffocates him, stupefies, extinguishes, and dissipate its heat, convince it, numb it, stare at it the more he moves.

I have repeatedly considered that the birth of chicks depends on the external temperate heat, and continuous for about 20 days, of the hen, or of a warm oven, equal; and that inside the egg there is everything that is necessary for the formation, nutrition and augmentation of it: and although in the eggs it is not by ordinary blood point, with all this we see that a very small ruddy drop will be born on the third day which begins to palpitate, and the heart becomes firm, from which it then receives all the rest, the tincture, and finally all the parts feed and move.

It is certain that the blood originated from the internal matter of the egg with the external heat; but which of two substances [Page 25] of the egg gives the material for the generation of it, this is the one, which I do not mean well; since it may be that both, that is, the white and the red, mixing together, become red by the heat; but if we first consider the qualities of the two aforesaid substances better, we will be able to discuss his generation with more foundation.

The red of the egg rather liquefies due to the heat, and becomes softer: on meeting the light for every little heat condenses, nor freezes with the cold. Having understood this difference, he will serve us as an introduction to others, and to make a comparison, since we find that the red part of the blood congeals from the cold, and in the veins while it is hot, it is very fluid, but the watery part, and serous due to the heat, condenses, separated from the red part; and in the cold it hardly congeals.

If we must therefore from the similarity [Page 26] of the effects trace the matter that composes the blood, I dare to say, that both substances of the void contribute to its generation, and that the subtlest part of the clear one, mixing with the substance of the body, by the heat you become red, and you form the blood.

But so far it is not enough to understand how the red colour of blood is made; however, I will think it well to recognize first of what substance and quality the red is, and of which it is clear, and of which of the three principles they most participate; that is, of salt, of sulphur, or of mercury, and we will easily find that in itself the red contains more sulphur than of any other principle; first because it has a flavour and colour similar to sulphur, second, because it freezes in the cold, and melts in the heat, third because it produces oil, which with the smell, is the combustion imitates, which it does not follow of salt, and of mercury.

Now add for greater probability [Page 27] than what has been said, that if you want to destroy the sulphur with a slow fire, in its first liquefaction it becomes red, and purple like blood; and the same sublimated with mercury becomes cinnabar; and if it is good to us (or better to say) it will not give me the heart with the aforementioned substances to form blood, because I do not yet have so much presumption of trying to do so; therefore we must not say, we with these two ingredients do not know how to make this compound, therefore the blood in man is not made with only the concurrence of the clear and the red, but of something else, and in a way totally unknown to us up to now; and I for one confess it.

I said this only in order to instil some fine talent, in imitation, to philosophise better than I, being the debt of every philosopher to harass the causes of things, and

to express his thoughts; since some, more often than not, opens the other's intellect, to better conclude.

[Page 28] The quality of man's whiteness is imitated by the proud part of the blood, since both become firm in the heat, and freeze in the cold: I would believe that painful vital spirits depend on the copy, which stagnate in the seminal foamy substance, which so immediately do not disappear; so in the mortar the fire is quiet, it immediately flies away, if it does not become rotten from the damp; similarly, the water does not freeze, due to the copy of the fireworks, which in itself contains.

I believe that it then becomes established with the heat that it is an effect of salt, and of mercury, which salt is the principal cause of stifling, as it still gives some fixation to mercury, and yet the salt of serums is sweet; and I would say that the pearls are nothing else, which rises petrified from the heat, in hot, greasy, and earthy water, and the large copy of the salt, which takes care of it, proves it; and the [fetor], that one feels by burning them authenticates us, that the similarity of the bone, or horn, burned [Page 29] salt, and some viscous [lentor] condensed with it, contribute to their generation.

Therefore, assuming that these narrated effects are in passing, it will be recognized with what providence mother nature has composed the blood of so many different substances, so that, when united, they can defend each other from whatever quality, nourish each part even at different temperatures, never inside the veins, if not from a deleterious and poisonous quality, which can decompose its mixture, dissolve it, sublimate, or precipitate, [-], or [inacetire], for so say, all the blood.

I have said this little about the blood, and its origin, not because this is enough and fights for the most certain, but to begin its entire investigation, and I could add some experiences around this made by me, but to be few: I do not want to diminish the glory of whoever it is for [Page 30] to begin, and to finish, such a curious and useful enterprise; what would it be if we were quite sure of what the blood is made up of, how it turns red, what effects the poisons of malignant fevers, plague, viper, tobacco, scorpion, and the like do in it; hemlock, mandrake, aconite, opium, tassel; what diversity you can see in it, with the infusion of lemon juice, brandy, vinegar, and various plant mushrooms and still waters, such as spirit of vitriol, sulphur, salt; and finally I do not think it impossible, with such tests, to acquire so much light that the clearness of the truth is revealed to us, dispelling the darkness, which hitherto conceal the entire knowledge of the maladies, and of the remedies.

The blood is therefore that precious liquor, which watering the limbs nourishes and increases them; that river of fire where life swims, the chariot of the soul, and that alone, for which, and [Page 31] of which the heart is made, which, as a family father, and just distributor of food, always watches over jealously defender of the individual, conservator of peace between soul and body; and which has life, motion, and death from the same blood that produced it; I would know which of you was first in existence, the most necessary, the most useful.

Since the blood is therefore an overabundant copy of the food of animals, and by its nature congeals if immobile; from the pro-guiding hand of the Creator the donated circulation, so that it could continue to be nourishment, although they did not always eat; and that blood, which increases at the nourishment of the parts, without stopping, returns around the veins to the heart, and from that sent through the arteries to the whole body, always receiving from the same heart, new perfection, and warmth, from which, thinned, the vital spirits are generated, which then fixed in the substance of the [Page 32] lungs by the fresh air breathed, they become the proximate matter of the animal spirits, which better fixed, and purified in the cold substance of the brain, they are separated, and placed, as in the treasury of the soul, in the ventricles of it, or their other place, where the mind serves to illuminate, heat, and perform any other animal operation; which place where they live if they were healthy, I think they would see themselves shining as the body of the firefly does; and I deduce this from seeing the eyes of cats and dogs very resplendent in October; and

in ourselves we can observe this; because if they look carefully during the day in some cloud; we will see, when we look, wandering in the guise of the fireflies, some igneous ones, which are born in the middle where we fix our gaze, moving away from it, with an unequal inclination, are soon lost, and are lost. What other are they, but the visual spirits, who [Page 33] entering the eye through the black optic, to illuminate the spices of the objects introduced into them, and to nourish it, they leave there sanctifying humour, oil, and fat, and the heat that brought them, exhales, and is lost; from the evaporation of which follows the attraction of the new ones, and as a lit lamp draws from other oil continuous, which is resolved in smoke, so from the exhalation of these spirits follows hunger, and thirst, which failing to satisfy with new food, in a few hours and days the lamp goes out, life is missing.

Blood is absolutely necessary, for the quantity and for the quality, which however nature keeps in the veins an overabundant copy, in order to better ensure life; but when by the continuous circulation of many years it exhales the warmest, subtlest, and most witty part, then it becomes less able to hide, it becomes big, and black, and easy to congeal, and in a word it gets wet, and dies.

[Page 34] The speech already made could help us to get out, if not all, at least part of the rooms of the dark labyrinth, and with the weapons of replicated experiences to win the minotaur of ignorance, which keeps us in doubt whether blood transfusion is to be possible and useful.

To investigate this truth, therefore, it seems necessary to me to first understand the cause of aging and turning gray.

The greyness is nothing but a disease of the hair, due to lack of natural heat, which does not work well, and therefore becomes depraved nutrition.

But if our soul is in the blood, like the wisest want it to be; *e magna in sanguine vitalitatis portio*; we will be able to conclude that in the good or badly constituted blood consists the length and shortness of life, the curing, and the hiding.

[Page 35] And yes, as Cicero said *senectus ipsa est morbus*, why will it not be permissible for every doctor to seek the remedy, to keep it away?

In the year 1652 I read the libretto by the Englishman Guglielmo Aureo, which deals with the movement of the heart and blood; which reading with some information, which had of the planting of plants, produced in my imagination this third problem, namely, that given the circulation of the blood, transfusion was possible, with which one could not only cure some ailments, but rejuvenate, and magnify again; as I mentioned in my booklet of the cultivation of the vine, which I did not publish for anything other than to make it clear to everyone that the blood transfusion had been introduced by me, and since the year 1654 manifested to the Most Serene Ferdinand according to Grand Duke of Tuscany, of eternal memory; who, liking the novelty, was of his most pleasant genius, and profuse experienced magnificence; [Page 36] nor did I ever communicate this thought of mine to others, giving myself the belief that if this invention were successful, it would only be worthy of the monarchs.

Twelve years went by, I never heard of any of this problem, nor did I live in Florence by then, as I do now, but shy, how curious, I don't know what half term to take to get news of it. I determined to write my physical recreation, which, reading it, and from the physical hieroglyphs of the frontispiece, and from the material that I deal with it, everyone will be able to recognize that by virtue of the transfusion it was written, and also dedicated to the same Grand Duke Ferdinand, in order to present it to him, how it revealed to me in 1665 something of it; but by keeping silent, I assumed, either that he had not had any experience of them, or even having had them, he did not want them to be known; and remaining in the same [Page 37] ignorance as before, do not dare to discover me with anyone: but when I thought less of it, I was told by my friend Ser. Ippolito Tei da Bibbiena, and who then lived in the House of the Most Illustrious Marquis Filippo Niccolini, as in England they have found

a beautiful invention of rejoicing, by transfusing the blood of joy in the veins of the old.

Whatever I was left to such a self, I leave it to those who have waited for a while to consider, and then having obtained a very good improvised new one, coupled with a pain as great as joy was, in order to lose in the same moment the honour which he hopes for, and believes he has acquired; since he did not know whether the same thought had happened to others in the same century, or whether it had sailed from Tuscany to London; I flatter myself, however, that for having been here at the Court of Florence some English virtuosos, and still present in many experiences, as [Page 38] attests Mr. Redi, among whom was Mr. Finchio, that at present we find the Ambassador resident at the Ottoman gate for the Crown of England, they could have understood it in this Court, and then transported to the homeland; add to this true similar, that of all the other beautiful inventions, which are referred to as the name of the author, except for this one.

