ORIGINE E VICENDE DELLA TRASFUSIONE DEL SANGUE CONSIDERAZIONI STORICO-CRITICHE

BY: Dr ALESSANDRO SIMILI (1933)

A TRANSLATION OF THIS BOOK BY PHIL LEAROYD

The book 'Origine e vicende della trasfusione del sangue: Considerazioni storico-critiche' [Origin and events of blood transfusion – Historical-Critical considerations], written by Alessandro Simili, was published in 1933 in Bologna [by Cooperativa Tipografica Azzoguidi] and can be viewed or downloaded from two internet site addresses, though both provide the same PDF document:

https://www.woodlibrarymuseum.org/library/pdf/S_ADKF.pdf

https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjdrLjBjLfsAhVAQhUIHVtMC5s4FBAWMAZ6BAgGEAI&url=https%3A%2F%2Fwww.woodlibrarymuseum.org%2Flibrary%2Fpdf%2FS_ADKF.pdf&usg=AOvVaw1eAEV8dQY7ZB544QaUPkIS

This book, of over 150 pages, covers the history of blood transfusion from antiquity until the end of the 19th century, but does not unfortunately include any information regarding the development of blood transfusion during the early part of the 20th century, especially around WW1, which given that the book was published in 1933 is a disappointment.

I have translated this book from the original Italian into English in the hope that the content may be appreciated by a wider audience. Whilst I am obviously aware that instantaneous computer-generated translation is possible, this process struggles with specialist terminology and also produces a 'colloquial style' not always representative of the original text. I have purposely produced this translation to be 'un-interpreted', in that I wanted to maintain the author's original meaning / wording as much as possible. As with any translation the wording may be purposely or inadvertently altered to 'make it read better' but in doing so there has to be an element of personal interpretation involving something on the lines of 'I believe that this is what the author is actually trying to say'. I wanted to avoid that as much as possible and try to present what the author actually wrote and as a result the reader may find that the English text does not 'flow' as well as it could. Whilst some of the words / terms originally used are obviously open to interpretation, I have attempted wherever possible to hopefully maintain the author's meaning, intent and detail. Although I have taken great care not to misrepresent the author's original wording I cannot guarantee that this work does not contain 'translational errors' and the reader is recommended to check specific details against the original Italian text.

I have translated the names of authors identified in the text from the original Italian and I provide a list of these below – the original names used in the book together with the ones used in this translation – but have kept their names in capital letters, which is how they appear in the original text. I have also maintained the author's use of italics in the translation text. There are a small number of comments of my own, mainly relating to interpretation that I have included within square brackets. The book contains a great deal of Latin and some Greek text that is also presented in italics. I am unable to reproduce the small amount of Greek text within this translation and have represented either the Greek word or words where it does

occur (in both the main text and references) simply by the word *Greek* in square brackets. If required, the original text must be consulted to identify the actual wording. I have maintained the author's original paragraph settings.

The references to the text, of which there are in total of 638, are listed in the book at the bottom of each page. I have sequentially re-numbered these and reproduced them (as written) at the end of the translation (see pages 88-114). Some of these are not in fact references as such but additional pieces of information. Where this is the case, I have also provided a translation of this text as well, presented in square brackets after the original Italian text.

As well as the references, the author also provides a bibliography containing an addition 118 sources of information (listed alphabetically by main author's name). I have reproduced these as written and placed them after the references (see pages 115-117). I have not however reproduced the contents list of authors provided by Simili as the page numbers do not of course match with those in this translation.

Finally, there are 14 figures provided in the book that are presented within eight separate tables. These figures do not necessarily appear within the book near to where they are discussed and some are not even referenced in the text, whilst others are referenced to the text but are not listed in numerical order. I have separated the individual figures and presented the ones that are referenced in the text in more appropriate places within the translation – though by keeping the original numbering of the figures this has inevitably resulted in them not appearing in numerical order!

As identified within the 'summary' at the beginning of the book, like many other authors, Simili has broken his history of transfusion into three 'parts', the first of which is sub-divided into 1st period and 2nd period, whilst the second part is somewhat confusingly sub-divided into 2nd period and 3rd period. I have reproduced this summary below (as written) and added the page numbers of these sections as they appear both in the original book as well as in this translation.

In fact each of these three Parts, together with their respective Periods, also somewhat confusingly, contains a number of sequentially numbered sections, i.e.

PART 1: 1st Period:	Contains sections I to X
PART 1: 2nd Period:	Contains section XI
PART 2: 2nd Period:	Contains sections I to IV
PART 2: 3rd Period:	Contains section V
PART 3:	Contains sections I and II

The book does not contain a list of contents (only the one of authors mentioned above) and I therefore provide my own 'Summary of Contents' topics, listed with the page number of this translation, that will hopefully act as a guide to a particular period / topic:

I have to admit to the fact that I found it very difficult to produce the translation of this book whilst adhering to my stated aim of not purposely altering the text. This is mainly due to the author's style, especially in that he frequently uses very long convoluted and in some cases rambling sentences, which also frequently include rhetoric. This writing style detracts from the essential information it contains and makes reading the original text (and therefore my translation of it) rather difficult. Because of this, I quite often found myself trying to understand what the author was actually referring to, especially at the start of a new paragraph. Simili also frequently reproduces the original Latin text as explanations for some of his statements or arguments, without any additional comment, which is somewhat unhelpful to anyone other than a Latin scholar.

Whilst many authors, either overtly or covertly, though possibly understandably, accent the 'milestones' in the history of transfusion to having been discovered or implemented by people from their own country, I find that although Simili denies it in the text, he primarily credits and presents the work of Italians. Whilst most historians would agree that people such as Colle and Folli in being the first to think of the idea of blood transfusion have a pivotal role in its history, Simili does not however balance this "primacy of the idea" with equal amounts of historical information regarding the work of those non-Italians who put the idea into practice. Therefore, by comparison, there is relatively little information about the work of people such as Denis, Lower and Blundell included within this book.

Simili also attributes the discovery of the circulation of blood to Cesalpino whilst at the same somewhat denying the importance of the research work performed by William Harvey. Simili also concentrates on the work of Michele Rosa in re-establishing blood-transfusion in Italy but does not give equal information about the work of James Blundell in re-establishing it in England. Whilst I would agree that the role played by Italian researchers has been under-reported by many authors, these points I believe leave Simili's history of blood transfusion somewhat unbalanced. Although Simili agrees with other authors (e.g. Scheel (1802), Moncoq (1874), etc.), that Denis's transfusions did not result in a Papal ban, the author's explanation for the events leading up to the 'ban' in Paris is incomplete and in places incorrect.

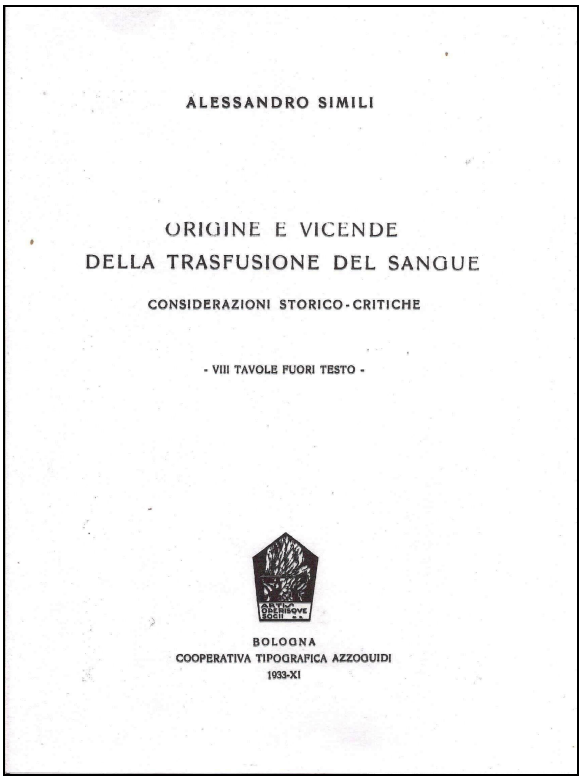
The book does however provide a different account of the history of blood transfusion, some aspects of which is not included in other published works.

In the 'Notes' section at the end of the book (see page 87 of this translation), Simili states that delays in publishing the book included "waiting for the English translation of it". I have been unable to locate an official published English translation of this book.

LIST OF TRANSLATED NAMES

NAME USED WITHIN THE BOOK	NAME USED IN THE TRANSLATION
ALCMEONE	ALCMAEON
ANDREA DI CARISTO	ANDREAS OF CARYSTUS
ARCAGATO PELOPONNESIO	ARCAGATE PELOPONNESE
ARETEO	ARETAEUS
ARISTOTELE	ARISTOTLE
ASCLEPIADE	ASCLEPIADES
CARIDEMO	CARIDEMUS
CELIO AURELIANO	CAELIUS AURELIANUS
CICERONE	CICERON
CRITIA	CRITIAS
DEDALO	DEDALUS
DEMOCRITO	DEMOCRITUS
DIOCLE	DIOCLES
DIODORO SICULO	DIODORUS SICULUS
EMPEDOCLE	EMPEDOCLES
ERACLITO	HERACLITUS
ERASISTATO	ERASISTRATUS
ERMOGENE	HERMOGENE
ERODOTO	HERODOTUS
EROFILO	HEROFILOS
ESCULAPIO	ASCLEPIUS
ESONE	AESON
EUDOSSO	EUDOXUS
EUDEMO	EUDEMUS
EURIDICE	EURYDICE
FABRICIO	FABRICIUM
GALENO	GALEN
GIOVE	JUPITER
GIOVENALE	JUVENAL
GIULIANO	JULIAN
IAMBLICO	IAMBLICHUS
IARED	JARED
ICARO	ICARUS
ICCO	ICCUS
IPPOCRATE	HIPPOCRATES
ISIDE	ISIS
ISOCRATE	ISOCRATES
LEUCIPPO	LEUCIPPUS
LIBAVIO (ANDREA)	LIBAVIUS (ANDREAS)
LUCILIO	LUCILIUS
MARZIALE	MARTIAL
MATUSALEM	METHUSELAH
MENELAO	MENELAUS

METRODORO	METRODORUS
OMERO / OMERUS	HOMER
ORFEO	ORPHEUS
OSIRIDE	OSIRIS
OVIDIO	OVID
PARACELSO	PARACELSUS
PITAGORA	PYTHAGORAS
PLINIO	PLINY
PLUTARCO	PLUTARCH
PLATONE	PLATO
PLAUTO	PLAUTUS
PLUTONE	PLUTO
SALOMONE	SOLOMON
SCRIBONIO LARGO	SCRIBONIUS LARGUS
SOCRATE	SOCRATES
TACITO	TACITUS
TANAQUILLA	TANAQUIL
TARQUINIO PRISCO	TARQUINIUS PRISCUS
TERTULLIANO	TERTULLIAN
TESSALO	THESSALUS
TIBULLO	TIBULLUS
TRALLIANUS A	ALEXANDER OF TRALLES
TULLO OSTILIO	TULLUS OSTILIUS
ULISSE	ULYSSES
ZENONE	ZENO


ALESSANDRO SIMILI

ORIGINE E VICENDE
DELLA TRASFUSIONE DEL SANGUE

CONSIDERAZIONI STORICO-CRITICHE

- VIII TAVOLE FUORI TESTO -

BOLOGNA
COOPERATIVA TIPOGRAFICA AZZOGUIDI
1933-XI

Title-page of 'Origine E Vicende Della Trasfusione Del Sangue'
By Alessandro Simili (1933)
(Image credit: woodlibrarymuseum.org)

SUMMARY

PREMISE

The origin of blood transfusion has been the subject of long study and reason for severe disagreement among the scholars of Italy, France, England and Germany, when they, both in the early days of the experiments and subsequently, for the favour of doctors and of the people, began to contend, by way of national glory, the honour of its discovery.

Nor is it to be believed that today the historical dispute is definitively resolved; because indeed in the general revival of historical studies, pursued with diligence of means and spirit and with alacrity of works and faith, although noting, especially on the part of the Italians, a more frequent - and therefore propitious - concord of opinions than in the past; however most of the authors give a different version and yet different names; so that, once again, the ancient Latin adage rightly returns to admonish: "Quot capita, tot sententiae".

With the present research, however long and sweaty - as anyone who has been involved in this or another knows - I do not intend to say the last word; first of all because I do not have the competence or even the authority, and secondly because I would consider it a careless and vain presumption to make a claim, which could easily be eradicated, when one thinks, among other things, that a famous apostrophe is written in the divine poem:

"O superbi cristian, miseri lassi,
che, della vista della mente infermi,
fidanza avete ne' ritrosi passi;
non v'accorgete voi, che noi siam vermi
nati a formar l'angelica farfalla,
che vola alla giustizia senza schermi?
Di che l' animo vostro in alto galla,
poi siete quasi entomata in difetto,
si come verme in cui formazion falla?";

and because, finally, I firmly believe that the following pages will not say anything new to those who will have the time and inspiration to read them, since I intended to entrust them, as their sole purpose, with the task of placing the facts in the framework that they sit in time, and reveal them, as they evolved, with impartiality

and exactness - an inseparable combination, at least in theory, for anyone who is preparing for historical works - so that every reader can independently deduce the conclusions, which however I dare to hope are in keeping with mine.

It is obvious that anyone who attends to historical research must draw from their predecessors the best they have found and written; I did so too, and perhaps with excessive diligence and scruples (although in researches of this kind "melius est abundare quam deficere"), both in referring to the scientific knowledge dominant in times so distant that it seems almost impossible and to human ingenuity, doctrine and diligence to have unearthed from the thick millenary fog and to have illuminated with sunlight; both in highlighting the dark and fascinating environment; both in examining and exposing to the scrutiny of the most severe and serene criticism the numerous texts that I have all consulted; since it was in my vows that I flee from those who, as the divine Dante says,

> “a voce più che al ver drizzan li volti,
> e cosi ferman sua opinione
> prima ch' arte o ragion per lor s' ascolti.”

And if in the pages that follow, too unadorned, someone tries to find profound doctrine, originality of ideas or novelty of results, he - as I have already said - would search in vain; but everyone will find - I am sure - scrupulousness of investigation and scientific accuracy; that if even these poor skills fail me, it is my job to say right now that all the fault is really mine and that I will be grateful to those who show me the correction.

INTRODUCTION

It is the custom of historians to determine within arbitrary boundaries, represented by the dates of the most notable events, - boundaries that then take on the value of epochs, I would say almost predetermined, the weighty sum of information that the passage of time leaves behind in apparent disorder, so that there is greater clarity of interpretation and memory.

Thus the history of blood transfusion can usually be divided, following De Cristoforis (1), into three periods, the second of which, I have slightly modified with regard to the date of its historical origin:

1st - Mythological period (before the discovery of the general circulation of blood)
2nd - Experimental period (from the historical origin of blood transfusion (year 1628) to the end of the 18th century)
3rd - Therapeutic or practical period (from the 18th century to the present day)

PART ONE

1st PERIOD

I

Some authors (DE CRISTOFORIS (2), ROUSSEL (3), SANTORO (4), ORÈ (5), etc.) wrote that blood transfusion was actually known to the ancient Egyptians, who practiced it - as we read in the *Encyclopedic Dictionary of Surgery* (6), which sums

up the thought of the aforementioned authors very well - "*to promote the renewal of forces in their principles, oppressed by diseases of debility*".

But there is more; continuing reading, one learns that "*being one of them in the act of the operation was understood by horror, seeing a man close to death in his arms, he ordered that it be forbidden, and that the transfusion be replaced by the human blood bath*…"; which news is deduced, according to DE CRISTOFORIS, from BORRICCHIO.

It would have been really nice, if not the compiler of the Dictionary, that DE CRISTOFORIS had had the idea if not to quote the entire passage from BORRICCHIO, at least to affix the precise indication at the bottom, instead of giving the well prepared and safe recipe to the reader: "*History tells us that ... etc.*"; since, it seems to me of capital importance, by the very nature of this work, to verify this information, despite the fact that MORSELLI (7) believes that today "*futile matter of priority are given the importance they deserve*"; I have spent time and effort without having had the good fortune to find it, and without being able to exempt myself from reporting the results, such as they are, of my investigations.

As the enigmatic Egyptian sphinx, once again, posed impenetrable in its mystery.

And I have tried to go back to the very remote sources.

What do they keep for us?

What are they hiding from us?

What do they reveal to us when they are minutely scrutinized and sounded out with the more or less limited means that Nature has for everyone?

What is the appearance of the remains, written or illustrated, and what is the reality of them?

In such investigations it is necessary to proceed with extreme caution, since it is very easy to put the mind ... in error; and to enter at once "*in medias res*" I wonder: if blood transfusion was really practiced in the early days of Egyptian, Greek, Assyrian, etc. civilization, was it performed by doctors or priests?

And then: what are the direct and indirect documents that we have?

That the mention of physicians is very old (since 1672 BC) is credited to *Genesis* (8); but LE CLERC (9) ventured further, writing that "*the first man was, in a sense, the first Physician*"; and this assertion is not difficult to comprehend, and explains the other handed down to us by HOMER (10), namely, that "*Aegyptios omnes medicos esse*." And then, since in Egypt everyone was a doctor (so it should not be too difficult, not only to acquire those notions that are supposed to be indispensable to those who practice medicine, but even to become a doctor!), or, perhaps better, everyone took care of themselves, it does not matter to us, therefore, to answer the previous question; that, in this case, doctors are no longer of immediate interest either in the origin or in the performance of blood transfusion. Because, what remains enigmatic and what is important to know is whether or not this was performed. And to this end it is necessary to follow the most likely footsteps, in the absence of the safest. Therefore, since medical art is in the public and equal domain, doctors did not excel and did not constitute the well-defined category that, conversely, represented the Priests; hence, if it is true that, in absolute terms, everyone could use any therapeutic expedient, nevertheless it is presumed that even in those times the blood transfusion operation - even if it was performed - was not considered very banal and therefore available to anyone; so that, for the reasons already known, the research on the generic and too evanescent work of those doctors is discarded, it is suggestive to insinuate that the Priests, who had the monopoly of all the sciences (more or less occult), could have the prerogative, both for their custom and ability in calling and making sacrifices, and for the aura of mystery in which they knew how to bind these and every phenomenon. Well, what do we know about the Egyptian Priests?

The majority of authors (ALPINI (11), JAMBLICO (12), BORRICCHIO (13), SCHULZE (14), LE CLERC (15), GOELICKE (16), SPRENGEL (17), etc.) agree in

asserting the great wisdom of the Priests, whose "*principia quidem universalia Mercurius ipse tradidit duabus voluminum myriadibus, ut narrat Seleucus; vel ut Manetho, librorurn sex chiliadibus quingentis et viginti quinque supra tres myriadas perfectissine demonstravit*" (IAMBLICHUS) (18), and from whom MENELAUS, according to HOMER (19), would have been initiated into the medical mysteries, and MOSÈ (1537 or 1531 av. Cr.) would have learned not only geometry and arithmetic but also medicine, and HOMER himself, according to DIODORUS SICULUS (20), and PYTHAGORAS, PLATO, DEMOCRITUS and EUDOXUS, according to IAMBLICHUS (21), would have gone to, attracted by their fame.

Priests, were subdivided by PORFIRIO (according to what PUCCINOTTI writes) (22), according to their dignity, into Prophets, Hierostolists, Hierogrammates, Orologues, Pastofores and Neocori, and qualified as magicians by CIRILLO (23), by JAMES (24), etc., were indeed the custodians of ancient wisdom, and therefore the privileged among men, but not the only doctors, since we already know that "*Aegyptios omnes medicos esse*"; and it is natural that in the face of the common level of culture of the time, they, knowing something more than the others, whatever it was, not only enjoyed the esteem and tributes of all, but also arrogated to themselves particular rights.

That they were esteemed the wisest of men, or, so to speak, the heralds of ancient wisdom, does not mean that they were already certainly capable of practicing blood transfusion, and much less that they practiced it: but also admitted, by hypothesis - everything is possible in this world!, and an exceptional set of scientific knowledge is not really required for transfusion, not even now!, let alone then! - that they performed it in particular cases and with unknown technique, since we do not have direct evidence (at least to my knowledge), we try to chase the great fame that hovers over their foreheads and let us try to break it up into words - *absit injuria verbo!*, - so that some favourable element may indirectly result.

GOELICKE (25) in fact writes that the Egyptians "*in physiologia aeque ac pathologia non vulgares fecisse progressus*"; but it will suffice to recall that the conviction that the heart grew two drams in weight every year until the fiftieth year of age, and then decreased by the same weight every year, until death, is of their time and that this was thus the cause: and that even several hundreds of years later, that is up to ARISTOTLE (384-323 BC), not to mention that the "teacher of those who know", angiology (which is the only branch that interests us) had so little progressed that, except for the affirmation of PRASSAGORA (350 BC) - quite late, then! - namely that the pulse is palpated only in the arteries, it can be said that it lay in the most blind confusion. The Great Philosopher in fact, and with him all doctors, who even in the Middle Ages felt the undisputed influence so that his doctrines were the head and end, considered the heart as the acropolis of the body, which produces blood in its cavities and pushes it to the periphery from which it never returns: "*bene igitur Aristoteles comparavit animal reipublicae, animam autem regi, et cor regiae*..." (CESALPINO) (26); and argued that a vein went from the liver to the right arm, hence the conclusion that a bloodletting done in this one cured the diseases of that one, similarly to what happens for the left arm in relation to the spleen; and that the spirit (i.e. air) entered the heart from the trachea; and that the aorta sends no branch either to the liver or to the spleen - from which it might be inferred that he never dissected a corpse -; etc. etc., so that it was necessary to reach GALEN - isn't it strange that no other doctor, and worse still, no surgeon ever noticed that blood spurts from an artery cut in vivo, better than from a vein? - to find the fix for some big mistakes.

And if you add that "*apud Aegyptios medicina hunc in modum distributa est, ut singulorum morborum sint medici non plurium. Itaque omnia referta sunt Medicis. Alii enim sunt oculorum, alii capitis, alii dentium, alii partium alvi, nonnulli morborum occultorum*" (HERODOTUS) (27), whence it is clear that so-called specialists are not a luxury or a novelty of modern times, I ask myself: what on earth and how many things could they ever know, if, moreover, they dealt individually with single parts of

human pathology, albeit granting them the knowledge of the elementary principles of geometry, arithmetic, astrology, etc., when it was absolutely not worthy of [GIOVANI] PICO DELLA MIRANDOLA to embrace it completely with the mind, and when, like the facts, their scientific knowledge proved to be less than embryonic, with absolute respect to BORRICCHIO, their staunch defender? What if they were all doctors? Why then, if the Egyptian Priests were really very learned, as CONRING (28) also writes in another of his books, they exhibited the seriously ill on the public road (so STRABONE tells us) (29), so that passersby could give them wise advice; although SPRENGEL (30) declares, basing his assertion on the ease of exchanging the two Greek words, that not the Egyptians [*Greek*] but the Assyrians [*Greek*] had such a system in use?

In any case, this custom could also be considered as an inveterate habit handed down from generation to generation, or as a public consultation, in the same way that private consultations are made today; unless one wishes to infer, without ill will, that that practice then reflected the intimate awareness of one's ignorance.

If we then come to consider the baggage of their therapeutic means, of a truly primordial simplicity, and which I have long plumbed in order to learn if among them there was a trace or word of blood transfusion, it is necessary for me to say immediately that it was not possible to bring to light any indication of a transfusion measure; since all their wisdom - and today, in the midst of the jumble of medicines, some of which are also dangerous, it is justifiable to agree that finally it was not very little – it consisted of not doing harm; since ISOCRATES (31) tells us that: "*Sacerdotes Aegyptii igitur his usi comrnoditatibus, ad corpora curanda medicinam invenerunt, non eam quae periculosis medicarnentis utitur, sed earn quae cum aeque tuto sumi possit, atque cibi quotidiani, tantas habet utilitates, ut nero neget eos et saluberrimis esse corporibus et vivere diutissirne*". And if in their simplicity and frugality they really deserve the most sincere praise, as they ate no meat and drank water, as OVID (32) tells us in his chaotic and brilliant book and how JUVENAL (33) engraves in a satire, even if the thought of achieving an amazing longevity - chimera of the ancients and moderns!, dream of panaceas a time of immortality, now of rejuvenation! (34) - since, as far as I know, none of them ever reached the legendary age of ADAM, nor of JARED, nor of METHUSELAH (35); nevertheless, it must be concluded that Egyptian therapy existed more in name than in fact.

I only mention a few salient episodes among the many that could be mentioned; on the other hand, if I had to transcribe the best I have gleaned in the volumes of ancient history and accompany it with brief considerations, I would come to compose a useless trial of Egyptian medicine, rather than a very simple study on the origin of the transfusion of blood. It is therefore that, passing over the other notes collected to propose their synthesis; I can say that it appears to me increasingly problematic in its existence. Which, if it were not so doubtful, would have to have leaked here and there, perhaps indirectly, in the same way that, among the most popular therapeutic aids, peeps out the frenzy of enemas and vomiting. So in fact DIODORUS SICULUS tells that they "*morbos ut avertant, clsteribus et potabilibus quibusdam purganentis, jejunisque et vomitu corpora medicantur, idque vel in dies singulos repetunt, vel triduum aut quatriduun interponunt*" and we know that with this particular therapy, which is reported in detail without however remotely presenting the interest that a possible blood transfusion should have been assumed, under whatever aspect it is considered, "*si credeva di aver trovato il mezzo di conserver la vita…, sicchè divenne un costume generale l' eccitare il vomito, almeno due volte al mese, e la domanda che faceasi l'un l'altro non era già: come stai di salute? ma bensì: come hai sadato?*" (HUFELAND) (36). Although, in more modern times even more serious exaggerations have been made, such as the one reported to us by HUFELAND himself (37), namely that 210 enemas were applied to King Lodovico XIII, in the last months of his life, in addition to 47 bloodletting and 215 purgatives!!!

I do not mean, or rather, I do not intend to subvert the fame of wisdom that honours the Egyptian Priests - very intelligent without doubt - and which, perhaps, is a magnanimous tribute from posterity, always ready to be "*laudatores temporis acti*"; time past certainly deserving not for science, but rather for art, and even more for honesty, since

> *non arces, non vall us erat, somnnumque petebat*
> *securus varias dux gregis inter oves* (38);

but one cannot be slavish with an idea, let alone a tradition, full of suggestion and charm without a doubt, but not crowned by the necessary aid of the facts, which are always the only and irrefutable testimony, to the risk of being mocked or pitied.

I gladly grant the Egyptians the merit of having been shrewd observers of the customs of animals, (which they teach many things in their silence), that from them they learned the practice of enema (39) and bloodletting (40), in the execution of which they then had to reach such excellence of art that they did not hesitate to incise the arteries as well as the veins, and of these even the most dangerous such as the jugular ones; so that ALPINI (41), after having exclaimed: "*Quid etenim ut tibi demultis aliqua proferam, nonne mirum in modum landandus esset ille mittendi sanguinis Aegyptiorum usus ex sectione multarum venarum, quae nostris medicis minime sunt usitatae? Quales sunt jugulares, narium, angulorum oculorum, frontis, post aures, poplitis atque aliarum multarum corporis partium... Quid dicam de sectione arteriarum, quam ad mittendum in multis morbis sanguinem, non minus tuto, quam in venis ipsi failiarissime usurpant...?*" (42), states below: "*Aegyptiis sanguinis vacuatio per sectas arterias non minus quam per venas, familiarissima est et absque ullo timore eas secant ad quam plurimos curandos morbos*", albeit accepting the news with discretion; but it is not difficult to argue that, if art and civilization were very advanced, science instead was nothing but a shapeless heap of rudimentary and hybrid knowledge, almost always wrong and frequently very strange. And if I only had this path to travel, I could continue on this tone for a long time, so much so that if those Priests lacked the shrewdness, cradled a hundredfold by circumstances, to wrap with the veil of mysteries, prophecies, rites, alembics and religious and superstitious sacrifices, in which they proved to explain natural and supernatural phenomena to appease the gods (false and liars), the halo of wisdom shining on the priestly head of haruspicices, oracles and other mystical tales, it would quickly vanish at the breath of human invocations and sighs, even under the faint spread of incense in dark temples.

After all, how long did the belief, already expressed by Indian medicine, that diseases were the work of evil spirits and that it was necessary to drive them out with exorcisms, magic, etc., last? Is it not still the case that sorcerers and witches do business in gold, not only among the simple populations of the countryside and mountains, who believe in witchcraft and devilry, but also among the so-called "aristocracy" of the city?

Two observations before proceeding further, the second of which has just been mentioned. The first is this: why is the merit attributed to GALEN of having discovered that the arteries, like the veins, contained blood, if the Egyptians were already in the habit of bloodletting by incising both of them differently? The second is this: is it not perhaps strange that we have received news of bloodletting, with so much replication of details, and not even a hint of the supposed blood transfusion, which also has a distant relationship with it?

But all this would not count for much, and would have only the name, if it deserves it, of mere dialectic, if it were really possible for me to trace in the many dusty volumes I consulted a single passage which, causing the previous castle of arguments to collapse, could have irrefragably documented that blood transfusion

had been in use at that time; instead of the few completely inconclusive lines gleaned here and there.

The only really undoubted fact is the use of human blood as a medicine taken by mouth.

It is permissible for me to dwell briefly on this custom for now. Which originated from the absolute conviction that the soul had its seat in the blood, rather than the blood itself was the soul: "*sanguinem autem animae sedem esse communis est opinio; immo pro anima ipsa accipi solere satis perspicuum est*" (ARISTOTLE (43), CRITIAS (44), etc.); and in this sense he lays down the Sacred Scripture (45), wrote LUCREZIO CARO (46), and even agreed to by HARVEY; hence the belief that in order to restore life, will, activity and vigour it was necessary to give blood by mouth. So in fact HOMER (47) makes the mother of ULYSSES drink blackish blood, when he descended into hell, and she, only after this drink, could recognize him:

... La madre
s' accostò intanto, nè del negro sangue
prima bevè che ravvisommi...

Thus tells ERODOTO for the Lydians, LUCILIUS for the Scythians, TACITUS for the Armenians, PLUTARCH for the Romans, DIODORUS SICULUS for the Greeks, CASSEL for the Huns, the Magyars, the Tartars, the Americans; and gradually, with the passage of time, persisting this revolting use called in its highest expression "blood league", not many years ago Dr. GASTALDI (48) gave an 18-year-old girl suffering from chlorosis, instead of the common martial preparations, blood from an ox heart with great success. But the effects of blood taken by mouth, and human in particular, proved beneficial, according to the ancient concepts, not only as invigorating, but also as real medicines; so that, in the course of this work, we will have the opportunity to cite the various indications.

It is right to remember, however, that Sacred Scripture repeatedly prohibits (49) the pre-established therapeutic system.

The second thing that seems certain, according to the publications of CONRING (50) and BORRICCHIO (51), of which the most learned HALLER (52) concludes that " *non potest mala causa defendi melius, nam Aegyptios transmutationis metallorum ignaros, aut magnos anatomicos medicosve fuisse nunquam persuaserit, ipse nimis credulus*... ", is the use, only in particular cases, of the human blood bath.

We have seen above that such a custom would have followed blood transfusion; and it's not strange, then, that every clue of it has been lost, at least for what I am about and for the negativity of my investigations, while we can read large amounts of information about it? (PLINY (53), ALEXANDER OF TRALLES (54), etc.). How come CONRING and BORRICCHIO, who, although they talk so long about this peculiar bath, have not felt the duty or the goad of curiosity and ambition to mention that other? That if they really knew about it, would they really fail to warn of it? Unless HOEFFT (55) is right in writing that "*verisimilius autern esse, transfusionen priscis medicis cognitam quidem fuisse, sed effectu dubiam ideoque reiiciendam visam esse, nemo certe in fitiabitur*..." and that of his own opinion were not only CONRING and BORICCHIO, but all those who from these very ancient times up to ours - and they are legion! - wrote about medicine. In any case, BORRICCHIO, in book II chap. IV of his work, taking the cue from a sentence of CONRING (56), tells us, with doctrine and elegance, the human blood bath:

"*Veteres autem Hermeticos sanguine humano non nisi inter magica usos esse falsum est; enim vero usi eo sunt etiani ad anginam et comitiales morbos sine ullo crimine. Plinius, l. XXVIII, c. IV; sanguine ipsius hominis ex quacumque parte emisso efficacissime anginam illini tradunt Orpheus et Archelaus: item, ora lapsorum comitiali morbo. Plin. XXVI, c. I. Aegypti peculiare hoc malum et cum in reges incidisset, populis funebre; quippe in balneis folia (57) temperabantur humano*

sanguine ad medicinam eam. Insedisse reges elephantiacos balneo ex sanguine humano et foliis medentibus parato crudele fortasse videri potest magicum non magis potest quam... Notum superius ex Orpheo valere humanum sanguinem ad anginas, ad comitiales quidni licuit regibus experiri, anne etiam ad lepram? (58)... Fuit et Parisiis ante hos octo annos, qui balneis ex calente bubulo sanguine aegros recreavit, auctoritate publica munitus... Abusos esse quandoque humano sanguine idolatras nemini dubium, abusos autem esse Aegyptios, ex Pliniano illo loco nequaquam conficitar", etc.; and so far we are on the subject; but where BORRICCHIO could have written about transfusion, I confess that I don't understand and I don't know. On the other hand, I must say that it seems strange to me that even ALPINI, who in his aforementioned volume entertains himself for a long time and on various occasions around the use of baths among the Egyptians, does not bare quotation, or the most fleeting summary; to say that it was not a very common bathroom!

This, however, was reserved for the kings, who, as is well known, the Egyptians took into account Gods; "*Aegyptii reges suos non secus ac Deos venerantur et colunt; nam et eos non sine Dei providentia summo imperio potiri existimant* " (59): for, without divine help, they could not ascend to the highest power; nor the kings, for their part, proved unworthy of the veneration of their subjects, since they had no disdain, dissecting corpses, to learn the normal and pathological anatomy (without us knowing, in truth, how much they learned and knew about it); so that there is a reputation that the Egyptian king ATOTIDE (60), even more than ERMETE, son or friend of OSIRUS, not only practiced medicine, but also wrote a treatise on anatomy (3000 BC). It is curious to observe that the first cause, it is said, of their immersion in human blood was languor, "*primum movens*" also of the supposed blood transfusion; well, since it was believed that languor was caused by food (61) (it is not clear why), does it not seem strange again that kings did not have at their table just enough to keep them from it?

But why so many speculations? Could it not perhaps lead to silence the following irrefutable assertion of DIODORUS (62): "*quae Sacerdotes cognita in arcanis habent, nolunt, ut veritas ignota sit, ad multos manare; poena iis etiam adjecta, qui ea in vulgus proderent* »? Or this other phrase of PLUTARCH (63): "*Sacerdotes Aegyptii ex quibus plerumque reges eorum creabantur, omnem suam sapientiarn fabulis occultabant...*"? Oh! I do not doubt that many can truly declare themselves satisfied with the phrases of such popular authors and therefore renounce any further research; but if it is not pride to say one's thoughts openly, I do not hesitate to write that I am not satisfied with them, neither point not a little, and it seems to me to be something of absolutely no value, parrying behind a wall that cannot be dismantled spreading the banner of uncontrollable wisdom on the nose of posterity; since it will always be legitimate to raise suspicion (which could also be certainty) that, if among the Egyptian Priests "*cum omnis sapientiae, tum medicinae in primis thesauri fuere reconditi*" (64), such treasures of medical knowledge, then seen through the magnification lens - forgive me the anachronism! - of the occult, were in reality very thin and skimpy. In any case, the traditional selfish mania, typical of those Priests (and even today followed by some wise men, but with a magnificent and generous apostrophe already stigmatized by SENECA in a letter to LUCILIUS) of concealing what they knew is not a sufficient pretext for allowing us to advance in the darkness of those mysteries by waving the torch of Egyptian wisdom.

This is a more comfortable than safe system, to which a second even more comfortable but safer system can be added; that is, that to us - and on the other hand it is truth - almost nothing of their scientific production has reached us (65), dispersed as

...blowing in the light leaves
Sibilla's sentence was lost;

and that therefore no less secret has come to us than the news of their blood transfusion, just as the secret of embalming has not reached us, if not in part, of which however we possess the most splendid specimens, and for which no one will dare to contest their truly sumptuous expertise (66).

But we must never forget that the indirect sources of that very ancient epoch are neither few nor poor and that, without being able to boast a flood of news, it is possible to assert a vast if not profound knowledge; and in any case that every conjecture must have a starting point from a basis of undisputed and indisputable truth.

And speaking of embalming, an addition of FRESCHI (67) to the pragmatic history of medicine of SPRENGEL, would offer the right, by analogy, to admit the practice of blood transfusion; very bold analogy, but still possible; because the very learned Italian doctor tells us that the Egyptians "*sometimes ... used rather to inject into the veins, with a very complicated and very expensive method, a certain liquid composed of various substances...*"; whence the dilemma, apparently impeccable: if they knew how to inject liquids into the veins, why would they not have been able to inject blood?

What could have passed through the minds of those ancient mortals, or, in secret, be handed down from generation to generation, it would be folly to want to hypothecate.

I am obliged to confess that I do not know where FRESCHI dealt with the news of intravenous injections carried out for this purpose by the Egyptians, and to add that, among others, PUCCINOTTI (68) does not write about intravenous injections, but only "*to inject through the intestines, without opening the cavities*...”; but that, in any case, my ignorance is so great that I can neither support the quotation from FRESCHI with other examples, nor further refute it.

And here we come to a truly "miraculous" turning point in our journey; would there perhaps be hope of obtaining some light, albeit artificial, as will happen to us later with regard to MEDEA?

The tradition, to which I mention, is that of ISIS and OSIRIS, the one (69) considered more expert than these (70), and to which TIBULLUS (71) also considered it dutiful and grateful to raise a song:

> *Nunc, Dea, nunc succurre mihi* (*nam posse mederi*
> *picta docet templis multa tabella tuis*).

The Egyptians were indebted to Isis for the discovery of many remedies, or rather drugs, as DIODORUS tells us (72); but note well, nothing but drugs, (no doubt very similar to magical drinks), which are far from being able to represent anything similar to a rather complex and admirable therapeutic procedure that required at least a certain surgical skill how blood transfusion should be considered; without taking into account the usual miraculousness that enormously obscures the clarity of certain phrases. For, to cite an example, the fable of the resurrection of the son ORO, does not deserve any account, as something absolutely inadmissible, which, wanting to raise her ability to the nth degree, miserably obtains the opposite effect; a fairy tale, that DIODORUS (73) succinctly tells us: “*Ab ea quaque rnedelam ad assequendam immortalitatem aiunt esse inventam. Itaque Orum filium a Titanis insidiis interfectum, ac per aquam repertum, non solum in lucem restituit, sed eum fecit immortalem*”; where the previous period may very well allow itself (74), without wanting to give myself the air of being on the side of those who, opposing medicine, objected to HIPPOCRATES, that one could recover very well from any disease even without the help of doctors and medicine.

It is indeed true that, if one lets the mind fly free for the reign of ancient legend, other examples arise here and there of the resurrection of the dead; here ASCLEPIUS, already famous during the expedition of the Argonauts (year 1263 BC)

and therefore risen to the God of medicine, so much so that even in Rome public worship began in the year 716 BC, with his extraordinary ability to bring the dead back to life (DIODORUS SICULUS) (75); wherefore PLUTO, saddened and at the same time indignant that he was depopulating his kingdom, prayed to JUPITER; and the sensitive God of the gods struck the incredibly valiant offender. Here ORFEUS who brings EURYDICE back to life; and so on.