But impatient, I no longer wanted to be hidden, and making excuses to write about the cultivation of the vine; I discovered that I was the inventor of it, calling upon the [presato] Serenissimo Ferdinando II., who was in existence at that time; I never knew, that others have called themselves an arrogated invention. With reason, therefore, I can call it mine, whatever it is, and as mine, it is my duty of nature to defend it and protect it as best I can; but I started writing this third booklet thanks to it, if not with a certain faith to credit it [Page 39] as successful, to show at least to the world, that the reasons that led me to hope for it were not of such importance but how much they have been judged by many so far.

As the book of Consultations and Medicinal Responses of Mr. Raimondo Gianforti came to my hands this year, I read in it his answer about the blood transfusion; from the reading of which I took heart with a steelyard (i.e. Stadera – PL) to balance the favourable and contrary reasons produced by the same, with the addition of my own for and against; and as they say in schools, discussing it problematically in a language, and in such a form, that every Italian, and of any condition, can understand and experience it.

I will therefore recount in our language what is essentially contained in said answer about us.

He begins to praise the heart, by saying *that the vital faculty* [Page 40] *resides in it, necessary for life, and that in it alone the generation of spirits and of the pulse takes place*; and this he proves with the authority of *Aristole Aless. Auer. by Temist. d'Auicenna, Galen*, although not all uniform, but above all other the authority of Hippocrates *cordis ventriculi sunt puimana nature forntes*, and nor does it matter now whether it is more faculty, natural, or vital, it is enough just to understand, *that the generating faculty of spirits, and pulsates, necessarily resides in the heart, to nourish and conserve life, so that the other parts of the body with the heat given to them by it, make their own operations, and that they are so dependent on the one from the other, the heart and the blood, which are equally necessary for life*.

Here continues to exalt the same, and that *as the sun in the middle of the planets, the beginning of life, where it commands, the vital faculty where in sum its main instrument is more vigorous, that is the* [Page 41] *natural heat planted by nature on the principle of living, in substance spermatic, and sanguine of it, from which springs the influential heat, which diminishing in whichever part one wishes, diminish all their actions, and lacking it one dies.*

This natural heat in the humid radical resides, like the fire lit in the woods, by the consent of almost all the philosophers, and doctors, and particularly Plato, and this is also reported by Galen who says, that the flame lit in the damp woods in the beginning is small, and weak, and it seems that it remains suffocated, but then it shines, and grows, and gradually overcomes, and ignites all the combustible matter, and makes a great flame because it has taken on strength, but after lacking the nourishment it stifles, and turns off; thus our natural heat from the beginning, and too

humid, and weak, by masking the humid a little, grows a lot up to a consistent age, but then gradually rots due to lack of food; and this is what we call [Page 42] *old age, and finally it goes out, and we die.*

Galen prefers the opinion of other philosophers, but they do not like them, because he says, the flame ignites, and originates from the consumption, which is made of matter, fuel, but natural heat is born together with its [pabulo], that is, with the radical damp, and immediately attracts the nourishment, concocts it, agglutinates it; and it assimilates it, and to put it in a word, it is the work of the flame in its natural matter. And yet Aristotle said well, that in the seed of all things stagnates that for which everything is second, that is, natural heat, not fire, because in the words of the same fire does not generate any animal, but the heat of sun, and animals, because it has with it a wet nourishment.

Aristotle therefore spoke of our natural warmth as a vegetative soul, which resides in the heart and in the blood, because the heart is the first to come alive, [Page 43] *and the last to die.*

Here Gianforti tells about other authorities, which to conclude the saying so far I will omit them.

The blood, therefore, and the foment of our natural heat, is so similar, and united, that Critias believed, that the blood itself was the soul; and the same Aristotle calls the heart bloody, and Hippocrates names it sanguinem congenitum, and if I have not been able to, well find this text, I believe, however, that it means that the heart is generated together and in the same time as the blood, as he said earlier; *and that by losing blood, the natural heat is weakened, it bleeds well, as Galen notes; and again Aristotle wrote, that if a lot of blood comes out, the soul fails, if too much, it dies; and in the Holy Bible we read like this; beware of eating the blood, because their blood is in the place of the soul, and therefore you must not eat your soul with the flesh, which is meant by the soul,* [Page 44] *vegetative, or natural heat of the animal, which resides in the sanguine substance of the heart, and by means of the blood, and is distributed with it to the whole body.*

Plato says that all animals have heat in their blood and veins, as a source of fire.

This blood generated in the heart, and connected, contained here, and in the arteries, is fomented by food; and the same Hippocrates says, that food begins to become blood in the liver, and is perfected in the heart; because the body pulls the food inside and the heart the blood part; and Galen, and Aristotle agree in the same opinion, that the blood is disposed in the liver, but is not yet able to nourish; not that the liver is nourished of this, but of that which comes to it through the artery from the heart.

Up to now Gianforti has generally treated the heart, and blood, and their faculties, in order to lay the foundations for the reasons to be said about the [Page 45] transfusion of blood; then followed (not having had better news of the inventor) by saying; *that similar reasons given, and to be said, first gave the English, then the French, and finally the Romans the opportunity to induce and experiment with the transfusion of blood, which is estimated in practice to be tiring, and difficult, so it may prove useful to mankind; and all this can be proved not only with the foundations already mentioned by Galen, Hippocrates, and Aristotle, but also for the reasons, which will be mentioned below, and both.*

First, if so much multitude and diversity of foods of a different nature, is reduced in a chyle from the heat of the stomach, and the same juice from the heat of the liver, into imperfect blood, because of grace, the blood of another animal already rendered with its spirits of the same quality carefully transfused into the veins of a man, from his heart, which is a source of heat, in which virtue resides, and the property of nourishing, can it not be perfected and made suitable [Page 46] *for human nutrition?*

Second, finding the ability to bleed in the venous genus, as in the liver: the blood transfused forward, which reaches the heart, can acquire human nature in the veins, and yes like the chyle, which descends from the imperfect stomach forward and

reaches the liver, it is perfected in the ways of the intestines; thus the blood, which springs from the liver being imperfect and unable to nourish, acquires ever greater perfection in the veins, as it goes to the heart, from which it finally receives the faculty of nourishing, which is the doctrine of Galen.

Third, the foods in so many years need the stomach and the liver to be able to nourish, and, as necessary, that they converge into blood; but the transfused blood does not need the stomach or the liver to become blood, since it is already there; therefore it needs only the heart in order to give it perfection, and be able to nourish; the objection is valid, that the transfused blood is different from our nature, since [Page 47] *even the flesh of the same animals was far from human nature; nevertheless, converted into blood from the heart, they become our food and part of the human being.*

Fourth we read in the histories, that we can nourish people with smells alone, and before Democritus, that their life is lengthened with the smell of hot bread alone; in addition by Bruto Cons. Rom., who had besieged Durazzo, and leaving to go to Apollonia, City of Eprio, and he fainted, and would have died, had he not been with his own, with a hot pan asked of enemies, and recovered.

And although the authorities, and they reason to the expert, with all this is added the witness of Hippocrates who says, that to those who need nourishment, give yourself a moist food, because it quickly restores your strength, and those who need it more lend it, nourish themselves with smells, and Galen if smells do not give as much nourishment as solid things, they surpass them in [Page 48] *promptness of nourishment:* but add another reason: *yes, just as art is necessary for the spirits, so if the air is full of that fragrant substance, which exhales from nourishment, it will be pasture that will refresh the spirits more, and will conserve them. We now add to us; if the vaporous substance, which exhales from the food can nourish us, how much more will it nourish us a strong spirit substance, which is in the transfused blood, which, combined with our native heat, will yield: the same blood more similar to us and proper, since it is not a new thing, that our natural heat is fomented by that of animals, a more and different ways used, etc.*

But if the usefulness that can be received from the blood of animals transfused into us is probable, how much greater will it be from that of men?, and if experience is added, as they say, to these considered reasons, and adduced with such strong foundations, there will be no doubt.

It is true, however, that as such a difficult operation [Page 49] *of transfusing blood seeks a very attentive need, so to dissolve the blood of young men of good bodily habit, and among brutes that of animals, that the blood is more similar to man but that of bulls, of the asses for being big and black; and that of deer, fallow deer, and healthy oxen for being too subtle, I do not consider it to be good.*

So far Gianforti has produced those probable reasons, which may add to me, and others induced to this consideration of transfusing blood: now he continues to promote doubts to the contrary, and finally he believes that it is not, in order to succeed said transfusion despite the reasons given, and therefore he adds:

If anyone believes, that with this one can rejuvenate, as if the natural heat is renewed, and the natural heat grows, because once censored, it can no longer be regenerated, if Aristotle's axiom is true, that aprinatione ad habitum non datur regressus. [Page 50] *It could well reincarnate the emaciated for lack of food, and put them back in a pristine state, although the stomach was still weak, and the liver, if the blood is already done, and transfused to the only need of the work of the heart, which as prince, and principle of purification, and distribution, reserves itself, and retains that same vigour even when consumed, and emaciated: which vigour is not granted to the other entrails; and so on to the old, and young women who are thinner; food is administered from the heart, which cannot do the stomach or the liver.*

Thus blood transfusion would be beautiful, and very useful, if on the other hand there were no short-term difficulties arising from part of the operation, and after them even more serious.

Here, if we carefully observe these objections, we will recognize that they are far inferior to his need, and that with the same reasons he gave above in favour, these could be destroyed; but I intend to examine them, [Page 51] and then leave it to the reader to judge; and if I come to others, I will respond to the reason promoted by it against the possibility of re-joining on the basis of the foretold text of Aristotle, that is, that there is no regression from the deprivation to habit; that having once lacked the natural heat of man, it can no longer be introduced, and I concede all this; but the case is not over; because no one will ever be found, albeit decrepit, which is completely devoid of natural heat, since it could not be violent, but it is well diminished, that in this case the axiom does not square; but, as it says, an old man can get fed up, reincarnate, gain strength, and return to the pristine state that he was when he fell ill; but if old age is a disease, which comes insensibly, and by the same token the old man can improve the condition with the transfusion, and reincarnate; I do not know [Page 52] to see, nor to understand, that this reinvigoration is not the same as that of reinvigorating! Let's now hear what follows to object about the operation, and:

First the blood to be transfused is removed from the vein, or from the artery: if from the vein, the end of the transfusion will be impure; if from the artery, everyone will be able to know the danger of the aneurysm, and of death.

I would reply, that I would take it out of the vein; nor is the blood of the veins to be called impure, since Galen says that blood is made in the liver, and in the veins, as said above in the second favourable reason, where there is the faculty of languishing, and which always acquires greater perfection, and Galen mentions in this regard; but if I conceded that the blood of the veins is less good than that of the arteries, what would follow?, nothing; because it is enough for me that the blood, which one has to transfuse into the veins [Page 53] of the old man, is better than that which the same old man contains in his, and consequently nourishes him better than his own; and if I am not told what harm it is to do to him, I will give reason, and authority in my favour, as a sign that I will be able with foundation and hope to risk my own. But if the smells alone give some nourishment and vigour, which will make a youthful blood, warm, subtle, witty, sweet, and clear, passed so many times through his heart, in about how many half hours has it been in his body?, and of new, pass through the heart of the old man, in which, according to the same Gianforti's assertion, the vital virtue is awakened, nourished, and here it will receive new vigour. Perhaps the blood that has passed from the arteries to the veins is no longer good to nourish? If this were the case, we could badly live without food for seven or six days, more and less, according to the heat of the patient; it is enough, therefore, that the heart of the old restricted one [Page 54] of virtue, that he gives perfection to the blood, and that the blood is able to receive it, and generate copies of vital spirits, as is that of young people, subtler and warmer. We also see all day long, a sick person from a long sickness thinning and at the same time reinvigorating, giving thanks; a most identifiable sign that the heart does not lose its nourished virtue, although the other powers are weakened, or if more and more diminished it easily recovers it with the new one, and good blood nourishment; why then a better blood, easy to converge into spirits, will not give more nutrition and vigour to those who receive it?

Second objection: *If good and pure blood must be infused into a sick body with vicious blood, one must first remove the bad blood, and this in several times for less harm, that however the patient will lose so much spirit in opening the veins, and will lose his own blood, that what will then be introduced will not be enough to restore him.*

[Page 55] Now Gianforti confesses that the vital spirits also go with the blood of the veins; but granted all this, I do not know how to see so much ruin in extracting the

bad blood, since all women cause that when they begin to purge themselves for the first time, then they begin to gain weight, to grow, and to impose flesh; the youngsters in the first real one, and more, the most sanguine suffer from nose bleeds to their great benefit; how many the blood that is used to come out of the haemorrhoid has taken away their lives! We read in Pliny that Volusius Saturninus passed 90 years, although every year he vomited a lot of blood; so that we can deduce that the loss of bad blood is sooner good than harmful. But let's take it for granted that the blood in causing it to change it is very weak; who makes an effort to produce notable quantities, is it dangerous? I do not already believe that to get half a pound of blood out of an old or infirm person, is to die of it [Page 56] immediately; but who will prevent us from immediately transferring a pound?, and so, gradually, gradually the blood changes, without, expenditure of forces, rather with purchase?

Third, it is difficult to find an exact equality between two men, but very difficult between man and animals, which analogy, in transfusion and nutrition is necessary; but the transfusion becomes more difficult to overcome the bad body habit of a cachectic, and restores it, of an atrium, because it nourishes itself, being necessary and draws the blood from several bodies of young people to introduce enough of it.

I would reply: I would not believe that the transfusion of blood and nutrition was necessarily exquisite, likeness: and the same one said a little further on, that the heat of the stomach, in the same, reduces chyle so much, and consumed mass of foods of different kinds, spices, and temperatures, because the heat of the heart cannot; well perfect a blood of the same species, although not in all limits?, now I [Page 57] suppose an advantage, that it is better, warmer, ruddy, subtle, clear, sweet, as is that of young people; nor would that of deer and fallow deer, be at all useless, for having it subtle and easy to melt; which therefore are of great use. Nor would I like it similar, because nothing would help, but different as long as it changed for the better. And if I were to concede the said analogy as necessary; I would at least like to know what it must consist of, whether in blood alone, or even in the whole of man; if he must be, the agent who gives blood, of the same temperament as the patient, of the same colour of hair, of customs, of age, and what do I know; because if he said yes, I would laugh at it; since hair, customs, blood, age, temperament change according to age, seasons, diseases, habits, and if anything else exists; we see that a horse that has a guiderail, puts on a different hair from the first one, and this proceeds from the different constitution [Page 58] of the skin, not of the temperament, if he then wanted to have an exact similarity of blood, who will be that doctor, or surgeon, who has seen, or dug out a thousand bloods, and then the soul without a microscope is enough to know and to distinguish the human blood from the feral?, whether it is a man, or a woman, if feverish, or healthy, if fat, or thin, what temperament, what hair? I laughed several times internally, when I heard, oh what soaked blood! to see you take over, gouged out, and congealed as it is, that march-coloured skin, that as soon as you can cut it with a knife, which is nothing more than whey cooked by the great heat that lasts in the blood, while it congeals, and at other times it will be necessary to remove it a few hours after a meal, that is, in the hours of distribution, and you will see on the surface of the blood a very beautiful ruddy colour, for the chyle will be slightly introduced into the veins, and it will be judged very good, but basically it will be black, rhinestone, not all [Page 59] quailed, weak, without fibres, turbid and bad; finally if we must understand this analogy, it will not be difficult to find it, because, as I said, it is more difficult to know a difference than a similarity, which would also be superfluous if you wish to improve.

Fourth, if the milk, in order to nourish it must be sucked from the udders; because according to Galen immediately milked, like the seed out of seminal vessels it loses its strength; what can be said of transfused blood, which does not enjoy the operation of the stomach and the liver like milk?, and if the semen sometimes remains less than the length of the virile vessel from which it comes out, what should one judge of the blood transfused through a canal?

I would reply: Doubt seems beautiful, but not narrow; because if I will prove to them that the milk still nourishes when it gets cold, the request will drop; and if I said that I am happy that the canal is half as short as the one that transfuses the blood, than the one that introduces the semen, likewise, doubt will be [Page 60] of no value; first try all day long to take the still congealed and sieved milk, which does no harm, rather it refreshes, and nourishes; how many shepherds use milk in exchange for wine, drink it cold, unsorted, and use rennet, and also make very tasty soups with bread, which keep them healthy and robust; and the Scythians, and the Tartars do not use the milk that the vinegar has taken for their drink?, and Columella says that some artificially have the vinegar taken with milk to drink it with greater satisfaction. And Pliny tries to mix vinegar milk with sweet milk, so as to make them take the vinegar of the ferment, and finally those who want more proofs and reasons, read Gio. Nardi in the book entitled *tactis phisica analysis* that milk taken in any way always nourishes. What then Galen advises to suckle it from one's own breasts, he does this by authority more of others than his own, [Page 61] that is of Euryphon, Herodotus, and Prodicus, who before him advised this; and the same Galen had already left written, citing the same authors, to show that he says so, because others have judged it well, but he does not authorize it, I believe, because it does not seem to him a necessity to observe, as has been proved with experience, that he also enjoyed taking a few hours after milking, and warming it up; then the similarity that derives from the seed, which if it were stung from its own pots remains and infertile, does not walk in the same way, because the seed is a wet one full of spirits, and yet frothy, which very soon can vanish; but in milk I do not know that there is a lot of spirits, but a simple heat, which by fading does not leave the milk deprived of its quality to nourish, as follows the seed; when I conceded to Gianforti that the milk loses all its virtue to being milked, (which will never be true) what would follow [Page 62] for this?, it would follow that whoever wanted to transfuse blood; did not keep it out of his veins for too long, because it would not be good; and this I grant them; indeed, I do not expect it to stay as long as the milk is outside the breasts, and it will loose its heat, but I do not want it to touch the ambient air, as Galen himself notes in the aforementioned place. Furthermore, I say that if the semen passes through a channel, always moist with urine, or another humor, for a space of 14 days and more, and notwithstanding, it remains second, nor does it lose any point of its virtue; because it will lose the blood in the transfusion, for a channel less than half shorter, hot, very thick, very dense as the same vein, and more, being able to use a part of a dry artery, and then tanned of some animal; which arteries have more skin than veins; and then embraced said canal with a warm hand, it will foment it, [Page 63] it will press it, it will hurry to the entrance, so that it may stop in it, and it did not; I for me do not know how to see you, nor difficulties in the unsurpassed operation, nor a considerable loss of spirits in the passage from one body to another.

Vercor itaque, etc.

Here, as you can see, he returns to doubt, *that the good human blood is not introduced very well, cannot nourish, because it still needs the work of the stomach, and of the liver, so that at little it takes on human nature, lays down the excrements, and receives the ultimate perfection from the heart; which one would receive if it had not first enjoyed the benefits of the stomach and liver, which the transfused blood does not receive, still containing bilious excrements, and melancholy improper to human nature, and to this, and to that individual, useless, not arousing the heart to lay them down.* And he corroborates these reasons with the authority of Hippocrates. *Calor, natiuus auget, & corroborat, incarnat, & assimilat,* [Page 64] *& dissimilia facit, qua in singulis sunt, iuxta uniuscuiusque naturam, & facultatam: id vero quod prius inest superat.* And notice those words, *assimilat, & dissimilia facit que in singulis sunt, iuxta uniuscuiusque naturam; that is, in each individual, and according to his particular nature, not of the whole human species, that is, that every sensation*

should begin and end in that individual, to which it has to serve, according to its own temperament.

I would reply. The text of Hippocrates although obscure as usual, it would be nice if we tried to find out what he said about the transfused blood, and not about the food, by which the book of food was written either by him or by others; but a naked text without reason cannot undermine the foundations of a reasoned and adjusted discourse.

And to examine it better we will go back to the beginning, where he says, that he fears that the transfused blood needs the work, [Page 65] of the stomach, and of the liver; and it seems to me that he said more to say something, and authorize it with this text, than I really believe that he estimated it in this way; because he said above in the second movement of the transfusion, that the blood acquires perfection in the veins, in the liver, and finally in the heart; and this fortified with the authority of Galen; and even this I grant them; but who now pretends that the blood also receives perfection from the stomach, this is what I absolutely deny, and he himself said in the third movement, that transfused blood does not need the stomach, and liver; and yet we recognize the nonsense that would make Hippocrates say that is, that we take the blood in food by mouth, that everyone knows how bad it is; and I would hope that if Gianforti were alive, he would either withdraw or get away with better reasons for error; of the food then that goes into the stomach, spoke Hippocrates and he said very well, since we know that from the flower [Page 66] the bee sucks the dew, or other humor of its own, and converts it into honey; but the spider feeding on the same juice converts it into malignant liquor, and this comes from its own nature, and, as Hippocrates noted, we experience every day, that one of a bilious temperament, although always drinking water, will generate a lot of bile, and the other cold, and melancholy though drinking wine, will produce crudities and catarrhs. Knowing the cause of these individual differences, as well as does not belong to the present discourse; I say it is very difficult; but to give something of it, it could be that the temperaments depended on the denser or rarer substance of the liver, the spleen, the brain; and from the width, or narrowness, of the milky veins, and streets of the chyle, which, being like gutters, if they are dense, and narrow, they cannot enter if they are not in the chyle, and sauces thin, warm, and bilious; and therefore of such a temperament; and if in [Page 67] the contrary, the reason is also contrary.