It is certainly an innate need in the human soul to hope and believe in immortality of some men and to strive, as the ancients did, to reach it in the material sense of the word; because, in the moral sense, the thing is nowadays less difficult...

Luckily the great PLATO (430-348 BC) reduces the abilities of ASCLEPIUS to a much more miserable thing, namely to know how to heal wounds with herbs and sedatives and diseases by moderating passions, etc. (this is what the oracles also dictated; except in exceptional cases, such as that of ASCLEPIUS himself who advised ARISTIDE to bleed 120 pounds; could there be a priest who had a personal account with ARISTIDE?); and that HERACLITUS (502 BC), not believing the tale of the murder of JUPITER, tells us more candidly and simply that ASCLEPIUS died of violent inflammation (pleuropneumonia?).

Similar cases could, moreover, be attributed to catalepsy.

But nevertheless the legend has come down to us, with its charm and its load of improbability and beauty, and leaves its heroes intact in full splendour, like so many Numi

...because Numi is a gift
to serve in misery a lofty name.

The myth of ISIS and OSIRIS does not even give us the illusion that MEDEA will give us later; and if all this miraculousness, worthy of a smile, is the best proof of the empiricism of Egyptian medical science, meandering as it were - the snake was in fact honoured and represented the symbol of medicine among the Phoenicians, the Egyptians, the Jews and the Greeks - among those populations thirsty for supernatural events and happy to believe that others would become immortal, seeing and considering that they all died regularly - a belief that had repercussions until a few years ago with regard to a certain Gualdo (76) -; this does not mean, however, that blood transfusion could not possibly have been performed. Because, it is undoubted that certain surgical operations were in the past (without having to go back too far!) skilfully carried out by the layman in the blindest scientific ignorance; let alone in the beginnings of Egyptian medicine, whatever ALBERTI says! (77). But what matters are the facts; and for once they are silent.

And then I ask myself: if it is really true that blood transfusion was practiced currently in Egypt, as also claimed by ROUSSEL who, however, does not specify anything while asserting with all ease that many epochs believe in it, how is it possible that none of the doctors or of the later writers, from MELAMPO (78) to CHIRONE (79), to PODALIRIO (80), to XENOFANE (81) to PYTHAGORAS (82), to ALCMAEON of Croton (83); from EMPEDOCLES of Agrigento (84) to ANASSAGORA of Clazomene (85), to DEMOCRITUS of Abdera (86), to LEUCIPPUS (87); from HERACLITUS (88), to METRODORUS of Coo (89), to ACRONE of Agrigento (90), to ICCUS of Taranto (91), and down to the great HIPPOCRATES (92), and then DIOCLES of Carystos (93) and ZENO di Citium (94), and therefore all the others who followed and that we will name later individually, really no one, has kept a word of it? And would it not have been an excellent knowledge that ARCAGATE PELOPONNESE, the first doctor who came to Rome to practice medicine (year 219 BC), could have brought it with him and made use of it? It is true that both he and his followers (ASCLEPIADES, MUSA, THESSALUS, CRINA, etc.) were equally enriched, while giving proof of profound ignorance and offering their side to the just and terrible phrases of PLINY (95); but come on: couldn't it be a means if not more honest, at least more convincing?

But here I expect an avalanche of objections; and I would like to add that I too have placed them and considered them in detail one by one; and that, by citing those great philosophers and doctors of antiquity, I did not have the heart to produce citations that, directly, in and of themselves are sterile, since the scarcity of news, so to speak, autochthonous, that is original, it is even bleak; but only to ascertain that, although other authors have handed down to us, at least in part, their doctrines in one with many other items of interesting information, around their name, - which for some was never premised to any scientific work as happened for SOCRATES, - anyone who tried to discover traces of blood transfusion would linger in vain. So from the writings of the other authors nothing transpires.

And if GALEN has written so much about HIPPOCRATES, about and against ERASISTRATUS, and about other ancient doctors, is it possible that not even a hint of such an operation was done, if the voice of the ancient custom and practice had reached his ears? And why did all the ancients have so long discussed and written about the "*venae sectionem*", that is, to bloodletting, which, in the final analysis, is a much simpler operation than transfusion, so much so that around it several centuries later a multitude of conundrums was distilled (96), and no one has ever thought of hinting at blood transfusion? How come, when everyone thought about the possibility or necessity of drawing blood, also citing the good reason for its superabundance, no one ever thought of the opposite possibility or necessity, that is, of introducing it, in the case of its excessive scarcity?

Since there is no mention of this latter eventuality, it is really probable that no one has thought of it, despite the opposite opinion of some authors; because the mind and the psyche sometimes have curious deficiencies, sometimes it is very easy to determine and fix a subject on a given path without at all considering the opposite one. Unless you want to induce - which I do not believe - that this supposed blood transfusion had fallen into disuse and therefore into oblivion, or you do not want to reason absurdly and thus conclude - a conclusion absolutely foreign to my thought - that, being a question of such a common operation, no one has put any attention to it, as a matter of no account; and in either case no doctor or philosopher has thought it appropriate to keep a word of it.

But truly an obscure word, which would seem to me torn from the famous sibylline books (which, as is well known, appeared under TULLUS OSTILIUS, in the year 649 BC), if in truth it were not read in the Aphorisms of HIPPOCRATES (97), it jumps over my pen: "*Quicumque morbi ex repletione fiunt, evacuatio sanat; et quicumque ex evacuatione, repletio. Et aliorum contrarietas.*"

Repletio; but what? It is not known; it cannot be well understood.

But SANTINELLI (98), the famous adversary of blood transfusion, suggests to me another passage from HIPPOCRATES, (among the many other places by the same author that he cites more or less on purpose and for which reference is made certainly to its volume), where he is convinced of finding a certain allusion to blood transfusion; and the passage is as follows: "*sanguis alienus utilis sanguis proprius utilis, sanguis alienus noxius sanguis proprius noxius*". SANTINELLI comments and interprets it in his own way, as follows: "*sanguinen proprium esse utilem et noxium, utilem quidem, si bonus sit, noxium si pravus sit, ac male nutriat; sanguinem etiam alienium esse quandoque utilem quandoque noxium, hoc est posse aliquando nostris corporibus bene accomodare; aliquando vero non posse, unde colligi potest esse valde periculosum transfundere alienum sanguinem, cum aliquando etiam possit esse noxium*", etc. But where does the great HIPPOCRATES use the word "*transfundere*", or other similar and unequivocal expression? Or could he not have, more simply, meant that drinking blood is sometimes harmful, sometimes useful?

But by now it is time, after such long and peregrine arguments, to deduce a first conclusion: I cannot at all confirm that the Egyptians invented nor, much less practiced, blood transfusion in any aspect or form, as I could not absolutely trace neither a very tenuous clue, nor an image nor a memory that could give confidence in

certainty; and if this for practical, scientific and historical purposes is equivalent to denying them any merit in this regard, on the other hand I cannot support it and declare it absolutely, as I must honestly animate a doubt: that is, that other libraries, archives and museums of Italy and Europe may contain manuscripts, codes, books or figures which, removed up to now from the most scrupulous investigations or unknown to me, may prove me right or wrong.

II

I deliberately wanted to select the work of the two greatest representatives of the Alexandrian School (99), because the clues that it offers us really deserve special attention.

Their names: HEROFILOS of Calcedonia (100) and ERASISTRATUS of Giulida, in the island of Zia (101).

A hint is attributed to the first (DE CRISTOFORIS (102), MORSELLI (103), MENARD in the *Dictionnaire Encycl*. (104), etc.), or even something more according to *Diz. Encicl. di Chir*. (105), around blood transfusion: a hint that would be contained in his treatise on Anatomy.

HEROFILOS wrote great praises about Anatomy, particularly CELSO and TERTULLIAN; but GALEN also wrote about it: "*Herophilus reliquam rnedicinam perfecte callebat; sed in anatomica doctrina ad summum apicem pervenerat*... "; and that the reputation of the Alexandrian anatomist was very high even in the Middle Ages, FALLOPPIO demonstrates this by writing: "*contradicere Herophilo in anatomicis est contradicere Evangelio*."

That, as GALEN says, he may have reached the highest peak of anatomical science (for those times) may be, on the other hand, nor should he be too surprised, since "*sexcentos* (corpses) *exsecuit ut naturam scrutaretur*" (TERTULLIAN) (106); indeed I would almost say that it would be surprising that after 600 necropsies many and crude observations of macroscopic anatomy escaped him; but with regard to human vivisection, handed down to us by CELSO (107), and which implies both Alexandrian anatomists in the accusation, I have no doubt that it should be considered, if not in the same way, as a tale.

But if the chorus of lauds, which could continue, is truly impressive, even though among them there is screeching, as always happens, some reproaches (TURCHETTI) (108), which proceed from conserve and as good friends, just as "*truths circulate among men mixed and confused with errors*" (SCUDERI) (109) we must not forget that they concern HEROFILOS as "anatomical" and not "surgical"; and that even having been a good anatomist (although the praise addressed to him may perhaps be attributed more to perspicacity than to doctrine) it does not mean you have not been a good surgeon, as, moreover, being a good surgeon does not at all mean having performed or able to perform the blood transfusion. On the other hand it is known that he and his disciples (EUDEMUS, who discovered the pancreas, MANTIADE, ANDREAS OF CARYSTUS, ARISTODEMO, HERACLID OF ERITREA, DEMOSTENE PHILOCTETES, etc.) devoted themselves little to surgery and instead more to the search for remedies, without however bringing noteworthy advantages to therapy (HURTADO DE MENDOZA) (110).

It is superfluous, I am about to say, that I declare that in the works of all the authors I have consulted I have not had the good fortune to glimpse even a glimmer of reference to the question in the studio; which must therefore be considered, even in regard to HEROFILOS, as a dead letter.

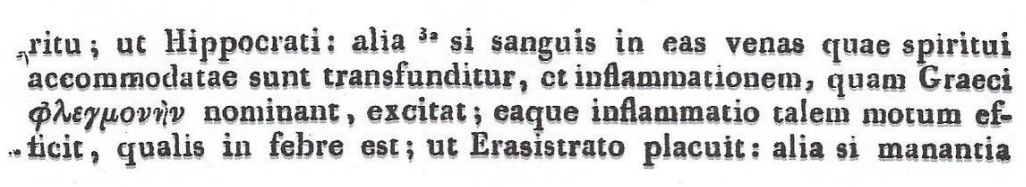
And yet it is a source of profound regret to note once again that none of those who have studied the subject with greater breadth or with wider means have deemed it imperative to transcribe the entire period, certainly not devoid of historical and scientific interest, of HEROFILOS; and how, having such documentation all the

requisites of irrefutability (if, without fail, it were original), it was not adduced as it is to support an otherwise untenable thesis. That if, in fact, it had been exploited wisely, it would not have forced other researchers to undertake sterile and heavy burdens of work and thought, when, on the contrary, the maximum result could be obtained with little effort; since, if it is true that the herophilian allusion is contained in the Treatise on Anatomy, it is not certain that everyone can have the good fortune to admire it in the original; all the more so since to be able to read some fragments of the work of HEROFILOS one would have to wander through all the Libraries of Italy and Europe, finally with the fear, which cancels the joy of reading an ancient codex or an ancient incunabulum, of suspecting it apocryphal or of seeing it on "*ut puto*", as we read on the Greek title page of the manuscript existing in the Ambrosiana, and from which neither PUCCINOTTI (111), from whom I got this information, nor prof. CALDERINI (112) of Milan, nor Cardinal A. MAJ (113), can and know how to give a firm judgment.

Much richer in emotions, albeit sudden and transient, is the study of the work of ERASISTRATUS, for what we can deduce from the notes of his fans, admirers or adversaries; and although the conclusions that will follow the exposition of the periods of one and the other are not such as to comfort the hopes that they first arouse, nevertheless it is undeniable that in these periods the word "*transfundere*" and synonyms are read for the first time.

Reading the work of C. CELSO (114), I came across the following two periods, of which the first (Figure 1) says:

"*... alia si sanguis in eas venas quae spiritui accomodatae sunt* transfunditur... *ut Erasistrato placuit*" (115).

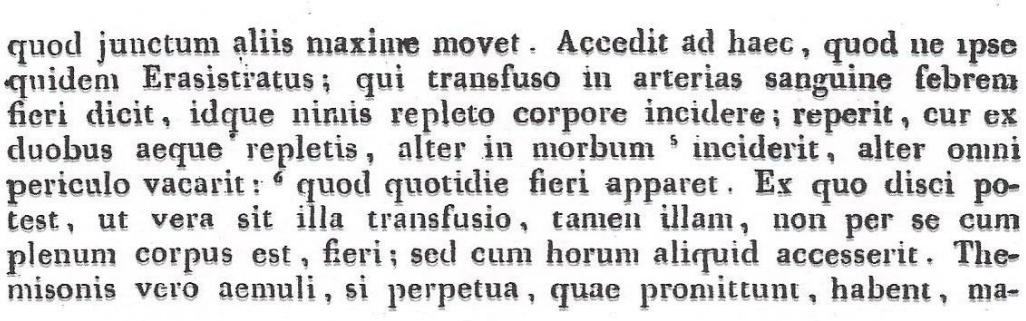


ritu; ut Hippocrati: alia [3a] si sanguis in eas venas quae spiritui accommodatae sunt transfunditur, et inflammationem, quam Graeci φλεγμονὴν nominant, excitat; eaque inflammatio talem motum efficit, qualis in febre est; ut Erasistrato placuit: alia si manantia

Figure 1

and the second, in turn, (Figure 2) says:

"... accedit ad haec, quod ne ipse quidem Erasistratus; qui transfuso in arterias sanguine *febrem fieri dicit, idque nimis repleto corpore incidere; reperit, cur ex duobus aeque repletis, alter in morbum inciderit, alter omni periculo vacarit; quod quotidie fieri apparet. Ex quo disci potest*, ut vera sit illa transfusio, tamen illam non per se cum plenum corpus est, fieri; sed cum horum aliquid accesserit..." (116).



quod junctum aliis maxime movet. Accedit ad haec, quod ne ipse quidem Erasistratus; qui transfuso in arterias sanguine febrem fieri dicit, idque nimis repleto corpore incidere; reperit, cur ex duobus aeque repletis, alter in morbum [5] inciderit, alter omni periculo vacarit: [6] quod quotidie fieri apparet. Ex quo disci potest, ut vera sit illa transfusio, tamen illam, non per se cum plenum corpus est, fieri; sed cum horum aliquid accesserit. Themisonis vero aemuli, si perpetua, quae promittunt, habent, ma-

Figure 2

I think it is beyond doubt that, at first glance, it is tempting to admit a venous transfusion in the first case and an arterial transfusion in the second; but if we analyze a little more carefully the concept of those periods and if we think that CELSO indifferently calls arteries or veins the blood vessels, we immediately see that the veins of the first period are nothing but arteries, and that, since it is necessary to investigate well and be very cautious before issuing a definitive judgment, for now we can ask only two questions:

First: Did ERASISTRATUS know or not, and, in the first hypothesis, did he practice arterial blood transfusion?

Second: Is it possible that ERASISTRATUS has, according to the genius of the second period, made some experimental research?

It would be very important to extensively highlight the scientific conditions of those times by virtue of the more or less important deductions that could be drawn; but, in so doing, the work would go beyond its modest limits; on the other hand, in a small part we have done it before, in another part, albeit in summary, we will go hand in hand that the opportunity will present itself propitiously; in the meantime let's try to see if, gleaning elsewhere, we could find other periods either of ERASISTRATUS himself or of other doctors sufficient by themselves to bring light.

And indeed, in the book of GALEN (117) entitled: "*De venae sectione adversus Erasistratum, etc.*", we read as follows (118):

"*Simulatque vero causa quaedam violenta irruerit, tum sanguinem ipsum* in arterias transferri, *et animal iam necessario aegrotare. Causas item huius rei aliqnas, praecipuamzque illarum sanguinis abundantiam esse, a quo et venarum tunicas distendi reserarique fines, qui prius clausi fuerant*; transfundi etiam in arterias sanguinem, *qui postea spiritum a corde delatumn perturbans, illiusque motum alterans, siquidem e directo, atque prope principem partem constiterit, iami id febrem esse, si autem ab ipso retro repellatur, ac in finibus arteriarum condensetur, inflammationem tune existere… Verum quae ex vulneribus contingit eam sanguinis* ex venis in arterias transsultu fieri ait; *cuius rursum transsultus causam illam, quae ad evacuationem fit, successionem esse putat*…"

Well, what does this period teach us? Nothing other than this: that if by bad luck blood were to be transported in the arteries, man (or animal) would fall ill (*iam necessario aegrotare*), fever, inflammation would arise, and even heart problems would ensue (*qui postea spiritum a corde delatum perturbans, illiusque motum alterans*), etc. So: a disaster. GALEN himself confirms this inflammatory concept, in the pathogenesis, where he says (119): "*Docet enim nos studiose ipse Erasistratus accendi numquam posse phlegmonem*, nisi sanguine ex venis in arterias incidente". Therefore, the eventuality proposed by ERASISTRATUS must be considered not only pathological, but also fatal. And in fact ERASISTRATUS himself, quoted by GALEN (120), says: "*Si itaque hoc ipso tempore adjectiones concessae fuerint et concoctione distributioneque suas actiones perficientibus, vasa alimento repleta fuerint inflammationes multo vehementiores persaepe fieri contingit... Medicantenta enim cum sanis partibus illinuntur, claudendo atque obturando prohibent ne sanguis desuper fusus in loca dissecta irruat; quandoquidem in illa quae affectu carent, eo quod multae arteriae illic venaeque recludantur, sanguis, qui in arterias transilierat, facile in venas quoque transsumetur*", and GALEN continues "*venae namque, quum alimento vacuae existunt, longe facilius sanguinem in arterias ingestum resulnent*...", a concept that GALEN reiterates even further (121): "...*venae, cum a nutrimento exinaitae fuerint, sanguinem qui in arterias transiliit, facilius suscipient*".

Hence, as we can see, very little new can be learned and added to the theories set out above.

As for the second question, I really don't know what to say; or rather, I would know; however I think it is a bit more difficult to solve.

It is indisputable that ERASISTRATUS appears to hypothesise of a blood course different from that considered normal, although it can be said so, since it is known that the ancients had no exact idea about the circulation of the blood; but that he really did carry out experiments in this regard, as that absolute ablative (*transfuso in arterias sanguine*) mentioned above would certainly believe, I would not really dare to affirm. It is more probable that he has only put forward a hypothesis; both, because everyone denies that the experimental method was in force in those times, and because, if ERASIATRATUS had actually carried out such an experiment, he would have immediately had to change his mind about the doctrine of the spirit (or air) contained in the arteries, in which he would have seen blood flow.

Certainly, if the concept of transfusion, in the sense of the passage of a liquid through canals up to then inaccessible to it, either for one reason or another, in the periods in which ERASISTRATUS's thought is clear, the same cannot be said in the sense intended by us; indeed, it is good to immediately establish the conclusion that any idea of blood transfusion never occurred to the Alexandrian doctor's mind.

The reasons? Multiple; and here are some of them:

1. ERASISTRATUS believed that air was contained in the arteries and that blood could not pass through them except however in a totally exceptional and pathological way.
2. With the aforementioned periods ERASISTRATUS did not in the least allude to a possible blood transfusion operation, but only wanted to reflect on the aetiology of some disease, considering the above described occurrence as the cause.
3. He never mentions a possible venous transfusion, the only one that could be admitted based on his theories, but only arterial; and this is inadmissible for the above reasons.
4. ERASISTRATU, although an excellent surgeon, (as BURCI) (122), as he would have performed gastrorphic operations and operated abscesses of the liver and spleen, and exercised his mind in the invention of a kind of syringe, and however daring he was in surgical art, as CELIO AURELIANO (123) attests, he had no sympathy for bloodletting, at least according to what GALEN tells us (124):

   "*Quaesitum ergo a quopiam fuerat num Erasistratus recte fecerit quum venae sectione numquam sit usus*"; and at this point at least I will want to concede that without a partial "*venae sectione*" it is absolutely impossible to have a blood transfusion!
5. Although blood transfusion is inevitably linked, *from the scientific point of view*, with knowledge of the general blood circulation, nevertheless it cannot be absolutely ruled out in a peremptory way that there may have been, I do not say the idea, which for true we will read later, and in incontrovertible form, in a period of CARDANO, and therefore some time before the general circulation of the blood was known, but also the fact that the experiments attempted for Pope INNOCENT VIII and the mysteries of the Croce-Rosei would seem to prove it. As for blood circulation, in BOERHAAVE's book (125), HALLER tells us that ERASISTRATUS "*experimentum fecit, quod poterat ad circulationem sanguinis facere; ligavit femora et brachia in sputo sanguinis".* (CELSO, lib. IV, cap. 4); for which we wanted to induce that the Alexandrian doctor had a glimpse of knowledge, or even something more, of blood circulation, although, in my opinion, it is necessary to express one's thoughts clearly when one tends to a certain end, and not to force posterity to elaborate and stretch out consequences and knowledge, which perhaps never crossed the brain of whoever said or wrote that period, as is the custom of commentators with regard to poets; but, to conclude, there is absolutely no sure sign of blood transfusion, and no evidence for circulation.

And it is truly strange and at the same time curious - as I said above and how I insist - that all the ancient authors write so frequently and with so much interest about bloodletting (which they indicate with the words "*venae sectio, mittere sanguinem, sanguinis mission*", etc.) and around its peculiar modalities, but no one hints with any foundation, not even superficially - without enigmas, of course! - to the reverse operation, that is to introduce blood (*transfusio sanguinis, sanguinem transfundere o immittere o injicere in venas* (126): although, for this last verb and derivatives it is necessary to be very careful not to fall into gross errors, since, for example, in the following period of TERTULLIAN (127), the word "*injectiones*" means precisely "*cogitationes*", that is "*intentions*"!: " *Nam et ego si quid donavi, donavi in persona Christi, ne fraudemur a Satana; quoniam non ignoramus injectiones eius*"); which operation could not, even in those times, arouse curiosity and interest, or excite enthusiasm and hopes, as it must have exaggeratedly generated twenty centuries later.

And is such forgetfulness possible if blood transfusion had really been in use? Such stubborn and general silence? Eh, go! It would seem almost a tacit understanding, if saying it were not absurd.

Thus, in my opinion, all hopes conceived of fine principle on the basis of the periods first of CELSO and then of ERASISTRATUS and GALEN fall, and one plunges back into a three-thousand-year darkness.

The soul is always yearning for investigation, but the conviction of not finding any trace that serves to clarify the question is deep in me. Because, so it seems to me impenetrable silence of things, codes, art and iconography of that era, so rich in spiritual, artistic, sentimental and scientific seductions, like the silence and the voice of the numerous disciples of ERASISTRATUS (LICONE of Troade, STRATONE (128), APOLLONIO of Menfi, NICIA of Miletus, APOLLOFANE, CARIDEMUS and HERMOGENE of Tricca, etc.).

III

But this medicine of ours, so mistreated even by very great men, so that BACCELLI (129) wrote that "*the plebeian world passes before it irreverent, the poet makes fun of it, the transcendent philosopher laughs at it; ready all to bend forward as if to a God, when the crude hammer of infirmities strikes them*"; this protean medicine, which however, according to HIPPOCRATES (130) and CICERO (131) has a divine origin, even though its followers, according to CATONE (132) opposed them almost as much as the Carthaginians, and according to PLINY (133) do not show at all to feel the aura that it breathes; this medicine, I say, must still lead us along the paths of superstition, prophecy, magic and mystery, before leaving us free to follow those marked by science.

Another legend tells that TANAQUIL (134) gave her husband TARQUINIUS PRISCUS in a supreme attempt at salvation, her own blood. It is known that this king of Rome was assassinated in the year 577 BC, the 38th year of his reign; and that if antiquity, exquisitely legendary as always, was able to embroider around the supreme test of his wife and pass on the legend of a truly superb therapeutic attempt, such as blood transfusion, this is due to the fact that TANAQUIL was renowned as a sorceress. Therefore, the fable worked a lot around her; which is, as far as you want, "*a building raised above the foundations of truth, and under the bark of the fable are hidden the senses of the most arcane philosophy*" (VINCENZO DA FILICAJA) (135), but it is still a fable, unreal like a good dream.

However, it is precisely in consideration of "the arcane philosophy" which it contains, that I have also investigated this vague clue minutely; but unfortunately, again, without touching better luck.

PAIS (136), in his admirable *Critical History of Rome*, writes at length and with certain competence about the events of TANAQUIL and her husband TARQUINIUS PRISCUS, not failing however to observe that too much has been talked about these characters; and in any case he ends his study without even briefly mentioning what the Book of Wisdom of TANAQUIL would mention.

BAYLE (137), in turn, tells us that the ancients "*supposed that TANAQUIL had found excellent remedies against diseases and that she had locked them in her belt*"; but this, as we can see, does not at all mean that she knew and practiced blood transfusion, but only that she was an expert in the art of magic; nor, on the other hand, does it tell us that she had ever given her husband her own blood.

MOMMSEN (138) tells us absolutely nothing; as nothing is found in the new *Historical Dictionary* (139).

And so it is necessary to be satisfied with the mere mention of the fact, which, although sub judice, seems unlikely to me.

And so, in the same way, I could make an observation, which has all the appearance of being out of time and place, and will be insane as well as absurd, but in the end it can cause no harm except to its author; observation that has comfort and foundation in the analogy of the murder of King TARQUINIUS PRISCUS, and of which several others, more or less brainy, could be made. In any case, given that the memorable event of which TANAQUIL was the protagonist would have taken place in Rome, where the echo had not yet been extinguished, why would it not have been thought to repeat the same experiment for other similar mournful events, for example for CAESAR dying after the ambush? Far be it from me the foolish display of hindsight; but what better occasion for the doctors of the time (TEMISONE, MUSA, NICONE of Acraganto, etc.) to demonstrate to the great Emperor that, in 47 BC, dictator in Rome, had granted doctors the right of citizenship, not only his gratitude, but also his doctrine and surgical daring, so little appreciated? (PLINY (140), MARTIAL (141), JUVENAL (142), etc.).

Because, if it is not always possible with deeds, at least in words it costs very little! ...

The legend flourishes better the further one gets in time, and the death of Julius Caesar took place 533 years after the infamous episode of TANAQUIL; and the human spirit is usually eager to have recourse to ancient memories rather than recent ones, and the Roman one, perhaps even then, inclined to the reminiscences of ancient Greece, teacher of arts and sciences, rather than those of Rome, teacher of arms and empire; and it is very true that certain treatments, operations and drugs are subject to fashion such as clothing, hairstyles, etc., so that what once was in force could lie in oblivion; it also means that doctors, with all certainty, would not have had the opportunity or the time, given the circumstances, the place, the severity of the wounds and above all the environment in which the murder was carried out, to rush and to access the dying person and to arrange any assistance; but if it is true that TANAQUIL was able to donate her blood to her dying husband at the hands of a murderer - which I think is a fairy tale - I think that, although the divine Emperor was to be considered lost no less for the numerous wounds inflicted on him treacherously by Brutus and assassins than for the resoluteness of the ambush, if blood transfusion had been a notion acquired by tradition or by experience, by the works of innumerable authors who have written of him with love and of the end of him with regret and mourning, could very well have peeped out a very fleeting allusion or a very rapid thought about this superb attempt fatally failed.

Thus history would have embellished without any damage to the truth, weaving it, the chronicle of one of the grimmest crimes of all time and for which one of the greatest geniuses of humanity ceased to shine on 15th March 44 BC, on the horizon of the city.

IV

And here, finally, we have come to examine the first step, where, more or less clearly, it would seem to allude to the transfusion of blood.

It is a passage from OVID (143), perhaps for the first time indicated by MANFREDI (144), according to ELSNER (145), but known for a long time under another aspect (FICINO (146), etc.), and by then cited almost as a matter of course by other writers (VINCENZO DA FILICAJA (147), etc.) who touched upon the subject in study in their philosophical wanderings, besides, as is well understood, by doctors (DE CRISTOFORIS (148), MORSELLI (149), ROUSSEL (150), HOEFFT (151), etc.). Some of these (BARDUZZI (152), LANDI (153), SCALZI (154), RUBINO (155), POSTEMPSKI (156), SANTINELLI (157), *Encicl. Med. Prat*. (158), etc.), place the origin of blood transfusion in the time of OVID, without mentioning more ancient times; someone else (FICINO (159), JAMES (160), etc.) mentions MEDEA exclusively as a sorceress capable of restoring youth with empirical means, without making the slightest mention of the problematic blood transfusion that others attribute to her in one with her singing, (this proves that they were far from attributing to it that value that it has assumed for others); still others (BILLROTH (161), etc.) do not mention it at all.

The passage from OVID sounds like this:

> "*...Quid nunc dubitatis inertes?*
> *stringite, ait, gladios, veterernque haurite cruorem*
> *ut repleam vacuas iuvenali sanguine venas*."

It is irrefutable that in this place there is talk of filling the empty veins of the old with the blood of the young in order to rejuvenate; but what the appearance offers us must not be immediately taken as reality, but studied and... calibrated, since from words to deeds there is often more than an abyss, there is a current involved... so adverse that it cancels them; and if almost all the authors have considered that there is a sure trace of blood transfusion, it seems to me that a rigorous examination of the aforementioned verses somewhat distracts us from that opinion and instead presents the theme in a different light, that is to say, not smooth at all, but fraught with doubts.

And let's see.

No other Latin author, poet or prose writer, much less a scientist, confirms us with a similar phrase what the poet from Sulmona writes; and it is truly astonishing the fact, even if very possible, that a doctor ignores a therapeutic procedure extolled by a poet; secondly, it is necessary to take into account that, apart from mythology has handed down to us all sorts of miracles, in the work of the Sulmonese there cannot be the exactness and rigor of the scientist, but only the imagination and boldness of the poet; who, precisely because he was endowed with great ingenuity, ready to write admirable things in marvellous verses, then found the help of magic grateful to his imagination, invoked to carry out enchantments transformations rejuvenation with the same ease and with the same chaos, which it necessarily swirled in his own as in the intellect of other poets.

But that would mean very little; at the most as an alarm bell... to a mere dialectical denial.

And here it is precisely that this quotation is perfectly isolated, and so little rooted in the mind of the poet himself, that before, in the description of the rejuvenation operation, he, among other things, writes:

> "*nunc opus est sucis, per quos renovate senectus*
> *in forem redeat primosque recolligat annos*" (162).

And a little further (163), when the procedure employed is fully read, here is what is described:

> "...*stricto Medea recludit*
> *ense senis jugulum, veteremque exire cruorem*
> *passa, replet sucis*...".

And even further (164):

> "*cuius ut Haemonio marcentia guttura cultro*
> *fodit, et exiguo maculavit sanguine ferrum,*
> *membra simul pecudis validosque venefica sucos*
> *mergit in acre cavo*...".

And so the rejuvenation process is complete!

We would almost have to say that if that wretch hadn't been in the hands of a sorceress, we missed nothing but a really deadly cough!

And how many other transmutations does OVID accomplish? (165). And the poets do not even celebrate the reverse fact, that is the transformation from young to old, suffered for example in the blink of an eye by ULYSSES (166), and finally the famous transformation, which, CIRCE accomplished, of ULYSSES' companions into swine? (167) On the other hand, is the metamorphosis of AESON by MEDEA, from old to young, perhaps worthy of faith? Reading the whole episode (168), here is an invocation to the Gods and then a whole mechanism of fabulous things before giving the old man his youth again, and not by transfusing him with blood - and here is the beauty! – but with... giving him a magical drink! And where did the aforementioned procedure end up, which raised such high hopes of reality... proven, albeit unlikely in its effects? Should the spirit of this enchantment be taken as a genuine expression of knowledge known or experienced in those times, or rather of imaginative revolutions? One fact is certain: when one hopes to glimpse the description of a procedure other than the very banal one mentioned above, one will again fall into either the mystical or the fantastic or the miraculous.

I therefore think that Ovid's allusion must be considered nothing other than a poetic image and not as a reminiscence of things read or heard; an image that suddenly crossed the unconscious mind of OVID, but did not enlighten - nor could it - in its true practical and no less theoretical value, neither his nor the minds of his contemporaries (especially doctors) nor, for over sixteen centuries, the minds of posterity.

Moreover, even at that time, where the most varied antics and beliefs of the cultured and uneducated people existed, in the inane occultism of signs and phenomena of nature, up to the hyperbolic, albeit ingenious, poetic visions were lacking - and how! - scientific knowledge, which was always, more nor less, represented by the doctrines of ARISTOTLE (169), more than by those of PLATO (170), and by the already known theories of the Alexandrian School.

V

MORSELLI (171) refers to other vague indications: the principles of physics of MASSIMO, the Treatise on the sacrifices of the emperor JULIAN, and an ancient Hebrew text shown by the rabbi of Amsterdam to LAMARTINIERE.

I can't add a single syllable to it.

VI

And, for the second time, let's go back to consulting the works of science.

No author enlightens us about the origin of the blood transfusion since no one talks about it; but all (PLINY, CELSO, SCRIBONIUS LARGUS, TERTULLIAN, CAELIUS AURELIANUS, ARETAEUS, Q. SERENO, FICINO, PARACELSUS) mention the therapeutic use of blood taken by mouth.

In fact, PLINY (172) tells us that the sick with "*morbi comitialis*" (173) used to drink the blood of the gladiators killed in the arena: "*sanguinem quoque gladiatorum bibunt, ut viventibus* (174) *poculis, comitiales morbi: quod spectare facientes in eadem arena feras quoque horror est. At hercule illi ex homine ipso sorbere efficacissimum putant calidum spirantemque, et una ipsam animam ex osculo vulnerum; cum plagis ne ferarum quidem admoveri ora fas fit humana*"; which custom lasted almost unchanged until the fourteenth century, - renewing the horrendous spectacle to be seen even in the event of fairs, - as CANTÙ tells us (175): "*Then, with the furious anxiety from which thirsty dogs rush to the fountain, some were seen running on the gallows; to collect in a bowl the blood that gushed from the torso and rained from the head, and steaming down it. They were unhappy, tormented by epilepsy, who believed with this horrible remedy to heal from the most horrendous of infirmities.*"

We already know that human blood, for oral use, was attributed, in addition to therapeutic virtues, even thaumaturgical virtues, which it is not necessary to repeat here.

Anyway, let's read the same thing in several other Latin authors, and precisely in:

a) CELSO (176): "*Quidam jugulati gladiatoris calido sanguine epoto tali morbo se liberarunt; apud quos miserum auxilium tolerabile miserius malum fecit*."
b) SCRIBONIUS LARGUS (177): "...*Postea adiicitur, si puer fuerit qui laborat, testudinis masculae* (178), *palumbi masculi,... sanguis, quantum fluxerit dum viva utraque animalia dimittantur. Sin autem puella fuerit, foeminei generis animalia sint, et eodem modo capta, sanguine effuso emittantur... Nam sunt et qui sanguinem ex vena sua missum bibant*..."
   And elsewhere (179): "*Item ex jecinore gladiatores jugulati particulam aliquam novies datam consumant*..."
c) ARETAEUS (180): "*Nonnullos autem vidi nuper jugulati hominis vuineri phialam subjicientes, atque inde haustum cruorem bibentes. O ingentem necessitatem, quemquam sustinere, malum malo piaculo depellere! Atqui ex ea ad sanitatem, nec ne, illi pervenerint, nemo vere mihi affirmare potest. Quin et quemdam auctorem legi qui humanum jecur epulandum apponi praecipiebat*."
   And further on: "*humanum autem sanguinem ac viscera ab homine devorari, non minus contra naturam hominis censeri debet, ac si homo in feram vertatur*."
   Thank god!
d) TERTULLIAN (181): "*Ecce in illa religiosissima urbe Aeneadaruin piorum est Jupiter quidam* (182), *quem ludis suis humano prolunt sanguine... De sanguinis pabulo et eiusmodi tragicis ferculis legite nec ubi relatum sit, (est apud Herodotum, opinor) defusum brachiis sanguinem ex alter utro degustatum nationes quasdam foederis comparasse* (183); *nescio quid et sub Catilina* (184) *tale degustatum est, aiunt et apud quosdam gentiles Scytarum defunctum quemque a suis contedi... Hodie istic Bellonae sacratos sanguis de femore proscisso in palmulam exceptus esui* (185) *datus signat. I te illi, qui, munere in arena noxiorumi jugulatorum sanguinem recentem avida siti comitiali morbo medentes auferunt, ubi sunt?*"
e) CAELIUS AURELIANUS (186): "... *Dant etiam bibendum lac asininum, cum sale, vel sanguinem testudinis marinae, vel humanum, aut vituli marini, et non solumn*

sanguinem, verum etiam coagula, quae lacti miscentur... Et tunc corda hominum atque equorum » (that is: comedenda!!!).
And a little further on: "*Non aliter etiam potus sanguis testudinis, sive hominis, atque vituli marini, et sumptio coaguli, quod Graeci* [*Greek*] *vocant. Mustelae quoque, sive hominum caro siccata*..."

Q. SERENO (187) also mentions it, but in less clear terms than the others.

Therefore all, very openly and almost with the same words, trace the same concept; but no one, as I have already said, deviates from this. Moreover, the habit of drinking animal and human blood is perhaps even more ancient than what we think and already know; and it is known that in the solemn religious functions of the most remote (and even quite recent) antiquity, blood never failed to make a mournful appearance and impression. And in fact, in a note on p. 267 of the book of the mysteries of IAMBLICHUS (already mentioned above) we read that "*hanc ob causam in evocandis manibus et Daemonibus fere adhibebant sanguinen calentem et anima plenum*." And since it is still blood ... drinkable, so I like to add that in the *Book of Wisdom*, translated by BOARETTI (188), we read the following passage: "*Nam pro fonte quidem sempiterni fluminis, humanum sanguinem dedisti injustis*"; a passage which, according to BOARETTI, should not be understood literally and which would only indicate the Nile "*cangiato in sangue in castigo del decreto, con cui Faraone comandava che i figli degli Ebrei fossero uccisi*."

However, as everyone notices, in all the places cited there is no mention of blood transfusion, but only of drinking blood, even more horrendous because it is human; and of this we have spoken at length above.

MARSILIO FICINO (189) also takes the word of "sucking" the blood, recommending to the old to suck the blood of the young in order to rejuvenate: "*Communis quaedam est et vetus opinio, aniculas quasdam ... infantium sugere sanguinem, quo pro viribus iuvenescant. Cur non et nostri senes omni videlicet auxilio destituti, sanguinem adolescentis sugant? ... Sugant igitur more hirudinum ex brachii sinistri vena vix aperta unciaim unam aut duas*"; and a little further on: "*Deinde ut moneam, sanguinem potari posse et quidem salubriter; atque in sanguine humano virtutem esse, qua humanum sanguinem attrahat et mutuo prosequatur. Ne forte diffidas iuvenilem sanguinem a sene bibitum trahi ad venas; membraque posse, ibique prodesse quamplurimum.*"

And it seems strange to me that SPRENGEL (190), (evidently in error, despite the clarity of those periods, which explains the thought of the famous Florentine doctor better than any comment), attributes the first idea of blood transfusion to FICINO; when he, in giving the above advice to old people and in giving them several others (191), had in mind only the aim of having the blood sucked in order to prolong youth, without, as is well understood, to succeed neither less for oneself; intently reachable, according to him, through a blood therapy "*per os*" (and not "*per venam*").

Being able to regain youth or to be able to prolong it to an ever more distant death was at all times a goal avidly pursued and not achieved; and it is easy prophecy to assert that, even in the years to come, the problem of perennial or resurrected youth will thrill and delude scientists and the elderly.

But time will follow its path inexorably and invincible.