But returning to the transfused blood, which, Gianforti says, lacks the operations of the stomach, the liver, and the heart; I would ask them, who made this transfused blood?, perhaps it was distilled with chemical art, and made a chyle, or something else, or an extract very similar to blood!, who let it come out of their veins, perhaps he too had no stomach, and liver, and veins, and heart! I don't know that a way has yet been found to artfully make blood, and that if he can say, the operation of the stomach is missing, but what I say made the blood with art, I do not know if anyone has tried to undo it, to know what is done; nor will one ever find the blood of an animal that has no liver, veins, and heart. The blood therefore transfused has been in the stomach into food, and is then separated from the milky veins, from the glands, and from hand to hand takes on flavour, then colour mixing in the veins, [Page 68] in the heart; and again circulating in the liver, and in the heart it returns; and therefore it has received all the necessary operations, and it is most perfect blood, like everyone else; since it passed from there, it received all his virtues. But I hear him say, it has not passed, and it has not received that particular virtue of that individual, to which it must then follow, that is, since it was not first made a chyle from the stomach of Piero, but of Gio: it cannot be good, and useful to Piero, since it is not at least proportionate in the large or subtle substance, as it requires. I reply, that I also concede that the transfused blood is not similar and proportionate to the new members, or strains that you find in Piero; but that by introducing a warm, thin, ruddy, clear, sweet youth's blood, I would be sure of benefiting from the best, because it would circulate better than the big one; if then it is to tell more, I defer to judgment

and experience; and those who say that transfused blood [Page 69] cannot help, it is necessary, if they want it to be believed, that they say the reason, and what harm it will do, although the transfused blood is very perfect, and if they do not give better reasons than the aforementioned so far, they will not be disdained to defer to experience, which they dissuade in order not to remain convinced. But in order that these reasons I have given up to here, take it easy, I will place the case made by nature in my favour.

The year 1645 greets the real one passes through Pisa, where he then stayed at the studio, a monster of two male twins attached together straight to their livers, and the attachment could be about a palm wide in diameter, one of which was undoubtedly a defect of good, and a fine body suit, which alone eats and drinks, and every other operation proper to a healthy and perfect face; but the other was blind, gross, and mute, and with his arms, legs, and thighs disproportionately small [Page 70], and overgrown; the rest of the torso was of similar size to the other. The blind man stands supine, and his head rests near the left shoulder of the healthy man, who carries him, and his legs dangle from his right thigh; similarly the blind man, neither ate, nor drank, nor did any evacuation, except a little drool from the mouth, and water from the eyes; he has some sense of touch, because if he pinches, he gives an indication with some movement of the muscles of the face, and of the eyes, that he feels pain; and this same example I brought to the Most Serene Grand Duke Ferdinand II when the first time he was given it; and this strengthened me in the hope of transfusion; and the same Serenissimo told me that he had seen him, and they liked the thought, and that said monster had died in Maremma; the blind man having died first, and then the other died from the corruption of his companion. Nor will it ever be said that there was only one individual, but two [Page 71] truly distinct animates; and a single stomach supplies the pound, and blood to two different animated bodies, to two hearts; and a single stomach administers the chyle, and blood to two different animated bodies, to two hearts; and if they will obstinately maintain that in regard to the communication and participation of the same blood, and to the attachment and union of bodies, there is only one individual; for the same reason the transfusion funnel will communicate and unite the two bodies in the transfusion, in the same way, and they can be considered a single body.

From this example it can be known that it is not necessary (as Hippocrates said) that the chyle and blood be made in the body of that individual, which one has to feed, since the blind man does not eat, and yet he nourishes himself with the blood, and chyle of the healthy, and had grown in the age of around 28 years. More I notice that nature also uses the same transfusion, when it needs it, as in the aforementioned decline; by administering one blood to the other body, and as follows [Page 72] always inside the maternal uterus to animals that are born without wanting, through the umbilical vessels; nor will it ever be said that the blood of the mother of thirties, for example it is proportionate to that of the infant at the very beginning of his generation; and yet it nourishes it very well, that is, with its thinnest part; so much more will the thinner blood of youths be able to nudge the old, although different, but better. On the contrary, I will dare to say that if a thought of mine occurs, as I can hope, nature has taught us and showed us this transfusion.

I have repeatedly considered with myself what use they can have those corns which beasts of burden have on the inside of their legs; nor have I been able to find any author who wrote about it; moreover I have observed that these beasts have little or no sign of a navel; which has given me I die to believe that it may be, that nature has caused them to enter the blood through the usual umbilical vessels, [Page 73], and necessary for the nutrition of the fetus, not to the straightness of the navel, but of these corns, in order to perhaps escape the danger that may occur in carrying the burden, of opening the navel due to the great weight; where two thus derived, and disunited, and in part stronger, they remained safe.

Here I would like to be pitied, if I propose something uncertain, without first having certified it, swearing that since this thought was born in my head, I am not lucky enough to be able to experience it; since one of these beasts should be raised pregnant, and opened it, to see what these corns are for; for now I do not feel like making this expense, who can do it, since it is a great happiness to be able to experience their thoughts at the expense of others, as Aristotle did at the expense of Alexander the Great. It is also possible to recognize from the aforementioned monster that it is not necessary for the heart to deposit the excrements [Page 74] of the transfused blood, as Gianforti wants; after being left in that body, where the chyle and the blood are formed.

But let us pass to the last argument, which is reserved, as the master of fencing does for a sure and irreparable blow; and intends to authenticate the aforesaid things, and also the obscure text of Hippocrates with a very clear to his words of Aristotle, here it is.

Sanguis imprimis necessarius, comunisque sanguineis omnibus animalibus est; nec aduentitius supperit, sed vernaculus, atque intimus in omnibus integris atque in putidis habetur; and he says *thus the Principle of Philosophers, almost predicted and refused the transfusion of blood; so that either one will no longer have to believe in these two great lights of philosophy and medicine, or even the transfusion will be useless, indeed harmful.*

I would reply, it could have been that Gianforti's fear was superfluous, and that the transfusion was useful and good, and therefore these great men would lose point of [Page 75] credit; since no one will ever say that they challenged the transfusion, which they did not know; but every good philosopher, and the doctor would comment otherwise, so that if the transfusion then went out happily, there would not be any shadow in the face for these lights of science, nor for it to laugh at.

And if he bases his reasons in the authorities alone, here is a clearer one than his own, of the same Hippocrates in the same food book *sanguis altenus utilis*. I therefore respond fairly well to the Hippocrates text, with the same answer I think I will satisfy both of them, and replying those words, that is, *nec adventitius suppetit*, I say that Aristotle has heard himself of the blood taken by mouth in drink to nourish; nor do I know that any of the commentators have otherwise interpreted it. And from the words of the same text that immediately follow, we can be sure that Aristotle would have praised the same transfusion; since [Page 76] what he says, *that the blood is then in the blood vessels, when it is in the veins, in the heart and in the arteries*; therefore that which is infused into the stomach is truly *adventitius*, and stranger; but transfused into the veins it is really *vernaculus, & intimus*, and in its proper place, and therefore joyful, and useful, the transfusion will be successful.

And it is reasonable to believe that Aristotle understood that the valiant and pious Themistocle his Paesano; a hundred years earlier, more soon a voluntary death was elected, which was procured by drinking the blood of the bull, which Captain of Xerse would go against the ungrateful homeland that has disbanded it.

But Gianforti said above that the authorities must yield to reason and this to experience, but leaving similar disputes, any one can, on the basis of better reasons, be applied to experience, which alone will discover for us the truth that I am tracing.

It remains now that in order not to show me [Page 77] too partial of the transfusion (since no one of the ancients can be in the opposite direction; this being one of those inventions left entirely, and completely intact) I go with the intellect more than with the study, imagining the reasons that have held an entire world from continuing it, or even experienced, so that it does not succeed; and other objections from Gianforti that I have not read; since it is compelled to believe that there are greater difficulties than those produced by it, having the power to make one of the most beautiful and most useful problems which have come to light be neglected in abandonment; it is because I have not the right conjuncture to understand the true cause of the believed impossibility, but I hope, indeed I pray, and I will oblige, that

each one, who knows it, by publishing it, will get rid of error, and of thought; because with just saying it cannot succeed, it is a chimera, a nonsense, they will soon show themselves more envious than zealous [Page 78] of the truth if they do not give the reasons that persuade them to blame it.

First doubt: I fear that old age proceeds, not only from the swelling of the little blood, and drought of it, which therefore badly generates vital spirits, and is less hot, or it is able to nourish, but that the main viscera, that is, the liver, spleen, brain, nerves, and other inferior ones, become hard, dry, dense, and colder with time; who then diminish their faculties, diminish vigour, nourishment, life; and therefore the transfusion is superfluous, where the bowels are imperfect.

Second. I still doubt that the blood with time, swelling and weakening the faculties, the concoctor does not concociate the blood well; and the less vigorous expector does not chase away all the excrements from the humoral mass, as they are deemed, they infect the blood, the intestines, and therefore become dull and die.

Third doubt is the inequality [Page 79] of the seasons; and particularly the improper and out of the ordinary, as Hippocrates put it, caused by the variations of the winds, which produce admirably different effects in the humors of our body, not only with the first qualities of heat, cold, humid, and dryness; but with the various mixtures of the corpuscles, aromas, or seeds of the exhalations which they carry with them, raised from different parts of the earth, and of the waters of where they pass; others fade, condense, like the cold ones, and dry kites: others temperately open, and comfort, like the zephyrs, and west; others by heating release, swell and moisten, such as the southern; others shrink by swelling, cooling down, like those rising, which to us mostly produce drops, if the southern ones precede them; therefore the exact and more individual science of similar effects would be very useful in curing ills and preserving health; because such mutations weaken [Page 80] the natural heat, from which all ills depend, and particularly old age.