BICHAT (192) says splendidly: "*La vie est l'ensembie des fonctions qui résistent à la mort*"; and how can we prevent these numerous and complex functions from never wearing out in their daily resistance? That is, even if worn, as can be admitted - hope is always legitimate! - that by means of any mechanism, always too simple and almost rudimentary, they can return to their pristine state? Unfortunately we die little by little; and we ourselves witness our fragmentary death. First, childhood dies; then adolescence, - then youth .., and so on, until old age, even if one reaches it, with the end being the death of the whole body. And our life cycle is thus completed. The suggestions of BOERHAAVE (193) and the narratives of HUFELAND (194) and

BORRICCHIO (195) make us smile sadly, since nothing else should hope for us except a benevolent delay of old age and death!

I do not want to deny here that a hygienic and sober life should really have no weight in postponing those unwelcome visits at the latest; but I am not writing a treatise on youth and I realize that I have already exceeded the limits of a lepid digression.

And even PARACELSUS (196), of whom HURTADO DE MENDOZA (197) says that he founded the therapy "*enteramente en la cabala*", could do no better, long after, than to recommend the use of human blood orally, liquid or congealed in pills or distillate.

VII

It now falls in order to keep word of what STEFANO INFESSURA (198) wrote in his Diary of the city of Rome, on the basis of which, and almost exactly transcribed, MURATORI (199) handed down to us that famous narration, from which we wanted to deduce another argument of supposed blood transfusion, carried out in Rome in 1492, with the aim of saving the life of the dying Pope INNOCENT VIII.

Here is the narrative:

"*Interea in urbe numquam cessarunt tribulationes et mortes; nam primo tres pueri decem annorum e venis quorum Judaeus quidam medicus, qui Papam sanum reddere promiserat, sanguinem extraxit, incontinenti mortui sunt. Dixerat namque illis Judaeus se velle sanare Pontificem, dummodo habere posset certam quantitatem sanguinis humani, et quidem juvenis, quem propterea extrahi jussit a tribus pueris, quibus post phlebotomiam unum ducatum pro quolibet donavit, et paulo post mortui sunt. Judaeus quidem fugit et Papa sanatus non fuit.*"

MURATORI rightly considers this operation to be the same as a crime, and so must anyone consider it, even a doctor. It is true that we are by no means certain that it really happened; and if by chance it was really tempted rather than carried out, that it did not have any success, nor even in its preliminaries, the death of the children, the escape of the doctor and the oblivion of that time, prove it.

However, before devoting ourselves to the study and examination of the above period, let's see, if it is possible and as best we know and can, to investigate the authenticity or not of the fact.

The only one who flatly denies it is PASTOR (200), the undoubtedly great historian of the Popes, who expresses himself as follows: "*As the Pope rejected that blood, the evil doctor fled. If this account were well founded (as* GREGOROVIUS, IV, 19 *seems to believe), it would be important to prove that Jews used human blood for medicinal purposes. Except that the precise embassy dispatches of the Mantuan agents still unpublished and examined by me do not say anything similar. Not even in the* VALORI *report is there any mention of this.*"

But if VALORI says nothing, the *Encyclopedia Ecclesiastica* (201) nothing, and the *Histoire de l'Eglise* (202) nothing, many, on the other hand, are those who report, almost with the same words, the same fact; and if the concord of these last authors, which could also be fictitious, can lead us into an easy judgment, nevertheless we must not forget that it cannot have absolute value, since the source of information may have been unique. Of course, if the fact were proved with irrefutable documents, so that no doubt of an interpretation or transcription error could arise, one could almost agree with JOUGHIN (203), when he writes: "... *but I can find no record of any earlier account which approximates the preceding in clarity*"; although he forgets that, if there really are no previous accounts that go beyond the one in question for clarity, nevertheless there is a famous period of the CARDANO, which, in my opinion, says much more than it apparently expresses.

In any case, GREGOROVIUS says, so badly accepted by the PASTOR, that "*qual nome meriterà invece la turpitudine che si commise al letto di morte di un Papa? ... ed eglino morirono vittime di quell'iniquo esperimento. Vien detto che il Pontefice non vi avesse acconsentito, e che cacciasse poi da sè il medico: meno male!*" (204).

Thus, in the *Ecclesiastical Annals* of RAYNALDUS (205) we read: "*Laboraverat diutino morbo, a biennio enim, quo torpore soporifero viginti horis sine vitae signis jacuerat, adversa valetudine fuerat usus: acciditque tum, ut cum vis morbi medicam artem eluderet, Judaeus impostor, qui valetudinem pollicebatur, a tribus pueris annorum decem, qui paulo post emortui sunt, sanguinemn exhauserit, ut ex eo pharmacum stillatitium chimica arte paratum propinandum Pontifici conficeret; quod cum Innocentius rescivisset execratus nefas Judaeum jussit facessere, qui mox fuga supplicio se subduxit.*" Here see not the hypothesis of a blood transfusion, but rather of a blood drink, prepared with particular art that could have the taste of alchemy, and that had to be administered to the Pope.

But SISMONDI (206), in its history, writes: "*Nell' ultima sua malattia Innocenzo VIII si lasciò indurre da un medico giudeo a tentare il rimedio della trasfusione del sangue, rimedio tante volte proposto dai ciurmadori, ma fin allora non isperimentato che sopra degli animali* (207). *Tre fanciulli… furono successivamente assoggettati all' operazione crudele con cui doveasi far passare il sangue delle lor vene in quelle del vecchio e il sangue di questi nelle vene loro. Tutti e tre morirono nel cominciamento dell' operazione, probabilmente per l' introduzione di qualche bolla d' aria nelle lor vene*..." (208).

And also VILLARI (209) informs us that "… *forze vitali di Innocenzo VIII svanivano rapidamente... Si cercava invano ogni mezzo per ridestare la spenta vitalità del Papa, quando un medico ebreo propose di tentare con un nuovo strumento la trasfusione del sangue; cosa tentata fino allora soltanto sugli animali. Il sangue del decrepito Pontefice doveva passare tutto nelle vene d' un giovane che doveva cedergli il suo. Tre volte fu tentata la difficile prova, nella quale, senza alcun giovamento del Papa, tre giovanetti perderono successivamente la vita*..."

I do not doubt that theoretically there were rumours among doctors or even among medical charlatans of the possibility of transfusing blood from the veins of a young man into those of an old man, and that this was not a mystery, although no irrefutable documentation comforts us in this hypothesis, and only CARDANO, more than sixty years later, speaks of it; but that blood transfusion experiments on animals had already been attempted, I do not know at all and I can not even confirm on the basis of my research. Is that news true? Or did SISMONDI and VILLARI unwittingly embellish it with some additions or details that were well known in their time but perhaps not to those of COLOMBO?

What TOMMASINI (210) tells us, in his commentary on the INFESSURA diary, is certainly an interesting detail, but it does not reveal anything new in regard to transfusion medicine; which, on the other hand, would thus reveal its own birthplace, without the shadow of a doubt, if it were possible to know from whence SISMONDI and VILLARI were able to obtain the news that it had already been tested on animals.

As regards the aforementioned fact, it is correct to advance at the forefront, for obvious multiple reasons, a prudent reserve; nevertheless I think I can say that if it happened, it must have happened on the basis that we will say just now, albeit without the knowledge of the weary and drowsy Pontiff, who certainly was horrified at that sight, as it was in itself; but that a blood transfusion had indeed been attempted, despite the very clear expression of SISMONDI and VILLARI, I would not dare to affirm but would rather agree to disagree; because, I have certainly read (but I have lost the indication, as I cannot find it in my notes) that the Jewish doctor handed the blood of the three children in a cup to the Pontiff for him to drink. Thus, moreover, RAYNALDUS also suggests, and so judges C. R. of Chicago (211), who writes that

the Jewish doctor "*for this purpose he drew all the blood out of three young boys, who immediately died. With their [this] he prepared a draught which, in spite of the doctor's protestations, failed to improve the sick pontiff's condition. The saving virtue of drinking human blood was no new idea*"; therefore he, in order to save the Pontiff, drew all the blood of the three boys, with whom he prepared "a potion", which completely missed waiting (more or less hostile); it being very true that the idea of drinking human blood, due to its peculiar already known virtues, was by no means new.

Another side of the question, which deserves a long and careful examination in the light of profound investigation and not only of reasoning, is that which concerns the possibility or probability that Jews (doctors or not, but still famous) could have the right to enter in the Vatican, albeit in a completely extraordinary or rather exceptional way, as the visit of an illustrious doctor to the Pontiff who is lying in desperate conditions should be considered. My research gives me confidence that even in these extreme cases an attempt was made to observe the decree prohibiting Jews from accessing the Papal Palace.

In any case, whether in regard to the historical event, or in relation to the supposed operation (very nebulous!), one fact stands out immediately and deserves to be remarked: the attempt to cure a fatal disease, through the vital properties of blood, and not to help (teacher indication!) a bled body, as we saw for Tanaquil, nor, much less, the tenaciously pursued mirage of prolonging or bringing youth.

VIII

And finally, after so much wandering in vain, the first period, where the concept of blood transfusion is really induced, even though to the author it seems unreal and unattainable, that is to say such as to completely change customs. And it is precisely this lack of confidence in him in the new whispered procedure, or rather a certain scepticism, that makes him hardly mention it, without even pausing; and it is still precisely this haste of his to get rid of that voice and this news, which he does not care to deepen and describe better, that authorizes us to proclaim CARDANO not as the discoverer (which in truth, in our case, it is not possible either to recognize or in any case to designate him), but only as the standard bearer of blood transfusion.

Unexpected standard-bearer perhaps yes, but still such.

The famous and odd Milanese doctor GIROLAMO CARDANO (212), a man of vast mind, (Figures 3 and 4) wrote thus: "*Sunt qui cum alio juvene bonorum morum duplici fistula, alii unica, commutare sanguinem posse sperent; quod si fiat, commutabuntur etiain mores*".

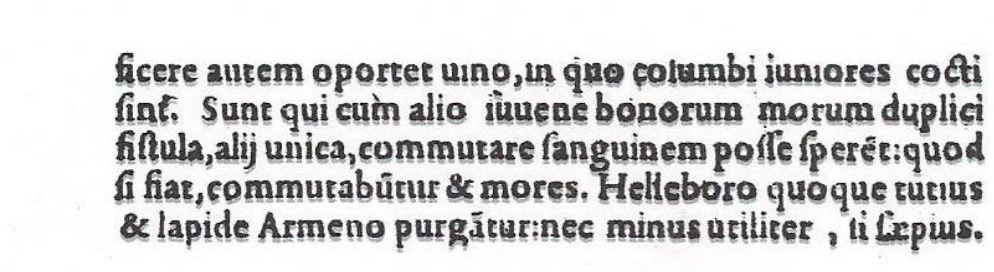

ficere autem oportet uino, in quo columbi iuniores cocti
sint. Sunt qui cum alio iuuene bonorum morum duplici
fistula, alij unica, commutare sanguinem posse sperét: quod
si fiat, commutabũtur & mores. Helleboro quoque tutius
& lapide Armeno purgãtur: nec minus utiliter, ti Lxpius.

Figure 3

Figure 4: Gerolamo Cardano (1501-1576)

After this, what I have said before is readily understood; CARDANO, in fact, mentions the idea of commuting the blood by means of a double or simple fistula, without attaching particular importance to it; but what is irrefutable is this: that we thus possess an original period, where for the first time there is an allusion to an exchange of blood through the veins, and not to the ingestion of blood; the first concept is new, the second very old. And at least, for the first time, there is an irrefutable document of it.

Therefore, at the time of CARDANO, people thought and spoke openly of blood transfusion; and this sentence can be pronounced without fear of making a mistake, because the meaning of the Latin "*commutare sanguinem*" is precisely that expressed by the aforementioned Italian translation; but the certainty that someone advocated such an operative act, certainly with the aim of rejuvenating, does not imply, nor definitively exclude, the consequence that it had already been put into practice. Unfortunately, as for the latter hypothesis, there are no documents that I know of; and it is necessary to limit ourselves to the above considerations, pending, if possible, some sensational revelation.

As for the objection, raised by some, that at that time the general circulation of blood was not yet known, which would be intimately connected with transfusion, indeed inseparable from it, I must confess that, in my opinion, it matters very little or not at all; first of all, because, while ignoring the circulation of the blood, people thought and talked about blood transfusion in such clear terms that they do not fear contradiction; and secondly, because - as the word "fistula" expresses to us - it was evidently known, for better or for worse, how to proceed with this operation; and one could argue, if one wanted to sophisticate, that more than one of these had been accomplished - which, however, cannot be said.

But that blood transfusion is the birthplace of "*…ab operatione quadam paucis ab hinc annis excogitata, infundendi scilicet per syringam intra ipsas venas alimenta et medicamenta*..." is another of SANTINELLI's errors (213), which I point out simply for the record.

IX

The development of my theme now borders on and intersects that of the general circulation of blood. It has already been said that almost all the authors consider the two arguments inextricably linked to each other, or, better, transfusion to the circulation; and if from the *theoretical and scientific* point of view it is logical to say that they are right, from the *practical* one it is right to reiterate that they can be, as they are, wrong. And in the previous paragraph we saw why.

I must therefore open a parenthesis; but I would like to say at once that it will be a short parenthesis, first of all because, if it were not so, I would leave the main argument, where it is a matter of giving incidental information; and secondly because the number of those who have studied and debated the problem of the discovery of the general circulation of blood is already so great that it would seem to me to be a waste of time to want to increase it, without needing it at all, and, above all, wanting to rekindle a dispute, which is really time to be completely extinguished and settled in good peace and in accordance with justice.

According to what CERADINI writes (214), "*Galeno aveva già asserito che il sangue passa dal cuore destro al sinistro attraverso il polmone*...", and BOERHAAVE (215) confirms: "*Idem* (GALENUS) *de usu valvularum venosarum cordis recte sensit et ex iis minorem circulationem eruit in codem de usu partium opera.*"

But there is more: GALEN even had an intuition of the capillaries, that much later, in the year 1661, MALPIGHI, bigger and bigger with the passing of the years, studying the movement of blood in the vessels of the frog's lung, he discovered, recording his joy and wonder with the following famous words: "*Talia mihi videre contigit ut non immerito illud Homeri usurpare possim ad reni praesentem melius: magnum certum opus oculis video*" (216).

So, you will wonder, what did REALDO COLOMBO (217) do and what did MIGUEL SERVET Y REVES do? (218).

"*Realdo Colombo from Cremona recognized the function of the atrium for the first time and also denied that blood passed from the right to the left ventricle through the septum of the heart, according to the hypothesis of the ancients, of which Giulio Cesare Aranzio* (219) *from Bologna was the first that proved the absurdity…*" (CERADINI) (220).

And did COLOMBO have knowledge of GALEN's work, where does he speak of pulmonary circulation? (221).

And the Spanish monk, whose morality left much to be desired, and whose celebrity was due more to "*suoi errori in materia di religione, e per lo tragico fine, a cui questi e la malizia di Calvino lo trassero in Ginevra, che per lo suo valore in medicina*" (MALACARNE) (222), did you know the Galenic work?

Meanwhile, we are approaching the discovery of the general circulation of blood. The merit of this is attributed by some (FOLLI (223), RAMAZZINI (224), HALLER (225), MACKENZI (226), JAMES (227), MAREY (228), BLACK (229), *Encyclopedia of Medical Sciences* (230), TOMMASINI (231), FREIND (232), BONANDI (233), FLOURENS (234), FRASER HARRIS DAVID (235), etc.) to the English WILLIAM HARVEY (236); from others (ERCOLANI (237), VALENTIN (238), etc.), to the Bolognese senator and professor CARLO RUINI (239); from others still (FRACASSATI (240), SBARAGLIA (241), BOERHAAVE (242), TOURTELLE (243), DOUGLAS (244), LANDOIS (245), SCALZI (246), CERADINI (247), LUCIANI (248), VOSS (249), STUBBS (250), LANCISI (251), BILANCIONI (252), CIONE (253), etc.) to ANDREA CESALPINO (254).

Apart from the gross misunderstanding into which ERCOLANI fell, perhaps seduced by the ideas of VALENTIN; and apart from the judgment of those (BORELLI (255), HURTADO DE MENDOZA (256), BROUSSAIS (257), SCUDERI (258), etc, who, following the ancient saying that reason (or wrong) is not all on the same side, they attributed the merit partly to CESALPINO and partly to HARVEY; I believe that

today it cannot be denied, except in faith, that ANDREA CESALPINO discovered, in the year 1569, the general circulation of blood.

In a long period of the "*Quaestio quarta*", he was the first to introduce the new word "circulation" to mean the movement of the blood that goes from the hollow veins to the right heart, from which it passes to the lung and from this to the left heart from which it passes to the arteries and from these returns to the heart with the veins; and if reproducing the original passage in its entirety did not take me too far from my task, which others, for their part, have carried out with competence far superior to mine, with infinite complacency I would have transcribed it there. Furthermore, in the year 1583, in the book *De Plantis* (259), he reconfirms: "*in animalibus videmus alimtentum per venas duci ad cor, tamquam ad officinam caloris insiti, et, adepta inibi ultima perfectione, per arterias in universum corpus distribui*..."; and ten years later, in 1593, in the *Quaestionum medicarum* (260) he gives the "experimental" proof of his doctrine by ligating the veins, which swell, as he saw, between their capillary origins and the ligature, and, they let out first black venous blood, then arterial red blood.

All this several years before the publication of the famous book by HARVEY, which - strange to say - never mentions CESALPINO, (as indeed does MAJOR (261) - and it is well understood why he does not mention any of his numerous predecessors); the book that HALLER, without hesitating to subvert the truth by making a very serious wrong to CESALPINO and paying unfair praise to HARVEY - it seems that there was a reason that was anything but historical or sentimental, but rather practical or useful - called "*opuscuium aureum*"; "*opusculum aureum*" without doubt, but published, as we know, in the year 1628.

And it is painful to note that, precisely in the period of maximum splendour of Italian science, when, as an honest foreigner DEZEIMERIS (262) says, "*l' Italie devait précéder les autres contrées de l' Europe dans la carrière des progrès scientifiques*" and our great Masters, spreading the most vivid light of science and glory, should also, by obligation of their own office and name, know the works of their colleagues, at least I say as much as they illustrate; the Masters themselves, and therefore the disciples were in the dark about the real name of the true discoverer of the general circulation of blood. And I think that, perhaps best of all, the reasons for the painful oblivion are summed up by BOERHAAVE (263), who writes: "*Primus fuit* CAESALPINUS *qui dignoscendis plantis signa ex fructificatione sumsit; primus etiam inventor fuit circulationis sanguinis*, *sed non evulgavit*, *nec eo usque penetravit, quo* HARVEY."

Almost in agreement about the "*non evulgavit*", as CESALPINO had to write clearly - and what else was an honest author or inventor to do? - his own discovery, which he did not care too much or little about spreading; small assertion that is equally on HALLER's nerves (264); but finally a period of undoubted honesty. And if appealing to the authority of BOERHAAVE, of which HALLER himself (265) wrote that he was "*medicorum sui aevi princeps, neque minus candore et animi magnitudine conspicuus, quam excelletiti ingenio*", does not mean, however, to obtain and to enunciate verbally an irrevocable judgment, since neither he nor others, at any time, was ever granted to possess a patent of infallibility; nevertheless it is indisputable that, given the value and the doctrine of this great man, who deserves the splendid seat he occupies among the luminaries of science, the identity of view is a comfort for us.

By this I do not mean to diminish the virtue of HARVEY, but to place it only within its just boundaries; and in this case it must be said that his merit is great for the titanic struggle he had to endure in order to support the discovery of CESALPINO, then passing it off as his own.

And indeed TOURTELLE (266), with the eloquence and enthusiasm typical of the French, shows it to us thus: "*Couvrons de honte la faculté de Paris qui dans tous les temps a aspiré à exercer la dictature médicale et husilions son orgueil. Depuis plus de dix ans la circulation du sang était si connue et si clarement démontrée qu' elle*

était admise partout... la seule faculté de Paris était encore dans les ténèbres: RIOLAN (267), *san grand* RIOLAN, *fit un livre contre* HARVEE *et la circulation*...”; and in an anonymous noterella, unless it is autograph, of the "Zelotypia" of FERRARI (268) we read as follows: “*Mr. dr. Antonio Zanella public reader in the Parma office gave a slap in the face to Mr. Gio. Batta Pedana student parmig.no with the strength of argument forced him to confess the circulation of the blood which Mr. Lettor bitterly denied, Mr. Dr. Zanella went to ask his forgiveness all the way home. Last year 1690.*” But aside from the splendid tenacity and keen understanding and disclosure of others' discovery, nothing else belongs to HARVEY.

And since the dates of publication of CESALPINO's works speak too clearly in his favour; and on the other hand, it cannot be argued that HARVEY was ignorant of the works of the Italian Master, as he lived for a few years in Italy and especially in Padua, and because of not having mentioned him proves very eloquently that he was too afraid ... of the studies indeed of his writings; so there is nothing left but a single hypothesis: that is, that others prior to the Arezzo-born ANDREA have word of it. This is what I will study to mention as quickly as possible.

First of all I want to say that FABRI HONORÈ (269), in his book *De plantis et de generatione hominis*..., undoubtedly appropriates the discovery of blood circulation made by him in no less than 1638, and, what is even more amazing, is that his father REGNAULT awards it to him; certainly firstly in bad faith, secondly in good faith, but too naively.

BARRA of Montpellier (270), and with him GRAECUS (271), maintains that in HIPPOCRATES is the description of the circulation of blood; but, if I do not think badly, it is made in such a way as to demonstrate the contrary, that I think we can fearlessly reject the sentence of the aforementioned authors.

But others (BLACK (272), TOMMASINI (273), etc.) cite the following period of PLATO (274), stating that he wanted with it to indicate the circulation of the blood:

“*Cor venarum originem fontemque sanguinis per omne corpus impetu quodam manantis* » (that is: *circumlati*);

but it is beyond doubt that not only the great PLATO, but also SOLOMON (275), to whom the circulation of blood, with all due respect to ETTMULLER (276), was by no means revealed by a miracle, or, as he says, qualifying it "*inventumi divinum*", "*ab ipso Spiritu Sancto Salomoni reguin sapientissimo inspiratum*“; and again ARISTOTLE, ERASISTRATUS and GALEN and so on, BERENGARIO from Carpi, EUSTACHO, etc., - without the shadow of injury!, - “*very profoundly ignorant*” (GOELICKE) (277).

Still others rely on what the Spanish veterinarian FRANCESCO DE LA REYNA (278) wrote in 1564: "*La sangre arda entorno y en rueda por todos los miembros*"; without considering that an affirmation is vague, it may very well be found (as in fact it is found) in several other much older writers, without even having the shadow of the knowledge in question, and which, however, is quite insufficient to describe blood circulation.

And another mistake is made by FEYJÔÔ (279), when he writes that the Spanish veterinarian first used the word "circulation", which in this sense belongs indisputably to CESALPINO.

And if it is true that GALEN (280) wrote: “*Cum enim naturali modo habet animai, ubi contrahitur cor, spiritum in arterias mittit: hae vero ubi implentur distenduntur: ubi vero distenditur cor, ex pulmone attrahit; hae vero tunc evacuatae, contrahuntur*”; and elsewhere: “*neque ullum aliud quintum os in corde possumus invenire, quo e jecore admissum sanguinem in totum corpus distribuat*”; and the passages quoted above demonstrating that the arteries contained blood; and this other place, where he first introduces the concept of the torsion of the vessels in case of irrepressible haemorrhage: “...*si vas unde profunditur alte sit demissum, certius ipsius tum positum intelligat, tum etiam magnitudinem; praeterea vena ne sit an arteria. Post haec injecto unco attollat, ac modice intorqueat*” (281); but most of all the following

passage (282), which is nothing but the translation of the above-reported period of PLATO: "*cor simul et venarum fontem et eius sanguinis esse, qui per omnia membra circumfertur*"; however, it is not difficult to demonstrate, by leafing through the Galenic work, that the famous doctor of Pergamum had no idea, by no means exact but not even distant, of blood circulation, as FERRARI (283) also writes; that, just to name one, it would be enough to remember that in those times and after, and only by ANDREA CESALPINO and by FABRIZIO D'ACQUAPENDENTE in here (whose discovery, entrusted to the famous book (284), some (ROMITI (285), etc.) contests today, changed and known, the movement of blood in the veins was considered exclusively centrifugal, and therefore considered and taught centripetal by our Masters.

But my long digression isn't over yet; a few more words, which will fill the gaps abundantly scattered here and there.

It would be injustice to omit to mention, as that of a precursor, PAOLO SARPI, the modest and most learned friar, who, according to ETTMULLER (286), "*de sanguinis motu mirabili.., conjecturam primus incoepit*"; and, it is bitter to note that a foreign author, CLARK (287), in order to defend his compatriot HARVEY at any cost, even malicious!, was not ashamed to write that "*si defunctus* HARVEUS *defensione nostra nunc egeret, facile monstrare possemus magnum et summe doctum* PAULUM *ab ipso* HARVEO (*inter hos enim vetusta manebat amicitia*) *primam circulationis notitiam* (*mediante Oratore Veneto, hic tunc temporis commorante*) *recepisse.*"

So, poor friar PAOLO, even the mockery! From the conjecture of a theory to complete ignorance of it! And when, please, would he have learned it, if he died in 1623? Yes, it is fine; there may have been some time, but it should be proven that HARVEY, since 1619, publicly taught the true circulation of blood, as BROUSSAIS wrote.

In any case, the question has no vital interest for the interposition of the great name of CESALPINO.

FREIND (288) again says that "*si quidem auctor affirmat circulationem sanguinis*... NEMESIO (289) *fuisse notam*... "; it would be necessary to answer - I add - that he was known as GALEN, that is completely unknown.

Therefore: apart from the famous SARPI there are no precursors worthy of mention, and the great doctors who lived before were completely in the dark about the exact circuit of the blood. CESALPINO sensed, described, demonstrated the true blood flow; HARVEY reaffirmed, denying its first, only and inextinguishable source, the truth of it, of which, firmly convinced, he was more than a champion, an apostle. And he was able, in this way, to write a pamphlet, which is a masterpiece of a man of genius, albeit second to another genius.

And so also the judgment of BARZELLOTTI (290) despite coming from Olympus, present five great ones: HIPPOCRATES, ARISTOTLE, GALEN, CESALPINO, HARVEY; since, even the experimental demonstration of blood circulation is, as we have seen, the work of our CESALPINO.

X

Having acquired so much scientific information, it will not be long before blood transfusion, perhaps intuited and even more perhaps attempted than empirically practiced in ancient times (although the proofs are sought in vain) and certainly considered theoretically (since safe experimental proofs are absolutely lacking); in more recent times, from the slow and constant succession of scientific progress it will rise to a rational practice and, under the aegis of science (more or less), it can be said to be an accomplished operation.

And it is precisely at this point that the skein of history unfolds and we get to the heart of the argument; this is where the core of this work is concentrated.

Who is the discoverer or inventor of blood transfusion?

I immediately, openly, say my opinion, as I have done so far.

It is very difficult, if not impossible, to establish who invented or discovered blood transfusion; first of all, because from ancient times we possess only very vague clues, which only emerge too timidly or enigmatically here and there and even forbid us to assert in an irrefutable way that it has a theoretical life much longer than that which it can be defined, but precisely for this reason they fatally hide the name of the person who conceived it; secondly, because we know that the first truly unchallenged experimental tests were carried out a long time after the most exact descriptions of blood transfusion and therefore we cannot, while leaving our judgment on any previous experiences (perhaps forever unknowable) suspended, to attribute to those experimenters the boast of the experiment and not that of the idea; and thirdly, even admitting that the thought of such an operation could erupt from the re-entering of a single individual like a flash of genius, - although very often it happens that even the greatest discoveries are the fruit of a long preparation of minds and times - nevertheless we cannot deny that the one who first launched this concept, perhaps completely unaware and heedless of its own value, will remain forever buried in the mists of time.

And at this point I am reminded of the passage from HIPPOCRATES, quoted above by me, where it is said that "*quicumque morbi ex repletione fiunt, evacuatio sanat; et quicumque ex evacuatione, repletio*..."; and it pains me once again that it is possible to interpret, with the clarity that in historical research it must be above all suspicion, the word "*repletio*", which, indeed, could otherwise have illuminated the theory, and consequently the story, of blood transfusion.

Thus, with regard to the history of this, we must - if I may be bold enough - split the paternity of that idea into two, that is: real paternity and putative paternity; the first escapes us and will always escape us perhaps, the second can be attributed and must be according to the intemperate honesty of research and meditations. More and more sometimes it happens - if malice is excluded from the comparison - in the human family...; except that in this the untempered honesty completely changes aspect...

Thus only - and until proven otherwise - with this premise we can continue the journey in the vast field of investigations and their reporting.

Some linger their benevolence to the point of asserting that the laurel of discovery must encircle the forehead of PEGHELIUS MAGNUS (291), because he wrote: "*Ratio chirurgica insignis et rara homini communicans extera quae ipsi bona, et interna multa quae noxia avertes*"; hence, if I am not mistaken, there is really no sign of blood transfusion, and at most one could stretch an allusion to intravenous injections.

Otherwise, without dwelling too much on the name of ELOY PICHOT DE MACON, (who is said to have devised and built a special device), the idea of blood transfusion came to the mind of the monk ROBERT DES GABETS, who exposed it in a friendly meeting in the house of Monsieur de MONTMOR; so, in fact, tells DENIS (292) in one of his letters: "*Ainsi les François ont eu l' honneur d' avoir pratiqué les premiers la transfusion sur les hommes, commne ils avoient la gloire de l' avoir les premiers inventée. Car quoyque les Anglois avant tous les autres, l' ayent mise en pratique sur les bestes; il est certain que ce sont les François qui leur en ont donne la première pensée. On sçait... qu' il y a plus de dix ans que Dom.* ROBERT DES GABETS... *fit un discours... la pluspart se mocquerent pour lors de cette proposition, et qu' on crût qu' elle estoit impossible... Les Anglois voyant qu' on ne faisoit aucun estat en France de cette invention, s' en sont voulu emparer cornne d' une chose abandonnée...; mais nous l' avons en fin reclamée, et nous avons trouvé moyen de rentrer en possession de ce qui nous appartenoit, en la pratiquant les premiers sur les homes.*"

If truly, as DENIS affirms on the basis of very little documentation (whatever he says), the credit should go to the French monk, to whom ORÈ (293) also attributes the particular and curious idea of the "*communication du sang en 1655*" (note well: year 1655), I believe that no one would want to take it away from French possession; but since the periods of DENIS are full of inaccuracies, not to mention historical ignorance and exaggerated "chauvinism", and moreover not supported by undoubted documents, it is necessary to immediately say that ROBERTO DI GABETS does not really have a damn thing.

It would then be appropriate to say - if it were possible to argue with Mr. DENIS - than to rely only on words, especially vague ones (*fit un discours*), and trust and maintain that others believe them both after a decade and after many decades, without adding any other serious motivation (e.g. justification or documentation or testimony or claim etc.), is a bit too risky and childish at the same time; for words fade too soon, if they fade, until they no longer have any value - as was the case in some treatises - even the writings!

And it is natural that even CLARK (294), unscrupulous moreover in historical matters, rejects the disproportionate and desperate defence of DENIS regarding the primacy of an idea, which, moreover, does not belong to England either, and, premising that all men of common sense cannot think otherwise, answers that "*the certain way of deciding such controversies as these, is a Pubblick Record, either written or printed, declaring the time and place of an Invention first proposed the contrivance of the Method, to practise it, and the instances of the success in the Execution*"; and naturally finishes by saying that "*all this appears in the field for England*".

It is evident that CLARK demands a lot from an invention patent, since the irrefutable public document is not enough, but it wants to know the time and place, the project of the method and its implementation and the examples of executive success (this last condition is due to a personal fact, the declaration of which, as will be seen, is entirely in his honour); the latter two endowments that offer him a good game, because, in the case in question, they touch the English without fail; but basically he is not all wrong.

Still others claim that the discoverer of blood transfusion is ANDREAS LIBAVIUS; and PORTAL (295), who is one of the most heated, marvels "*que les Historiciens en aient retardé la découverte jusqu' à la fin du dix septième siècle*"; which clearly shows that he did not pay the necessary attention to the study of the following passage from LIBAVIUS (296): "*Ille vero noster quo quaeso remedio putabat se ista insperata consequi posse? Adsit juvenis robustus, saus, sanguine spirituoso plenus; astet exhaustus viribus, tenuis, macilentus, vix animam trahens. Magister artis habeat tubulos argenteos inter se congruentes. AIperiat arteriant robusti, et tubulum inserat muniatque; mox et aegroti arteriamn findat, et tubulum foemineum infigat. Jam duos tubulos sibi mutuo applicet, et ex sano sanguis arterialis calens, et spirituosus saliet in aegrotum, unaque vitae fontem afferet, omnemque languorem pellet. Sed quomodo ille robustus non languescet? Danda ei sunt bona con fortantia et cibi; Medico vero helleborum.*"

It is undeniable that in this passage blood transfusion, and precisely the method of arterial blood transfusion is very clearly described; and that this, therefore, was a little better known is beyond doubt; but that with this we must say that the merit of the discovery is due to LIBAVIUS, oh, there runs a lot! Nor is it bad to be able to curb sudden enthusiasms. In fact, what more than any dissertation, even the most saturated with logic and criticism, helps to support my affirmation, is precisely the end of the period; that is, that the doctor, who had in mind to perform such an operation, should be given the hellebore without any other means; which, in the words of the book of the cure of diseases (297), is "*una pianta che si adopera in medicina, come purgativa, e che gli antichi ce credevano la atta a guarire la pazzia*..."

And that such an unexpected conclusion SANTINELLI (298) writes, had the effect of having "*nec meliorem obtinet sortem Transfusio in exactissima sui descriptione, quam apud* ANDREAM LIBAVIUM *vir doctissimus invenit; ubi ostenditur illam non tam nostris diebus excogitatam, sed etiam inter huius saeculi initia cognitam fuisse, non inquam meliorem obtinet sortem, cum existimetur opus chimericum, et quisquis illa utitur, parum sanae mentis homo judiceretur, ac proinde afferatur, illum helleboro indigere*..."; and it must not surprise that other authors conform to the preceding.

Indeed, the opposite is surprising; since the fact that LIBAVIUS, with his concluding annotation, has given opponents the right to affirm that he too was opposed to blood transfusion, is a new weapon sufficient even by itself to cut any knot you want to tie around the question; and it is another very clear and impartial reason for declaring that the chemist of Halle cannot be attributed other merit than that of having exactly described one of the methods of blood transfusion, undoubtedly reached his ear or perhaps even seen practiced, and the demerit for having blamed him unmistakably. Since I cannot really understand that an inventor must give himself - his will - in return for his invention, the wonderful appellative of "crazy"!

It must therefore be admitted that LIBAVIUS was not conscious of being the inventor of blood transfusion, but as a spectator, not even doubting that those who advocated it were mad; hence, of necessity, it is deduced that he does not want to be an accomplice in such a procedure, much less does he think of claiming it for himself.

On the other hand, perhaps because DEDALUS and ICARUS attempted the legendary flight, must they be credited with having conceived and solved the problem of human flight? And, without further lingering on mythology, to dwell on the great LEONARDO, to whom more than the superb masterpieces of art, given if not with the wealth of a certain number with divine indifference and the power of the sovereign genius, the dilemma of flight was invincible and the certainty that man would fly in the future was light comfort; to the star LEONARDO must perhaps belong this merit? Evidently not; as for wireless telegraphy there is no name that holds the seal of glory if not that of GUGLIELMO MARCONI, even though the very great ones of HERTZ and RIGHI are crowned by him; just as the great painters, who painted the divine Child resting on the maternal breast, with the little big toe upturned, do not have the merit of the discovery of that phenomenon, so admirable for its simplicity and importance and so fruitful of advancement in the sciences, that on the contrary, much later, it was to be discovered and illustrated by BABINSKI and to be known among doctors by this name.

That is why I definitely reject the blind belief of PORTAL; this is why I consider LIBAVIUS, as far as blood transfusion is concerned, nothing more than a chronicler, exact as much as you want, but always a chronicler, who, as is well known, puts very little of his own in the account of an event; since, - if one aspires to the merit of any priority - it is not enough to declare and describe a fact and immediately deny it, but it is necessary, without contrast whatsoever, if not really to experience it, at least to affirm and reconfirm it.

And this is the case of those who could be declared, with the greatest titles of probability and glory, the inventor of the blood transfusion; I mean GIOVANNI COLLE, from Belluno.

2nd PERIOD

XI

The story of blood transfusion has its centre precisely here; and in the crossroads that departed from it are the names of COLLE and FOLLI.

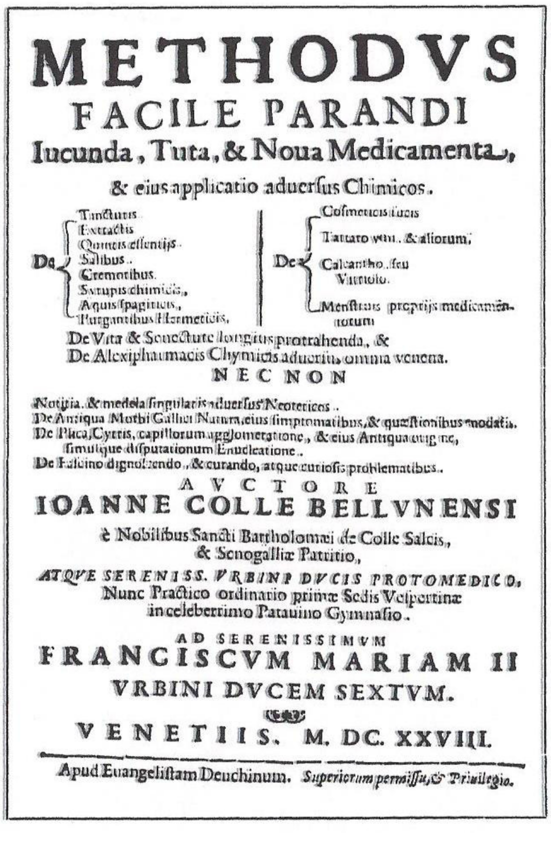
I would not have wanted to premise considerations, albeit by way of a brief introduction, which would find their place better later; but I am led to it in spite of myself.

The controversy, which is ignited by posterity, is therefore localized to two Italians; the solution does not enjoy universal suffrage in Italy and, perhaps, not even regionally!

However, it is indisputable that the theory of blood transfusion is the gem of Italian thought.

To say that foreign authors have not cited COLLE and, in particular FOLLI, except with parsimony worthy of Arpagone, - except for the many who have placed them in non-cale [deliberately ignored] - is a very well known thing; and to say that COLLE enjoys no less benevolence than the equanimity of the Italian authors and, so to speak, something else very well known. Even SCALZI, diligent and shrewd, is grossly mistaken when, in the examination of their passages, he asserts that there is no other indication than that of intravenous injections ... of medicines! Could this have been the opinion of the illustrious professor of the Roman Athenaeum?

But not now the conclusions; just a premise. It will not have escaped that I begin the second period of the history of blood transfusion with the work (Figure 6) by COLLE and not with the date of the famous interview by FOLLI; whence it is easy to infer my thoughts on the subject, and which will be illustrated later.



METHODVS
FACILE PARANDI
Iucunda, Tuta, & Noua Medicamenta,
& eius applicatio aduerſus Chimicos.

De Tincturis, Extractis, Quintis eſſentijs, Salibus, Cremoribus, Syrupis chimicis, Aquis ſpagiricis, Purgantibus Hermeticis,

De Coſmeticis fucis, Tartaro vini, & aliorum, Calcantho, ſeu Vitriolo, Menſtruis proprijs medicamentorum

De Vita & Senectute longius protrahenda, &
De Alexiphamacis Chymicis aduerſus omnia venena.

NEC NON

Notitia, & medela ſingularis aduerſus Neotericos.
De Antiqua Morbi Gallici Natura, eius ſimptomatibus, & quæſtionibus nodatis.
De Plica, Cyrris, capillorum agglomeratione, & eius Antiqua origine,
ſimulque diſputationum Enucleatione.
De Faſcino dignoſcendo, & curando, atque curioſis problematibus.

AVCTORE
IOANNE COLLE BELLVNENSI
è Nobilibus Sancti Bartholomæi de Colle Salcis,
& Senogalliæ Patritio,
ATQVE SERENISS. VRBINI DVCIS PROTOMEDICO,
Nunc Practico ordinario primæ Sedis Veſpertinæ
in celeberrimo Patauino Gymnaſio.

AD SERENISSIMVM
FRANCISCVM MARIAM II
VRBINI DVCEM SEXTVM.

VENETIIS. M. DC. XXVIII.

Apud Euangeliſtam Deuchinum. *Superiorum permiſſu, & Priuilegio.*

Figure 6

Few authors mention COLLE (299); of them the most explicit, although not free from a strange inaccuracy, is CASTIGLIONI (300), who, in his beautiful *History of Medicine*, writes as follows: "*The first of whom there is certain news that he practiced blood transfusion is* GIOVANNI COLLE *from Belluno, Professor of Medicine at the*

University of Padua and doctor of Cosimo II, Duke of Florence, who in chapter VII of his book published in 1628 with the title: "Methodus facile parandi etc." gives an accurate description."

Then DE CRISTOFORIS, then HOEFFT (301), which, to my satisfaction and with great clarity in its lapidary brevity: "COLLEUS *transfusionis utilitatem a. 1628 magis etiam illustravit*". I immediately say that the "*magis*" is written in relation to the description of LIBAVIUS.

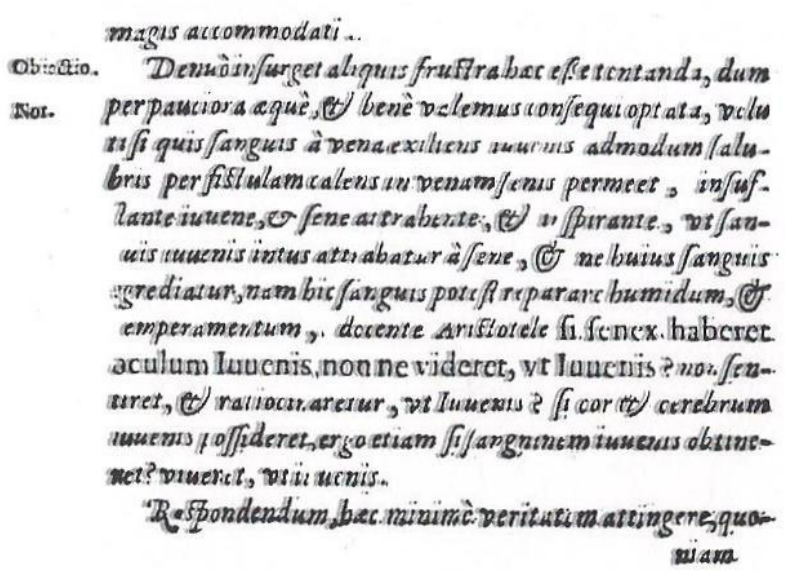
Then HALLER (302), who writes: "JOHANNES COLLE (in *Met. Facile parandi etc.*) *Bellunensis paulo ultra Marsilii praecepta progressus juvenis sanguinem in senem transirittere auctor fuit, ut nova juventus Aesoni redirect*"; and ETTMULLER (303) with the following words: "*Authorque fuit ut fiat traslatio sanguinis ex juvene in senenin*"; while BOERHAAVE (304) does not quote the work that interests us and defines it: "*Theoreticus et compilatitius auctor*"; which may also be true, since I do not know his other works, but it is not at all true in the reports of blood transfusion.

Contrary to usual, MORSELLI (305) does not evaluate with the acumen that everyone recognizes the passage of COLLE, and goes so far as to write, I don't know if out of haste or distraction but in any case wrongly, that the Paduan professor always relied on teachings of ARISTOTELE - and this will be true - and that "*the traditions of Medea were more easily gathered than the discoveries of Harvey*" and this proposition is doubly unfair and is disproved by the place that we will see just now.

The other authors, more or less, do not penetrate his work.

Yet COLLE had written as follows (306):

"*Denuo insurget aliquis, frustra haec esse tentanda, dum per pauciora aeque et bene valemus consequi optata veluti si quis sanguis a vena exiliens juvenis admodum salubris, per fistulam calens in venam senis permeet, insufflante juvene et sene attrahente et inspirante, ut sauguis juvenis intus attrahatur a sene, ne huius sanguis egrediatur. Nam hic sanguis potest reparare humidum et temperamnentum, docente Aristotele.* Si senex haberet oculum iuvenis, nonne videret, ut juvenis? *Non sentiret et ratiocinaretur, ut juvenis? si cor et cerebrum juvenis possideret, ergo etiam si sanguinem juvenis obtineret? viveret ut juvenis.*" (Figure 7)


magis accommodati ..

Obiectio. Denuò insurget aliquis frustra hæc esse tentanda, dum

Not. per pauciora æquè, & benè valemus consequi optata, velu ti si quis sanguis à vena exiliens iuuenis admodum salu- bris per fistulam calens in venam senis permeet, insuf- flante iuuene, & sene attrahente, & inspirante, vt san- guis iuuenis intus attrahatur à sene, & ne huius sanguis egrediatur, nam hic sanguis potest reparare humidum, & temperamentum, docente Aristotele si senex haberet oculum Iuuenis, non ne videret, vt Iuuenis? non sen- tiret, & ratiocinaretur, vt Iuuenis? si cor & cerebrum iuuenis possideret, ergo etiam si sanguinem iuuenis obtine- ret? viueret, vt iuuenis.

Respondendum, hæc minimè veritatem attingere, quo- niam

Figure 7

Without wishing to discuss the argument put forward, isn't there perhaps a huge difference between this place and that of LIBAVIUS? Apart from everything, does not the one who writes like this appear to be a supporter of blood transfusion?

And wanting to clarify philosophically, and therefore with a heap of easily understandable errors, his concept, nevertheless does not completely deviate from the possibility mentioned above, as he continues:

"*Respondendum haec minime veritatem attingere, quoniam in nutritione et vita vegetali actu requiritur sanguificatrix actu expeditur nutritiva facultas et genuinum calidum temperamentum, quod trasmutat sanguinem illum introductum; necessario etiam desideratur ut continuo non ef fuat illumn humidum et calidum temperamentum quod, teste Ippocrate et Galeno, incessanter ab intimis principiis et ab aere lambiennte lacessitur: actiones vero sensuum et intellectus non conficiunt sibi propria objecta, sed solummodo ea recipiunt aut illustrant; non potest quod dissimiles mores habet in discordibus locis pernancre; discordia rebellant, pugnant atque inter se dissident ignis et aquae temperamento: haec sunt philosophiae medicae arcane*."

Perhaps it will not have escaped that "could", which I wrote above with regret, but on purpose, and which, in turn, implicitly translates the strange inaccuracy of CASTIGLIONI: since COLLE, unfortunately, never had experience of blood transfusion. It is indeed true that, as FRACASSATI (307) writes about the CESALPINO-HARVEY controversy, which is reborn, under another aspect and less important, in our case "*non tamen spernendì qui rerum rudimenta ponunt, etiamsi infecto nec absolìito opere cessaverint; qui invenit, anticipavit laborem, et curam quaerendi; et ad minora vocamur, si quaestionis sollicitudo, ac jactatio tollatur; par tamen decus manet, et illum, qui primum inenit, ac qui postremum perfecit; nescio enim, an praestet invenisse an ditasse*"; period to which you can fully subscribe; but it is equally true to him that in such cases the glory is at least divided in half.

And it always happens that the two halves are not equal

It is therefore indubitable that the absolute mean of a discoverer or an inventor is made up of two factors, of which the first is utterance, and the second experience; and since LIBAVIUS, as we have seen, does not belong to the first factor, so we might be perplexed whether or not to attribute it to COLLE, since even these cannot be assigned the second; and in the final analysis, since we do not possess (at least so far) more ancient and equally clear documents, we would see all doubts drop if we were certain that he had ignored the German chemist's publication. My research gives me the conviction that this really was; however, as I said in section X of this work, the inventor of blood transfusion cannot be designated, at least in the sense we all want. But what we can affirm with certainty and conscience, in perfect harmony with the above principles, is that COLLE can and must be attributed the "putative" paternity of the idea of blood transfusion. In fact, considering the few documents at our disposal and the various clues that leak out from the writings of various authors almost shyly, without, however, that none of them should or can be given priority, since the requirements that distinguish it are inflexible, it follows that *the idea of blood transfusion was maturing step by step, and that at the time of* COLLE *it was not a novelty* - always in pure logic and theory -; but that nevertheless COLLE expressed it in the most worthy way. This, of course, is in retrospect. And always in retrospect, we can establish that his period only partially presents the absolute characteristics of originality; but we cannot swear that COLLE, in his time, did not rightly believe in writing it as the author of an original concept. I can already hear who wants to correct me: not "author", but "innovator"; and it is fine; offer me proof.

In any case, if what CASTIGLIONI writes were true, namely that he had to practice blood transfusion, since the experiment alone is, in our case, what counts more than everything, thus, dissolving any finer suspicion, none other than COLLE would be the inventor of blood transfusion.

What can be said knowingly and truly is that the idea of this operation arose in Italy and was born from Italian minds; since from the tiniest - albeit treacherous - clue (OVID) and, gradually, to the clearest (CARDANO, COLLE, FOLLI), it is all Italians who conceived and described it.

And what does it matter if TOURTELLE (308) wrote that "*ce fut à cette époque... que des hommes peu versés dans la science de l' économie animale, proposèrent une opération, aussi ridicule que meurtrière, et qui eut sur les hommes chez lesquels on la tenta les suites les plus funestes*", when the most beautiful denial to his words today bring the facts?

And that BLACK (309) was not outdone by his French colleague, letting himself be transported to a prophecy that completely failed? ("*u ... mais cette Médecine infusoire eut de si funestes succès que, suivant toute apparence, on ne la hasardera plus sur le hommes*") (!!!).

Of course, the nebula, which enveloped this period of the history of medicine, and today, thanks to the work of the many who have put study and love in strenuous research without any other reward, wait until oblivion, considerably thinned out, although not yet cleared as it is in the votes of everyone, and although it is perhaps vain to hope for more, although hope is the last Goddess ... However I think that, without prejudice to the above disquisitions, the name of GIOVANNI COLLE is the most deserving to boast the title of inventor of blood transfusion than any other.

CLARK (310), and after him LANDOIS (311) and others, tells us the same thing that "*misso illo testimonio, quod a viro fide digno et Regiae Sociétatis consorte, penas te etiam num reperitur Rev. Dom.* POTTER, *theologum insignem, triginta ab hoc annis, considerata circulatione Harvejana, socio huic nostro et aliis viris doctis, saepius transfusionem sanguinis proposuisse*."

I have no particular research to add in this regard and I must limit myself to just quoting; in any case, I note that, even if this hypothesis were true, POTTER's verbal proposal is ten years after the date of publication of COLLE's work, nor, as far as I know, was it ever written down, much less, practiced.

And now I am pleased to speak of another great Italian, who in life claimed the honour of the discovery of blood transfusion: I mean FRANCISCO FOLLI from Poppi (312) (Figure 8).

Official Italian historical science, albeit poorly represented (as a number, of course!), gives the Florentine physician the priority of the idea and therefore the glory of discovery; so in fact do TARGIONI TOZZITTI (313), FRESCHI (314), SCALZI (315), the compiler of the eulogy of illustrious Tuscan men (316), and some others who have taken the name of FOLLI from the authors cited; while DE RENZI (317), appreciating its merits, does not mention any primacy either by FOLLI or by others. Even a small representation of foreign ones are not alien to paying him, if not the same honour, certainly praise; so in fact HOEFFT (318), ROUSSEL (319), COX (320), who, after having said that FRANCESCO FOLLI, on 13th August 1654, "...*demonstrated the operation of transfusion of blood, before the Grand Duke Frederick II*" (?), very rightly observes close by: "*I am not familiar with any verification of his statement of having made this demonstration. It is accepted as fact, however, and his instruments pictured in a book intitolato Serie degli Uomini Illustri Toscani, Firenze, 1766*." and adds that in "*Dictionn. des Sciences Médic., Paris* 1821, *edit. Panckoucke, it is stated that he appears to have been the first to try transfusion, an operation that the formidable accidents caused to be forbidden by the authorities*."

I confess at once that I am not of the opinion of such illustrious authors, even though the difference of opinion can harm me; but with a firm and serene mind, having examined the writings, let us say, of the papabiles and meditated at length, I propose, as I said, for the election of COLLE.

However, since the work of FOLLI still predates that of the English, so I expect to talk about it for a long time.

Figure 8: Francesco Folli (1624-1685)
(From: *Stadera Medica*)

And, first of all, I like to report what he writes (321):

"*In the year 1652 I read the book, in English, by Guglielmo Arveo, which deals with the movement of the heart and blood; which reading, with some information that I had about grafting plants, produced this third problem in my imagination: that is, that given the circulation of the blood, transfusion was possible, with which one could not only cure some ills, but rejuvenate, and magnify again, as I mentioned in my booklet on the cultivation of the vine, which I published only to make it clear to everyone that blood transfusion had been invented by me and until the year 1654* (322) *manifested to the serenissimo Ferdinando II Grand Duke of Tuscany of eternal memory; who, liking the novelty, was experienced by him very pleasant ingenuity and profuse magnificence, nor did I ever communicate this thought of mine to others, giving myself to believe that if this invention were successful, it was only worthy of the Monarchs.*"

Continuing, he says that when a friend of his, IPPOLITO TEI from Bibbiena, told him (year 1665) that in England they had made a beautiful invention, namely that of rejuvenating by means of blood transfusion, FOLLI undoubtedly suspects that (323) "*For having been here at the court of Florence some English virtuosos, still present in many experiences* (324)*, as Mr.* REDI (325)*, including Mr.* FINCHIO*, who at present is the Resident Ambassador at the Ottoman Gate for the crown of England, could have it in this Court understood, and then transported it their country*."

He then calls the Grand Duke as a witness of his discovery, declaring that he "*began to write this third libretto in his favour, if not with a certain faith to credit it as successful, at least to show the world that the reasons that led me to hope for it were not of such little weight as they have been judged by many up to now*"; and ends by

saying that "*with reason, therefore, I can call it mine, such as it is, and therefore defend and protect it as best I can*".

From the reading of the previous passages, a contradiction is immediately evident: that is, while FOLLI tells us before that he had never communicated his thoughts to anyone; afterwards he adds that the English present at the Court of the Grand Duke there had learned it. And in that case only the Grand Duke himself could have spoken of it, unless other dignitaries were present at the meeting; who, in truth, even in this supposition, should not have said too much, if FOLLI could for a long time ignore his own invention.

However, that the English present at the Court of the Grand Duke could have heard and learned much from the Italian scientists who met there daily, despite CLARK (326) resolutely refusing to believe that their compatriots had been aware of blood transfusion, as we have seen, is attested by REDI in absolute and unsuspected good faith; who, however, never mentions blood transfusion; and this oblivion of REDI alone confirms the sumptuous silence of FOLLI, making the obscure contrast noted above more striking.

I do not want to diminish - nor on the other hand have I any reason - the capital value of the contribution of thought that FOLLI brought in on himself and later claimed; and I declare frankly that his statements, like those of any scientist of any nation, must be believed to be very true at least until proven otherwise; since in any discipline dishonesty or lies are not admitted, and the forehead of those who have nourished and expressed them are blamed with infamy; and the probity and incensurability of FOLLI are above any insinuation.

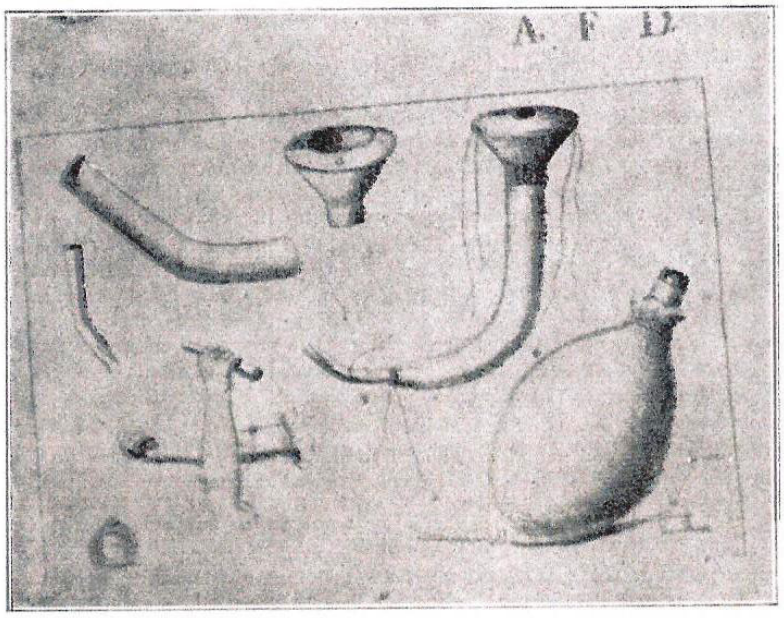


Figure 9: Drawings by F. Folli
(From the table that is at the end of *Stadera*)

Moreover, even those few historians from beyond the Alps, who have rightly quoted the Italian doctor, do not raise any objection regarding his sayings, and indeed report drawings of cannulae made by him with the date 1652 (Figure 9); they only point out that the date of publication of a work counts decisively and that of conception in a random way... But unfortunately it is the fate of Italians to foretell and foresee new phenomena and not to take care of the details or to keep them in small account, or to prepare negligently the experiments that are also of inestimable importance; although the great experimental method has taught us and the whole

world; and it is destiny that foreigners will have to gird their foreheads with laurels that many times would only be half theirs, and sometimes not at all; and that we have nothing left, in the ignorance of our intellectual assets, but the meagre consolation of seeking and claiming to our homeland

.... Italy glories, perhaps unique
since the badly forbidden Alps and the alternates
omnipotence of human destinies
weapons and substances invade you and are
and country, and, except memory, everything.

But, in order not to evade the obligations of impartiality, which it is my first concern to observe, I must focus my attention on another point in FOLLI's work, and precisely on this one: that he did not have to make any experiments in this regard, as he himself says: "I finally know that I have said too much about the way to contain oneself in the operation, not having experienced it" (327); for which reason the affirmation of SCALZI, accepted by COX with just reserve (see above), promotes profound amazement, namely that FOLLI, before Grand Duke FERDINANDO, gave "solemn proof" of blood transfusion; when he himself, twice - see also below - declares that he has never experienced it. I do not know if SCALZI intended to mean "theoretical proof", which, moreover, seems to me very unlikely; however I do not know where he may have inferred this information.

But why did he never experience blood transfusion? He himself tells us indirectly: because it seemed to him too great, a royal thing. It is really a pity that FOLLI, at that time, did not have to follow the path that Dante's verses superbly trace:

"*Only fear those things*
that have the power to harm others,
of the others no, who are not fearful"!

Too bad indeed!

But if so far we have considered FOLLI's flaws, for in his mentality and for his works, let's see now also the merits.

It does not take into account the excessive criticism of his works, especially in relation to the spirit that informed them, for many very evident reasons and after all that has already been said in spite of everything, and above all after what FOLLI himself has told us; but the merits to which I mention, and which it is right to point out, are the following three. The first is that, in his "*Recreatio physica*" (328), he writes the phrase "*permutatio saniguinis...*" (329), which may very well mean - as in fact - the same concept that expresses the another "*transfusio sanguinis*", although I am of the opinion that it is always better to express oneself clearly twice than metaphorically only once; and on the other hand we know that MORGAN (330) and KNIGHT (331) use the word "transmutation", which is the exact English translation of the Latin "permutatio", meaning the same concept desired by that of "transfusion" ; and if English authors are granted, so to speak, a linguistic license, nothing prevents it from being granted to FOLLI in equal measure and in the same sense; which proof, as everyone sees, would be truly formidable to validate the claim of the Tuscan physician, undoubtedly unaware of the works of LIBAVIUS and COLLE. But there is more: that is, the second merit, even more clearly, confirms the previous supposition, since, again in the *Recreatio physica*, where he keeps talking about the way to prolong life, he writes: "*Remedium igitur ad vitae prorogationem... Ferdinando Secundo, Etruriae magno Duci, … anno millesimo sexcentesimo quinquagesimo quarto, idibus Augusti, quid de hoc sentirem aperui;* ...." (332); and without saying what he had to manifest to the Grand Duke, as he evidently does not want to reveal the jealous secret, he easily suggests that he is alluding to the famous conversation

just described. And it is perhaps from this passage that SCALZI was misled, as a little later, FOLLI speaks of experiences..., which were made by other scientists and for other purposes. The third merit - which, like the other two, strictly adheres to the history of blood transfusion - is that, even in the dialogue around the culture of the vine (333), he writes: "*One among the others* (inventions), *which I liked very much, for the greatness of the thought, and of the usefulness, I have always longed for and believed possible, although I had not experienced it, and such was the transfusion of blood*"; which shows candidly that our FOLLI had in fact long thought of the possibility of transfusing blood. And therefore it must be honestly recognized that the idea of blood transfusion evolved in FOLLI's mind in a wider and more harmonious way than in that of his predecessors, but which, however, did not take on colour and matter. Therefore, too long years have elapsed from the conception of this idea to its manifestation, only in the face of evidence of experiments carried out by others elsewhere, FOLLI felt the belated and sure pride of claiming what he had conceived with little success, albeit after the description by COLLE.

In any case, to conclude, I must say that if FOLLI could believe in good faith and then claim to be the inventor of blood transfusion, we cannot be of the same opinion, since he had a forerunner in COLLE or, better, an emulator more than a precursor; but if he, without his knowledge, was prevented, this does not detract from his living genius, and we Italians retain the joy of knowing and affirming that another son of Italy, for the third time and independently of his predecessors (unknown and perhaps unknowable), conceived, reiterated and cultivated the idea of blood transfusion.

Some German authors (STURM (334), VEHER (335), ETTMULLER (336), and some others) inform us that, in the same way as the Italians COLLE and FOLLI who had theoretical knowledge, as professor of the University of Padua, HOFFMANN (337) stated in 1662, "*docuisse quozodo in Melancholicis, Epilepticis,.... sanguinis and juvene floido in aegrum immitttendus sit...*" (ETTMULLER).

I have not been able to find any particular argument in support of this thesis; however, what is certain is that if HOFFMANN limits his teaching to a pure theoretical dissertation, he was preceded at least by COLLE and FOLLI, to leave the very important quotation by CARDANO in the shade; that if, on the other hand, he had to accompany it with practical application, the lack of any document capable of proving it irrefutably is deeply worrying, since, given the more or less certain knowledge of intravenous injections, nothing, in pure logic, could forbid admitting it.

PART TWO

2nd PERIOD

And now we enter the heart of the experimental practice. But before starting the study, it is necessary to dwell a little on the work of MAJOR (338).

I

As almost always happens in similar circumstances, opposite judgments gravitate around the name of MAJOR: HALLER (339) tells us that he was "*vir qui fine moliebatur, pauca perficiebat*"; PORTAL (340), given that MAJOR "*a été un des premiers à tenter la transfusion*" and that "*il s'en est même approprié la découverte, quoique* BILS, GRAAF, FRACASSATI *et plusieurs Anglois en eussent parlé après* LIBAVIUS", while he "*s'est étendu en longs raisonnements, et a fait peu d'expériences*", ends up telling us that the German professor is a presumptuous and

"*un des plus mauvais Ecrivains*" of the seventeenth century, and that "*on est indigné... d' apprendre qu' il soit parvenu aux premières places de son état*...";
whereas BLACK (341) only mentions him, much praised, and GOELICKE (342) writes that *"...no less admiratione dignum Chirurgiae genus inversit...*".

And so on.

From reading his works, I seem to be able to say that if he

had the blood of envy so parched

to claim by every means a place in the sun, and in his pages there is a certain unconfirmed ambition that is not genuine, skilfully concealed under the veil of false modesty, yet he is worthy of consideration at least for having been the first in his homeland to introduce the new method which he did not invent.

It is indeed true that in his "*Delicia Hiberna*" he pauses to describe a particular method, which gives ETTMULLER (343) the field to comment that "*ex his patet per Transfusionem sanguinis significari, sanguinis unius animalis in alterius animalis vasa sanguiflua per intermedios canales derivalionem, pro usu Therapeutico et Diaetetico*", and that in his "*Prodromus chirurgiae infusoriae*" he proclaims himself the inventor of infusoria surgery, as in his "*Chirurgia Infusoria*" he claims the title of inventor of blood transfusion; but it is easy to object that in 1664 and in 1665, both in the prodrome and in some letters (344), he dealt exclusively with infusion surgery (already known), and that with transfusion he wrote and claimed every honour for himself when experiments had been carried out for over a year... His whining with great men (T. BARTOLINO, SACHS, SCHENK T., HORST, etc.) is known, and it is also known he uses their naive letters (345) to declare himself a victim once again, since, even then, very few (and precisely MANFREDI (346), BARTOLINO (347), MICHAEL (348), TACK (349), HORST (350), and some others) were those who attributed to him the glory of invention of infusion and transfusion surgery; but it should be remembered that intravenous injections had already been practiced for some years, and according to a statement by HALLER (351) for several years (since 1642) or at least, with certainty, since 1657, and that therefore they were already known everywhere; and that from intravenous injections to blood transfusion there ran that time that everyone knows by now and that, once passed, MAJOR proves to ignore, or, better, to forget.

Another indisputable and very equivocal fact is that the German professor, in his works, mentions only those to whom it is easy to raise well-founded and favourable objections, namely G. SCHOTTUS and A. BORELLI; but he is careful not to name those who, although some already dead and others alive, with the mere mention of their name could ignominiously ruin the castle of glory he created with so much passion and already falling on every side.

In any case, he puts it this way (352):

"...*modo citra translationem sui ex uberibus in canalem infusorium, indeque in venam sectam, sine jactura ullius aurae volatilis, derivari possit, sicut sanguinem ex vena hominis sani in venane alterius (eiusque causarii, vel valetudinarii, ut vulgo vocant) derivari posse, ante annum circiter docui in Hibernis meis Deliciis (invento 2) et Galli novissime, Anglique simile quid non infeliciter experti sunt in sanguine ovillo ad hominem derivato; quam actionem Transfusionem nominant*."

He continues in this minor key, until he reaches a key that would screech a lot if it were pressed correctly; nevertheless, it is of some interest to linger for a moment in criticism.

Here is how the MAJOR begins its refutation (353):

"*Quoad inventi gloriam: me primum non esse Chirurgiae ipsius Autorem: nam a Clar*. SCHOTTO *jam disertam eius mentionem factam esse in Mechanica curiosa, vel admirandis artis, ut jam supra diximus, et pridem ante* SCHOTTUM, *a* BORELLO *quadantenus, Centum videl. IV Obs.6 et Cent. III Obs. 58;*" etc. etc. As we can see,

he reduces to very few the pretenders, without their knowledge, to the glory of the invention of blood transfusion; and precisely to two scientists who, however great, in the history of blood transfusion appear in the wings; but that's all; the reason is obvious. As for the first, who to put it, in the same words of the MAJOR, "*lib. XI, Mirab. Miscell. c. 21, p. 891, ...Pharmaco purgativo, per apertam phlebotomica lanceola venam infuso in hunc modum... fistulam in apertam venam intrudunt; vesicam comprimunt et per fistulam contentum liquorem venae infundunt, venam tandem diligenter claudunt*" (354), he gets away with claiming to have thought and said it two years earlier; as for the second, "*ne hoc praeteream, Exempla ex ipso petita, valde eterogenea sunt. Nam Centur. IV. Obs. 6 agit quidem de Anatomia, quam vocat, infusoria vel injectoria; sed res ipsa ac titulus edocet, Actum ibi inculcari non Chirurgico-Pharmaceuticum, sed mere Anatomicum; cognitionis, non operationis aut sanationis ergo. Neque insuffiatio liquoris in venan ab ipso fit in homine vivente tali, ut hic morti admodum vicinus sit, sed in placenta uterina pueri, in lucem recens nati, et victuri indubie annos plusculos. Ac denique ab Auctore lac in venas, non liquor medicamentosus aliquis: inque venas non patentes utcumque et lanceola facile feriendas, sed in obscuriores quasdam et lacte proin implendas ut visui pateant, intromittitur. Atque dum idem Borellus (Cent. III. Obs. 58) Cuiusdam insufflationis meminit: huius administratio non consistit in adigendo medicamine quopiam liquido ad intranea venarum, ope instrumenti alicuius metallici...*" but "*quomodo Deus animam Adamo insufflavit (si supernaturalibus istis haec naturalia collata referre licet*)." (355)

Thus, by saying that BORELLI exclusively cultivated infusoria anatomy, J. D. MAJOR gets along nicely; and he does not bother to remember any other, who timidly and sparingly suggests HORST in the names of SILVIO and BELLINI; but above all he is careful, as I have already said, to mention those who have preceded him without any doubt, and to whom rightly belongs purer fame.

He, continuing in the refutation, confuses the ideas and even the conclusions, but he does not run into any pitfalls; happy and confident that the credentials offered him by letters from illustrious colleagues, who even in their subsequent works proclaimed him the inventor, such as e.g. VAN HORNE (356), had the power to pave the way to the goal. And it is not clear how TACK (357) can say that Infusion Surgery was "*ab Anglis tamen jam pridem quoque decantata*", without feeling the need to deepen the investigation or rather the shame, knowing it, of lying, continuing in this way, in the volutes darkness, to incense MAJOR.

MAJOR is a vain illusion! He also did experiments on dogs by injecting "*extracti liquidi opii, grana XVI croci metallorum, infusum croci metallorum, acida (coagulando sanguinem statim mortem intulisse) decoctum arsenici (infusum cani necem intulit) mercurii sublimati in aqua simplici soluti (in venam cruralem canis... qui paulo post expiravit) nitri communi aliquot unciae (absque ulla alteratione)*", etc. etc.; but which he accomplished, without fail, after those of the English, albeit wanting to grant him - although very little probable, indeed, in my opinion, completely improbable - with the magnanimity that ultimately costs so little and with the same right of equality and justice the alibi of ignorance of foreign experiments.

It may now be inappropriate to treat intravenous injections from the historical point of view; but since I wish not to sever the ideological thread of the weaving hitherto followed around the history of blood transfusion, so I propose to give a nod to the end of this work.

II

Experimental research was then busily carried out in England, Italy, France and Germany; and according to this order they will be exhibited here.

A) ENGLISH AUTHORS

From a purely experimental point of view, blood transfusion had a favourable reception, fervent examination and happy implementation among English scientists. And since it is better than my words to give value to the concepts set out above by the words of the English themselves, so from their works I will draw a great deal of original quotations.

All the English authors are in agreement in asserting that the springboard for the execution of the first blood transfusion was constituted by the news and above all by the vision of the experiences of intravenous injections performed first by WREN in Oxford; and so far nothing wrong; one can only wonder if they really ignored or pretended to ignore the well-known passages of LIRAVIO and COLLE and the idea of FOLLI, since on their part there is the highest silence around their names. The question is arduous and delicate; however, it seems difficult for me to admit that in England what was already known and published in other nations was ignored.

Here is how CLARK (358) describes the *primum movens* of blood transfusion in his own country:

"*Circa finem anni 1656 aut circiter, Mathematicus ille insignissimus,* D. Dr. CHRISTOPHORUS WREN *primus infusionem variorum liquorum in massam sanguineam viventium animalium excogitavit et Oxonii peregit. Anno sequenti (1657) idem mihi tunc temporis sanguinis naturam proviriti indaganti, quae ipse fecerat, etiam communicavit, ex quo tempore diligenter ad diversa huiusmodi experimenta facienda me accingebam; et inter alia, quae tunc tentporis agenda decrevi, aquas, cerevisias cuiusvis generis, lac, serum lactis, juscula, vina, spiritum vini, et animalium diversorum sanguinem, injicienda mecum statui... Et practer fistulas alias ad varias operationes adaptatas, quasdam Figura in modum jactas habui, et uno extremo in arteriam unius animalis immisso, altero in venam alterius, sanguis ab uno animali in alterum facilius transfundi posset; et ut docto cuivis quod debitum est reddam,* D. Dr. HENSHAW *etiam e Societate Regia, vel ante hoc, vel circa idem tempus (uti et egomet) incassum tamen, eodem methodo, sanguinis transfusionem tentavit. Hinc fuit quod cum in Regali Societate inter alia experimenta (quod ex Archiviis illius satis liquet) sanguinis transfusio proponeretur, alii viri docti mecum opinabantur ex operatione tali nil fortasse sperandum, atque ipsemet difficultates recitavi, quae mihi hanc operationem peragenti contigerant. Dehinc res denuo tentata nobiscum non successit, donec doctissimus et Exercitatissimus Anatomicus,* D. Dr. LOWER, *Oxonii, anno 1666, rem feliciter conficeret...*"

Hence the conclusion that the British were the first, as also acknowledged by ETTMULLER (359), SANTINELLI (360), DU HAMEL (361), etc., to attempt blood transfusion in animals, which nevertheless succeeded for the first time only to RICHARD LOWER (362).

In order not to create confusion, let's start the study "ab ore".

Most of the authors agree in affirming that WREN (363) deserves the credit for the discovery of intravenous injections; so in fact write an Anonymous (364), SPRAT (365), BIRCH (366), BOYLE (367), CUMSTON (368), ETTMULLER (369), and HALLER, which however falls into an unusual and somewhat curious contradiction, since one thing is told in his *Elements of Physiology*, namely that "*primus horum experimentorum auctor perhibetur* J. GEORGIUS V. WAHRENDORF *qui anno 1642 in Lusatiae pago vinum in canum venas impulit et ea animalia inebriata fuisse notavit*" (370), and in the *Biblioteca Medica* he tells us another, namely that "CR. WREN *astronomus et architectus circa a. 1660 proposuerat infusionen medicamnenti in venam animalis. Curavit experimentum* R. BOYLE. *Opium canem stupidum reddidit, crocus metallorum vomitum funestum civit. Ab eo tempore experimentum saepe iteratum fuit a variis, potissimum a* T. CLARK. *Inventum tamen debetur* CHRISTOPHORO WREN" (371).

And since I am in this subject I want to immediately recall that in the Latin version of the *Journal des Sçavans* (372) we read the following: "*Maxime vero omnium arrisit ipsi* BULLIALDO, *quod ex litteris tuis intellexit infusionem jam factam esse in Germania anno 1642, ut certum sit exinde Anglos qui pri huius se rei inventores depraedicant, falli*"; which statement, as is well understood, if it were otherwise proven, would take away the merit of the invention from WREN. To whom they also give the honour of the discovery to MAHON (373) which undoubtedly relies on the last statement of HALLER, CLARK himself (374), HEISTER (375), FRESCHI (376), SPRENGEL (377) and others.

It is certain that, following WREN's experiments, the practice of intravenous injections was given a strong impetus by CLARK himself, who, as BIRCH reports in great detail (378), entertained colleagues of the London Society several times, and for a long time; then from HENSHAW, around which HALLER (379), MERKLIN (380), ETTMULLER (381), the *Diz. Encics*. (382), etc.; then by BOYLE (383), which BOERHAAVE (384) rightly calls "*illuid totius Angliae decus*", and to whom BARTOLINO (385) pays the splendid praise of BORRICCHIO, with evident consent, in a letter addressed to MAJOR: "*Praeter allatas a magno amico nostro D. Sachsio et Schotto diligentissimo, experientias, aliud ex Boylaeo illustri, de quo non dubitat Borrichius noster affirutare, si centuin haberemus Boylaeos totam naturam brevi videremus patefactam*...".

I thought it appropriate and useful to summarize briefly here, because I wished to recall the experimental preparation work before blood transfusion took place. And from this moment on, KING, D. COXE, CROONE, HOOKE, WALLIS and BALLE also deserve special mention.

As I said above, the first blood transfusion was happily performed by LOWER; which, starting from the discovery he says "...*a me primum excogitata atque suscepta, et quibus demum mediis et auxiliis ad effectum perducta sit*..." and continues "*cum vero insuper plures alimentares succos simili modo in fuderim, atque cum variis vini, tum cerevisiae injectionibus sanguinem diversorum animalium satis apte et amice congruere vidissem, animnum mox subiit experiri, annon multo magis sanguis diversoruint animalium inter se conveniret, et sine periculo aut lucta commisceretur... idcirco longe mihi commodius videbatur, animalis vivi, et adhuc spirantis sanguinem illibatum in aliud transmittere... Et primun fistulis, hinc inde adaptatis e vena jugulari huius in jugularem alterius transmittere conatus sum; sed cum propter languidum sanguinis venosi motum, eum in fistula concrescere statim et sibi ipsi viam obstruere viderem, mox aliam viam tentare coepi, et praeeunte quasi ipsa natura, statui tandem ex arteria unius in venam alterius sanguinem transvehere, novoque hoc artificio ipsius circulationem quasi ultra praefinitos limites extendere... tandem Oxonii, sub finei februarii anni 1665, praesentibus Doctiss. Viris Doctore* JOHANNE WALLIS *Mathematices Professore Savilliano, Domino* THOMAE MILLINGTON, *medicinae Doctore, aliisque eiusdem Academiae Medicis experimentum hoc novum, jucundo sane spectaculo, atque optimis auspiciis, exhibui... Nimirum comparatis canibus... ex eorum uno mediocris magnitudinis, aperta vena jugulari, sanguinern... detraxi...; deinde ut tanto huius dispendio alterius sanguine subvenirem, e cervicali arteria molossi majoris ad latus ipsius alligati atque compositi, sanguinem eiusque immsi*..." (386). (Figure 10)

LOWER, after these experiments, that can also be read in the *Philosophical Transactions* of 19-XI-1666 (387), repeated others publicly in December 1666, always with the method that "*was first practiced by* Dr. LOWER *in Oxford, and by him communicated to the Honourable* ROBERT BOYLE..." (388); and rightly complains that DENIS attempted "*huius experimenti inventonem mihi praeripere et sibi arrogare*"; and shows on page 20 the letter that BOYLE wrote to him (on 26th June 1666) inviting him to repeat the experiments before the Royal Society (*hoc itaque ut jam dignari velis obnixe rogo, totamque huius negotii peracti methodum ordine exponere, etc.*), and to which letter he replied on 6th July 1666 (389); and ends by

proclaiming that, just as "*Harveius sanguinemi intra propria vasa circulantemi corpori suo vitam praestare primo docuerit*", so he certainly deserves the glory of blood transfusion, to the perpetual honour of England.