Reply to the first doubt, I say, that it is true that the bowels can harden, thicken, and dry up, and that, however, the surgeons in drawing blood from the old, find the skin much harder than the young; the aforesaid truth can be proved by another reason; because if we trust carefully, because the beasts of burden especially, they change their hair where they have added some guide rails, we will recognize that the density of the skin made by the scar was the cause; and that, not being able to pass through the pores of it the usual nourishment of the hairs, it penetrates only the thinnest, serous, and clearest part, and therefore the hair becomes white; so I believe that it intervenes in man by nourishing, that is, if it condenses, and so constipates the skin, that only the serous part of the blood passes through it to nourish the hairs, and hair.

[Page 81] And if well I have conceded the assumption of the hardness of the bowels since it could also be the contrary, and that the greying proceeds otherwise, I do not feel however in a state of surrendering myself for defeat.

And the sooner it is observed that the white hair born in those guide rails in a few months, is reborn of the same colour as before, and all the more soon, the more youthful the beast is; a clear sign that the skin has softened due to the continuous flow of good nourishment, has softened and made more rare; and to confirm all this, I will also recount in the human race what I have seen in this regard.

Mr. Stefano Felici, who currently teaches Hebrew language here in the Florentine studio, about eight years ago, he pulled a very long hair from the head, which from the middle up towards the root was very black like his others, and the other half below was very white, but what I observed most is that the two colours were so well finished, and distinct, and the other half below was very white, but what I observed most is that the two colours were so well finished, and distinct, which [Page 82] could be easily divided into two parts, without any sign or less nuanced than the other colour, but again, as the black part of the hair, and particularly where it ends in the white, was much larger than the white one. In truth, this observation is too vulgar,

but which can nevertheless serve exactly to dispel the proposed doubt; since it is probable that that pore from which that hair emerged, was by some accident made narrower than the others, and this is due to its subtlety more in the white part than in the black; but widening the hole with some occasion to rub, or comb in that part precisely, or with better nourishment, or health, or in some way removed the original impediment, the pristine, and usual food, quickly returned to pass him, and therefore I become black and thicker. But who would tell me that such accidental cases should not rule, and vary the natural order [Page 83]; since we do not see gray-haired men returning to the first colour (although there are histories to the contrary) as it would seem convenient, if the accident of the hair, is of the guide rails were the order of nature, and not of chance, or of another impediment.

This I say is that case, and that impediment that I am trying to alleviate with the transfusion; but if old people never get their first hair colour back, this goes on, because more and more the impediment, or the cause of turning gray, keeps watch, after a guide rails, and to that hair, having relieved the impediment, the usual and natural order followed that the skin before it was prevented; and if in old age you could soften and thin the skin, or thin the blood, as it dries up ahead, I would not think it impossible to restore the hair; but introducing them with a lot of blood, and the thinnest and most fruitful one, I can't see the impossibility of softening it, [Page 84] as follows to the scars of the guide rails; indeed, that the hair would be reborn, I believe, not of the first colour, but of another mixed with the colour of the hair of the one that his blood transfused him; and what I have said of the external skin, is to be understood more of the internal viscera, which swim more than the external one, so to speak, in the humid; and therefore with the transfusion one could remove the greyness that has already come, and the old age.

To the second doubt, I would answer that in order to restore the concocting and expelling faculties, it is necessary to change the patient's blood by introducing the best, without excrement, and more fruitful in natural heat, from which all the natural operations of our body depend; and thus reinvigorated the faculties, getting better, renewing the hair, will be the same as rejuvenating.

In the third doubt, which were the changes of the seasons, and of the improvised times, [Page 85] and irremediably suffering, and producers of sickness, to weaken the heat, I answer with saying, that as the outside air alters the spirits of our blood, and the same humors, so much more will the bad weather in our body die with the transfusion of a very good blood; and made robust, it will be able for more years to resist the aforementioned sudden changes, precisely in that way, which the robust ones resist better than the weak, the young, than the old; and if the smell of a hot bread invigorates, and recreates the vital powers, and animals, which we believe should make an abundant copy of humorous blood, hot and thin inside a thin, weak, melancholy, cold, and lazy body; and if a little wine taken by mouth, shortly after it gives so much strength, energy, and [-] to a [briaco]; I will believe with Plato, *bibentium animos, si cut in igne ferrum, ita vino feruentes molliores, iuniores que fieri*. The blood [Page 86], even though it is a source of fire, all spirit, and divine, and of other foods, will immediately make you rejoice, shine, as young children do, reinvigorate, rejoice. In conclusion, I would resemble life to a sonorous organ, which if the bellows give little wind, will give little sound; if there is a lot of wind, the sound will be louder. The wind be the blood, the bellows your heart.

Being satisfied as much as I could, and knowing the objections proposed regarding the blood to be transfused, it remains for us to see if more are in introducing it, and what difficulties may arise around this operation.

It remains in doubt whether the blood rushed in it of its nature, or even it was necessary to squeeze it, or to squirt it into the patient's veins; but of this I am very sure, that he drains us without pressing it to you, having had sufficient experience of it; it should be added that the English, the French and the Romans also experimented with it, [Page 87] and that it is not impossible to introduce it. Certain

that we are of this, we will go thinking about the easiest and safest ways; and to walk in order, to guide; we do this operation in three terms, namely in the quality of the blood, in the quantity, and in the instruments, methods, and times of working.

The blood I believe is better the closer it is to its origin, or birth; but because it would be a dangerous thing for children to take care of it; however, I would praise that he was elected of youngsters aged 14 or so, and the sex I do not think made much difference, but to preserve the analogy, I would elect of similar sex, however it will always be better, and that of the males; and since the blood of deer and fallow deer has been mentioned at other times, which have it thin and hot, and which are very violent, I would not consider it a useless business; and so much more the soul were young; even if being hairy and horny did not do anything new. I will make myself [Page 88] legitimate in this regard to add a thought that will increase more than the reckless, than the discreet; but supposed to be useful the transfusion, in no way will it add to the improbable. I say therefore that if blood is infused into the veins of a young man who stops growing, and this for several years, intruding a good portion of it every year, I would hope that it would grow above the ordinary condition, and could magnify, and this is said about the quality of the blood.

The quantity of it will give us much to think about; since to want to change 25 over 30 pounds of blood that an old man has, you would want too much, and I experimented with putting 30 pounds of red-tinted water in a jar, and then taking out a pound, and replenish another of clear water, and so to follow until it comes out clear, I have found to have rewound in so many pounds; a number that scares you to think about it, and is difficult [Page 89] to practice a lot, but it will not be impossible, and particularly to a prince, or rich man, to have so many little jewels ready, which can give us so much blood, and last as many days to soak it, as many as the said quantity requires; it is true that I am not as well certified as them [SS.] English, French, and Romans cited by Gianforti, have experienced this transfusion; since if a similar quantity of blood of animals of the same species is introduced, and it is not well gone, now forever I will call myself convinced, and I will confess that the transfusion I have imagined is not only useless but harmful. But because I am not sure, I will continue to say my thoughts: indeed, if I remember well, it seems to me that I have read it, or in the gazettes, or newspapers, which in England had rejuvenated a horse; and in France a madman had been cured by infusing two pounds of calf's blood into his veins; if this were true that [Page 90] only two pounds of coarse blood, like that of the calf, had corrected the bad weather of the brain, one could hope for great fruit, with little blood; however, leaving the truth in its place, I defer to experience skilful with quantity to overcome the ailments that the care of them will require; hoping that without changing all the blood, the previous constitution can be destroyed with half, or very well corrected.

Now we will say of the instruments which must be used for this operation, in which number it will be good to note the persons who have to serve the patient; and first it is necessary a continuous assistance of a doctor, and of a surgeon, so that according to the necessities they provide, and help; it will likewise be good to have the help of a young assistant for every need. Two young men must always be ready in the house to give blood, and every day change one, or more, according to whether the operation will take place, [Page 91] once or twice a day; cautioning, however, that he does not expect at the time of the operation to produce at least twenty young people, which alternately succeed each other with all readiness, making to nourish and treat them well, and these are the characters who have to appear in this scene. The doctor will arrange for, and have ready, elixir, vinegar, fresh water, and the like in order to be able to help the patient or the young men who faint in drawing their blood. The surgeon, in addition to many good hands, and bands, will produce a funnel made in the form you see. This funnel will consist of three things; the sharpest part, and which must enter the patient's vein, will be golden, or silver, but perhaps it would be better to take the [cannellino] of a feather from a crow or rook; if, however, it is not

too big, and in the middle I would like it to be somewhat folded; and the tip a little cracked, so that [Page 92] it could be narrowed when introducing it, and above the fold, a ribbon could be fixed so that it could then be tied to the arm (Fig. 1).

The second part of the funnel will be a hare, cat, or dog gut, (Fig. 2) of the capacity of the little [auricolare] finger of the hand, and even less; and whoever took a piece of goat's artery, or some other similar animal, I think it would do very well, and by keeping it in brandy, or in human fat, it will become soft, and treatable, and will keep the blood from congealing, and the length is four traversed fingers, or a little more, and this is tied from the widest part of the [cannellino], or pen, so that it cannot slide.