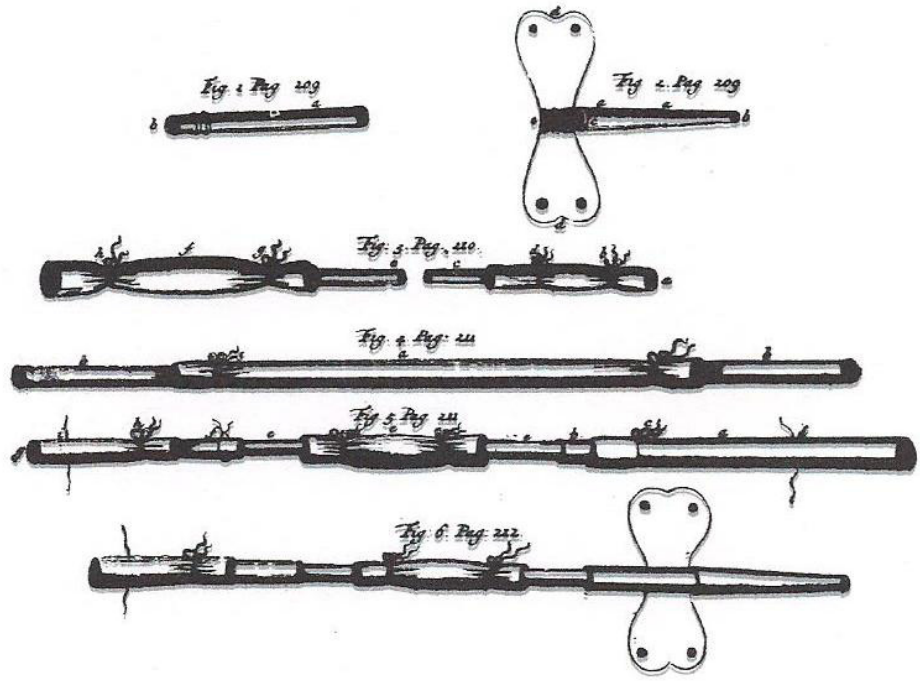


Figure 10: From Lower's book – V. pag. 89-

[Note: Simili states that he 'transcribes the explanations of the table from pages 209-212 of LOWER'S book – the information is presented in the original Latin. The following is taken from N. Peter's translation of Richard Lower's book - PL]

Fig 1: Where:
a. Is the silver pipe.
b. That part which is to be inserted into the vein or artery with its two circular rings where the ligature might be tied with the greater security.

Fig 2: Is a silver pipe made to convey blood into a human arm
aa. The silver pipe.
b. Its lesser part to be inserted into the vein of the arm.
c. Its greater part where it receives the blood.
dd. Its two branches perforated on both sides for passing a ligature through to fasten the plate to the arm.
e. A sinus excavated in the middle between both branches, if it might more commodiously receive the pipe which so compresses the vein that lies under it, that no blood can flow out of it and may be fitly compared to the pit in the middle of a man's upper lip.

Fig 3: Shows the pipes as they are fitted to the artery and the vein before the operation is to be performed, where
a. Is the emittent cervical artery.
b. The same artery tied tight, but as a slip knot.
c. The pipe conveyed into the artery for transmitting the blood.
d. The place where the artery is tied tight upon the pipe between the rings.
e. The pipe for receiving the blood and conveying it into the jugular vein.
f. The jugular vein.
g. The place where the vein is tied tight upon the pipe.
h. A ligature on the vein, but with a loose knot.

Fig 4: Shows the cervical artery taken from an ox or horse and fitted to the silver pipe at both ends
a. The cervical artery
bb. The pipes fitted to the artery

Fig 5: Exhibits the whole apparatus for transfusing the blood out of one animal into another, where
a. The jugular vein towards the heart of the animal into which the blood is to be transmitted.
b. The silver pipe conveyed into the jugular vein.
c. The vein tied upon the pipe with a close knot.
d. A ligature on the vein beyond the pipe with a very loose knot.
eee. The intermediate pipes and cervical artery which convey the blood from the immittent pipe into the recipient.
f. The pipe receiving the blood from the artery.
g. The artery of the animal which emits the blood.
h. The place where the artery is firmly tied upon the included pipe.
i. The place where it is tied beyond the pipe with a knot to be loose as occasion

Fig 6: Shows the same apparatus for transfusing blood from a brute into a man the use of which may be sufficiently understood from the foregoing.

It should be said immediately that LOWER has every reason to be in controversy with DENIS; but that he does not have all the merit of the discovery of blood transfusion, but only the experimental part; which is undoubtedly a great deal.

PORTAL (390) is not very exact about what he reports on LOWER; a little more exact is HALLER (391) and, in equal measure, CUMSTON (392); the most exact is ORÈ (393). In any case, the English scientist is very clear, comforted by the confirmation of CLARK; he says that he was the first to successfully practice blood transfusion on 15th February 1665, previously unsuccessfully attempted by CLARK himself and by HENSHAW, and that the thought of infusing blood into the veins arose when he saw in Oxford that doctors used to inject various medicaments into the veins of the sick to cure certain diseases; and that, having failed to transfuse blood from the jugular of one into that of another, for the prompt coagulation of the venous blood, he thought of changing the source, and, by choosing the carotid of the donor, he succeeded perfectly in his aim.

It is therefore beyond doubt that LOWER happily carried out the first blood transfusion in animals, after he had a vision or knowledge of the practice of intravenous injections, which his compatriots WREN, CLARK, HENSHAW, BOYLE, (and our FRACASSATI); and that, for the other experiments that he had to carry out afterwards, he is truly worthy of being considered the first of his country among the lovers of blood transfusion.

LOWER devoted himself for a long time and with passion to the transfusion of blood, and of the many experiments that he had done in collaboration with KING and on a healthy man, certainly ARTHUR COGA, deserves to be remembered; of which I will keep the word till later.

We have already seen that CLARK, according to his own narration, attempted the transfusion of blood in vain; today we can also note that GOELICKE (394), HALLER (395), TARGIONI TOZZETTI (396) reported exactly the first failed attempt, while DE CRISTOFORIS (397) does not judge with the usual exactness; but we also know that CLARK too, after the first experiments of LOWER, was among the first to carry out blood transfusion, and precisely on 21st November 1666, as BIRCH describes at length (398) and, much more briefly, HALLER (399) tells us as follows: "*l'ostea, erectus ab his felicioribus tentaminibus ipse Clarkius d. 21 nov. eius anni 1666, transfusi ex arteria in venam jugularem sanguinis, ovisque, quae suum pene totum amiserat, legitima cruoris copia restauratae recteque valentis, historiam coram*

Societate praelegit. Inde porro 12 Dic. 1666 et privatim, et coram ea illustri Societate experimentum factum est, et sanguis ex ove in canem transfusus, neque porro res aut rara fuit, aut arcana, acque pluribus diversarum gentium anatomicis id periculurn repetitum est."

On the other hand, CLARK himself, in that same letter quoted many times (400), addressing Dr. OLDENBURG, first editor of the Phil. Trans., is expressed as follows: "*Tutemet nobiscum vidisti, vir amicissime, animal larga sanguinis profusione fere exangue redditum, et convulsionibus lethalibus plane moribundum, sanguine alterius animalis, eiusdem speciei in illum transfuso, intra septem horae minuta ad pristinum et perfectum vigorem restitutum*"; whence it is inferred that CLARK conscientiously studied blood transfusion experiments, in which he used the direct method, and "*ex repetitis tamen experimentis talibus sanari, vel etiam in aetate senili juventutis vigor aliquatenus instaurari...*".

Doubts that today would be easy to resolve, but then...; although CLARK himself had already written above: "*agnosco tamen me de huiusmodi experimentorum utilitate multum adhuc dubitare*".

BOYLE, in addition to physics, wanted to link his name to biological experiments; and not only was he generous with advice, ready for intuition and wise in judgments, objections and questions (401), so much so that many doctors turned directly to him (402), but, rightly appreciating the value of the new form of therapy, he himself worked on experiments in favour of it. Indeed, in his work on the utility of experimental philosophy (403), he writes as follows:

"…*Quare sagacitatis eius haud vulgaris conscius et propositionem ipsius experimento probandi cupidus, canem magnum, ut experimentum suum praesentibus quin ex adjuvantibus aliquot medicis insignibus aliisque viris eruditis, tentare posset procuravi...*"

And he continues describing the technique and the whole experiment.

The following news is also interesting, which follows the above description; namely that "*aliquot post menses, Legatus quidam Curiosissimus, Principis exteri, Londini tunc temporis degens, me visitatione sua dignatus, mihi retulit, quod experimentum infusione croci metallorum fieri jusserit in corpore ultimae conditionis domestici sui, qui patibulo alias ob delicta reservabatur, cum vero, vix facta infusione Balatro iste deliquium animi (verum an astutia fictum ambigo) passus sit, audaciae insignis Experimentum continuari nolens, alium ab eo desistens, effectum non perceperit, quam quod torminibus ipsum aliquanium vexatum audiverit*; ..."; etc. etc.

In numerous other places in his own work, BOYLE, in addition to the experiments of others, also reports his own, which BARTOLINO, in the aforementioned letter to MAJOR, reports and judges as follows: "*Observavit ille, post infusam in arteriam canis opii tincturam, illum mox in vertiginem et post paulo in soporem incidisse, paulatimque ex eo tempore mirum in modum coepisse pinguescere: in alterius molossi arteriam infusum, crocum metallorum minuta quantitate nil invexisse damni; cum autem dosis ad uncias duas adaugeretur, miserum simul evomuisse animam et omnia*"; furthermore, as we have already seen, he proposed questions (404), which HALLER (405) judged "*acuti judicii plenae*"; and he recommended that many experiments be done on animals before thinking about practicing transfusion in man; and he was always at the forefront of the scientific discussions that were held within the Royal Society.

Of HENSHAW I have already mentioned incidentally when dealing with the work of CLARK.

KING is another merit of blood transfusion; and his name occurs several times, both in the *Philosophical Transactions* and in the history of BIRCH. He used the direct vein-to-vein method, in contrast to LOWER, who operated from artery to vein;

and, as we read in the *Phil. Trans*. (406), "*this way was first practiced (for ought we know) by Doctor* EDMOND KING, *and the success thereof in two Experiments communicated by him to the Royal Society as follows*..." (on pages 450 and 451); and for the first he performed heterogeneous transfusions, and had custom, as HALLER says, "*animal sanguine pene exhaurire, tum demum ex altero animale reddere*".

BIRCH (407) tells us that KING, together with doctors BALLE, D. COXE, TH. COXE and HOOKE, began his blood transfusion experiments on 15th August 1666 and that, in the session of 26-IX-1666, he was designated (408) by the Royal Society, with colleagues D. COXE, T. COXE and HOOKE, to perform these experiments, and that "*Goddard, Merret, D. Clark, Croune and Balle were desired to be present at the experiment*"; and that on 14th November he and TH. COXE reported successful experiments from one dog to another (409). But the first experiment of heterogeneous transfusion was carried out on 8-XII-1666, with T. COXE, D. COXE, HOOKE and POPE present; and KING transfused the blood of a sheep to a dog with happy results; while the following other experiences were unsuccessful: calf's blood into a small sheep; dog blood into a sheep; lamb's blood into a fox.

Furthermore, KING reiterates the concept of transfusion in man, which DENIS had already performed, and in a letter written to OLDENBURG on 21-X-1667 communicates the method and describes the apparatus, so that "*the method of transfusing blood into a man, as it was contrived by Dr. King was read, and ordered to be registered*" (BIRCH) (410) everyone can read in *Phil. Trans*., No. 28, p. 522; and on 23rd November 1667 he performed it in collaboration with LOWER (411), purely as an experiment, in a healthy man, compensated with a guinea, a certain ARTHUR COGA, whom LOWER calls "*hominem amabilis quaedam vesaniae affectuìn* » and HALLER « *parum sani ingenii*".

After bloodletting - bloodletting that was to be abused then and later, and which would weigh terribly on the conscience of doctors, if it were to be irrefragably proved that his victim was one of the highest minds that have honoured Italy and the world: I say Count CAMILLO BENSO DI CAVOUR (412) - after bleeding 6-7 ounces of blood, the two English doctors transfused that madman about 10 ounces of blood from the carotid of a lamb "*ce qui j'ai peine à ne persuader*" (PORTAL) (413), and he was fine; on the contrary, he himself wanted a second transfusion, which was given to him on 12th December of the same year, and he suffered no other disturbance than a little fever, due to the fact that the bloodletting was 8 ounces, but the transfusion reached 14 ounces of lamb's blood.

Furthermore, KING, as we read in the *Journal des Sçavans* (414), extracted 49 ounces of blood from a ram and transfused about the same amount from the jugular vein of a calf; he was fine, but since KING wanted to kill him, he had to draw 65 ounces of blood from him. From another smaller ram he drew 45 ounces of blood, and transfused about the same amount from a calf, without any inconvenience (415); always using the method "*ex vena in venam, verbi gratia jugulars*" (416).

Another English physician partisan of blood transfusion, already mentioned several times, is THOMAS COXE; who has, as BIRCH (417) says, "*related that he had made an experiment of injecting the blood of one pigeon into the veins of another by opening the vein of one, and letting it bleed, till the pigeon was almost expiring*"; but above all it should be celebrated for a superb experiment of indisputable scientific value. Indeed he transfused (418) to an old and mangy dog, which he had to heal, the blood of a young dog, which, although having [then] received 15-16 ounces of mangy and old blood, did not get sick.

Finally, it seems that COXE, with WILKINS, HOOKE and D. COXE, had made a blood transfusion from a dog on another day, 7th June 1665 and with excellent results; but of this experience I could not find the documentation.

I have already had occasion to mention and now I would like to recall that COXE is one of the main architects of blood transfusion, in his homeland and abroad.

As for D. COXE and WILKINS, very little remains to be said; more than actors, they were proponents and spectators of other people's experiences.

The same is true of BALLE and also of WALLIS (419).

CROONE, on the other hand, according to what CAMPBELL (420) tells us, "*Nov. the 14th. 1666, told me that at the meeting at Greshain College to-night (which, it seems, they now have evens Wednesday again), there was a pretty experiment of the blood of one dog let out (till he died) into the body of another on one side, while all his own run out on the other side ...*"; and besides, I have already had occasion to mention it.

Also Mr. HOOKE "speaking again of his experiment of passing the blood of an animal out of one side to the other without it passing through the lungs, and showing his contrivance for performing it, was ordered to try it first in private..." (BIRCH) (421); but he, formerly "*Nov 16th Tis noon I met with Mr. HOOKE, and he tells me the dog which was filled with another dog's blood, at the College the other day, is very well, and like to be so as ever...*" (CAMPBELL) (422).

As can easily be inferred from all that has been said, the English really dedicated themselves, according to their phlegmatic and positive character, with breadth of means and tests and with keen interest to the practice of blood transfusion, which they performed first (423) on animals, and, after DENIS, also on a man; but they waited very little for the therapeutic indications, and did not obtain any notion of pathological physiology, which the Italians were the first to observe.

B) ITALIAN AUTHORS

"*Italos transfusionem diligenter excoluisse constat*...", begins the chapter that concerns us in HOEFFT (424); and I take the liberty of mentioning that, although abstracting from the theoretical contribution due entirely to the Italians, in the experimental part they were the first, after the first experiments of DENIS, to carry out transfusion of blood in the sick in grand style.

"*It seems that the first to perform it in Italy was the famous Geminiano Montanari from Modena*..." (TIRABOSCHI) (425); certainly, according to the date of the experiments he was the first; since, on 28th May 1667, in the house of CASSINI (426), the famous astronomer of the Bolognese Studio, MONTANARI (427) performed the first blood transfusion, and with excellent results, from the carotid of a lamb into the jugular of another.

The *Journal of the Literati of Rome* (428) reports as follows:

"*On 28th May 1667 in Bologna, Mr. CASSINI transfused blood from the carotid artery of one Lamb, until it expired, in the right branch of the jugular vein of another, from which he had first drawn as much blood as a lamb of equal size could give total fainting*." This transfused Lamb died suddenly on 5th January "*having found himself overwhelmingly filled with rotten food*."

It is now interesting to report in full the two letters that CASSINI himself, "*most excellent reader of Philosophy and Medicine, Great Mathematician and Public Reader in this Bologna Study*", as GHISELLI calls him (429), wrote to Senator BERLINGIERO GESSI and to abbot MICHELE GIUSTINIANI; letters that GHISELLI faithfully reports in his Chronicle, existing in the University Library of Bologna (430).

1st Letter: to Senator BERLINGIERO GESSI, ambassador residing in Rome.

Ill.mo Sig. et Pron. Colendissimo,
I would not have delayed until now to share with Your Honour, but of the experiences we have here of the transfusion of blood from one animal to another in imitation of those that began to be done, first in England, and then in a somewhat different way in France, if I had not been completely satisfied at the beginning, but because it seemed to me that by using one way or another they succeeded with that frankness, which is supposed by others, I did not dare to talk about it as I was not sure whether the difficulties encountered came from the thing itself, or from our way of operating. I at last know that the method that was newly practiced in France, which we took to be the easiest from the beginning, is much more difficult to succeed than that which was practiced in England, which is of such a kind.

The carotid artery, which carries the blood of the left ventricle of the heart towards the head, is found in the neck of one of the two animals; in the other the yoke vein, which carries the blood from the head to the right ventricle of the heart, and made certain ligatures with threads so that they can be cut without effusion of blood; opened with iron [sic]*, and a small tube is put into the artery, which from the inside is towards the heart of the animal that has to give the blood, so that the blood that comes from the left ventricle exist through it, and another tube is placed in the vein of the animal that has to receive blood, which on the inside is also towards the heart, and being so much wider, that the tube connected to the artery of the other animal can enter and pass the blood through them from the artery of this to the vein of that. But in order that the animal that receives the blood, at the same time, sheds as much of it as it receives from the other, in the same vein in the upper part, towards the head another small tube is adapted, whereby it is made to come out in a basin as much blood as is estimated to be what is introduced underneath. The two tubes are thus connected, so that the passage from the artery of one to the vein of the other is given... It is assumed in the hypothesis of circulation that the new blood introduced into the yoke vein goes down the vena cava, from which it has its branch, into the right ventricle of the heart, from where with the usual rejected movement it cannot return back through the same door whereby it has entered because of certain films, or valves, which lean against and close on the backflow of blood, which exits through another door that fits the first that has the valves yielding to the backflow of blood and gives it access to the pulmonal artery, already known as the arterial vein, which spreads out for all the spongy substance of the lungs, transfuses it through insensitive pores. And because in the lungs another channel is branched that opens into the left ventricle of the heart through a third door, which has the valves yielding to the flow of blood towards the heart (omitted). We suppose that the blood which entered the lungs passes to the branches of this channel that is now the pulmonal vein, formerly called the venous artery, and through it enters the left ventricle, from where it is rejected by the usual movement of the heart, unable to leave the third gate, which closes at the reflux of the blood as the first, enters through the fourth door that has valves yielding to the reflux of the blood, and by means of the great artery called the Aorta which therefore has its principle is distributed to all parts of the body and transfused in meat for use in nutrition. And because other channels are likewise branched out throughout the body, all terminating in the great trunk of the cava, which leads to the right ventricle of the heart, from which in the aforesaid manner it passes back to the lungs, then to the left ventricle of the heart, whence it comes again distributed to all parts of the body, thus continuing its circulation.*

It is therefore assumed in the transfusion experiment that the blood that is released into the animal from the upper part of its yoke vein, which receives in the lower part the blood of the other, comes from the head where it was pushed by the arteries originating from the left ventricle of the heart, competing in this way subsequently exposes the blood to the whole body, through the opening made in the

vein, can let out all or almost all the blood of an animal, to which the new blood succeeds, which it receives by transfusion from the other.

It was estimated in France that it was not necessary to transfuse blood from the carotid artery, but to be able to do the same for the crural artery, which for other animals was more convenient, easier to uncover, and to adapt to the neck of the other animal that has to receive blood, which also seems likely to us at first we appealed to this way of passing the blood from the crural artery of an animal to the yoke vein of the other, but in practicing it, it seems to me that there was little blood transfused in this way; I thought well to experience how much blood could come out of the severed crural artery and how much more from the carotid artery.

We then practiced it along this path, in the lambs tied one against the other so that the necks were joined together, letting the blood pass through two tubes of hen's feathers through which it transpired and you could see that the yoke vein of the lamb that received it beat as if it had been an artery until the animal that transmitted it died, and let out from the other in a basin from the upper part of the yoke vein as much blood as we have tried to get out of the carotid artery of a lamb, we have loosened it, having remained alive and robust.

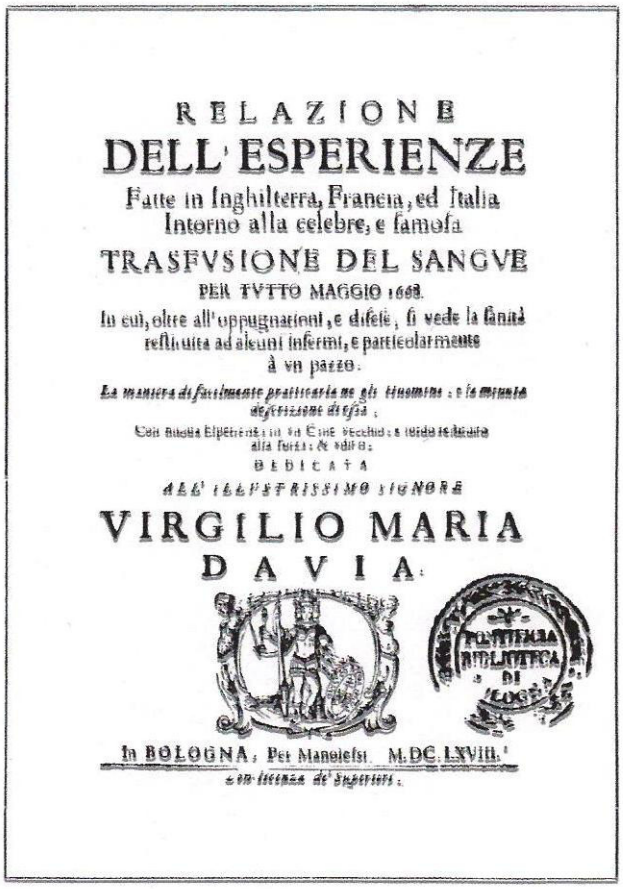
Here is what testimony I can make from own experiences of the success of the transmission, of which I did not want to write to V. S. Ill. until I have acquired the evidence. I have learned many other things on this occasion about the manner of the passage of blood from the arteries to the veins by still other infused liquors; but I have been too long-winded now to have to add more, so that, by resigning myself to Your Most V. S. Ill.ma, my humble servitude devoutly ratifies myself.

2nd letter: to Abbot MICHELE GIUSTINIANI, Patrizio Genovese de'Signori di Scio

Ill.mo e Rev.mo Sig. et Pron. Col.mo,
I am sending to V. S. Ill.ma a copy of the letter written by me to the Ambassador of Bologna in Rome about the new experiments of blood transfusion from one animal to another, in which I liked to practice some of these more ingenious Anatomicals in the hope of being able to find in it a form of medicine in those evils particularly which proceed from scarcity, or from corruption of blood. And already in France it has begun to be practiced also in men in which the transfusion of blood of other animals has produced very useful effects, so that the French are rightly praised for having been the first to reduce it to medicinal practice, as they assert it was also first discussed in France, even though the French were then allowed to prevent the English from experimenting with it in animals, in which the blood of others was transfused, to remove any scruple that could in time cause harm, which seems to give present help. To this effect I still have one of those lambs, in which in the past month of May the transfusion of other people's blood was carried out, with evacuation of one's own without significant disturbance. And hora [sic] *is very healthy and vigorous, even though he has the yoke vein for which the transfusion was made cut crosswise and tied by two ends, nor is it any more recognizable in any way where the opening was made, so perfectly he healed, nor yielded point to his peers in greatness. I also wished that those who transfused the blood of lambs had first experienced as I did, how much blood wants to come out spontaneously when the arteries that they use in animals of the same species, so that they would not believe they were transfusing more copies of what they do. From the cut crural artery of a lamb I have seen very little blood, a very large amount from the same of a dog. From the yoke artery (431) both totally faint.*

That's how much I got carried away to add, as an appendix, to the attached copy of the letter. While to V. S. Ill.ma resigning my most devoted servants I make a very humble reverence.

Bologna, 30th September 1667.



RELAZIONE
DELL' ESPERIENZE
Fatte in Inghilterra, Francia, ed Italia
Intorno alla celebre, e famosa
TRASFVSIONE DEL SANGVE
PER TVTTO MAGGIO 1668.
In cui, oltre all'oppugnationi, e difesè, si vede la sanità
restituita ad alcuni infermi, e particolarmente
à vn pazzo.
La maniera di facilmente praticarla ne gli huomini : e la minuta
descrizione di essa.
Con nuoue Esperienze in vn Cane vecchio, e totalmente
alla furia, & rabbia.
DEDICATA
ALL' ILLVSTRISSIMO SIGNORE
VIRGILIO MARIA
DAVIA.

In BOLOGNA, Per Manolessi M.DC.LXVIII.
Con licenza de' Superiori.

Figure 11: Title-page of Emilio Manolesso's book (1668)
[Not referenced in the text]

The other Italians, who practiced blood transfusions and achieved fame, are: IPPOLITO MAGNANI, GUGLIELMO RIVA, PAOLO MANFREDI, ANTONIO and GIUSEPPE GRIFFONI, GIORGIO BAGLIVI, ANTONIO VALLISNERI.

IPPOLITO MAGNANI (432), "*very diligent and learned doctor, and, what matters most in similar cases, prudent, cautious, and circumspect; who, due to the many experiences from October onwards made on animals of different species, as we will report below, ensures that he shows it, whenever it brings the need, in men themselves with the simple cut of an ordinary bloodletting*..."; experiments that SANTINELLI (434) also tells us, sometimes with joy, sometimes with acrimony.

MAGNANI was the first to notice a very important phenomenon, which later, on the part of foreign authors (who tried to get hold of the indications and understanding of it), had to be considered not only neglected but unknown to Italian doctors; who, on the other hand, - as often happens even now for new observations or discoveries, - precisely thanks to MAGNANI, had then - or have - first observed and communicated it; I mean haematuria, sometimes consecutive to blood transfusion.

MAGNANI made numerous experiments:

1. Transfused the blood of one dog into another, with excellent results.
2. He drew blood from dogs, who the next day received it by transfusion, and vice versa; and the dogs "*live invigorated*."
3. He saw bleeding dogs rise to new life after the transfusion; "*And that is why we learned from here that the restitution of the blood to whoever had lost it through injury or fluxions serves to give him back his life*."

4. "*The passage was then made to give the blood of a castrate to a dog, and perhaps because he exceeded the quantity at the request of many onlookers present, he urinated blood, died, and opened, had not only extraordinarily swollen blood vessels, but the vesica still full*". Needless to say, this experiment is reported with great frown and with great trumpeting by SANTINELLI.
5. "*In stalked animals, it has been learned, as well as in letters from Bologna, that the carotid artery sends out blood in abundance... so that in dogs it is almost always taken from it, and transfused into the jugular vein*...".
6. "*In introducing the blood it has been observed that the heart changes the order of the pulsations and makes them more frequent and harder, stopping the course a little with the finger, or discharging the blood through another vein, the heart also returns as usual; hence he learned that it had to proceed slowly for less alteration, so that it can distribute itself with the ordinary movement of the heart*...".
   Etc, etc…

From this we can see how the MAGNANI was a keen observer and did not consider transfusion a plaything or a simple mechanical operation of giving and taking at the operator's will - as was customary -; on the contrary, he perfectly sculpted the master indication of blood transfusion: that is, to replace the lost one with new blood, on pain of life.

Of course, not all MAGNANI's experiments had a happy outcome; and particularly those in which one sinned for unknown details and hardly glimpsed but of supreme value; and obviously SANTINELLI takes advantage of this, lingering around them with a long anthology of recriminations and paternals, telling us, for example, that a scabby dog, after a transfusion of lamb's blood, had haematuria and died; a fate that also befell, with its grave scandal and consequent reproaches, to another dog bled and supplied with lamb's blood.

It is without doubt that then, blood transfusions were carried out by almost all doctors in complete obscurity of physiological, pathological and therapeutic ideas, and that most of their failures are precisely due to ignorance and therefore to the non-fulfilment of fundamental precepts; but it is indisputable that the Italian doctors tried to give the most complete scientific seriousness, the most severe interpretation and the most acute intuition of those experiments and their phenomena, although they could not, for insult of time and doctrine, reach more conspicuous or prodigious deductions.

Famous are the experiments of the Piedmontese GUGLIELMO RIVA (435).

He, surrounded by the greatest men of his time, with pomp and public solemnity, in Rome, operated the transfusion of blood in three men, one of whom was a professor of medicine, consumptive. His name was FRANCESCO SINIBALDI, "*et cum phtisicus ipse derelictae spei et destitutus et moriturus esset*", he certainly could not find in the new blood transfused into him the magical balm that would eradicate his terrible disease; and in fact he died after a few months of pulmonary tuberculosis. The second was suffering from continuous malignant fever; the fever ceased; he left, and no news was heard of him. So says TIRABOSCHI and others. MERKLIN (436) on the other hand, says that he died; DIEFFENBACH (437) that he improved. It is much more likely that TIRABOSCHI was right. The third had suffered from intermittent tertiary-type fever for 36 days; three days after the transfusion he was already weakened and then cured. MERKLIN, usually specious, finds a way to discredit the operation and the operator alike, asserting that the patient would be cured equally; the thing is very old, as HIPPOCRATES (438) also points it out to us - who, however, knew how to respond properly - and in every time, especially among layman, he had and will have followers, so much so that we doctors today also see it in some cases; but MERKLIN should not have posed the objection so bravely if he

had wished to achieve his goal, but very differently; and the way would have been beyond his strength.

Considering these three transfusions individually, it must be said that it is possible to pass a serene judgment but a sure inference impossible; since, for the last two, indispensable elements are missing, especially in relation to the diagnosis, and it is not prudent, for the rest, to stick to the saying: "*post hoc ergo propter hoc*"; therefore, neither exalt nor condemn them, but draw the auspices of them for experiments on a larger scale. This then, that even now. Certainly, the indications for blood transfusion are now well defined, and no one would dare to transfuse blood to a sick person just because he has had a fever for 36 days; but in the fanaticism of that time, only the miraculous remedy could be conceived, hoped for and implemented: blood transfusion. This had to bring down diseases, like the storm the rushes.

As for the second case, whose malignant fever is a word for us, very little can be added; nor should one believe that the eclecticism of interpretation and judgment is a quality sought and desired by me, which is only imposed on me by historical contingency; and our second reserve, without sin of pride, seems to me wisdom more than prudence.

As for the first of the three transfusions, it is right to agree that HALLER (439) is not entirely wrong, when he writes that RIVA "*in phthisici venas, non certe prudenter, sanguinem immiserat*"; but more than the factor in and of itself of transfusing blood to a consumptive, is the fact that he was in a very advanced stage, and therefore not only included among the main contraindications, but even inexorably devoted to near death. However, we must not forget, in defence of RIVA, what I have already said, namely that blood transfusion at that time was going through a period of such blind fervour in the world of the layman and doctors that "*neque multum abfuit, quin ad immortalitatem non valde eminus se prospicere persuaderentur*" (HALLER); and that, if these experiments did not bring the operator the satisfaction that he perhaps expected himself, this is not at all due to a lack of technique (although, the aspect of antisepsis being unknown, it is not clear how the transfusion of blood could go smoothly), but rather due to an error of choice of the patient and perhaps to adverse luck. From this the legend of the papal veto on blood transfusion was born, similarly to the veto proclaimed by the Parisian court; since, as HALLER (440) tells us, "*paulo post, cum duo aegri, transfusionem* GUILIELMI RIVAE *manupassi, periissent, etiam Pontifex Romanus simili lege curiositatem medicorum coercuit*"; a veto which, (apart from the serious inaccuracies of this period by HALLER), also erroneously supported by MERKLIN (441), SPRENGEL (442), MACKENZIE (443), DE RENZI (444), *Diz. Encicl. di Chir*. (445), and others; and that SCALZI (446) assures us that it was never promulgated, especially in the form of a bubble, and that it existed only in the minds and voices of certain doctors and of the greater people.

During his lifetime, RIVA was unable to publish his anatomical work, which he left to MANFREDI for posthumous publication with 100 Roman scudi; but the latter did not comply with the will of his friend and above all with his duty; so that the work remained unpublished and has been lost. The title of it, transcribed by MARINUCCI, is as follows:

"*Novissima et inaudita usque ad saeculum praesens extispicia sive physicoanatomica de latice in animante a* J. G. RIVA *astensi doctore in medicina romano, anatomico, ecc. Christianissimi Galliarum regis chirurgo ordinario, jamdiu private ostensa, mox in theatro publico indigitata; observationibus modo nuperrimis, ac aere exaratis, illustrata, figuris proelo commissis, quibus hepar sanguinis officinam non esse, catharrum, pus, lac, et serum ex sanguine non fieri, sed ex chylo, quo et corpus nutriri colligitur, quadripartita in circulationem chyli sanguinis et limphae motum jatrophysicis cum proeloquio, totiusque operis epitome, Sanctiss. Dom. Nostro Alexandro VII Pont. Op. Max.*"

So FRESCHI (447).

RIVA's experiments, which are perhaps the first in Italy carried out on men, have been reported to us as follows by ELSNER (448):

"*Trium sanguinis transfusionum ex animalium trium vivenlium arteriis in trium laborantium morbis diversis venas celebratarum anno 1667 mense decembri Romae, non bestiali more sed feliciori et humano methodo prosperoque eventu a* JOHANNE GUILLELMO RIVA *ac principalioribus comprofessoribus operationibus interfuere subscriptae ac testificatae.*"

Hence we immediately see that ELSNER disagrees with improvised opponents, in whom prevention almost always dominates, and appreciates the method and the attempt of the Roman professor, which he calls "favourable".

All of which reported experiences, as accomplished by a man of merit and rightly in fame, helping to pass on the news; experiences of which "*we have the report printed on a fly sheet, which is kept in the Casanatense of Rome written in Latin, and authenticated by four doctors, witnesses of view...*" (TIRABOSCHI) (449); and RIVA would certainly have continued if death had not taken him.

He had greater luck, so much so that his successes promoted a huge echo and contrasted with the unhappy results of the French; PAOLO MANFREDI (450), who in two interesting memoirs, one of which was reviewed by ELSNER (451) has left faith of that.

He was assisted by doctors C. CANNAJ and B. SIMONCELLI, and was a convinced advocate of blood transfusion, because this, as he himself says, "*plethoricos exinanit, atrophicos humido rore conspergit, putredines abluit et duplici beneficio pravum depulsum meliori commnunicato supplet, extinctam fere caloris flammam accendit...*"; he did not do many experiments, but the results were brilliant; at first he performed some on animals, and precisely on two dogs, transfusing the blood at first from the crural artery of one into the jugular vein of the other, and then, on two other dogs, always using glass tubes, from the carotid of one into the jugular vein of the other. Then, on 2nd January 1668, he performed the first transfusion on a man. We have an incomplete description of this; we know that that the man was a certain Angelo of Udine, and that MANFREDI transfused him lamb's blood, with a direct method and obtained a favourable outcome.

There is no point in lingering any longer, although MANFREDI's experiments may deserve a more accurate analysis, because the way forward is long, and if you stop too long at each stage, it may happen that you arrive in port.

The *Giornale dei Letterati di Roma* (452) tells us:

"*Another experience of transfusion of the blood of a lamb into a dog, made in Udine by Mr. dr.* MONTANARI, *in the house of Mr.* GRIFFONI *with the help of surgeon Mr.* ANDREA CARAFFINI, *on 20th May this year...*"; and indeed MONTANARI himself, a mathematician professor from Bologna, described the experiment in two letters to CASSINI. In the first (453) he tells that on 20th May 1668, Mr. Count GIROLAMO SAVORGNANO DEL MONTE, Dr. G. BATTA CORIS from Bologna and the surgeon ANDREA CARAFFINI, in the house of doctor GRIFFONI, underwent the following experience: he transfused lamb's blood to a deaf and decrepit dog, which later recovered his hearing and strength.

Let us pause for a moment on this experience. We have already seen that THOMAS COXE had a wonderful experiment on a mangy dog that recovered from mange following a blood transfusion of a young dog, which, in turn, did not get sick by receiving the old and mangy blood; now, if from this fact it could be deduced at least that mangy blood could not generate the mange, it must on the other hand be inferred that the introduction of young and healthy blood had so profoundly modified the humoral environment of the sick animal to be brought clean net to recovery; hence the general conclusion that blood transfusion had immense therapeutic value. (Please refer to this syllogism, which in part could also apply today, to the year 1667

or thereabouts). But the experience of MONTANARI shows more and less at the same time. It shows more when it indicates that a much more serious and quite different disease (in whatever aspect it is considered) was cured by the transfusion of blood, so that some wanted to see in it the first truly serious and happy therapeutic attempt; and it shows us less in that there is no research into experimental pathology, and because we return to the apology for the restoration of strength, which is to say rejuvenating...

In the other letter (454), MONTANARI writes:

Dr. ANTONIO GRIFFONI, on 13th June 1668, writes to me thus: "*We are soon to carry out a new operation of transmitting the blood in another old dog, to then pass on to that of man; attesting to you with truth, that my dog, in which V. S. made the first transfusion here, has recovered his hearing almost as before, lost at all for three years, and is beyond comparison more vigorous than he was before the operation*..."; and on 20th June MONTANARI received further details from GRIFFONI: "...*my dog hears, walks behind his masters, has made himself good, where he did not just leave the house before, he found it difficult to walk, and to eat for weakness*..." (455).

If this fact is true - and it will undoubtedly be so, since the honesty of precluded men like MONTANARI and GRIFFONI is absolutely incensurable - all that remains is to express one's wonder, however, it is not surprising if similar effects could have given rise to crazy hopes, and therefore lose the sense of practical reason, even more abroad than in Italy.

I have not been able to find documents attesting to the completion of the experiments promised by GRIFFONI.

GIORGIO BAGLIVI was rather involved in infusion surgery, and will be mentioned and studied in connection with this.

ANTONIO VALLISNERI (456) has, rather than experimented, composed a dissertation in which nothing is found worthy of special mention.

The man who was famous for his experiments, even before there was talk of blood transfusion, is professor CARLO FRACASSATI, a friend of MALPIGHI; but we will talk about his work in the Appendix.

Establishing comparisons is always hateful and in the sciences nefarious, if it is not suggested by unequivocal and sacrosanct claims of priority of thought or action. In the present case it is, moreover, useless and silly. The contribution given by Italians in this field alone documents and in a very eloquent form, what was accomplished in our homeland; distilling and pouring out the work done by the Italians and the English drop by drop is not worth the price of the work.