The third part (Fig. 3) which the funnel will perform, will be a nozzle like a small funnel, made of ivory, or bone, with a thick rim on the widest part, so that it can be pierced with a drill to prevent the wind from remaining inside; and make other holes [Page 93] to fit a ribbon, so that it can be tied to the young boy's arm. And this in the thick hem that will touch the arm, from the side towards the hand, I would rather lower, so that it does not press the vein that must give us the blood; and tie the gut in the narrowest part below; and of three pieces our funnel is formed. The way to introduce the [cannellino] (Fig. 4) it will not be difficult, if the vein is cut crosswise, and the ligature untied, so that it does not give blood, on the contrary, bound underneath by the hand side (supposing to introduce it through the elbow veins, since it is also possible, as from the feet below the knee, from the neck through the jugular veins) the cut down towards the hand, and lowered, it is introduced with diligence up to the folding, and binding, then it binds well to the arm; and similarly tie the same arm on the side of the mouth to give time, [Page 94] that the young man's vein be cut; and having fixed the bed with its supports, saw the young man on the bed too, and made him so that he could stay like this for a quarter of an hour, or how long it will be necessary, with the outstretched arm, and with the hand tighten a rope, or rod, placed crosswise at the head of the bed, to keep the arm still; (Fig. 5) and the patient holds his arm high, and straight perpendicular, and takes a similar cord with his hand, to be comfortable, and still in the same position; and loosened the nozzle from the patient's arm, adjusts to the [soro] of the cut vein of the young man, having hitherto held it closed with the finger, let it flow out and drain down the funnel; and immediately the doctor takes the patient's other pulse to observe that the heart is moving, and the surgeon embraces the gut with his hand, and according to that he feels it fill, he will go slowly pressing, and even needing to go; nor will there be no ways to recognize [Page 95] if the blood runs there, and how many times you turn the gut, yes with squeezing it, as also with observing the patient's vein if it swells, and retracts it, and therefore it will be good if the cut of the young man's vein is small, and gives us little blood, so that it does not gather in the funnel, and congeal.

In this manual operation, the greatest diligence must be observed that no wind is introduced into the vein, which could cause palpitations, intermittences, and syncope, and yet I said that the edge of the nozzle is large so that a hole is made in it from the outside, which reaches the bottom of the nozzle; but if you make the gut with a few pieces of an animal's artery, you could choose one that would have some smaller branch of the artery, and by keeping it wide, let the result free to the enclosed air. After about eight ounces of blood have been introduced, or what the doctor will think, it will be possible to leave the funnel [Page 96] attached to the patient's arm with the [cannellino] introduced, and also to tie the nozzle to it, so that not following any other ache, one escapes the pain of introducing it again; and whether it is less of a pain to keep it until the wound does not rot, or even to put it back and take it out at every operation.

I would estimate the time of this work to be the best in February, and March, so that, when Spring comes, the patient can enjoy the motion, and warming that the blood does at that time, and be introduced in cold weather, so then occupy less

space than when it is hot, but whoever feared that the blood would freeze, the face of state.

The particular weather will be better in the morning; and whoever wanted, to anticipate, to do it twice a day, that is, in the morning, and in the evening, I would not believe that it would hurt; on the contrary, it will be possible to begin the first day by introducing them at once, eight ounces, and on the second day [Page 97] twice, that is, in the morning and in the evening, and on the third day, introduce it twice in the morning, and once in the evening, and so it grows every day, according to what will appear to the doctor with experience.

About the time of getting it out of the patient, I would praise getting out of it as much as possible, if the patient is somewhat robust; or even if he is weak, I would introduce it first [-] about six, and then I would get a little, less or more according to tolerance, and that for the haemorrhoidal, or for the foot, with always interspersing the evacuations, some transfusions.

It will still be possible to try to prevent it at the same time as it transfuses, and if there is greater tolerance.

The food of the patient is very little, and good, and of ease; and this I would do not to feed it only, but so that the stomach, and the intestines, could preserve the heat, and their operations; and the milky veins, and glands, and other ways of the chyle should not dry out.

[Page 98] And because it might be necessary that in transfusing it, some ephemeral fever should light up for the copy of new blood, and spirits; therefore I would praise making the patient abstain from wine all the time of the [-].

Finally I know that I have said too much about the way of containment in the operation, not having experienced it, and I would be foolhardy if I pretended to teach the most novice doctor who is ever to be entrusted with this function, but I did it only, so that everyone, albeit simple and idiotic understood the post, and entice it, and even experience it with the least possible expense, and for this sole purpose I wrote in the vernacular, it was born.

I advise well that if you want to experiment with this invention to reinvigorate, this decrepit age should come forward for more respects: one, so that he can suffer this discomfort better; the other, so that the bowels are not so worn out, and it is hard [Page 99] that the transfusion of a good quantity of blood is of little benefit; if it does it around the age of 60, it will make them of lesser quantity.

Oh how many in order to acquire riches, honours, and virtues, like the alchemists, become impoverished, endanger their lives, and perhaps even the soul there that would not make a prison condemned to death to free himself from it; would not give all of his! Wouldn't a sick person do the same in order to ensure life led in the end? How much would a King, an Emperor, a Pope, when he came to his bedside give, to whom he would assure him, and lengthen his life for 10 or 20 years? And yet an invention of such importance, that one can no longer say that life itself remains in an abandoned, derided, trampled canton! At least we all knew why she was treated so; who has she harmed? It is not known, or who knows it does not mean it; but why? Did it fail the first time? It could be that the second, the third succeeded [Page 100]; but why doesn't it repeat itself?, because everyone does not know it, or everyone is not rich that they can do this expense, and the rich perhaps know less than others, and therefore they run with the flood, which has already condemned it; but I feel a curious person who would like to know what expense is this that scares each thousand scudi? A thousand doble? Or well, not less than a hundred doble, but a hundred scudi could serve. *O tempora, o mores!* No, I tell myself; few are known about the transfusion, very few have seen it; but now that it comes out in public, I hope it's not to miss her godfathers; life is too expensive, it is too short. And it will be in common interest to try to find a way to prolong it; nor should anyone think this is impossible in nature, since if we have to believe in the histories, we will know that a few times the rejoicing has happened to mankind, and wall his gray hair several

times in the first colour, and then still up to three hundred [page 101] forty years, and whoever wishes to understand this problem better, read Fr. Martin del Rio Giesuita Tom, pr. Lib. second, Queft. 23.

REFLECTION II

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ABOUT THE THINGS WRITTEN BY MR BARTOLOMEO SANTINELLI AGAINST BLOOD TRANSFUSION

REFLECTION V

At the point this little work of mine was under the press, when by the most excellent Mr. Giuseppe Baldi, philosopher and doctor of this Florentine College, famous botanist, and my very partial master and friend, I was shown the book of Mr. Bartolomeo Santinelli entitled *Confusio Trasfusionis Sanguinis*; and I was truly confused at what Mr. Santinelli claimed to confuse the transfusion itself, considering myself to [Page 184] be ashamed of having been so negligent for so long in the use of such matters. However, my regret was soothed by the reading of such an erudite composition, the author of which, satisfying himself in refuting it, demonstrated the acuteness of his genius, which is extremely versatile in all sciences.

It is quite true that I have recognized that trite sentence, which says, *omnia noua placent*, as fallacious, since the aforementioned author in several places seems to declare himself an enemy, not only of this, but of all the novelties; and to tell the truth, I believe that it is a common and natural genius to contradict the great thoughts, as a sure argument of their beauty, to encounter them on the principle of difficulties; and not only for the reverence that is owed to the ever venerable antiquity, which seems in a certain way; that it remains below in similar cases to the moderns, and that if they were there, they too would suffer a tacit reproach, and a bit of envy; but again [Page 185] to exercise their spirit only their volatile and fiery talent, they immediately argue to the contrary, remaining then under the obligation to support their saying even against conscience and reason.

But Mr. Santinelli consults the blood transfusion, because he does not believe it; and because he is plentiful with witty reasons to the contrary; therefore, not to contradict the author, whom I regard as very learned, but only in defence of my proposition, I have taken the courage to ponder my reasons with this coarse steelyard (i.e. Stadera – PL); then leaving to his casual judgment, and to any other professor, the sentence.

I say therefore that I imagined the transfusion of blood to be possible, and useful, made by young people into old, animals of the same species, from vein to vein, in addition, and several times; and times to delay aging and death.

And to persuade me to have a good end of it, I am encouraged by the following propositions [Page 186] drawn up by Hippocrates, Plato, Aristotle, Galen, Guglielmo Arueo, and other very clear authors.

First: That it is true, and that the circulation of blood is certain.

Second: That the cause of the curing is the drying of the root moisture, and the decrease of the natural heat, through the diminution of the blood, and its enlargement which follows with time.

Third: That the blood in the young is copious, and overabundant, very warm, subtle, sweet, clear, is ruddy, and finally more capable than that of the old to give copious material of itself for the generation of vital spirits.

Fourth: May the heart bestow its vital, calorific, and spiritual faculty more than any other principal member, which lacking, life is missing.

Fifth: Let the blood be what [Page 187] it carries, and leave to all parts of the body that portion of itself, which immediately converts into dew, and nourishment.

Sixth: That good blood, then it is in the veins, and runs there, needs no cooling to be able to putrefy, other than that of the heart. And finally, which I do not intend to contrast with those who deny such fundamentals and principles.

Having hastily passed (so as not to delay the purpose of the work to the printer) the book of Mr. Santinelli, and having found the supposed, and the practice of its transfusion other than that which I imagined, I will neglect to ponder those reasons which do not diametrically hurt my assumption; and such is the first following balance sheet.

1. He therefore rightly *calls the transfusion excessive, barbaric, and cruel, doing it with great shedding of arterial blood, with uncovering of arteries,* [Page 188] *of veins also jugular, with great inconvenience, and pain, among animals of different species, denying that it can benefit not only old age, but absolutely no evil.*

Reply: For now, it is enough for me to have proposed it as easy, more cheerful, indeed pitiful, and reasonably possible, and useful, against old age; to be able to experiment first, without fearlessness, among brute animals of the same species, hoping over time to increase the invention to other uses.

2. Supposes *that by mixing the nuclear blood with the old, they produce agitation in the spirits, and consequently do more harm than useful with the transfusion.*

Reply: There is no need to fear agitation of spirits, since one does not have to transfuse arterial blood by force, but venous, which flows without impulse, slowly, and much less than the capacity of the old man's vein, and finally [Page 189] how much by itself it goes down and runs; as the author still grants it. And just as we do not feel disturbing alteration, but rather consolation, when the chyle of the milky veins is distributed, and mixes with the blood, the less the blood will agitate with the blood because of their similarity. Therefore I say that the aforesaid emotion is arbitrarily supposed, nor is it supposed to be true what is in question.