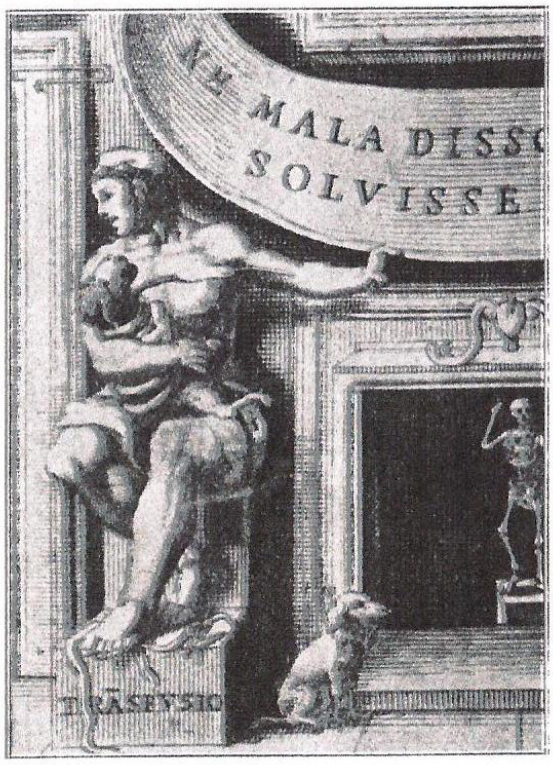


Figure 12
Part of the title page of Petrioli's Anatomy
(From the work of Sen. Prof. D. Giordano)*

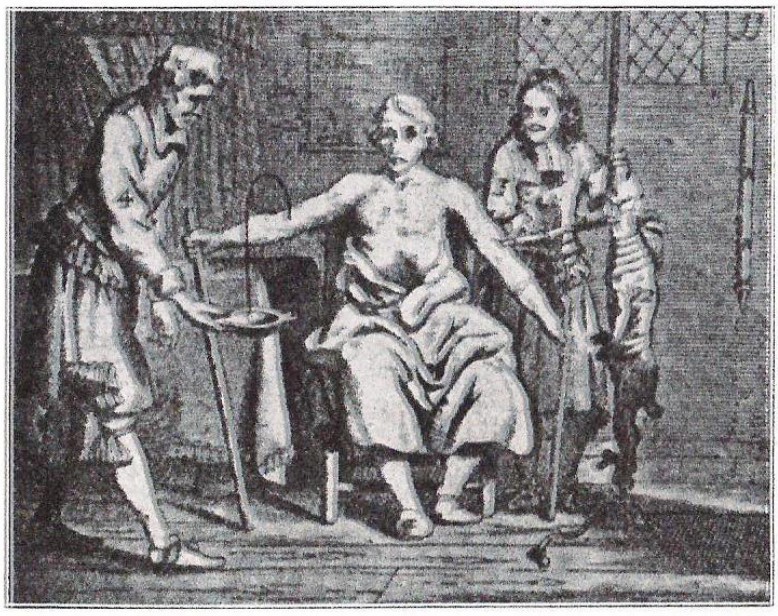


Figure 13
Reproduction of the transfusion from animal to human according to the ancient concepts
(From the work of Sen. Prof. D. Giordano)*

[* These two figures are not referenced specifically within the text but are placed (as Table XII) at approximately this same place in the book. They are identified in the 'Notes' section at the end of the book.]

C) FRENCH AUTHORS

The leader of the French doctors, who devoted themselves to the study and practice of blood transfusion, is DENIS (457).

As I have already mentioned before, the French professor has the great merit of having performed the transfusion of blood in man for the first time; but he is wrong, making use of this priority, of claiming other undeserved and unjust laurels.

The first blood transfusion in man was performed on 15th June 1667. DENIS drew about 270 gr. of blood from the carotid of a lamb and transfused it into the marginal vein of a boy of about sixteen, "*suffering from obstinate fever for two months, which had forced doctors to bleed him up to twenty times. At five o'clock in the morning, the DENIS took three ounces of "thick black" blood from him and poured nine ounces of lamb's blood into him. At ten o'clock he wanted to get up and was laughing and serene; at sixteen* [sic] *he had three or four drops of nosebleed; he went to bed at nine, and got up the next day at four. Then he felt good, got fatter, more awake, while he was slow and sleepy*." And he healed. The fact will be very true, and it is not legitimate to doubt it; nor should we be surprised by the fact that the young man had no other disturbance than a minimal nosebleed, since, as regards the haematuria, if it is true that "*in man it was possible to observe bloody urine after injection of more than 100 g. of lamb's blood*" (LANDOIS) (458), it is equally true that "*the urine of patients can remain free of haemoglobin and albumin even after the injection of 240 gr. of lamb's blood*" (LANDOIS) (459). [Haematuria is not mentioned in the original report, only epistaxis]

The success of this experiment was not without effect on the mind and soul of doctors.

The second experiment was made on a 45-year-old man, but "*plus par curiosité que par nécessité*"; which was compensated with money; and "*aussitost que l' opération fut faite, on ne le pùt empescher d' habiller luy-méme l' agneau dont il avoit receu le sang: ensuite de quoy, il alla trouver ses camarades, avec lesquelles il bût une partie de l' argent qu' on luy avoit donné*..." (460); and since he felt very well, "…*he undertook a very great effort, which a man could hardly bear, since horses themselves would have difficulty resisting it*" (461). [He was a sedan-chair porter]

I narrated these two experiences on man first, because they are the greatest title of glory of DENIS; but it is fair to add that they followed some experiments on animals. Indeed, on Thursday 3rd March 1667, DENIS, following the direct method, carried out a transfusion from the crural artery of a bitch into the jugular vein of a dog with excellent results; and on the following Tuesday (8-III-1667), from the same dog, which in the previous experiment had received blood, he extracted it to transfuse it to a third dog, not only without noticing any inconvenience, but "*avec un grand estonnement de ceux qui nous honoroient de leur présence, et principalement d'un fort habile Docteur en Médecine*..." (462).

With this, DENIS wanted to prove an absolute truth, which he had realized with perfect reason; and that is that "*Nous nous proposâmes... non seulement... de faire passer le sang d' un animai dans un autre, en faisant mourir celuy qui le communique pour conserver l' autre qui le reçoit; mais nous voulûmes les conserver tous deux*" (463); since, as will be remembered, it had become an incredible habit, especially among English authors, of killing the animal that gave blood by bleeding it.

But, on 2nd April 1667, DENIS performed three new blood transfusions, infusing three dogs with that of three calves; and "*les animaux dans lesquels on a fait la transfusion du sang, mangent tous aussi bien qu' auparavant, et qu' un de ces trois chiens à qui on avait tiré tant de sang le jour précedent, qu' il ne se pouvoit presque plus remuer, ayant le lendemain receu le sang d' un veau, reprit à l' instant ses forces, et fit paroistre une vigueur surprenante*" (464); and in one with the surgeon and friend Dr. EMMEREZ, DENIS, using blood from the crural artery; 19 blood transfusions in dogs in all, and always with flattering results.

It is curious, and in a certain sense ingenious, the comparison made by DENIS to justify and support the transfusion of blood in animals: "*transfusion of blood of one animal into another is sufficiently taught to us by nature itself; and it must be conceded that if we practice it, we will do nothing but imitate it. For when she is not yet able to administer nutrition to a fetus by mouth, and her stomach is unwilling to digest; she makes a continuous transfusion of the mother's blood into the umbilical vein of the child in order this way to nourish all its parts, corroborate them, and likewise increase them. Nor should it be answered that the mother and the child in this state are considered as one and the same body and one substance; for it often happens that the semen of the father predominates more than that of the mother, the constitution of the fetus is very different from that which carries it in the womb; all that it does not let to be modified by the transfusion of its blood*." (465).

And it is also curious to note that, among other curious reasons, DENIS alleged in favour of heterogeneous transfusion, that is, that "*the operation will be done with greater courage, and better outcome using animals*", because "*the blood of animals must to be less impure than that of men*" (466); and among them he gives preference to the calf.

Pessimistic philosopher the good DENIS!

The first serious failure, indeed very serious, of his experiments on man, occurred when, despite their strong opposition, DENIS and EMMEREZ were induced to perform a transfusion in Baron BOND, - [the son of the] prime minister of the King of Sweden, who had been ill for three weeks with "*lienteric and hepatic flow, etc*", and in very serious conditions. On 24-VII-1667 they gave him the first transfusion of calf's blood, and the sick man, feeling better, fell asleep shortly after. But the well-being lasted only 24 hours, after which a swoon occurred. Then a second transfusion was performed, but after eleven hours the sick man died. The autopsy showed an intussusception of the ileum, the pancreas hard and degenerate, the spleen four fingers large, the liver very large and discoloured. Hence we see that the surgeon could obtain very little, that is, nothing, from the blood transfusion, but perhaps something from laparatomy...; and that the main defect of some deaths was the difficulty of diagnosis even then, although, even if it was established, this, in our case, could not have radiated light and decreed influence on future deliberation...

But the joys and sorrows of DENIS were not to cease here; that he had to prove both again and at the same time. It is a case that has remained famous, and which was the cause of controversy and judicial measures, and which the French professor has dealt with at length in another letter (467), not without interest, and also reported as such in the *English Philosophical Transactions* (468).

It is about a certain waiter ANTONIO MAUROY, thirty-four, suffering from recurring madness for eight years, and who slept neither day nor night. Mr. DI MONTMOR stopped the madman and entrusted him to the care of EMMEREZ and DENIS, who, on Monday 19-XII-1667, subjected him to blood transfusion, with what reasoning is not known but with what hope it is easy to guess. After bleeding 10 ounces of blood, they injected six from the crural artery of a calf. The first effect, of which, given the theories in force at the time, one could be certain, was flattering: the sick man felt better; and then on the following Wednesday, EMMEREZ and DENIS performed a second transfusion of calf's blood, this time infusing more than a pound. But the next day the sick man had a nosebleed and urinated a large glass of "black" (sanguine) urine, and the next day as well. It should also be remembered that during the second transfusion the insane patient had profuse sweat all over his face, great pain in the kidneys, vomiting and faecal discharge, and then a deep sleep which lasted 10 hours. After which he was well until June 1668, so that he had already been declared cured (or was he not subject to recurring crises of madness?), when he was seized by an unshakable relapse, and in March 1669 by death. [Simili omits mentioning the final attempted transfusion and possible poisoning of Mauroy by his wife, etc.]

Well, isn't the healing sustained by DENIS premature?

But DENIS includes another truly surprising case, which is this: in February 1668 he was called to a woman suffering from apoplexy, with right hemiplegia. She had been treated in vain by other doctors with bloodletting, medicines, enemas, vomitories, etc., but she stumbled, without any conscience, in the recovery - it is said - by means of the double transfusion of arterial calf blood (in all 12 ounces), made by DENIS (469). Without malice, is there no doubt about the diagnosis? Couldn't it be instead - puta case – a case of an arteriosclerotic softening?

However, DENIS is one of the main exponents of the history of blood transfusion. Some of his experiments were also attended by other doctors: VAILLANT, LALLIER, DODART, etc

Another fanatic supporter of transfusion was CLAUDE TARDY (470). "*The French claim ... that* TARDY *and Abbot* BOURDELOT*, both doctors of great renown, had originally imagined it (that is, transfusion), and that they originally imagined it before* HENSHAW *and* WREN..." (471); but it is not enough to write like this; you have to be able to prove it.

TARDY, as well as in his treatise, speaks to us of the transfusion of blood in two letters; one (472) where "*il prétend que cette opération doit encore mieux reussir sur les hommes que sur les bestes*", and to avoid inconveniences "*il vaudroit mieux la faire de veine à veine*", and, finally, the "*personne qui fournit du sang, ne donne que celuy qui luy est superflu*"; and the other (473), addressed to Mr LE BRETON, in which, not without reason, albeit for other reasons, he affirms that "*le sang des hommes est meilleur pour la transfusion que celuy des bestes*", and "*que la transfusion est nécessaire à la perfection de la Médecine. Car come cette science remédie par la saignée à la superfluité du sang, elle seroit imparfaite si elle ne remedioit aussi au défaut de sang par la transfusion*", and concludes that transfusion is not beneficial in all evils, but only in some.

For this very correct statement of his, it would have been interesting to know what the indications suggested by him were, since, according to those of his compatriot DENIS, which represented the *vade-mecum* of the new doctrine, we see some that could instead be called contraindications; in fact he writes: "*now who doubts that the transfusion of sweet and good blood could not save some and extend the life of the others? Many advantages could still be drawn from this operation for pleuritides, smallpoxes, cancers, ulcers, risipole, anger, madness, and other diseases that come from the malignancy of the blood*..." (474).

But, moreover, it is undeniable that TARDY, with the above concepts, has better than any other identified and penetrated the spirit of blood transfusion, as it was to be confirmed in the future; hence, after such wise, though unspecified, words are not meant by anything, why he induced himself to propose "*a mutual transfusion in men, that is, that in the act of one man giving blood to another, he should also receive from him*" (475), which he called "*communication du sang*"; which is in evident contrast with the above concepts of the same author, and whose inspiration, meaning and practical value are not understood.

Undoubtedly, the work of TARDY, even with its flaws that do not need to be brought to trial, from a theoretical point of view, is highly applauded.

GADROYS (476) is also a supporter of blood transfusion, whose immense life giving virtue he points out in this experiment, which he recounts in a letter to Abbot BOURDELOT (477).

A sick man, "*réduit à la dernière extrémité*", who had eaten nothing for three months and had lost knowledge and speech, and "*les Médecins qui le traittoient l'avoient abandonné*", after the first small blood transfusion, showed an improvement so conspicuous that he then got up, speech and consciousness returned to him, and the diarrhoea stopped; but after 24 hours he worsened again, returning to his former

condition; after a second transfusion he got better again, but just 12 hours later he died. At the autopsy, gangrene of the intestines was found.

Whence it is concluded once again that blood transfusion was not only esteemed at that time the main remedy to be used in any acute or chronic disease, without too much discrimination, but also the extreme resource of medicine, which with it in front of its threshold, in the deepest darkness, it could throw the ultimate challenge to death ... that is, work a miracle.

DE GURYE (478), following the famous sentence that "*virtus in medio est*", expresses the opinion in a letter to abbot BOURDELOT (479) that blood transfusion can be done in robust men, but not in weak, and that it is not so "*sure nor of so great use as some claim; but neither is it so useless and much less harmful as others claim*", hence "*le sentiment de cet Auteur touchant la transfusion est qu' il faut tenir le milieu entre les deux opinions contraires...*"; and even once it must be admitted that the old adage is not completely wrong ...

It would have been not without interest if DE GURYE had clarified the first concept better; since, for example, a bled man can be very weak, but without fail, saved by an opportune and wise blood transfusion.

GAYANT (480) with PECQUET and PERRAULT also made several experiments on transfusion in different animals and with good results (481), and also pointed out the danger of superabundant transfusions; but this just recommendation was not given due recognition.

Of the other French authors, who dealt with this subject in one way or another, I will keep my word when discussing that of the opposition to blood transfusion.

D) GERMAN AUTHORS

We have already considered the experiences and attributes of MAJOR; let us now consider the other scientists who in Germany devoted themselves to the study of blood transfusion. They are the following: PURMANN, KAUFMANN, GARMANN, ELSHOLTZ, ETTMULLER; without considering for now the one who more than any other of his compatriots gave impetus to infusion medicine, I say SCHMIDT, otherwise called FABRICIUM, who will be mentioned at length and with praise in the appendix.

PURMANN (482), meritorious for having supported and practiced infusion medicine as much as he could, as will be seen later, "*chirurgiam transfusoriam etiam vidit ed admiinistrantibus adfuit, ut medici ex agni vena jugulari sanguinem in venam brachii injicerent, optimo eventu; non ita militibus herpete laboranítibus, quidem eadem operatio nocuit*" (HALLER) (483); and indeed the three transfusions that he performed were unsuccessful. SPRENGEL, in his pragmatic History, tells us that PURMANN, together with KAUFFMANN, treated a leper in 1668 with a transfusion of lamb's blood; but he does not tell us what the result was, which everyone can easily imagine.

KAUEMANN (484), who is credited with having been perhaps the first to propose injecting blood directly into the arteries, because, while agreeing that the method is dangerous, the medicine reaches the sick part more quickly, carried out four transfusions; the first in an individual suffering from malignant fever for three months, and to whom, after bleeding, a corresponding quantity of lamb's blood was injected, with excellent results; another two out of two soldiers suffering from scurvy, who got worse; the fourth in a fisherman, suffering from lupus, who also got worse.

There is no need to insist on details, already mentioned several times, nor on considerations already carried out.

I will speak extensively of GARMANN in the historical notes on intravenous injections; for now suffice it to say that he wrote with a certain genius about infusion and transfusion surgery.

ELSHOLTZ (485) is among those who have been the first to deal with transfusion and the infusion of medicaments, and, in truth, not with infamy; in his "*non inficetum opusculum*", as HALLER calls it (486), he makes a history of some transfusions performed in dogs, and speaks of a successful transfusion in a man; however, since he, as GOELICKE (487) also says, has preferably treated intravenous injections, so we will deal with him later.

And here we are at ETTMULLER (488), whom I have quoted many times, first of all because "*suo tamen tempore inter celeberrimos medicos habitus est*" (HALLER) (489); secondly, because in his work on blood transfusion (490) he seemed to me to be correct in historical details certainly more than many of his contemporaries; thirdly and lastly, because I believe that his work has been written with great conscience and with uncommon criteria. And in this regard, it is better than any discussion that I report the index of the chapters, from which we can indirectly deduce the importance of his monograph, even if here and there strewn with inaccuracies and puerility (491). I know very well that reporting the index of a job resembles the mentality of the churlish, who in buying a car is concerned with the horn or the brakes rather than the make or, at most, the engine; but I want to remember that the purpose of my work is not to study blood transfusion in its indications and in the technique etc., in short, in the clinic and in physiopathology, but only in history.

ETTMULLER did not have many experiences; more than anything else he limited himself to the theoretical conception and to gather, with severe eclecticism, the observations of others, without abjuring his own reflections and conclusions.

Finally, he narrates that “GRASSIUS *cani itidem detraxit sanguinern ad instantis mortis judicia; sed cune alterius sanguinem huic instillasset, revixit. Experimentans autem* GRASSIUS*, an lac, si cani, cui sanguis detractus, infundatur, in sanguinem mutetur, expertus est mortem subsequi*“.

Finally, I must remember that he, on p. 1472 of his work, strongly advises to consult FROMMANN, around which, however, I have not found anything to report.

HALLER (492) and others also cite LAMZWERDE (493), whose work I was not able to trace in the even so rich libraries of Bologna, and whose contribution I am therefore not given to review.

E) DUTCH AUTHORS

Among the Dutch authors who dealt with blood transfusion in this period, I have to mention only van HORNE (494), who does not make observations worthy of particular importance, and in the historical mention about transfusion surgery he only mentions TARDY (495).

* * *

Other authors have already been cited in the course of this work, nor do I have further news to report.

In other countries not mentioned above, I am not aware that any experiments of remarkable value have been carried out or otherwise worthy of memory.

III

So presented, very aridly, the evolution of blood transfusion in its first fervent and impetuous practical period, we are now entrusted with the study of that theory which rises from a simple objection to the denial of a fact.

"*It is a universal feeling* - LEOPARDI says in chapter VIII of Parini, or glory - *that human knowledge owes most of its progress to those supreme talents, which arise from time to time, when one when another, almost miracles of nature. On the contrary, I believe that it owes the most to the ordinary minds, very little to the extraordinary. One of these, let us say, provided that he has with the doctrine the space of knowledge of his contemporaries, proceeds in knowing, so to speak, ten steps ahead. But other men, not only are they unwilling to follow him, indeed most of the time keep silent, or at worst, they laugh at his progress... Therefore, no truth like this, unless it falls under the senses, will ever be commonly believed by the contemporaries of the first who knew it.*"

I do not want to discuss this opinion of LEOPARDI, which I do not fully subscribe to; but in those times you do.

The enthusiasm of some, who were vilified, was opposed by the pessimism or hostility of others, who achieved an ephemeral victory; and it was not thought that the progress of the sciences is late and constant, and that every new thought and every new experiment, even if denied or derided at the present, lead one step forward, sooner or later, in the eternal path of knowledge.

"*But as no one feels the perpetual motion that carries us around together with the earth, so the universal of men is not aware of the continuous progress that their knowledge makes, nor of the assiduous variation of his judgments. And he never changes his opinion in such a way that he thinks he is changing it.*" (LEOPARDI).

As far as I know, in England alone did no hostile authoritative voices rise; but in Italy, France and Germany, yes.

With us BARTOLOMEO SANTINELLI and RAIMONDO GIANFORTI; in France LAMY, PETIT (otherwise known as EUTIFRONE), PERRAULT and PIERRE MARTIN DE LA MARTINIERE; in Germany, MERKLIN.

* * *

SANTINELLI, whom I have quoted several times and whose work I have recalled in the beginning, was the most persistent among us, and he went so far as to write, that for the good of humanity, he would have wished that such an operation never again be practiced; axiom and wish enormously denote how much he was a miserable prophet.

GIANFORTI (496) says that "*the transfusion of blood would be very beautiful and very useful, if on the contrary no difficulties arise, not just a Moment to the operation and after it even more serious*"; and summarizes his objections, to which FOLLI also answered in part and sometimes in a comic way, in the following which I summarize:

1. Should blood be removed from the artery or vein? In the first case, greater danger is encountered, but in the second greater damage, due to the impurity of the venous blood.
2. If you want transfusion to be really useful, when for example it is carried out in an individual who has impure blood, all his impure blood should be extracted from him before transfusing him with good blood.
3. If it is difficult to find exact similarity between the blood of two men, it is very difficult to find it between that of men and animals.
4. Will the transfused blood be able to maintain its qualities and properties intact, even if outside its own vessels?

And although the third and, even more, the fourth, which has all the requisites of an excellent subject of study, are not devoid of common sense, it must nevertheless be said that GIANFORTI did not know how to master the subject; that, even then, he could have brought contrary elements of theoretical and practical judgment of indisputable value, even if in turn they could be criticized and avoided; take for example haematuria, vomiting, fever. But the philosophical impregnation - unfortunately I coin them incorrectly - permeated every cell of the body and every externalization of the spirit, so that it invariably ended up being translated into words and deeds.

However, with us the opposition did not reach the intensity of the French one; and we have already seen that it was a mistake to have believed the promulgation of the papal note to be true, which was to prohibit the transfusion of blood in Italy, while we will see that the emanation of the French decree that placed it within very strict limits will be very true.

* * *

In France, one of the most heated, and at the same time the first "*qui ait écrit contre la transfusion*" (497), is LAMY, of which we have two letters (498) in which, as PORTAL (499) says, (that almost entirely copies a period of the first letter of the LAMY), "*il prétend che cette opération est plutòt un moyen de tourmenter les malades que de les quérir*"; and not only does he consider it a useless method of treatment, but also "*pernicieuse*"; and although right or wrong are not clearly divisible, here it must be said that on LAMY's side, there is a bit too much wrong. It is perhaps appropriate to repeat LUCREZIO:

"*Omnia enim stolidi admirantur, amantque*
inversis, quae sub verbìs latitantia cernunt."

Another consideration: LAMY evidently did not ponder the fundamental question and that is whether transfusion was really so harmful as an operation in and of itself or if it were outside of itself, and therefore due to other factors, represented by antecedent and fatal errors, attributable rather to those who made it at random; and then he would certainly have noticed that splendid results were due to it, while the catastrophic ones, at least for the most part, had to be attributed rather to the unwary and almost senseless operators.

PETIT maintains none other than "*à moins que de renverser toute l'ancienne Médecine, oz ne peut pas... admettre la transfusion. C' est pour quoy il prétend que' elle doit estre absolunent rejettée*..." (500); and, trying to explain himself better, he affirms that it is "*impossible for the blood of a calf transmitted in the veins of a man not to cause much alteration in his body, and so to speak, not to transform him into a beast. For yes, like an apple grafted on a pear tree, it produces the fruit, which has no pear tree but apple; so it is credible, that the blood of a beast mixed with that of man will in a certain way degenerate into a beast* ..." (501). And it seems to me very strange that, despite the many transfusions performed and described, a man of genius like PETIT had not yet observed any of those metamorphoses, which he fears and believes, both spiritual and somatic ...; and who, in spite of this, believed equally to write such nonsense! Thus, for example, he goes on to say that "*with transfusion the advantage of bloodletting is destroyed ... since nature is not discharged, but its weight changes*", - hence the misunderstanding of time, even if only in part -; and he concludes by affirming, and rightly here (for once in a while!), "*que pour la faire il faudroit se servir du sang d' homme et non pas du sang de beste*" (502).

I would not like it to be possible to conjecture, from what I have just said almost by incidence, that I do not admit the objections or that I report almost by force and

with malice what were then made, because, as Leopardi says "*it is difficult for most men to admire and venerate in others a science much inferior to their own*"; no no!, all the more so since "*who can doubt that the next age does not have to know the falsity of many things affirmed today or believed by those who are first in knowledge, and to overcome by no small trait the present age?*" (LEOPARDI); but I only wish to insist on the fact that the objections of the time were affected, in most part of their basis, by the influence of a philosophy that was too abstract in the face of the evidence of concrete facts; hence, except for a few truly correct ones, all the others were not only trivial but also lacking critical criterion that one would like to include in the objection itself. This always has, in my opinion, the merit of helping the progress of the sciences, even though sometimes starting from false and lying preconceptions.

PERRAULT (503), a famous doctor and, perhaps, the most famous architect, because, if I remember well, he designed - emulating BERNINI – the Louvre palace, that was then built, stands up against the partisans of transfusion because, having also experimented it, did not portray any success; and, according to PORTAL (504), "*leur fait les objections les plus solides*"; but if we think that the most formidable objection consists in the conception "*qu' il est difficile, qu'un animal s' accomode d' un sang qui n' a pas été cuit et préparè chez lui même*", obviously one cannot help but smile; where the conclusion that it would be "*bien étrange que l' on pût changer de sang comme de chemise*" (505) is not completely wrong; which would be really strange and even dark, like the transfer of blood from TARDY.

It is certain that the main reason for the irreducible hostility of PERRAULT was derived from the fact that the two dogs of his experiments both died (one from too much injected blood); but this inauspicious outcome, if he had not clashed with an unfounded sentence, should have induced him not only to persevere and, in particular, to improve the sorting and experimental conditions so as to remove or, at least, reduce the causes of error to a minimum; but in the first place to look for these.

PIERRE MARTIN DE LA MARTINIERE (506) is also an opponent of blood transfusion; but of him I can say nothing else, because I could not find his pamphlet.

* * *

The main representative of the opposition in Germany is MERKLIN (507), who in his book, after a succinct but not exact story, gives the examples of RIVA concluding that blood transfusion is a cruel and dangerous operation, to the point that can lead to death from the transfusate; and therefore the German physician, as GOELICKE (508) well puts it, "...*hanc denique, quae de homine in hominem absolvitur, ad adcuratam experientiae lancem revocavit* ".

"*It is easy to criticize, difficult is the art*", they say; but here we must agree that the criticism of our ancestors had not yet absorbed the malice and sharpness from which the modern one is nourished.

IV

Having said this, today we can embrace from afar with an objective gaze and with a calm and serene soul the entire period of the rise and fall of blood transfusion, and, without showing off the superb knowledge that are the portentous and inevitable fruit of the incessant progress of human knowledge and that in the future they will be more miraculous than some of them still are today, pass men and things to the scrutiny of history, we can say briefly that the experiments of its proponents are not free from severe criticism like the test objections mentioned.

Like all novelties which, hiding under the mantle of miracle, inflame minds impetuously, so the new method generated in itself such an abuse and inspired such a mad concept that ruin must have followed hastily and inevitably to that daring tower of. .. Babel. The fundamental mistake was to believe that they had found not only a panacea capable of instantly curing and healing all incurable diseases, but also the elixir of long life, and therefore the resolution of the problem that later must have been so influential to poor Faust. Like the Nepenthe drink, in which HOMER celebrates the antidote of pain and anger, since whoever drinks it forgets the greatest misfortunes and lives blissfully for a whole day, so blood transfusion marked at its birth with the antidote of old age and death.

Gigantic and unfortunate madness!

The fundamental error was therefore that of believing it possible to stop, change and reverse the eternal and immutable principles of Nature.

Gigantic and unfortunate madness!

And the ruin was tumultuous and glorious; because the Court of Châtelet of Paris, with a sentence of 17th April 1668, proclaimed not the absolute veto to practice blood transfusion, as was claimed by some, but only the sentence that "*à l 'avenir la transfusion ne pourrait étre faite chez l'hommne sans I 'approbation d' un médecin de la Faculté de Paris*" (509).

And why all this? We already know this through long meditation and disquisition; but very well summarized by BARKER (510) with the following passage, how much was already exposed on several occasions: "*how then can it be ... that there are so few excellent doctors, among an amazing number of them? To tell the truth, it takes more science to imitate nature well than is commonly believed. Painting, Sculpture are imitators of Nature, as well as Medicine; and yet we see as few excellent Painters and excellent Sculptors as the perfect Medici*...": which most just observations remind me of that magnificent period of CICERO, where he, with the mind of a brilliant profane, says to expect from doctors not pure science, which counts for nothing, but effects: "*Ut enim medicorum scientiam non ipsius artis, sed bonae valetudinis causa probamus, et ars gubernatoris, quia bene navigandi rationem habet, utilitate non arte laudatur; sic sapientia, quae ars bene vivendi est, non expeteretur si nihil efficeret*."

Well, the errors and damages were precisely committed, in spite of themselves and involuntarily, by the doctors themselves: and this is said without any irreverence.

It is strange that every novelty, more or less sensational, should immediately ignite souls and intellects! When the general circulation of blood was known, it was believed to have acquired, with the only notion of it, the panacea for every evil; this is how BERNARDO ALBINI (511) dissolves the hymn: "*Cum sidus hactenus non visum in coelo apparet, vix oculos animosque omnium magis occupat, quam cum is* (512) *sexti elapsi saeculi lustro doctrinam hactenus inauditam de circulo sanguinis scriberet. En nova medicinae primiordia! Incendebantur animi*... ", etc, and here follows the description of the remedies which, following the new discovery, will be docile and infallible in curing every evil; and here is a joyful interjection: "*Haec nostra sunt tempora! Tempora vere saturnia!*: and so on. And how, a century ago, MAGENDIE described the enthusiasm of the past: "... *mais, des que la circulation fút reconnue, une sorte de délire s' empara des esprits, on crût avoir trouvé le, moyen de guérir toutes les maladies, et méme de rendre l' homme immortel. La cause de tous nos maux fut attribué au sang: pour les guérir, il ne s' agissait que d' ôter le mauvais sang, et de le remplacer par du sang pur, tiré d' un animal sain*" (513); and when the transfusion of blood, which represented an astonishing notion and event, entered the public domain, practiced without restraint and surrounded by errors and disappointments, it touched on the disastrous consequences reported by the chronicles of those times. And so the transfusion of blood, which CARNOT with a picturesque image defines as a real "*blood transplant*," fell into oblivion.

And so those who dreamed of being right (TOMMASINI (514), BOERHAAVE (515), etc.) who later wrote that it had only served to prove, even if it was needed,

that the circulation of blood was right; that is, those (MAHON (516), etc.) who wanted to relegate it to the lowest degrees of medicine, not even granting it the benefit of novelty, which, in the final analysis, is the vanguard of progress. And in the face of such an assertion, which, if it were true, could certainly cause the building I had laboriously built with the present work to collapse at once, I might at least feel as to whether or not to continue the path taken; but the glaring realization that both he and the others were truly blind divinators, convinces me that, even with the awareness of my own poverty, I am allowed to continue on my way.

The oblivion, however, was not complete; some continued, albeit in the twilight, to experiment, others to write about the subject. Thus we see THRUSTON (517) perform the following experiment for physiological purposes: weighed a dog before and after the transfusion of sheep's blood, he saw that from 15 pounds the weight of the animal had risen to 17, with the consequence of intense dyspnoea followed by death; from which he concluded that the abundant amount of transfused blood is dangerous or even deadly. This experience contrasts sharply with that carried out by MAJOW (518), in 1667, who on the other hand, saw that a transfusion of arterial blood caused a dog, which was short of breath, to make it stop. Thus we see CROUNE (519) show, on 14th January 1669, the idea of making small and repeated transfusions to an animal to see if it was possible to keep it alive without giving it any food, but an idea that was not brought into effect; thus DOLEO (520) repeated a famous experiment, by means of which, as the famous HALLER (521) says with a nice summary, "*canis vetulus scabiosus a recepto per transfusionem sanguine junioris catelli suscitatus et alacris*."

But, indeed, after 1680 in which year FOLLI's Stadera medica appeared, a new tendency in experimental practice, though not intended to supplant the old one, flashed to the minds of those doctors; I mean the study of intravenous injections of air.

That air was harmful if introduced through the veins was known information; but what formed the object of the following experiments, hence the name "*Pneumatic Surgery or Medicine*", presented the greatest quantities of cases.

BRUNNER (522), in 1682, introduced into the femoral vein of a dog, by means of a tube, so much air that gurgling could be heard at the forehead. The dog immediately became very dyspnoeic, he had convulsions, but then little by little he recovered: but after another slight blow of air he died. The autopsy revealed: red and contracted stomach and intestines, congested spleen and liver, veins and heart distended by air, and especially the right ventricle.

WEPFER (523), which HALLER (524) considers "*ex praecipuis huius saeculi ornaramentis*", carried out some pneumatic experiments mainly in relation to the restoration of heart pulsations, and says that in an animal that recently died, it is possible to resume its own heart rhythm, by introducing air into some of the vessels that lead to it.

PEYER (525) also dealt with the subject, and in a letter dedicated to G. G. HARDERUS reports experiments made to revive the heartbeat; which obtained either by irritating the heart with some needles (and even today the question was debated as to whether favourable cases of restoration of heartbeat were caused by the mechanical factor or chemical-pharmacological ones, i.e. adrenaline), either with some hot iron, or by injecting air into the thoracic duct. And he narrates the experiment carried out on a cat, which had an abortion and was - or did it seem? - already dead, but which, following the blowing of a lot of air that penetrated into the heart, with the provoked resurgence of the heartbeats, came back to life. PEYER then tried to do "*l' application de cette expérience à l' homme, et elle lui a réussi*" (PORTAL) (526), or, better said, he realized that in strangled people, better effects were obtained if the air was hot.

But unfortunately it is not possible to know more...

CAMERARIUS (527) made three experiments on three dogs, coming to the conclusion that the excessive quantity of injected air caused death due to the great distension of the heart cavities. He alleged as proof of this fact that having blown air with great violence into the jugular of two bitches, he saw death follow; and that another dog, then, having drawn blood and injected little air and with little violence, he saw no serious disturbance; because the animal remained calm even if weak, and therefore after 10 minutes it was as quick as before. Then, shortly afterwards he injected into the other jugular of this same dog a great deal of air and with much violence, and saw death occur very rapidly. At autopsy: heart (especially right auricle) and very dilated vessels.

According to PORTAL (528), CAMERARIUS also blew air into the vas deferens. [i.e. 'channels deferential']

However, it seems that about a century earlier, albeit with a different understanding, CHARLES ETIENNE (529) "*avoit imaginé des tuyaux à vent pour introduire de l'air dans les parties, afin d'en découvrir la texture*" (PORTAL) (530); that ETIENNE, who according to some was the first to see the valves of the veins (531).

But the blood, "*vitae thesaurus, corporis totius alimentum, animae vehiculum, cuius tenuior spirituosa substantia quasi incorporea corruptionis expers, et fere dici potest caelestis, cum syderum caelestium instar, motu circulate fruatur, quo immoto perit, ac moritur animal*", says FOLLI (532), soon resumed its magnetic power, which it always exercised on doctors and among the layman; and blood transfusion was resurrected, after not even a century of shadow.

However, it is not to be believed that the new steps moved with enthusiasm, as they once did; because indeed! I am to say that they were between indifference and the accumulation of the most unfavourable prophecies.

History, which is the teacher of life, teaches us that the same fate befell, not much now, to other inventions and discoveries, which incessantly repeat the miracle of their existence and are an integral and necessary part of the complex and unnerving modern life.

And what does it matter if the doctors of the seventeenth century let themselves be dazzled by such a splendid mirage, that it was madness to hope, when even more splendid and overbearing hopes of immortality and perennial youth dominated?

And it is perhaps not possible to recall that, despite being very old, medicine was still very bitter in those times that, for one thing, PITCARNE (533) recommended treating epilepsy "*vomitu, tinctura valerianellae et fraxinellae, cum castoreo, stercore columbino, visco, senna, jalappa, turpetho in vino maceratis: addit pulverem cranii humani et ungulam alcis...*"? (!!!). And perhaps he believed he had formulated a recipe worthy of envy, of posterity or of immortality!

On the other hand, our RAMAZZINI (534) did not hesitate to write: "*Quin ab uno animali in alterius venas sanguinem transfundimus, quo pacto juventam renovandi modum didicimus*"; reiterating the nail fixed and re-fixed in everyone's mind, including geniuses like BACONE.

But recalled to far more modest tasks, blood transfusion is painstakingly certainly mean.

3rd PERIOD

V

One of the first, if not the first, to put it back in honour was the "primary public professor" MICHELE ROSA (535) (Figure 5), who, towards the end of 1780, experimented with humans and animals. For example, he narrates that on 25th August 1783, in the villa of S. Vittoria near Gualtieri, "*a ram, weighing 74 pounds,*

fasted in the morning, was stung as usual at the jugular, and, a sign of his vivacity, he anticipated the time of the usual fainting, because in between 10 and 11 minutes he found himself empty, bloodless, anguished, stunned, in mortal agony. The open vein was no longer dripping, the eyes were closed, the mouth open, the jaw dropping, all the limbs, as in the warm corpse, abandoned and dissolved.

Intruding the blood of a fat calf, the usual effect followed: in a minute the ram opened its eyes, in two it was revived.

Fastened the jugular and untied the legs, the ram tried to stand up, but it stopped, it was not stationary, it held up badly: nevertheless, wobbling it continued to go, and it was marvellous, that forgetting everything else it greedily took the bare ground of the floor; he seemed in need of something: but he did not want water and the salt offered him as soon as he tasted. So step by step he drew to the grass of the nearby meadow and carpi [this word does not translate] *avidly. And he was already more firm, and gradually grazing and hopping he dwelt in the open: he wanted to lead back, and more and more he widened and people to follow him and he to flee; until he reached the road he galloped and crossed the fields towards the well-known herd, he jumped three wide pits and at more than a mile he was at the fourth; he was already crossing it, but the cottages there by chance, bloody as he was, held him back and was brought back; he was panting but not dejected. Rested, swaddled, he was re-weighed; it was libb. 73. The excrements thrown, the grass eaten, the long course made the judgment of its true weight uncertain; but it appeared that he had lost more blood than regained.*

It was closed and stayed there for three hours; he was quiet: he was put back with his fellow man in the open meadow: he began to spend it lively: but as if full of suspicion he did not allow himself to be approached: then, more suspicious, he became more animated; he took the course; a pile jumped out of the wood, and from there a wall, then a hedge, a very large pit, and away through the fields, and his companion hardly equalled him; and not before two miles away was he detained and taken back.

Witnesses of all the well-known personalities and ladies, the Marquis Gherardini, Count Greppi, prof. Cerutti, prof. Scarpa, doctor Soncini, dr. Viscontini ... and a very mixed population ...".

Figure 5: Michele Rosa (1731-1812)

I thought it right to report in full at least one of ROSA's numerous experiments, which, I dare to think, will be read with pleasure, as the style is so vivid and colourful.

One of the spectators at the ROSA experiment, namely the great anatomist and surgeon prof. SCARPA, then repeated the blood transfusion experiments in 1784 in Vienna, according to what he himself tells us first (536) and then, with his usual diligence in his beautiful work on blood transfusion, prof. SCHEEL (537); and with a very brilliant result.

In England, prof. HARVOOD, in 1790, "*established that an animal could very well regain its existence from the blood of any other, although of a different kind, provided that it was introduced with the utmost caution, and guided with great prudence to travel the circulatory system*" (538); and he gave experimental proof of this, which was not new, in the presence of his pupils, by injecting blood from the jugular of a ram into the jugular of a bled dog.

But in our Italy, just as the genius of blood transfusion arose and animated itself over a century earlier, so then the study was better resumed than elsewhere. And indeed, at the same time that ROSA was carrying out his experiments, CARMINATI (539) in Pavia had set about numerous and various studies on transfused blood; and among the many observations made, this one deserves to be remembered, namely that "*sanguinem calidum ex arteriis vivi animalis in arterias alterius evacuatas injectum, aeque ac aquam tepidam, pulsum numquam resuscitasse*."

There is no need to criticize CARMINATI's experiments, leaving this task outside the nature of the present work; but even with the few lines mentioned above, there is no one who does not see how his searches were already routed in error from the outset.

But in the meantime, since those times, we began to turn our aim and our thoughts preferably to the chemistry and morphology of blood, which were quite in their infancy; hence most of the notions acquired over time until now lay completely buried in the blindness of the future.

Thus, while on the one hand some (HUFELAND (540), DE GRAEFE (541), HAEFNER (542), TIETZEL (543), etc.) continued, among other studies, to discuss blood transfusion, which did not seem now more of a past experience and a proof of circulation, others (DUMAS and PREVOST) (544) demonstrated that even defibrinated blood can restore an animal dying of bleeding to life for a few days; and of this most important communication no one, to my knowledge, took due account at the time. In fact, BLUNDELL (545), professor of physiology at Guy's Hospital, moved by the sudden death of a woman who died in two hours following metrorrhagia, thought of resorting to the transfusion of blood in similar cases (and even in quite different cases); which he thought he could perform "*by means of a syringe*" (546), and which he experimented variously.

But obstetrics had to provide - and indeed provided - the most suggestive testing ground. In the case of puerperal haemorrhage, for example, nothing was more opportune and profitable than introducing new blood to replace the lost: - and finally the master indication was grasped! - and so did, besides BLUNDELL, DIEFFENBACH (547), GOUDIN (548), SCHNEEMANN (549), POLLI (550), and others. But among these the BROWN-SEQUARD deserves particular mention for that famous experiment in which he was able to restore muscular irritability after death, and to already pronounced cadaveric rigidity, through the injection of blood.

It should nevertheless be believed that blood transfusion was only attempted in large blood losses; because it was also used in numerous other affections, very different by nature, without however touching the collapse of the past nor the discredit of the age; so that DIEFFENBACH (to quote one of the most authoritative), in the cholera epidemic of 1831, hoped in vain with the use of blood transfusion to heal the cholerosis, and probably to supplant with this the intravenous saline therapy, which was arising and availing itself.

But as in 1668, one year after the first experiments of DENIS on man, following the opposition of LAMY, PERRAULT, PETIT, etc. as we have seen, the veto of the Court Le Châtelet in Paris was provoked; so this time, without provoking vetoes ... judicial, but only better objections, formulated with more certain doctrine and with more acute discernment, several scientists, among them first GIACOMINI (551), arose to oppose the heterogeneous transfusion and to advance doubts on the methods and general indications of the homogeneous one. But note well: on the methods and general indications; which had to be justly discriminated against and definitively cleared of the tangle of confusion that even then congregated them; and not on blood transfusion, as an operative and therapeutic act in and of itself. These doubts, at least in part, had to find confirmation over time.

But in the meantime the roots laid in the seventeenth century were vital, even if afterwards they had withered for some time; since, after 1850, without taking into account other researches or so-called sensational news, it was really a wonderful revival and renewal of studies on blood transfusion on a very large scale, instituted with inflexible orientation to the imperative principles of science and devolved without utopias or preconceptions of any sort with a sublime purpose: to reveal and correct errors for the absolute search for truth, for the perfection of civilization and for the benefit of Humanity.

Numerous were and very many are, despite the oblivion of many, inevitable due to the high number and daily toil, the scientists intended to study blood transfusion. I also mention: WALLER (552), NUSSBAUM (553), MOSSO (554), GESELLIUS (555), ALBERTONI (556), HAYEM (557), HEDON (558), BERGMANN (559), BATTISTINI and SCOFONE (560), ORÈ (561), ALBINI (562), MARMONTER (563), LIVI (564), MONCOQ (565), MICHETTI (566), etc. etc.; and as I have said and it is well understood, I cannot continue to quote all the authors.

However, the overwhelming number of them testifies once again that blood transfusion, - which cannot be compared here with intravenous infusion or hypodermoclysis (a subject that I have dealt with elsewhere) - is not only placed in the light that it is up to, but it warns us and reminds us that it is an excellent therapeutic aid, as long as it is wisely understood and correctly carried out.

PART THREE

I

I should now, on the end of my work, draw, as usual, conclusions; except that, in the course of this dissertation, I have gradually come to deduce them, whenever clarity required me; but since this is not easily achieved, especially in scientific works, so I have to ensure that the following summary is not useless.

Blood transfusion was completely unknown, in theory and - even more so - in practice, to the very ancient doctors of Egypt, Syria and Greece. Advancing the hypothesis that it animated the secret of some sorcerer or some sect is equivalent - at least until proven otherwise - to plunging reality into the abyss of unreality, or at least of abstraction, to which it is not possible to set boundaries and matter, to which it is justice to deny any credit.

Nor was it less known at the time of OVID, no matter what people say or think.

The idea of blood transfusion appears for the first time in the 15th century; and it winds its way, but it does not know or cannot melt from its torpor. But dawn is near.

The first announcement is learned in an Italian book, in CARDANO's "*De rerum varietate*"; a pale announcement yes, but unmistakable and irrefutable.

The first sensible description can be read in an Italian book, in the "*Methodus easy parandi etc.*" of COLLE; and documentation more ancient and equal to this in value does not exist.

Twenty-six years later another Italian, FOLLI, independently from his two Italian predecessors, and a few years before foreign doctors, devised the transfusion of blood.

But, as the ancient adage rightly says: "*Nemo propheta in patria*"; and the idea went beyond the homeland.

To claim it is therefore our duty and right, since it was born from the Italian brain.

Then they experimented with transfusion on animals, first of all the English, and on men, first of all the French.

Shortly after, that is, in a few weeks, transfusion spread everywhere, raged, fell, timidly arose, and now it seems unshakable. But "*who can doubt that the next age does not have to know the falsity of many things affirmed today and believed by those who are first in knowledge, and to surpass the present age by no small stretch in the news of the truth?*" (LEOPARDI).

Changing my opinion will be an indefectible duty for me in the face of the eventual discovery of new irrefutable documents.

II

Considerations of various kinds are born josa [this word does not translate] in the mind, and here they would find the place to be carried out better than elsewhere; but since if I wrote them all I would run the risk of never ending, so I think I will limit myself to only a few.

Blood transfusion had the fate, more or less varied, that have almost all new discoveries or inventions on their appearance.

Recognized its value in some morbid forms - and it was precisely the erroneous evaluation of its indications, initially considered universal, the main reason for its collapse and the very serious accusation against those doctors - clearly delimited morbid forms and today studied and grouped on new pathogenetic concepts; rigorously examined the concept of defibrination, serum, citration of blood and serum, blood groups, etc.; the transfusion of blood has thus been subjected to modifications and improvements that make it a safe operation.

To penetrate into the modalities, the indications, the technique of transfusion evidently exceeding the prefixed theme, which is strictly historical or historical-critical; and also to mention the alleged or true dangers of blood transfusion is not a task to be performed here.

It is superfluous to repeat ourselves; and I have the bad habit of being verbose.

Prudence in medicine is, more than in any other discipline, the supreme law, which the ancients already summed up in the famous saying: "*Primum non nocere*"; that prudence which does not exclude energetic and prompt action, when necessity is upon us.

Blood transfusion is what it is; therefore it does not boast any kinship with a miracle, as indeed not even the most wonderful medicines we possess today, such as neosalvarsan, quinine, digitalis ... can boast it; but more than the other therapeutic aids it still exerts, undeniably, a particular fascination.

In the history of blood transfusion the Italic genius gave the fundamental contribution of thought, and due to strange inertia it could not add to this the shining one of experiment; and the fault that must be attributed to our scientists of the time is precisely that of not having brought into effect or not having been able to bring into effect what they undeniably knew how to invent. Make it serious indeed; but that does not take away the respect and admiration, contrary to what LEOPARDI affirms in his «*Parini*», which each of us must have for the works of our Fathers. However,

in the face of foreigners it is hard to make ourselves recognized at least that little or that much that is ours: the primacy of the idea.

But Science is not like Philosophy; it demands experimental control without discussion and without hesitation, without which any idea, even the most ingenious, possesses value; since it does not carry forward the gigantic progress of the Sciences by a single centimetre.

And there is no excuse that is valid.

It is painful that precisely at the time when Italy was the forge of the arts, letters and sciences; in which foreigners flocked to our celebrated universities to hear the words of the Italian Masters; in which Doctors and Scientists of Italy gathered from the university theatres in the princely courts to repeat experiments in public, with the refinement of those who have in their quiver large copies of arrows for the bow of knowledge; it is painful, I say, that in that golden age neither COLLE nor FOLLI thought that the best way to give value to one's thought was precisely to put it into practice. And if the awe that held FOLLI is excusable and, I would almost say, admissible in a courtier, it is undoubtedly reprehensible and condemnable in a doctor, albeit in times of courtly courtesy.

I don't want to be the one who fills pages with the easy and infallible sentences of hindsight; but the anger of seeing all the glory vanish from my homeland, and only half of it to advance, solely for a breath of naive hesitation will at the same time be reason and excuse enough for me.

And at this point another necessary explanation.

I feel that by giving preference to COLLE I come to hurt the susceptibility and conviction of many illustrious and learned Italians; so it is my duty, so to speak, to clarify the dispute.

Those who deny COLLE the priority of the idea of blood transfusion are based on the consideration that the Bellunese would have attached no importance, or very little, to the idea of blood transfusion; which therefore would have constituted for him something no less transcendental than vulgar. Hence the consequence that he, more or less deliberately, would have dropped into silence. And they add that a discovery must be supported with a theoretical and practical direction at the same time, more than once, almost with obstinacy; while COLLE would not have complied with this axiom at all.

It seems to me that, thinking in this way, it is a bit too quick to slide down a gentle and enticing slope at first, but that, beyond a certain stretch, becomes a precipice.

And let's see.

COLLE could not go back to the original idea, because he died three years after the publication of his "*Methodus facile parandi etc.*"; and his unexpected departure truncates any insinuation; and instead offers the right to object to the supporters of FOLLI. Which - as we know - let eleven years pass; precisely from 1654 (the year in which he first exposed the idea of blood transfusion) to 1665 (the year in which he returned and insisted, albeit not very clearly, on his own idea); and then again another five years, that is from 1665 to 1670 (in which year he reaffirms the idea much better); and lastly another ten years, namely from 1670 to 1680. In all, therefore, he returned to his idea three times, with three different publications, but in the space of twenty-six years, without however ever carrying out any experiments. This last date - 1680 - marks the culmination of his open claim, unfortunately belated, because the experimental practice, happily performed also on man, had already demonstrated, albeit in a hidden way, the resources of blood transfusion, and could no longer be either difficult or burdensome to support the authorship of an idea that had already had such a famous, open test. And it should be noted again that for over three years numerous publications on the theoretical and experimental topic had been published.

Nevertheless, I would have no difficulty in considering FOLLI deserving of the high honour and title of inventor of blood transfusion - subject to the principles set out

much more above - if there had not been another doctor before him, whom fate has hitherto opposed, which the homeland is also common to us: COLLE.

I am not fool or quibble about historical cunning, neither with regard to our Italians nor with regard to foreigners; or at least I didn't intend to do it; because they would really be out of place, either as proof of scientific dishonesty and narrow-mindedness, or as a sign of mental meanness; but since equanimous disquisitions can and must be made, because otherwise the bare historical investigation would have very little meaning, if the criticism - without prejudice to the inviolable canons of dates and facts - did not exercise its rights, so I stopped [sic] on paper, and without any pretence, what I had the field to observe, study and meditate during the carrying out of this work.

Here I should therefore make a point. And in this instant I have a doubt in my soul: oh! I feel well that in my work, which I hoped to make as complete as possible, some larger parts would have deserved a very different examination; but my mind could not reach sublime heights of doctrine and thought, and time was running out inexorably; and I, who without realizing it and almost out of badinage had leafed through a few volumes, gradually found myself so swamped in the papers of others and in my own notes that getting the work done was an effort for me for a few days.

Such works are sterile in practical results, even though they give the spirit a great satisfaction; and although I am an intransigent partisan of the experimental method, I must also confess that I have written these pages with pleasure, a reason for instruction for me too.

Historical research is a source of great satisfaction and pure pride for any Italian; where it is noted that in every time and in every field the Italic ingenuity had to shine; where, a most coveted reward to humble workers, we have the honour of concluding, making our own the sublime words of FOSCOLO:

"*O Italians, I urge you to stories, because no people can show more than you, no more calamities to be pitied, no more errors to avoid, no more virtues that make you respect, no greater souls worthy of being freed from oblivion from anyone of us knows that we must love, and defend and honour the land which was nourished to our fathers and to us, and which will give peace and memory to our ashes.*"

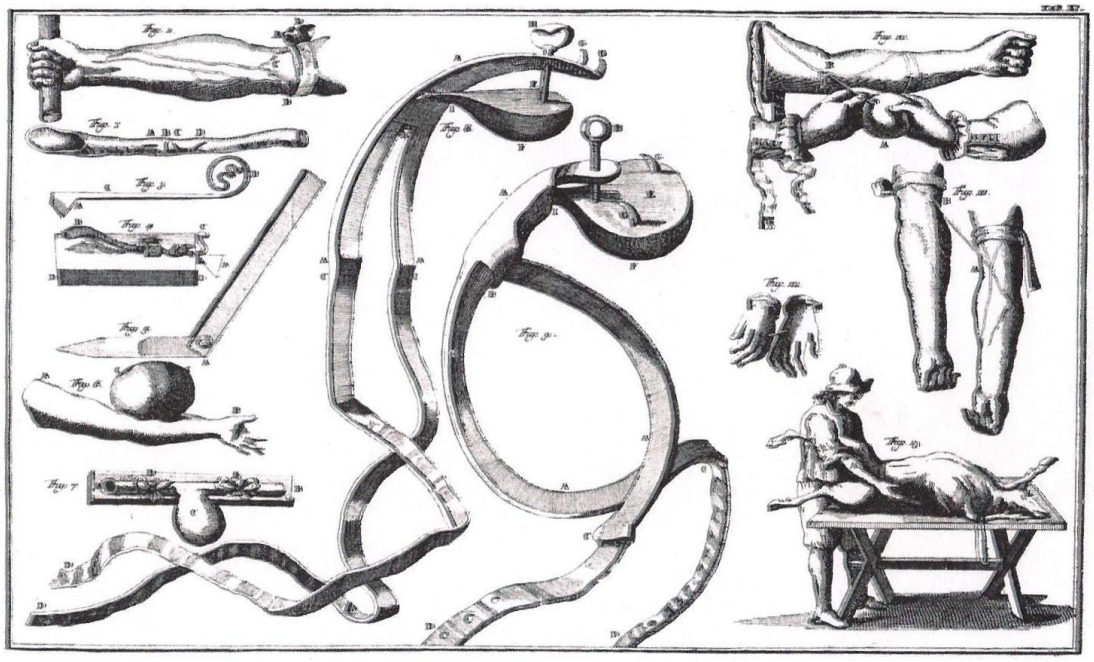


Figure 14: From – Institutiones chirurgicae – of Heister
[Not referenced in the text]

APPENDIX

HISTORICAL NOTES AROUND INTRAVENOUS INJECTIONS

It is customary to begin the discussion of this subject without taking into account the other injections that go by the name of "*anatomical*" - for the very simple reason that the Anatomists used them to inject their superb preparations into the blood vessels, - perhaps because these, since they are made on corpses, do not have the same value as those made on the living; but since they too are intravenous injections, even though the technique and the responsibility are very different, so I don't think I can refrain from mentioning them.

And also in this field it is grateful to my soul as an Italian to deepen the investigation as best I could, because the contribution of our Great Anatomists is decisive, with a formidable load of glory.

According to PORTAL (567), "*il paroit que* GALIEN [sic] *avoit quelque méthode d'infecter les vaisseaux du foie, puisqu'il savoit en dégager le parenchyme, et qu'il en e fait voir les diverses anastomoses*"; but nothing can be said for sure, especially with regard to the technique and the injected substances.

It is known that MONDINO, a famous anatomist from the Bolognese Studio, used to inject blood vessels in his anatomical preparations, and that he made no secret of this particular technique to anyone; so much so that, after his death, one of his very valiant pupils, ALESSANDRA GILIANI, continued, together with MONDINO's anatomical dissector, AGENI DA LUSTROLA, the anatomical work (of preparations and injections), in which he excelled; but unfortunately only for a short time, as he died when nineteen years old.

But the one who most validly affirmed the practice of vascular injections in anatomical preparations, and who proceeded with the injection of kidney vessels "*per syringamn aqua calida plenam*", is the famous JACOPO BERENGARIO DA CARPI (568), whom PORTAL estimates the greatest benefactor of humanity, having been the first to use mercurial clutches in the treatment of syphilis and to recommend them very strongly: "CARPI *est, à mon avis, celui qui a fait plus de bien à l'Humanité: sans lui l' univers seroit dévasté par les ravages qu' auroit fait la vérole*" (569).

And another great Italian, even before any foreigner, follows BERENGARIO in the practice of blood vessel injections; I say BARTOLOMEO EUSTACHIO (570), who used a special procedure and all his own: "*He macerated the pieces in different liquors, he dried them with various heat, he incised them in several directions, and he injected into the vessels of these parts more or less coloured liquors, more or less thick, and more less subtle...*" (PORTAL) (571). He gave this new practice a strong impetus.

And here is the Frenchman JEAN RIOLAN (572), who, however, did not inject liquids but only air (573), and recommended performing this operation on recently killed animals, when the blood is still hot, and on recently strangled men. As an essay on his experiences, here is an excerpt from what he wrote, about an observation about a newborn dead baby: "*Si on souffle par la veine ombilicale d'un enfant mort après ou pendant sa naissance mème, vous verrez que tout son corps s'enflera, et si vous ouvrez le bas ventre et le thorax, vous troverez que tous les viscères, les poumons, le coeur, le cerveau, les viscères nutritifs, les veines et les artères sont remplies de vent, ce qui vous fera connoitre la communication mutuelle qu'il y a entre tous les vaisseaux et que l'esprit se répand facilement par tout le corps: car suivant la sentence d'*HIPPOCRATE, *toutes les parties communiquent conspirent et synpatisent ensemble*" (574); but I leave the easy criticisms to everyone else.

Our DOMENICO DE MARCHETTIS, according to what DE RENZI (575) tells us, exhibited his microscopic injections in 1652.

Also G. BARTOLINO (576), son of TOMASO, "*a injecté plusieurs fois de l' eau diversement colorée dans les artères hypogastriques des femmies mortes pendant leur grossesse, ou dans celles de plusieurs femelles pleines*" (PORTAL) (577); and he had range to make the following observation, namely that "*sanguis maternus sub forma sanguinis non ingrediatur foetum, quia si hoc esset pariter aqua per arteriam impulsa cut ligata vena, nullum sibi exitum inveniret, in vasa foetus perrumperet. At cum aquae viam illam denegatam videamus paria de sanguine libere pronuntiare possumus…*" (578). BARTOLINO also injected water into the pulmonary artery, observing that if he injected it too violently it drained into the bronchi; etc. etc.

The famous THOMAS WILLIS (579) also resorted to the injection of cerebral blood vessels for his anatomical studies on the brain, realizing that the liquid that he injected into the right carotid passed into the left one; hence the discovery of the famous hexagon that still bears his name.

GLISSON (580) thought of using ink, or water mixed with milk, to better highlight the structure of the liver.

Our BELLINI (581) injected a material that melted with heat; SWAMMERDAM (582), on the other hand, was the first to use differently coloured melted wax; BILS (583) boasts of knowing how to dry blood vessels without bloodshed; KERKRING (584), of which HALLER (585) defines "*homo suspectorurn morum*", said "*qu'il conservoit les parties du corps à l'abri de la putréfaction par le succin fondu don t il les enduisoit, ou qu'il injectoit dans leurs vaisseaux*" (PORTAL) (586); ROUHAULT (587) "*dit n'avòir point trouvé de meilleure matière à injecter que la colle de gant et la colle de poisson fondu dans l' eau, dont* M. MERI *lui a donné I' idée*" (PORTAL) (588), and makes a history of some injections that have been successful; AMATUS LUSITANUS (589) injected the vessels by means of a siphon, without however having reached a notable perfection, which RUYSCH (590) achieved instead, by unanimous consent, which acquired this fame (more due to his preparations of anatomy that for the discovery of the valves of the lymphatic vessels) (591), which even LEOPARDI, albeit in another way, described him as the protagonist of a dialogue together with his mummies. TOMMASINI (592) outlines us in this way "*that many arterial extremities through which the blood passes into the system of the veins, continue in as many venous roots without the intervention of any organ or parenchyma,* MALPIGHI *first observed it with the lens,* RUYSCH *proves with injections and with the thread of injected wax which he obtained continuously from the arteries in the veins*"; and this contrary to what BOHN thought (593), who, not believing that the arteries and veins anastomosed each other and instead admitting an intermediate space, made many injections for this purpose, without, as is well understood, succeeding to prove their claim.

DRELINCOURT (594) made numerous injections into the left ventricle to demonstrate that the septum has no holes; etc. etc.

LE CLERC (595) says of him that he had to do "*experimenta super acidis sanguini mistis*" and "*experimenta super volatilibus et fixis urinosis sanguini infusis* ".

This historical look around anatomical injections does not intend - nor can - be a pale history of them, but only an introduction to that, albeit reduced and abbreviated, of intravenous injections, of which I have already sketched incidentally and at a glance a nod.

I regret not being able to find the volume of MALACRIDA (596), which at least has the merit of uniting the praises of the above reviewers.

I also searched for the work of LADEVI-ROCHE (597), but in vain.

There is no need to linger around those who, as surgeons, envisaged or not the possibility and necessity of giving injections into sores or wounds, such as for example ALCAZAR (598), who, as PORTAL (599) tells us, recommended "*l'usage des injections dans les plaies de la poitrine: il rapporte plusieurs exemples de personnes percées d' outre en outre*..."; or PLAZZONO (600), who, as MAJOR tells us, says that if the abdominal wound penetrates the cavity, "*praemissa extractione*

rerum omnium extranearum, suadet injiciendum siphone medicamentum esse...";
that this may be of historical interest from the surgical point of view and not from the medical one.

DI SEGNI (601), whose monograph I read when I had already completed and mostly sent my work to the press, resolutely affirms that the first reference to the practice of intravenous injections is found in the following passage by ALESSANDRO MASSARIA:

"*Quippe si res alio modo se habeat, ego quidem in ea sum opinione, posse neminem sine evidenti periculo pro sectione venae purgans medicamentum propinare. Quod non semel comprobatum hactenus, non decet amplius repetere*."

Hence DI SEGNI believes he can state without a shadow of a doubt that since 1588 the school of Padua, first in all of Italy and abroad, had knowledge and practice of injections later called intravenous.

I would have felt the same joy as DI SEGNI too - although I do not have the merit of having mentioned that place first - if I could have given the same interpretation in the same passage; but unfortunately I don't know how to translate it except in a way radically different from his. I do not think we should translate, as DI SEGNI thinks, "*pro sectionte vene*" in the same way as "*per sectionem venae*", that is: "per, *through the section of the vein*" but only: "*forward, before the section of the vein*"; hence the global conclusion, contained in the period of MASSARIA, that "*no one could without evident danger propinare* (i.e. administer by mouth) *a purgative medicine before the section of the vein* (i.e. before proceeding to a bloodletting)"; for which it clearly stands out that it is not at all an intravenous injection, but a pure and simple warning, in some cases, not to administer a purgative before bleeding.

Without resorting to the fact - in itself however very significant - that in no other place of the same work (or of others) by MASSARIA can we find a similar hypothetical concept (in the sense desired by DI SEGNI), where we read something to confirm what I have said above, it is enough for me to give two reasons, the first of which - more formidable and, in my opinion, sufficient by itself - concerns grammar, and the second reflects the property of language. And indeed, if MASSARIA had wanted to allude to injection through the vein, he would have certainly had to write "*per*" and not "*pro*", very treacherous and very obscure in this sense; and secondly to mute the verb, because "*propinare*" implies the act of pouring down some liquid through the mouth, and is used by CICERON, PLAUTUS and SENECA in the sense of "*drinking to the health of someone* ...". And if we also wanted to add that MASSARIA had to use it inadvertently, or knowingly, in a translated sense, one could really conclude that it is not the case to write riddles, especially when one intends to advise anyone.

We have already seen that the first remedies introduced intravenously fall with all likelihood around the year 1642; and here for the note it would be appropriate to deepen the investigations.

Meanwhile, chemical medicines were making their way, and our FIORAVANTI (602) "*inter primos Italos chemicis medicamentis usus est, et iis ipsis inclaruit*"; but the one who shone with the most vivid light in the infusoria experiments was CARLO FRACASSATI (603), although he was not the first to perform them. He thus tells us of the experiments he made, - so much magnified by BORELLI (604), MAJOR (605), ELSHOLTZ (606), etc., and also reported in the *Philosophical Transactions* (607), - in his epistle, already cited (608), to MALPIGHI:

"*Observatis aliquibus experimentis de sanguinis fixatione, infusis per jugulares quibusdam liquoribus in animantibus, peracta, quam Bononiae ac Pisis mihi amicissimus vir, ac solide doctus* D. SILVESTER BONFILIOLUS (609) *nostras Phil. ac Med. primus intulit, adeo ut* D. BILS *non amplius secreturn, quod pubblici iuris facere libet ad studiosorum utilitatem, invideamus*..." and further on (610) "… *hoc scire operae pretium erit, et ausam* infusoriae, *quam meditabam, medicinae daturum, cui nonnulla experimnenta paravimus ab observata congelatione sanguinis... in*

viventibus celebrata animantibus... posse hoc experimentum multa docere: videbatur... quae infusa per jugularem ac simui etiam cruralem venam aqua forti communi... et Bilsianum simui imitatorem... Una quaerebattr diversorum liquorum infusione sanguinis ista conglaciatio, sed operatio dissimilibus instituta succis ostendebat multo plura... Injectione itaque aquarum chrysulcarum, sed debilium, ac fractarum sanguis existens in vasis facilius cogitur... ab his experimentis... colligo, primo intuitu non admodum tutam infusionem liquorum in sanguinem, si ab injectis his salinis succis, vel sanguis gelascit, vel nimium solvitur; nec hoc invento nos adeo proficere, ut vires (quod quaerebatur) sanguini addantur, et emortuo revocetur fermentatio; quod erat nantissae huius institutum... Si experimenta peracta consulamus... oleum tartari non fixavit sanguinem, quamquam ab aliquo alio necem intulerit, ergo tartarea fluxibilitatem servabunt, et inde poterunt concreta liquare; quia tamem nimis acria sunt, spirituosa reddantur, ac cum spiritu quem volatilisatum salem dicerem, jungantur et idcirco spiritus vini tartarisatus poterit omnia praestare. Alia plura ex tartaro possent concinnari, sed in hanc rem videndus in sua Ampelograplia D. SACHS... *Haec infusoria medicina deploratos respicit morbos... videlicet obstructiones, orthopnaeas, leucophlegmatias, epilepsias et alios morbos*“.

I thought I was quoting only a few passages, since it would have been too long to report in full all that FRACASSATI writes on this subject (suffice it to say that he deals with it from p. 374 to p. 428); but the original transcription would certainly not have been useless; it is referred to anyone who wishes to know about it.

Other doctors - the first very Italian – to study infusoria medicine precisely and continuously, specifically GIORGIO BAGLIVI and GIUSEPPE LANZONI.

BAGLIVI (611), in his *Sylloge experimentorum per infusoriam in vivis animalibus*, tells us about experiments in infusion surgery he performed in Naples, Rome (20th and 30th January 1693, etc.), Padua (in 1691) and in Bologna; and in order to have an idea of the consideration in which these experiments were held even then, I think it appropriate to excerpt the following passage (612): “*Cani iuveni ad tabulam ligato in fudimius in theatro Anatomico Auditoribus pleno 7 Martii 1700 spir. vitrioli debitam quantitatem in jugularem sinistram. Statimo moveri fortiter ac conqueri coepit animal cum ululate ingenti, et post vehementes corporis concussiones periit semiquadrante horae vix elapso* ".

And so on…

LANZONI, "*eruditus coeterur vir*" (613), made numerous experiments that can be read in *Misc. Acad. Nat. Curiosorurn* (614); GOELICKE (615) makes a partial summary of these, when he tells us that "*singularem istius chirurgiae efficaciam experimento quodam demonstravit, dum cani scabioso liquoris in scabie adpropriati quantitatem proportionatam in venam injecit, qui primum inde vomere mox tamen, vomtitu cessante, comedere coeperit, donec quindecim dierum spatio ab omni scabie penitus immunis evaserit*"; and HALLER (616), sums up as follows: “*Experimenta infusoria in vivis animalibus capta. Vinum infusum in venam cruralem... A spiritu vitrioli mors, sanguine in arteriis inque venis coacto... Ab aqua cinnanionii rabies, surditas, caecitas. Spiritus tartari... vitrioli lethali eventu susrepti*”.

But as everyone realizes, infusion surgery experiments were performed on animals for therapeutic attempts, but only very rarely on men; and on these the one who made the greatest number was FABRICIO.

Our great MALPIGHI (617) did not experience infusoria therapy, but only, if we can say so, of infusoria anatomy (like the other great anatomists mentioned above); since in his epistle to BORELLI "*De pulmonibus*", he tells us that "*immissa siphone aqua per arteriam pulmonarem sanguinem totum foras protrudes*", and later, on p. 8: "*saepius enim immissam aquam nigram siphone per arteriam pulmonarem a pluribus erumpentem vidi partibus*"; etc.; on the other hand, we should not be surprised by this or should we blame MALPIGHI, since he was more than a great doctor - and he knew how to be such - supreme anatomist and histologist; and despite the lack of

experience of infusion therapy, no one can deny him a sovereign genius, the glory of mankind more than the glory of Italy.

Even BORELLI devoted himself almost exclusively, to MAJOR's great joy, who is anxious in his infusory surgery (page 22, paragraph 30) to proclaim it highly, so that everyone has a good idea of keeping it in mind - as if nothing else existed but BORELLI! - he devoted himself, I say, to anatomy "*quam vocat infusoria vel injectoria*".

Much later, ANNIBALE BASTIANI (618) intravenously injected a robust young man bitten by a viper and close to dying, with the spirit of deer antler as a viperine counter-poison and managed to heal him perfectly. A "*similar prodigy was also obtained by Mr.* GIUSEPPE GUAZZI" (619) who, by injecting 16 drops of deer antler spirit into the veins of a young man bitten by a viper, "*recalled him in the period of 14-15 hours from the agonies and frost of death to perfect health*".

Miracles of other times!

Before coming to talk about SCHMIDT, I would like very briefly to mention R. DE GRAAF (620); not because he has more merit than those in infusion surgery, but because he also cultivated transfusion, albeit for a short time and of a superficial character. In fact, he says (621) that "*simili etiam modo confecimus instrumentum ad chirurgiam peragendam transfusoriam*..."; but he does not tell us in which and how many cases he then experienced it. As for the other form, here are his words: "*Usurpari quoque potest ad chirurgiam infusoriam peragendam, de qua solummodo dicemus nos numquam bonum successum habuisse a medicamentis purgantibus in venas sensim infusis*..." (622); whence it can be concluded that in transfusion and infusion surgery DE GRAAF did not achieve that fortune, which instead prepared for him the anatomical injection of testicular vessels.

Famous in his time was SCHMIDT (623), otherwise known as FABRICIUM, who "*in Phil. Trans. N. 30 e 34, quo loco se* FABRICIUM *vocat, experimienta sua enarrat, quae fecit medicamentis in venas variorum animalium et pariter hominum impulsis, quibus luem veneream, epilepsiam et alia mala superavit*" (HALLER) (624). But also in the *Phil. Trans*. No. 39, 21st Sept. 1668, we read on p. 766 "*an extract of a letter written from Dantzick to the Honourable* R. BOYLE *containing the success of some, experiments of infusing Medicines into human veins*", which report contains precisely the following five experiments: to a very robust soldier "*tellement in fecté de la verolle, qu' il avoit les os des bras tout couverts de ces noeuds qu' on appelle exostoses*" (625), injected "*resiae Scammonii gr. VII dissolutae in Essentia guaiaci ad 3ii... optimo cum successu*" (ETTMULLER) (626); whereas in a second similar experiment, performed on another patient "*qu' on la jugeoit incurable*", he recorded a lethal outcome. Then with the consent of Dr. SCHLEFFER and in the presence of HEVELIUS, he gave intravenous injections to 3 other patients; one was suffering from gout, and, after the injections, "*commença des le lendemain à se mieux porter*"; the second, suffering from apoplexy (or epilepsy?), "*n' a en depuis ce temps là aucun accez de son mal*"; the third, "*travaillé de la maladie appellée Plica Polonica, qui l' avoit reduit à l' extrémité*", and that "*avoit plusieurs ulcères, en a aussi esté guéri*..." (627).

As far as I know, FABRICIUM made two more infusion experiments; and precisely, one in a married woman and the other in a twenty year old single girl, both suffering from epilepsy. He infused into their veins a "*purgatif dissous dans un ésprit antiépileptique*", and obtained healing of the bride but not that of the girl; and the reason - he says - is that the girl was a maid and could not submit to the necessary food (628).

We were still groping in the dark, both in terms of indications and deductions and both in the choice and in the use of medicines, but the way to intravenous injections, today perhaps too much used by some ... venal doctor, was open and started.

At this point GARMANN (629) deserves to be mentioned immediately, because he expressed a truly curious but brilliant and human idea at the same time: that of

bringing back to life asphyxiated children by injecting a few drops of Malaga wine into their umbilical vein; but it is better to leave the word to the Author, who does not betray his own thinking.

"*Quae curiosum animum ezercere posset, haec esset quaestio: an chirurgia infusoria in foetu in lucem edito administrari possit per vasa umbilicalia, ut ita non tantum a morbis futuris praeservetur, sed et ab haereditariis liber degat? Multa suadent hanc operationem: venularum patentia, via recta, qua ad hepar et ab hoc ad cor fertur salutaris hic liquor, pro ut sanguinis in foetu circulatio a* MAUROCORDATO*, Inst. Pneumat. Cir. Sang. e. II, p. 95 tradita id confirmat. Posset et haec adhiberi, quando foetus exanimatus fere lucem adspicit, si non tantum balneetur in vino, sed et vini Malvatici aliquot guttulae hoc modo ipsi infundantur. Tentavi hanc operationem, quamvis difficillime in hoc procedit, in catello, qui modo in lucem editus erat.*

Infundebam ipsi aliquam portiunculam spiritus vini rhenani; et praetor solitum incalescebat: paulo post superinjiciebam aliquot guttas liquoris narcotici, et heu! horrore percutiebatur, et stupidus evadebat. Elapsa semihorula de purgante paululum inspersi, et alvo soluta ad se redire videbatur."

GARMANN also experimented with "*sulfurea, acida, narcotica, purgantia, canibus saepius; id tamen testari possum, me unius liquoris infusi diversos saepe deprehendisse effectus*."

In another letter (630), written to MAJOR in March 1665, we are given the following:

"*CI. vir Olaus Borrichius, collega et amicus, nuper valido cane vivo secto statuit quinque vascula vitrea ordine, quibus infusus erat spiritus aceti, ol. sal. tartari per deliquium, solutio aluminis, spir. salis ammoniaci, spir. vini; in singula vitra ex arteria inguinali calentem sanguinem infudit; insfexit post intervallum et plenius postridie omnia, observavitque, sanguinem, cui affusus erat spiritus aceti, redditum nigricantem instar sanguinis melancholicorum, sedimento crasso, copioso, atro, supernatantem liquorem pene etiam atrum; cui affusumn ol. sal. Tartari, redditum coloris sic satis floridi, sed turbidiorem liquorem, sedimentum nullum, ramenta tantum fibrillarum instar huic inde conspicua; cui affusa solutio aluminis, redditum instar putidae et subcineritiae putrilaginis, omni sanguinis colore prorsus abolito; cui affusus vini spiritus, redditum turbidiorem; quami cui ol. sal. Tartari; cui spir. Sal. Ammoniaci, redditum omnium elegantissimum, colore floridum, substantia tenuem, in fundo sedimentum diaphanum instar gelatinae*"; etc. etc.

And he talks about opiates right after.

We also therefore learn that BORRICCHIO carried out experiments in infusion and transfusion surgery; but this is not really new; and I have not said a word about it other than just now and through the mouth of another, this must be ascribed to the fact that, since BORRICCHIO's volume - which is cited in the bibliographic notes - is not in the libraries of my city, I have not got to consult it.

If the desire to honour and pursue the truth, which, even without our miserable help, "*although silenced for a very long age, and bitterly challenged by men, takes revenge for itself for the oblivion of the times and pertinacity of opinions*"- as FOSCOLO says in his famous oration on the origin and office of literature - does not veil me before my eyes, certainly my partisan spirit does not blind me; and therefore it must be said that the German authors represent the majority of those who experimented with infusion surgery in those times.

Indeed, in addition to the aforementioned, we must also include: ELSHOLTZ, PURMANN, BRUNNER, SCHMUCKER, SCHEEL and VIBORG. In accordance with their spirit of patient and persevering observers, they investigated the mystery of the infusion of medicaments much longer than that of the transfusion of blood; but the reason for their particular sympathy for one rather than the other form of therapy escapes me; on the other hand, it does not deserve attention or need to be resolved.

ELSHOLTZ narrates his experiments in his frequently cited volume *Clysmatica nova*, and whoever wishes to know them all can read them with profit; but I do not intend to go too far, and I will be content to give a pale idea - so to speak - quoting the telegraphic summary of HALLER (631) - forgive me the anachronism! -: "*in homine, cum ulcus in tibia antiquum esset, balsamici quid in venam injecit; in altero febriente antifebrile; in tertio scorbutico aquam cochleariae*."

There are those who maintain that the incentive to start such experiments was brought to ELSHOLTZ more than by those of MAJOR or those of FRACASSATI, which he in fact cites widely; perhaps it could have been so.

PURMANN (632), who "*acuti ingenii homo fuit*", had the undoubtedly admirable audacity in those times, to give himself intravenous injections: "*Juvenis cum esset auctor, eique scabies molesta esset, aquam cochleariae cum spiritu theriacali in venam sibi injici curavit, scabiem sanavit, ut tamen diuturni abscessus in brachio supervenirent. Sic quotidianam febrem diuturnam in se ipso injecta aqua cardui benedicti sustulit*" (HALLER) (633).

It is the first time that it can be officially suspected that the lack of asepsis and antisepsis, very necessary in performing intravenous injections, has caused the least possible damage, that is to say some abscess.

BRUNNER also practiced the new intravenous therapy; but he cannot compete with other colleagues, because, according to what SBARAGLIA (634) tells us, "*separato pancreate vini opii expertus est in cane... temulentam et convulsivam. Huic varii referuntur effectus et saepe errores committuntur non consideratis omnibus circumstantiis*"; so that SBARAGLIA, continuing in the examination of these new experiences in general, draws the conclusion that "*ex his patet numquam sufficientes assignari posse cautelas pro recta illatione ex experimentis, etiam quando fiunt in eadern materia*"; whence one cannot help but appreciate the prudence of such a judge, who did not dare to experiment, as far as I know, with infusion therapy, but whose judgment, if he had full reason to be pronounced and supported then, has today lost almost all of its value.