3. He proposes some *experiences made in France between dogs, and dogs with good esteem, and others made in Rome with the arterial blood of [castrato] transfused into a dog, which continued dizziness, and then some blood was found in the cavity of the belly; and more blood between the kidneys and the bladder; and another dog sweat, and other things from the same chapter.*

Reply: The answer would not be necessary to be different from my supposed practice; however, to authenticate [Page 190] that the experience must be made between animals of the same species, and that those hitherto made between animals of different species; they cannot condemn for it useful the transfusion I say, that the [castrato] generates a serous blood, and moist for the nutrition, or generation of the horns, and of the wool; but the dog of a dry temperament had not distributed those super serums to his bowels, and yet competed with the brain, of which he consumes himself, and gets wet in greater quantity than the need to feed him, it causes vertigo, because they could not anoint themselves in horns; but the other part destined to make the wool grow, nature transmitted it to the bladder by urine (the usual place where the serous super fluidity of the blood is handed down) and by the so much humidity it relates to the kidneys, which also sends blood.

That other dog who did not urinate much, sweated, because they were proudly destined for the [castrato] and maintenance of his wool. The blood that is found in the belly, [Page 191] I believe was the extravasation in the unveiling of the vein, and the impetuous introduction of the arterial. Experience therefore teaches us that it is not well done among animals of different spices, and therefore of no force against my

transfusion; and because I do not know that experience has been made between men, and men, I could, with reason, give exception to all the other experiences already made, and await their very happy success from this for the reasons mentioned, and to be said.

The transfused blood goes immediately through the ever wider vein to the heart, it can growl of it for the minor ones, making the course easier for the major ones; and it should be added that towards the minor ones there are the valves discovered by the Acquapendente, which prevent it; and here I doubt that Mr. Santinelli does not believe in the circulation of the blood, because if he believed in it he would also consider the attraction of it superfluous in the parts, being expelled from the heart; which would sooner [Page 192] prevent the return of the same through the veins to the heart.

4. After the author continues to doubt, *that the little blood transfused can so quickly be distributed throughout the body equally; being proper to health, that the body enjoys an equal temperament and vigour, and that by introducing too much of it, and with impetus it runs into the aforementioned inconveniences, etc*.

Reply: I say that experience will teach us how much we need to transfuse; assuming that there is no other difficulty than the quantity; but I say of amount, that *multa panca faciunt unum satis*; and however I advised to repeat the transfusion several times so that it is enough; nor does it have any likelihood that the little blood transfused can harm by not being sufficient to equally wet the whole body; since the bloods are mixed, they no longer have their own existence, but participated, and therefore it will nourish better, and equally, and with that energy it possesses [Page 193] when it is mixed.

Nor would I judge it wrong to heal the sick immediately, if I could; nor the text of Hippocrates it seems to me contrary to the practice I propose, because it says *plurimum, & repente, &c*. but the author has already feared that a little could harm it; and what is done in days and weeks does not deserve the title of too sudden or repeated; and all the more so that one has to transfuse in those who have little, but several times, and little by little.

5. He says that *a little wine infused in a lot of water, is no longer wine, but becomes water, and so similarly the little blood transfused, even if good, is overcome, and enriched by the greater quantity of the first blood, and therefore nothing rejoices.*

Reply: This is one of those propositions that I have never well understood; but to understand it better, I would like to know from Mr. Santinelli what proportion the little wine should increase with the predominant quantity of water, if or example [Page 194] a hundred, or a thousand, and what do I know; I would still like to understand, how quickly this substantial transmutation takes place; because if I knew it precisely, I would teach without becoming an alchemist to make a lot of gold with this rule; or even with many barrels of brandy in a well, and a dripping over it, of continuous Pisa water, drips, drips, to add it to brandy always in the future. But now I remember that when I was studying physics, I read a similar proposition in Aristotle, and it is *nel p. libro de gen. & cor. Tex. 88* and here are his words. *Ideo gutta vini decem millibus congijs aqua non miscetur, soluitur enim forma, & mutatur in universam aquam.* Indeed, Aristotle believes that to want a liquid to transmute another in its own nature, it is necessary that it has the proportion that a hundred thousand pounds of water has to a drop of wine; and since Aristotle believed it, and wrote it, it is probable that he had proved it; because I don't find [Page 195] enough reason for you. But I would still wish that he would at least give me the sign to know when the mixing ends, and the mutation begins, that is, if with a pound less than 100 m. the mutation, or the mixing, were made; and since Aristotle has not said it, and cannot answer me, I do

not intend to oblige Mr. Santinelli to propose it, as he would have to do, and by the grace of both, I will calm down on what they tell me; and taking this account in their own way, I find that the sum matters, that whoever transfuses a drop of blood, in an animal of the same species, which has 100 m. pounds of blood (animal impossible to find) that drop would change in the nature of that of greater quantity, and consequently would not give any benefit. Now Mr. Santinelli, as I have admitted the text of Aristotle 88 predicted, so I hope that it is kindly to pass to me, and grant me [Page 196] the text to the following prefato 89 (if well I think he has read it, but kept silent, lest he do it to his advantage) and is content that out of zeal of the truth I put it on stage. He therefore says that when their powers are equal in some way, that is, that the mixtures are not so [disorbitanti] in quantity, here is the text, *tunc mutatur quindem utrumque* (not just one) *in dominans ex sui ipsius natura; generator autem, alteram sed medium, & commine.* Yes that if I transfuse for example 20 pounds of good blood of 20 degrees of heat, in an old man who has 20 pounds of blood of 10 degrees of heat, all the 40 pounds that that old man will then find in the body, will not be 10 or 20 degrees of heat, but 15 so arithmetic teaches me, which is a proven infallible science, and consequently that old man will find himself strengthened as if he were for example middle-aged in about; because I can apply myself to the proposal with similar proven probability, [Page 197] with certain hope of a very good end. But if I were commanded that in confidence, and secrecy, I disclose my thoughts, and what I believe of the foretold text 88, I would say to anyone who does not have an oath *in verba magistri* that I do not believe it; and the reason is this, because our sense of taste is not exquisite, how would you search for the fact, nor do I know that a way has been found to know, or to separate a drop of water that I would add to a bottle of wine, or a barrel, or a flask, or a glass, as the assayers and dividers do, who with cups and strong waters, find and separate precisely the mixed metals, without being transformed; but whoever believes it must prove it, which will remain clear.

6. The author of the aforementioned book, together with some transfusers, *is horrified, at the mere hearing that one gives one's blood to another* (atto, beche [-]) and in the same fifth chap. he is not so [Page 198] obstinate, and tenacious to believe the aforementioned text 88 of Aristotle, since he *allows the mixing of blood, not the mutation; and that feral blood can change temperament, and morals infused into the human body.*

Reply: I wouldn't want the name alone to shock us, but the fact deserves it.

I said that we have to transfuse the blood of young people aged about 14, at which age they most usually shed a lot of nosebleed in the spring, without them being inconvenienced, indeed with very evident usefulness; but if I showed to those women mentioned by Mr. Santinelli, and to those who are horrified at the name of the transfusion; I said, to see these young people so shedding blood, what would they say? They would say, that this jet is good for them, and that they gain weight; everything good; and if they saw a suckling woman, a nurse, who squeezed the milk from her breasts, and sowed it on the ground more [Page 199] sooner than giving it to feed to that child of hers who was dying of hunger, would they not be horrified? Wouldn't they scold her? Of course yes. If I ask that nurse, why are you expressing this milk? Maybe she would answer me, because the [-] my chest aches; but why don't you give it more quickly to breastfeed that baby? Gentlemen, here is the case in term; it would make us wonder to see a woman throw away a little milk, to be something new; but the great shedding of blood that these children do does not horrify us, because it is usual; and old, so that it is not the colour of the blood that scares us, that little or no one sees in transfusing it, but the novelty; and why that blood, which is superfluous to those little jewels, is not given to old people who need it?, because it is a new thing; not for anything else.

And so how does he admit that the foods and the milks taken to nourish himself, communicate their qualities, indeed even the costumes, because the [Page 200] blood of the young people will not communicate the heat, the spirit, that liveliness, and joy they have?

7. Mr. Santinelli in the first chap. of the 2 sect. produces other doubts, that is, *that the blood in transfusing loses spirits in the passage it makes through the [cannellino], or funnel; and that if he wants it to restore and give up its faculties, it must be witty, arterial, very pure, non-venal, and without spirits.*

Reply: I say that it seems difficult to me that his spirits vanish in the short course of the blood down the funnel, because it passes through a substance as dense as the arteries themselves are; but I also want to grant them that part of them vanished, not for this the transfusion will be useless, if the transfused blood is of very healthy young child, since those who faint, or in drawing blood, or in rendering services, or medicines, which proceeds from a soul of spirits, and also without other remedies, and without the transfused blood they recover [Page 201] from fainting, with the only new spirits that are continually generated in the heart; but the equivocation is in the supposition that Mr. Santinelli makes, with believing that that blood immediately transfused, venal, and of a few spirits is the one that has to restore the faculties, and nourish; and I still say, that it wants to be more witty, warmer arterial blood, and closer to the source of heat, just as the author himself wishes it; and that it would be good if it did not go through the funnel, nor when it goes to feed, it lose some of its spirits; but Mr. Bartolomeo the blood that goes to restore and nourish, is all arterial and witty; and it does not pass through the stem, but goes straight from the heart to the parts through the arteries, and restores; and so he does, and I expect the transfused blood to do; because immediately that it is transfused it goes to the heart, where it acquires perfection, and from there to the parts to nourish them; and therefore the transfusion will be very useful, because it nourishes with the blood of young people more fertile than spirits, [Page 202] and with arterial blood that is warmer and more witty than the old.

He adds, that by passing more and more times through the heart of the old man it will become his own, and natural, since with the warmth of his heart he will give them that specific perfection which the adversaries say is necessary, and which is lacking in the transfused blood; and so in a short time, and hours, that youthful blood, all spirit, made familiar to the old will rejuvenate him, resemble, reincarnate, according to his own nature, and ability to nourish, as Hippocrates said lib. de Ali. To the doubt then that he proposes that the venal blood is not good for nourishing, because it has left the spirits in the parts to nourish them; I say, and I concede that he has left some of them, but he reports many more with him; and here is Galen who confirms it *in toto est mutua anastomosis, atque oscillorum apertio, arterys simul cum venis, transumuntque ex si se partier sanguinem, & spiritum per inuisibiles quasdam, atque angust* [Page 203] *as plane vias*. And Gio. Vualeo in the two letters written to Tommaso Bartolini about the circulation of blood, asserts that the blood of the minor arteries is not different from that of the veins; when they are both frozen and finally that the difference consists in being warmer, and consequently rarer, thinner, and more ruddy; but cold both do not make a difference.

It can therefore be concluded that the better the blood, the harder it is to feed; but is it not already true that the heart in a single pass that the blood does for it, resolves into spirits all that portion of thinner blood, which in several times, and in several days it usually generates, but you generate them from hand to hand that passes through them, and therefore it does not matter much if in the transfusion you lose some of them, since passing through the heart it regenerates them, because the heart is able, and the good blood to produce them; and continue for longer, which would not do with blood [Page 204] big, black.

8. The author of the confusion subdues *that those things which soon nourish, soon die, but which the blood transfused with soon nourish, and die; make transfusion unnecessary.*

Reply: It is true that one's own or transfused blood soon nourishes; and therefore nature has found the circulation, in order to be able with new spirits generated in every beat of the heart, to restore the loss of them, and to always keep the parts and faculties vigorous; just as bellows do, which always feed new wind to the sounding organ; and as the blood of young people is more fruitful with spirits; in this way he will be able to administer the matter of them to the heart for a longer time; from which it will derive more vigour from the faculties, and better [cozzioni], and nourishment; which is what you are trying to do with the transfusion; but lest we think of being able to restore great vigour with little blood, I will say that the new vigour will [Page 205] be proportionate to the quantity and quality of the transfused blood. For example, if you transfuse 10 pounds of blood to a 60 year old man it will restore it, and it will come back into force as it was 10 years before; if the copy of the blood is greater, the restoration of all the faculties of his body will follow.

9. It continues in the aforementioned chapter that the transfusion cannot be useful, by saying *that if the liver or other viscera are infected these will spoil, and also make the transfused blood imperfect, and from the sample of the barrel that has the vinegar site, all the wine that is put in it takes vinegar.*

Reply: For now I have already assumed that the transfusion is good only to restore the old, that they have no other imperfection than big blood, and little; but the supposed example of the cask that has vinegar is more to my favour than contrary; since you will never find a new cask that has vinegar, [Page 206] but the vinegar has participated in it, that site; the watery blood is that which gives the flavour and vigour to the parts, not the parts to the blood, except the heart, which takes no other imperfection from the blood, than that which gives them death; and just as the author says that with decoctions of real ingredients the barrels are purged from similar or other sites, so I expect with the bath of transfused blood to remove the bad qualities that the said parts of old men would have, and to restore them.

10. It supposes *that the transfused blood enters with the impetus that runs through the arteries, into the veins, and therefore can dissipate the heat of the old or infirm, rather than increase it*; and relies on the authority of Galen, which says *ceu ventulo quodam excitari, accendique calor corum desiderat, vehementiori aute motu deijcitur.*

Reply: The blood of the veins is transfused without impetus, as we have said, and therefore the supposed is superfluous; and Galen means the exercise that the old must do, [Page 207] that is, that it is such that it ignites the heat, not too much that it dissipates it, and resolves it, and yet the text is beyond purpose.

Then Mr. Santinelli is right to propose the transfusion imagined by Marsilio Ficino as useless, the other told by Libavius, and the other by[-], because what [- - -] wants it to be sucked and introduced into the stomach, to which everyone knows how much raw blood is contrary; and that other doctor deserves hellebore, because it is so convenient to draw blood from the arteries, that is, kill one to cure another; and Medea wanted to [-] Pelias, when she advised his daughters to remove all the old blood from him, to make him believe that she was resurrecting him with the new.

11. Not content with the author to show in many ways the impossibility of enjoying with practicing it, he tries here with other reasons, to say, *that it should not be put into practice, because it is against the good rules of medicine, which consist in*

medicating [Page 208] *early, confidently, and playfully; but that the transfusion cannot be done quickly because it must be replicated; and that we cannot make sure of its usefulness by not having sufficient and certain experiences; and that it cannot be practiced without great pain; and emotion of spirits, and yet intolerable.*

Reply: It must be confessed that if Mr. Santinelli had set out to defend her, as well as to challenge her, he would perhaps do this hour so much for her practice that she would hardly lack perfect demonstration; but it has thus relieved the soul of each one of proposing it, that it will be difficult to un-impress the world, that more often than not it runs to shouts, I will not say to try it, but as a hateful and banished thing that wants to hear word of it; I, however, constant defender, will continue to say what I feel about it, more out of zeal for the truth, and for the usefulness, than for any of my own passions.

I remember that a little further on the transfusion [Page 209] is taxed because it feeds too soon, and now because it is too late, the effect of the author's will, or confused, or restless, who would like it in every direction, or wrongly, or rightly landed, annihilated; and I confess that the transfusion is quick, and still slowly its operations, those which it does soon if it seems few, we can repeat them, and therefore the replies seem to lengthen it; but *quod paulatim fit tutum fit*, Hippocrates said, and it could be that with practice he could do all the profit at once, but to walk with Hippocrates' rule above, I advised to replicate it; if then Hippocrates writes contrary to the good rules of medicine, I would not dare to believe it; I will therefore leave the trouble to Mr. Santinelli to take it with him, and to grant these rules. But, good God! how many decoctions, milks, [acciai], waters, and the like carry greater length of time!, and even those are done with rule; bad thing to be born unlucky!

[Page 210] Regarding safety, I have to say that the fault lies with Mr. Bartolomeo who advised against the practice, since if he had continued to try it, in eleven years we would have completely clarified the truth; I might well fear that by discouraging it so brazenly as if it were madness, he was tacitly calling himself reckless and ignorant to the most famous studies in Europe and the world, that is, the English, the French, and to your Roman scholars, that they believed it possible by proposing it; he does not lack reasons that persuade him, nor experiences that assure him, but the evil has been that he will never experience well.

Around the joyfulness, I say, that the more they would allow themselves to draw blood more quickly than to take a service, a syrup, or think of a medicine. But here we do not have to diminish the forces, we have to grow, and therefore the forces that require the missions of the blood, and the evacuations, as researched [Page 211] by this author in the old are not necessary. He is still afraid of the commotion of the spirits in transfusing the blood, but free, because, as we have said, the venal blood flows there in the same way that it does in its own vein.

12. Here Mr. Santinelli brings a very new reason, namely *that it is a shame for doctors to use those remedies that rely more on experience than allow reason*.

Reply: Or if this is true, now I will lose the quarrel, when I think I can earn it with experience; and if I want to know if you weigh more a pan of lead, or a bale of cork, or crowns, it will not be necessary to weigh them, but to judge by sight which must be heavier, which will teach me that something greater will be heavier; and if neither lead nor cork had ever been weighed, it is certain that one would believe the bale of cork to be heavier, but experience has shown us that lead is heavier [Page 212] in particular than cork; and I am one of those who believe that remedying them are authorized for good, with experience first, and then looking for the reason, and perhaps I would not lack authority, and also of Hippocrates who confirmed this; but I would like to know if Mr. Santinelli has ever given the powder known as Quartana to drive it away, and whether he tried to understand reason after he used it; because I

have ordered it hundreds of times, with no other foundation than the experience made first by others, and then by myself; and well that I have imagined more, and several reasons, I do not make sure I know why it heals, and yet I give it, and I will give it, and so I feel that the other doctors do it with the sole supply of experience, and they are not ashamed of it.

If then the transfusion satisfies the indications, or not, I will recover; I have pretended to transfuse the blood of young women warm, thin, etc. in a weak old man, [Page 213] who has little, and big, to reinvigorate him, blood being the only one that carries and gives vigour to all parts of our body, and perhaps what it preserves, and causes the heat of the whole body, with its mixture of sulphur and salt, just in that way that strong water mixed with dark silver makes, and therefore your veins are throbbing.

I have never pretended to immortalize human bodies with transfusion, as in wounds the author; first, because I do not transfuse the blood of an immortal animal; second, because it is not only old age that kills him; although there are too many evils; and also those who die young; for this reason he too, who is a doctor, will have the intention of making men immortal, while always trying to free them from death; but the fact is, we certainly know that *statutum est hominibus semel mori,* but we do not already know of what disease, and we always hope [Page 214] that the last one we cure is not the last, and so I intend to treat old age too, which is among diseases, as Galen said it. That we do not understand the causes of the experiences, it is not for this reason that we do against the good rules of philosophy and medicine, which know all the reasons; but the defect is of the philosopher, and of the doctor, not of philosophy, or medicine, since if the experience follows, it is also necessary that there is reason, although it is hidden from us.

13. Even the *Sacre Carti*, according to Mr. Santinelli, *are opposed to the poor transfusion, since the use of blood in food was forbidden to Jews, so that the abdomen would not restrain from the shedding of it, and to the murders.*

Reply: I believe this very well, but I do not already believe that the canonical and civil laws, or the sacred papers were to prohibit the transfusion; and the reason is, that the mission of blood, which spills it without any [Page 215] saving or limitation is not prohibited, much less to prohibit the transfusion, which does not throw away a spot of blood, on the contrary that he hardly sees it; and what is superfluous to an individual he transfuses him into what is in need, and with the sole purpose of benefiting him, and yet persuasive, desirable.

14. Following up to the last this tireless author to persecute, and as he himself says, to whip the transfusion, as worthy for his misdeeds to go on the donkey; but we do not know why; and he makes a catalogue *of moral authors who blame those doctors who take care of those remedies less certain, not proven, and leave them more certain and common.*

Reply: When the transfusion is experienced there as well as the other remedies, I hope it will be very good, but it cannot be common if it is not taken, and it is tried; I would therefore like to know that other remedies are certain in medicine, and tried to delay old age, or to restore [Page 216] old people, which should be placed before this one; I will always be expecting better ones, but in time I will not neglect to make them, and to advise everyone about them, ensuring them a very happy end for the reasons given; the wit of the author is much more, with which he endeavours to stop the transfusion; but to be easy to resolve, I leave them to the judgment of the reader, who detached, will be able better than the two of us to recognize the truth in these speeches.

I mean, however, and I declare to myself that these answers have no other purpose than to defend my transfusion, which I believe is possible; it is that out of debt of nature, and of truth, I have to do it, assuring Mr. Bartolomeo Santinelli, that I feel great disgust, not for having increased my invention, but for having been obliged to write reasons contrary to his; begging him, if this little book ever comes to his hands, that he wants to help me by himself, [Page 217] and at the same time make me sure of his most grateful, that I am to enjoy his good grace in the future; since if I have written weaknesses, it will be his greater glory to remain superior, and if I have produced probable or true reasons, he will not be disdained, that I have risked the truth.

REFLECTION V

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