It is logical that in those times, as well as in the present, the search for new medicine, harmless and highly effective, also led chemists to such a study, and that doctors often turned to chemists. Thus, for example, we read that SACHS (635), consulted for this purpose by MAJOR, replied to him in the following terms: "*Inquiris de remedio quodam singulari, penetrantissimo, quod minima dosi possit infundi, et sanguinem quasi concrescentem rursus fundere... Et mox: dum sigillo intentus sum, praeter spem invenio liquorem maxime restaurativum ex spiritu cinnamonii cum oleo succini albi digesto, in quo post Sal volatile C. C. tandem lapides preciosi, in Spiritu quodam secreto soluti, dissolvantur ac uniantur*... ". I do not know if this liquid, so powerfully restorative, according to SACHS, has ever been tested as it is…

SCHMUCKER (636) used emetic tartar intravenously in man, and we nowadays use stibiated tartar in Leismania; and the surgeon KNOPF (637), by injecting four grains of emetic tartar in half an ounce of hot water into the veins of a man, whose oesophagus was stuck in a piece of meat that had not been possible to extract with irons, admirably achieved the purpose thus managing to make him vomit violently.

Much later, and precisely in 1791, about nine years after ROSA had resumed blood transfusion experiments and six years later those of HARWOOD, reported by Dr. HULTON in *Philosophical Transactions*, SCHEEL and VIBORG (638) experimented with various remedies in the veins, but in particular tincture of white hellebore and black hellebore, emetic tartar, etc.

Thus the way was definitively open to the new therapy, which many decades later marked the beginning of a fruitful era. Success makes man bold; and a few years ago, on the basis of a deep and courageous knowledge of biology, heroic medicine was tempted for the veins, as BACCELLI said, and luck helped the bold.

The prefix theme is finished. It is not permissible for me to dwell on it, to disperse in vain in the immense ocean of modern intravenous therapy.

And if it is true that in exploring the history of medicine, the mind, departing from the initial heap of errors - which then have almost always disclosed (and often will disclose), from the acute criticism of their intimate essence, the true truth - is shaping from time to time to an infinitely better model of science, so that it seems to succeed suddenly from the densest darkness to the brightest light; nevertheless it is very easy, and I would say quite natural, that precisely in the most accurate examination of remote events that occurred in the midst of errors, it also falls from time to time into the vortex of errors. And in this anguish it is sweet for me to hear a verse from the great OVID, which more than beautiful, I now need to engrave:

"*Ut desigit vires, tamen est laudanda voluntas*".

NOTE

I had long since finished my work, of which I delayed the publication - against my will - due to numerous difficulties, and in the meantime I was waiting for the English translation of it, when I learned that in the Clinical-Scientific Review of the Italian Biochemical Institute (N .ri Nov. and Dec. 1931 and Sept. Oct. 1932) the sen. prof. DAVIDE GIORDANO had published a study on the history of blood transfusion.

I did not want to read it, so as not to create new scruples and in order not to experience the bitterness of finding in my work several of the many shortcomings that will unfortunately be contained in it; but I promised myself to read it, very sure of having a lot to learn, as soon as this study had seen the light. And therefore I limited myself to scrolling through the figures and having two of the most demonstrative ones reproduced.

REFERENCES

(1) DE CRISTOFORIS MALACHIA: La trasfusione del sangue. Milano, F.lli Rechiedei Editori, 1875.
(2) DE CRISTOFORIS M.: *Op. Cit*. p. 3.
(3) ROUSSEL J.: *De la transfusion directe du sang vivant*. « Progrès Méd. », 1884, p. 429. (È una lezione tenuta alla Salpétrière con autorizzazione di CHARCOT e pubblicata in varie riprese: pp. 409-429-472-491-560-597-810-828).
Egli si esprime così: « *Nous savons en effet par les traditions les plus antiques que lei prétres-médecins de Syrie, d'Egypte et de Perse, pratiquaient déjà la transfusion, et avec succes certainement puisque la notion de cette opération se retrouve conservée à chaque époque historique; les Grecs et Ovide la célèbrenìt dans leurs vers* ».
[He puts it this way: "*We know indeed from the most ancient traditions that the priest-doctors of Syria, Egypt and Persia, already practiced the transfusion, and certainly with success since the notion of this operation is found preserved in each historical period; the Greeks and Ovid celebrated it in their verses*".]
(4) SANTORO G.: *I principi, la tecnica ed i risultati della trasfr. diretta del sangue*. « Archiv. It. di Ginec. », 31-1-1913; si veda anche il « Morgangi », 1913, vol. II, p. 405.
(5) ORÈ: Si veda la voce: *Transfusion*, nel « Nouveau Diction. de Méd. et de Chir. Pratiques » etc. Paris, Baillière, 1884, torno XXXVI, p. 80.
(6) « Dizionario Enciclopedico di Chirurgia », Trad. di C. RUGGUERI. Padova, 1810, tomo V, pp. 192-195.
(7) MORSELLI E.: *La trasfusione del sangue*. Torino, Loescher, 1876, p. 8.
(8) *Genesi*: Levit., XIII, 2, 2: « *Quando nella pelle della carne di alcuno vi sarà tumore, o rogna, o bolla, etc*. »; Deuter. XXX, 19; etc.
(9) LE CLERC D.: *Histoire de la Médecine*. Amsterdam, I728, p. 7.
(10) OMERO, Cit. dal Goelicke, nella sua opera *Historia Medicinae Universalis*. Francofurti, 1717, pag. 92.
(11) ALPHINI P.: *De medicina Aegyptiorum libri quatucor*. Venetiis, 1591.
(12) IAMBLICHI: *Chiatcidensis ex Coeie-Syria, De mysteriis liber*. Oxonii, 1678, sectio VIII, Cap. I, p. 157.
(13) BORRICCHIO O.: *Hermetis Aegyptiorun et chernicorum sapientia ab H. Conringii animadversionibus vindicata*. Hafniae, 1674.
(14) SCHULZE J. E.: *Historia Medicinae a rerum initio ad annum urbis Romae* DXXXV. Lipsiae, 1728.
(15) LE CLERC D.: *Op. cit*.
(16) GOELICKE A.: *Historia Medicinae Universalis*. Francofurti, 1717.
(17) SPRENGEL C.: Storia grammu. della Medie., trad. dal sig. R. Arrigoni e accresciuta dal dott. F. FRESCHI. Firenze, 1840.
(18) IAMBLICO: *Op. cit*., Sectio VIII, Cap. I, p. 157.
(19) OMERO (910 av. Cr.): *Odissea*, libro IV, v. 350.
(20) DÌODORO SICULO: Bìbliothecae Historiae libri XVII. Lugd. 1552. p. 18: « *Et Homerus qui ad Aegyptios profectus est, mudtaque ab eorum sacerdotibus percepit*... ».
(21) IAMBLICO: *Op. cit*.: *de misteriis Aegyptiorum*, p. 1.
(22) PUCCINOTTI E.: *Storia della medicina*. Livorno, presso Wagner, 1850, vol. I, p. 117. (l'ultimo vol. è stampato a Prato, Tip. Giachetti, 1866).
(23) S. CYRILLI, Alexandriae Archiepiscopi: nell'*Iuliani Imp. opera et S. Cyrilli contra eundem etc*. Lipsiae, 1696. *Lib. IV, adversus Julianum*, pp. 124-125. Egli cita anche parole del PORFIRIO.
(24) JAMES: *Discorso istorico sopra la medicina*. Venezia, 1752, p. 12.
(25) GOELICKE: *Op. cit*., p. 116.
(26) CESALPINO A.: Cit. dal CERADINI, nella sua dotta monografia, che avrò occasione di citare altre volte più avanti: « *Qualche appunto storico critico intorno alla scoperta della circolazione del sangue* ». Genova, Tip. R. Ist. Sordomuti, 1875, p. 116.
(27) ERODOTO. Cit. dal BORRICCHIO: *op. cit*., p. 157 (cap. VII, lib. I).
(28) CONRING H.: *De antiquitatibus academicis disputationes septem, etc*. Gottingae, 1739, p. 3.
(29) STRABONE: Cit. dallo SPRENGEL, nella sua opera già citata. V. del resto anche il MERCURIALE, *Artis gymnasticae apud antiquos* etc. *libri sex*. Cap. I, lib. I.
(30) SPRENGEL C.: *Op. cit*., p. 65 (vol. I).

(31) ISOCRATE. Cit. dal Borricchio, nella sua opera già citata, a pag. 138.
(32) OVIDIO P. N. (43 av. Cr. - 18 d. Cr.): *Metamorfosi*. Lib. XV, vv. 96-98:

At vetus illa aetas, cui fecimus aurea nomnen
foetibus arboreis, et quas humus educat, herbis
fortunata fuit, nec polluit ora cruorc.

(33) GIOVENALE (55 - 130 d. Cr.): *Sat*. XV, vv. 1-3:

Quis nescit, Volusi Bithynice, qualia demens
Aegyptus portenta colat? Crocodilon adorat
pars haec, illa pavet saturam scrpentibus Ibin…

(34) Difatti i Cinesi, gli Sciti, i Geti investigarono ogni erba e ogni rimedio pur di scoprire questo farmaco immortale; e i Cinesi credono di averlo trovato nella radice di Ginseng; gli scolari di Lao-koon sostengono di possedere uno specifico che, a quel che pare, sarebbe basato su l'oppio; etc. etc.; noi possianmo vantare il... Faust, e gli studi passati del FICINO e d' altri, e quelli attuali di VORONOFF, CAVAZZI, etc.
[In fact the Chinese, Scythians and Getae investigated every herb and every remedy in order to discover this immortal drug; and the Chinese believe they have found it in Ginseng root; Lao-koon schoolchildren claim to have a specific which, it seems, would be based on opium; etc. etc; we can boast the ... Faust, and the past studies of FICINO and others, and the current ones of VORONOFF, CAVAZZI, etc.]
(35) Secondo la Sacra Scrittura (Genesi, V, 5. 8. 11. 14. 20. 27. 27. 31), ADAMO avrebbe toccati i 930 anni, IARAD 962, MATUSALEMME 969, etc.; il più giovane sarebbe stato LAMEC con soli 777 anni. Si noti tuttavia che taluno, fra le altre, ha affacciato l' ipotesi che anticamente venisse considerato come anno ogni stagione; donde la conseguenza che un nostro anno ne valga quattro die loro.
[According to Sacred Scripture (Genesis, V, 5. 8. 11. 14. 20. 27. 27. 31), ADAM would have reached 930 years, IARAD 962, MATUSALEM 969, etc.; the youngest would have been LAMEC with only 777 years. However, it should be noted that some, among others, put forward the hypothesis that in ancient times it was considered as a year every season; hence the consequence that one year of ours is worth four of them.]
(36) HUFELAND C. G.: *L' arte di prolungare la vita umana*. Trad. del dott. CARENO, Venezia, 1799, vol. I, p. 4.
(37) HUFELAND C. G.: *Op. Cit.*, vol. I, pp. 20-2I.
(38) TIBULLO A. (54 av. Cr. – 19 Av. Cr.): Lib. I. Ode. X, vv. 9-10.
(39) Pare che gli antichi derivassero l'uso del clistere da un'abitudine dell'uccello Ibi.
[It seems that the ancients derived the use of the enema from a habit of the Ibi bird.]
(40) Lo SCHULZE, *op. cit.*, pp. 38-39, così scrive: « *Venae sectionem Aegyptios primum vocasse in usum, ab hippopotamo edoctos, Plinius auctor est hisce verbis... atque ubi acutissimam videt stirpem, imprimens corpus venam quamdam in crure vulnerat, atque ita profluvio sanguinis morbidum alias corpus exonerat et plagam limo rursus obducit* ».
E lo SCHULZE commenta: « *Quae quidem verba non obscure videntur significare quod non solum praeservative, verum etiam ad curationem morborum hoc remedio uti, animalis huius exemplo, didicerint* ».
Il primo esempio, che si conosca, del salasso è quello di PODALIRIO (1195 av. Cr.; guerra di Troia), il quale « *sanguine ex utroque brachio educto, illam* (cioè Sima, figlia del re Admeto) *sanitati reddidisset* ». Si veda anche il LE CLERC, *op. cit.*, p. 54; lo SCHULZE, *op. cit.*, p. 114; etc.
(41) ALPINI P. - Si veda ciò che scrive di lui il BOERHAAVE, nel suo libro: Methodus studii medici emaculata et accessionibus locupletata ab A. HALLER. Amstelaedami, 1751, vol. II, p. 867.
(42) *Op. cit*. p. 2-b; l'altro passo è a p. 60-b (lib II, cap. XI).
(43) ARISTOTELE: *De hist. anim.*, lib. III, cap. 19.
(44) CRITIA. Cit. da ARISTOTELE (*De anim.*, lib. I).
(45) *Gen.*, IX, 4; *Levit.*, XVII, I4; *Deuter*. XII, 23.
(46) LUCREZIO CARO: *De rerum natura*, lib. III, 43.
(47) OMERO: Odissea (trad. di I. PINDEMONTE), lib. XI, vv. 218-220.
(48) GASTALDI: Annali di Chimica applicata (Ann. Polli). Milano, 1856, p. 96.
(49) *Gen.*, IX, 4; ma spec.: *Levit.*, XVII, 10, 11, 12, 53, 14, 15, 16; e *Deuter.*, XII 23, 24, 25.
(50) CONRING: *De hermetica medicina* (libro che non ho trovato: cit. dal BORRICCHIO).
(51) BORRICCHIO O.: *Op. Cit.*, pp. 337-338 (lib. II, cap. IV).
(52) HALLER A.: In *Met. studii* del BOERHAAVE, vol. II, p. 977.

(53) PLINIO: *Nat. Hist*. (vedi più avanti), lib. XXVI, XXVIII, etc.
(54) TRALLIANUS A. - Così scrive: « *Aegypti quidem reges, si quando, elephantiasi correpti essent, folia humano sanguine temperari jussisse ad medicinam eam, idem Plinius refert lib. XXVI* » etc. Le parole di PLINIO (lib. XXVI, Cap. I, Sect. 5) sono più sotto riferite dal BORRICCHIO (*Aegypti peculiare hoc malum... eam*).
(55) HOEFFT F. M.: *De sanguinis transfusione, pars prior*. Berolini, 1819, pag. 22.
(56) Tale frase è riportata dal BORRICCHIO e suona così: « *Veteres hermetici sanguine humano non nisi inter magica usi sunt, cum ad alia tum ad elephantiasis curationem, spiritu illo ignorato* ».
(57) Al. *solia*.
(58) Difatti anche PARACELSO dà la seguente ricetta contro la lebbra: « *dosis sanguinis humani, semel in mense in secunda die post oppositionem* ». *De cura leprae*, lib. III ; opera omnia, Genevae, 1658, vol. I, p. 503.
(59) DIODORO SICULO: *Bibl. Hist*., lib. I. pars altera.
(60) Si veda il GERIKE P.: De Athotis, Tosarthri et antiquissimorum Aegyptiorum anatomia fabulosa. Helmest, 1739.
(61) Così il BORRICCHIO: « ...existimantes omnes languores hominibus creari. ex cibis, quibus aluntur ». *Op. cit*., p. 160, paragr. 3.
(62) DIODORO SICULO: *Op. cit*., p. 36.
(63) PLUTARCO: *De Iside et Osiride liber*. In questo libro ricorre più volte il medesimo concetto espresso con frasi diverse.
[In this book the same concept recurs several times expressed in different phrases.]
(64) ALBERTI M.: Diss. inaug. medica de medicinae apud Ebracos et Aegyptios conditione. Hal. 1742, p. 11.
(65) Due Trattati di medicina esistenti nel Museo di Berlino e pochi altri frammenti sparsi (SMITH E.: *Storia antica dell' Oriente*, trad. di G. Carraro, Firenze, Barbera, 1887, p. 223).
(66) Chi desiderasse apprendere notizie dettagliate intorno all'imbalsamazione egiziana, consulti le seguenti opere: PUCCINOTTI, vol. I, p. 129; SPRENGEL, vol. I; PARCELLY, *Étude historique et critique des embaumements etc*. Lyon Paris, 1891; GUNTHER, *Hist. antiq. Untersuch. ueber die Verfahr*. etc. « Jour. der Chir. u. Augenh. », Bd. VI, 1824, S. 233; GRANVILLE A., *An essay on Egyptian Mummies, with observestions on the art of Embalming*, etc. London, 1825; PETTIGREW T. I., *A history of Egyptian Mummies*, etc., London, 1834; GANNAL F. N., *Histoire des embaumements*, Paris, 1838; NICHOLAS, *Précis historique embaumement* etc. Nouv. Orléans, 1852, T. I. p. 172; ROUX A. L. *Histoire de l'art des embaumements depuis son origine* etc. « Monit. des Hôp » 1856, T. IV, p. 369; STEEL I. E. *Embalming as practiced in Ancient and Modern Times*, etc. Tr. M. Soc., 1866, p. 18; BAYLE D. C. *L' embaumement dans les temps anciens*, etc. Paris, 1873; etc. etc.
(67) FRESCHI. Nella storia dello SPRENGEL, vol. I, p. 160.
(68) PUCCINOTTI: *Op. cit*., vol. I, p. 137.
(69) Chi desiderasse particolari notizie, consulti il LE CLERC, p. 15.
(70) Infatti TIBULLO cita OSIRIDE (lib. I, ode VII) senza parlare della sua abilità medica, contrariamente a quanto scrive di ISIDE.
(71) TIBULLO: Lib. I, ode III, vv. 27-28.
(72) DIODORO SICULO: *Op. cit*., p. 33: « *Asserunt autem Aegyptii Isidem plurium inventricem ad morbos medicamentorum, et medicinae arti admodum contulisse eamque immortalitate quoque potitam gaudere hominum culti inque eorum valetudine praecipue versari* ».
(73) DIODORO SICULO: *Op. cit*., p. 33.
(74) Esso dice cosìì: « *Visu quoque aut alia quapiam corporis parte debiles, eius deae numen implorantes, in pristinam valetudinem restituuntur* ».
(75) DIODORO SICULO: *Op. cit*., lib. IV, cap. 71.
Egli difatti, secondo la leggenda, risuscitò IPPOLITO, vittima di FEDRA, TINDARO, GLAUCO, IMENEO, LICURGO, ORIONE, etc.
(76) Così difatti ci narra l' HUFELAND (*op. cit*., vol. I, p. 593): « *si pretende che con detti rimedi (tinture d'oro, etc.) abbia vivuto 300 anni compiti, ed avvi persino chi crede ch'egli viva ancora*... »!!!
(77) ALBERTI M.: *Op. cit*., p. 21 « *proinde magnam omnino dignitatem medicinae in Aegypto fuisse necessum est*... ».

(78) MELAMPO (1500 av. Cr.). È celebre per aver guarito l' impotenza di Ificlo mediante la ruggine di ferro, e la lebbra delle figlie di Preto, re d'Argo, mediante l'elleboro e coll'artificio di farle correre inseguite da bei giovani... e col farle bagnare alla fonte di Anigro.
Anche VIRGILIO parla di lui: *Aen.*, Lib. X, v. 320; *Georg.*, III, v. 550; *Ecl.*, VI, 48-73.

(79) CHIRONE (1270 av. Cr.). « *Il gran Chirone, il qual nudrì Achille* » come dice DANTE, il più giusto dei Centauri, eccellente botanico ed esperto nel medicare piaghe ed ulcere, etc.
Cfr. VIRGILIO: *Georg.*, IV, 270; III, 548.

(80) PODALIRIO. È il primo di cui si abbia notizia aver fatto salassi (v. sopra), imitato pochi anni dopo... spiritualmente, nel 1179 av. Cr., da un medico arabo, AVENZOAR, il quale fece salassare il proprio bambino di tre anni.

(81) XENOFANE (620-520 av. Cr.). Egli sosteneva che nulla nasce e nulla muore, che tutto è eterno, che Dio è il mondo e il mondo è Dio: [*Greek*]
Cfr. KARSTEN, Philosophorum Graecorum reliquiae. Amsterdam, 1830.

(82) PITAGORA (580 av. Cr.). Secondo le sue dottrine, i numeri sono i principi delle cose; i principi: finito e infinito; destro e sinistro; diretto e indiretto; unità e pluralità; rettilineo e curvo; luce e tenebre; maschile e femminile; etc.; l' anima è un'emanazione del sole, che è divinità; teoria della metempsicosi, (lungamente descritta da OVIDIO: *Met.*, XV, vv. 60-478); etc.
Cfr. BECKMANN, *De Pythagoreorum reliquiis*, Berlin, 1850.

(83) ALCMEONE di Crotone (540-450 av. Cr.). Fu forse il primo a sezionare gli animali a scopo anatomico. Cfr. ARISTOTELE, *Hist. anim.*, I, 9; DIOGENE LAERZIO, VIII, 5; CICERONE, *De Nat. deorum*, I, 40. Cfr. anche KÜHN, *Opuscula Academ. Med.*, Lips., 1827.

(84) EMPEDOCLE d'Agrigento (504-444 av. Cr.). Detto altresì il « *domator dei venti* », è celebre per la teoria dei quattro elementi: aria, acqua, terra, fuoco, secundo lui l'anima e una composizione di essi e ha sede nel sangue; denomina così l' *amnios*, nome conservato tuttora, etc. V. i frammenti pubblicati dal KARSTEN, Leipzig 1838, e cfr. anche il GLADISK.

(85) ANASSAGORA di Clazorene (500-428 av. Cr.; 70a Olimpiade). Nulla nasce dal nulla: [*Greek*] (magnifica asserzione scientifica, precorritrice dei tempi moderni!). E il creatore della dottrina del [*Greek*], spirito che separa gli elementi, che ordina il mondo.
Cfr. E. SCHAUBACH, Leipzig, 1827.

(86) DEMOCRITO d'Abdera (470-404 av. Cr.). Ha fatto studi sul cervello etc. Ammette due principi: il pieno e il vuoto, ch'egli chiama l'essere e il non essere. I suoi frammenti ci sono conservati da ARISTOTELE, PLUTARCO, DIOGENE LAERZIO, CICERONE, SIMPLICIO, EUSEBTO. V. FABRICIUS, *Bibi. Graeca*, II. Cfr. anche MULLACH, *Democriti operum fragmenta*, Berlin, 1843.

(87) LEUCIPPO (400 av. Cr.). Famosissimo per la teoria corpuscolare, che ha precorso di tanto la nostra teoria atomica, etc. Cfr. RITTER, *Storia della filos. antica*, VI, c. II; inoltre ARISTOTELE, *Metaph.*, I, c. 4 e DIOGENE LAERZIO, IX.

(88) ERACLITO (502 av. Cr.). Mori pazzo e idropico. Secondo lui, il fuoco è il principio di tutte le cose; l'anima nasce dall'emanazione del fuoco; l'Universo è in una perpetua instabilità; etc. V. i frammenti pubbl. da HUBMANN, Leipzig, 1852.

(89) METRODORO di Coo (500. av. Cr.). Scrisse un trattato sulle opere di Epicarmo, etc. V. FABRICIUS, *Bibi. Graeca*, vol. I.

(90) ACRONE d'Agrigento (470 av. Cr.). Si dice che abbia arrestato la peste di Atene coll'accendere grandi fuochi; etc. Si veda un'iscrizione di lui riportata nel vol. di V. MALACARNE (*Delle opere de' Medici e de' Cerusici* etc. 1786; V. appresso), iscriz. XI della prefazione. V. FABRICIUS, *op. cit.*, XIII, 32.

(91) ICCO di Taranto (472 av. Cr.). Fiorì, come si vede, circa alla 77^{a} Olimpiade. Pose le fondamenta della medicina ginnastica. PAUSANIA lo considera come il più grande ginnasta del suo tempo e PLATONE lo annovera Con elogio tra i sofisti e IAMBLICO tra i Pitagorici. Cfr. PLATONE, *De legibus*, VIII; IAMBLICO, *Vita Pythagorae*, 36; ELIANO, *Hist. lib.*, II, c. 3.

(92) IPPOCRATE (460-377 o 371 (?) av. Cr.). Anch'egli calmò la peste in Abdera, Atene e Illirio con profumi e grandi fuochi; guari DEMOCRITO; però non badò punto al polso, non conobbe differenza fra vene e arterie, col qual nome chiama perfino la trachea; non rintracciò la fonte dei vasi sanguigni; usava il salasso nelle malattie acute febbrili;

operava l' empiema; di medicine conosceva l'elleboro, il sugo d'Euforbio, i semi di dauco eretico, la radice di Tapsia, i cocchi Gnidi, i fiori e i semi di Cartamo, tisane mucillaginose, etc.

[He too calmed the plague in Abdera, Athens and Illyria with perfumes and great fires; heal DEMOCRIT; but he paid no attention to the wrist, he knew no difference between veins and arteries, by which name he even calls the trachea; he did not trace the source of blood vessels; he used bloodletting in acute febrile illnesses; the empyema was operating; of medicines he knew hellebore, Euphorbium juice, heretic dauco seeds, Tapsia root, Gnid cocci, Safflower flowers and seeds, mucilaginous herbal teas, etc.]

(93) DIOCLE di Caristo (350 av. Cr.). Distinse per il primo la polmonite dalla pleurite, etc. Si occupò molto di anatomia. Cfr. FABRICIUS, *op. cit.*, vol. XII.

(94) ZENONE di Cizia (362 - 261 av. Cr.). Tutto ciò che esiste, è materia, etc. Scrisse molte opere, delle quali non resta quasi nulla: [*Greek*]. etc. Cfr. anche CICERONE e SENECA.

(95) PLINIO il Vecchio. Si veda più avanti (a prop. di TANAQUILLA).

(96) Si veda: *Nova medicinae methodus, auctore* JOANNE HASFURTO WIRDUNGO, Ettelingae, 1532, lib. II, cap. XV, pp. 50-55.

(97) IPPOCRATE: *Liber Aphorisrnorum*, Sectio II, XXII. Lo stesso concetto si trova pure in *De Nat. Hominis*, § 17 (non genuino, secondo GALENO), e in *De Flatibus* § 2.

(98) SANTINELLI B.: *Confusio transfusionis sive confutatio operationis transfundentis sanguinem de individuo ad individuum, ad Emin. et Rev. Principern Jacoburn S. R. E. Cardinalem Rospigliosium*. Romae. 1668.

(99) È noto che la Scuola Alessandrina, che esercitò nell' antichità sì potente influsso, sorse dal vertiginoso progresso di Alessandria, la città che ALESSANDRO MAGNO fondò nel 332 av. Cr. all' età di 24 anni - chi mai avrebbe osato predire che quell' uomo di genio, che l' anno dopo conquistava tutta la Persia e si coronava ancora di vittorie memorabili, sarebbe miseramente perito in Babilonia otto anni dopo, e cioè nel 324, appena trentaduenne? - la quale - toccato l'Egitto nel 321 al fratello del Grande di nome TOLOMEO, detto SOTERO - divenne ben presto, appunto sotto i Tolomei, l'emporio dell'industria e del commercio e il fulcro delle arti e delle scienze.

[It is known that the Alexandrian School, which exercised such a powerful influence in antiquity, arose from the dizzying progress of Alexandria, the city that ALEXANDER the Great founded in 332 BC at the age of 24 - who would have dared to predict that that man of genius, who the next year conquered all of Persia and still crowned himself with memorable victories, would miserably perish in Babylon eight years later, that is, in 324, just thirty-two? - which - came to Egypt in 321 to the brother of the Great named TOLOMEO, called SOTERO - soon became, precisely under the Ptolemies, the emporium of industry and commerce and the hub of the arts and sciences.]

(100) EROFILO (307 av. Cr.). Si veda il LE CLERC, *op. cit.* p. 315. Fu il primo a considerare i nervi come organi della sensibilità, benchè li chiamasse « [*Greek*] » (canali) come ARISTOTELE; scoperse il duodeno, il calamo scrittorio, etc.; fondò la dottrina del polso, etc.; pose la sede dell'anima nei ventricoli cerebrali, etc. Cfr. C. F. H. MARX, *De Herophili... vita, scriptis* etc. Gottingae, 1840.

(101) ERASISTRATO (300 av. Cr.). Si veda il LE CLERC, p. 296 e seg. Anch' egli fece studi sul cervello e sul cuore, ove scoperse le valvole tricuspidali; ammise il « [*Greek*] » che si respira coi polmoni e del quale si riempiono le arterie e del quale ancora egli distinse quello vitale « [*Greek*] » che opera nel cuore e quello psichico « [*Greek*] » che opera nel cervello; secondo lui è il « [*Greek*] » che produce la pulsazione delle arterie; e come chirurgo fece laparatomie, applicò il catetere, operò gli ascessi del fegato e della milza, etc. Cfr. PLINIO, *Hist. Nat.*, XXIX, 3; PLUTARCO, *Demet.*; I. E. HIERONIMUS, *Dissertatio inauguralis* etc. Jenae, 1790; etc. Ecco qualche titolo delle sue opere: [*Greek*]. etc.

(102) DE CRISTOFORIS: *Lavoro citato*.

(103) MORSELLI E.: *Lavoro citato*.

(104) *Dictionnaire Encyclopédique des Sciences Médicales*. Paris, Masson etc., 1885, t. 97 (180 della III serie), p. 4 (dir. da DECHAMBRE poi da LEREBOULLET).

(105) *Diz. Encicl. di Chir.*, già cit., vol. V, p. 192.

(106) TERTULLIANO. *De anima*, cap. X.

(107) CELSO. Prefaz. lib. I: « *Id vero crudele, vivorum hominum alvum atque praecordia incidi; et salutis humanae praesidem artem non solum pestem alicui, sed hanc etiam atrocissimam inferre...* »; ed anche: « *nocentes homines, a regibus ex carcere acceptos, vivos inciderint* ».
(108) TURCHETTI O.: *Dell' origine e dei progressi della nuova dottrina medica italiana*. S. Croce, Tip. Bartoletti, 1837; p. 10: « *mostruosissima teoria* » (anche per ERASISTRATO).
(109) SCUDERI R.: *Introduz. alla storia della medic, antica e moderna*. Padova, 1824, II ediz., p. 77.
(110) HURTADO DE MENDOZA: *Historia critica de la Medecina*, Madrid, 1854. A pag. 51. « *Las de Herofilo y Erasistrato no produjeron grandes variaciones en el arte de curar, y solo se han hecho celebres por sus descubrimientos anatomicos en el hombre* ».
(111) PUCCINOTTI: *Op. cit.*, vol. I, p. 513.
(112) CALDERINI. Si veda il Trattato del PUCCINOTTI, nei « Documenti » del vol. I, p. 727.
(113) MAJ A.: Si veda il Tratt. del PUCCINOTTI, nei « Documenti » del vol. I, p. 730 (« *Io per questo dubbio e per altre occupazioni non esaminai l'opera....* »).
(114) CELSO C. - Della sua opera *De artibus* ci restano solo i libri VI-XIII, che formano la parte medica: *Medicinae libri VIII*, ex rec. Leonardi Targae, Veronae, apud haeredem Merlo, 1810.
(115) CELSO C. *Op. cit.*, lib. I, pag. 5.
(116) CELSO C.: *Op. cit.*, lib. I, pag. 15.
(117) GALENI C. (131-193 d. Cr.): *omnia quae extant opera, ex secunda Juntarum editione*. Venetiis, 1550.
(118) GALENO C.: *Id.*; cap. III (*op cit.*, tomo VI, p. 5)
(119) GALENO C.: *De usu partium corporis humani*, lib. VI, cap. 17 (*op. cit.*, vol. I, p. 155 a).
(120) GALENO C.: De venae sect. adv. Erasistr., cap. III (p. 6, del t. VI).
(121) GALENO C.: *Id. id.* cap. VIII (p. 8 del tomo. VI, dell' *op. cit.*).
(122) BURCI C.: *Storia compendiata della Chir. It.*, a pag. 92 del vol. I delle « Pubblic. del R. Ist. Sup. », Firenze, 1876; si veda la pag. 99.
(123) CELIO AURELIANO: *Morb. Chron*. Lib. III, cap. IV.
(124) GALENO: *De ven. sect. adv. Erasistr.*, cap. I, p. 10 (vol. VI, *op. cit.*).
(125) BOERHAAVE H.: *Met. Stud.* (già cit.), vol. I, p. 313.
(126) Più tardi (sec. XVII) ebbe molti altri nomi: « *cura medeana* » (BORRICCHIO: *Diss., seu orationes acad.* Hafn. 1715); « *methaemochymia* » (VEHER); « *chirurgia infusoria o trasfusoria* » (la prima riguardante le iniez. endov. di medicamenti, la seconda di sangue); etc.
(127) TERTULLIANO: *De pudicitia liber*, cap. XIII, B, p. 564 (dell' edizione di Parigi – V. appresso)
(128) STRATONE. - Desidero rammentare, per curiosità, ch' egli ammetteva l' anima tra le sopracciglia.
(129) BACCELLI G.: *La medicina politica e la medic. clinica nella Roma antica e nella Roma moderna*. Roma, 1880, p. 4.
(130) IPPOCRATE: *De prisca medicina: « illos qui primi methodum medendi morbis invenerunt, judicasse hanc artem dignam esse cuius inventio Diis tribuatur* ».
(131) CICERONE M. T.: *De natura deorum*, lib. I; *Tusc. Quaest.*, lib. III.
(132) CATONE. - Di lui PLINIO, (citazione del TIRABOSCHI, a pag. 334 del vol. I della sua *Storia della Letteratura Italiana*, Modena, 1787, II ediz.), riporta il seguente passo: « *Dicam de istis Graecis suo loco, Marce fili, quid Athenis exquisitum habeam, et quod bonum sit illorum litteras inspicere, non perdiscere, vincam. Nequissimum et indocile genus illorum. Et hoc puta vatem dixisse. Quandocumque ista gens suas literas dabit, omnia corrumpet. Tum etiam magis si medicos suos huc mittet. Jurarunt inter se barbaros necare omnes medicina. Et hoc ipsum mercede faciunt, ut fides iis sit, et facile disperdant. Nos quoque dictitant barbaros, et spurcius nos quam alios opicos appellatione foedant. Interdixi tibi de medicis* ».
(133) PLINIO. - Così citato e tradotto dal TIRABOSCHI (*op. cit.*, p. 335): « *...Inoltre non vi ha legge alcuna a punir la loro ignoranza, non vi ha esempio in essi di rigoroso castigo. A nostro rischio si istruiscono, e colla morte di molti fanno le loro sperienze. A' medici soli è lecito impunemente l' uccidere... Ma ben ci sta, poichè non vogliamo apprendere noi stessi, ciò che alla nostra sanità sia opportuno. Camminiamo cogli altrui piedi: leggiamo cogli altrui occhi: salutiamo affidati alla memoria altrui: e coll' altrui soccorso viviamo, e*

niuna cosa crediamo, che sia propriamente nostra, fuorchè il piacere ». E altrove (cap. I, lib. XXIX della *Nat. Hist.*; e p. a 15 del vol. II del TIRABOSCHI) egli dice: « *Costoro, bramosi di acquistarsi fama colla novità dei loro sistemi, fanno traffico dela nostra vita…* ».

(134) TANAQUILLA. - Si veda il *Libro della saggezza* di TANAQUILLA, che io non ho potuto consultare.

(135) VINCENZO DA FILICAJA. - Lettera del Sen. V. FILICAJA, scritta di Villa addi 5 agosto 1687, nel vol. II, p. 43, delle *Lettere familiari del conte L. Magalotti e di altri insigni Uomini a lui scritte.* Firenze, 1769.

(136) PAIS E.: *Storia crit. di Roma*. Loescher, Roma, 1913, vol. I, parte II, pp. 400, 403, 410 n. i; 484, 503, 509, 515, 516, 519 n. i; 538, 546, 550, 560, 563 n. i; 573.

(137) BAYLE P.: *Dictionnaire historique et critique*. Amsterdam, 1734, t. V, p. 289.

(138) MOMMSEN T.: *Storia romana*, trad. di G. Sandrini, Torino, 1857.

(139) *Nuovo Dizionario Storico, composto da una Società di Letterati in Francia*, t. XIX, Bassano, 1796.

(140) PLINIO. - Si veda innanzi. Egli tuttavia, per mitigare l'asprezza delle proprie frasi, dice che « *antiqui non rem, sed artem damnabant* ».

(141) MARZIALE V.: Fra i tanti, ecco un epigramma:

Languebam, sed tu comitatus protinus a me
venisti centum, Symmnache, discipulis;
centum me tetigere manus aquilone gelatae,
non habui febrem, Symmache, nunc habeo.

(142) GIOVENALE: Sat., X, v. 221:

Quot Themison aegros autumno occiderit uno.

(143) P. OVIDIO N.: *Metamorfosi*, lib. VII, vv. 332-334.

(144) MANFREDI P.: *De nova et inaudita operatione medicochirurgica sanguinem trasfundente de individuo in individuum*. Romae, 1668.

(145) ELSNER: *Miscell. Cur. sive Ephem. Med. Phys. Acad. Nat. Cur*. (V. più avanti). Francofurti et Lipsiae, 1684; Dec. I, A. I, Oss. 149, pag. 289-291.

(146) FICINO M.: *Marsilii Ficini Fiorentini, medici atque philosophi celeberrimi, de vita libri tres,* 1549; *de vita comparanda*, lib. III, cap. XX.

(147) VINCENZO DA FILICAJA: *Op. cit.*, p. 43.

(148) DE CRISTOFORIS M.: *Op. cit*.

(149) MORSELLI E.: *Op. cit*.

(150) ROUSSEL J.: *Op. cit*.

(151) HOEFFT F. M.: *Op cit*.

(152) BARDUZZI D.: *Sulla trasfusione del sangue*. Firenze, 1874.

(153) LANDI P.: *Una lezione sulla trasf. del sangue*. Estr. dall' « Ippocratico », serie III, vol. XII. Fano, 1867, p. 4.

(154) SCALZI F.: *La scoperta della trasf. del sangue rivendicata all' Italia*. Roma, 1871.

(155) RUBINO M.: *Ipodermoclisi.* Palermo, 1915.

(156) POSTEMPSKI P.: *La trasf. del sangue*, Roma, 1873 (si noti che i dati storici son tutti desunti dallo SCALZI).

(157) SANTINELLI B.: *Op. cit*.

(158) *Encicl. Med. Pratica*. Traduz. di L. MICHELOTTI., Livorno, 1833, vol. VII, pag. 4431.

(159) FICINO M.: *Op. cit.; de vita comparanda*, lib. III, cap. XX, p. 225: « *Unde Medeam Magosque tradunt herbis quibusdam reddere juventutem consuevisse...* ».

(160) JAMES: *Op. cit*.

(161) BILLROTH T.: *Manuale di Patol. e Ter. Chir. Gen*. Napoli, 1868, pp. 32-33.

(162) OVIDIO: *Op. cit.*, lib. VII, vv. 215-216.

(163) OVIDIO: *Op. cit.*, vv. 285-287.

(164) OVIDIO: *Op. cit.*, vv. 314-317.

(165) OVIDIO: *Op. cit.*, lib. XIV, vv. 1-74.

(166) OMERO: *Odissea*, lib. XIII, vv. 463-468 e 505-510; lib. XVI, v. 495 e seg. (Trad. del PINDEMONTE).

(167) OMERO: *Odissea*, lib. X, vv. 303-313. (Trad. del PINDEMONTE).

(168) OVIDIO: *Op. cit.*, lib. VII, VV. 195-284.

(169) ARISTOTELIS Stagiritae (384-323 av. Cr.), *philosophorum omnia facile principis opera, quae in hunc usque diem extant*, etc. Basileae, ex officina Joan. Oporini, 1548. - ARISTOTELE fu, come è noto, il maestro di ALESSANDRO MAGNO; fu poeta, retore,

fisico, metafisico, fisiologo, medico, naturalista; scoperse l' aorta (così chiamandola), i nervi, dai quali, e non già dalla ragione, disse provenirci le conoscenze; fece ottime osservazioni sul coito e sulla generazione di molti insetti; sostenne che il corpo era nutrito dal sangue che si distribuiva dovunque; affermava che dalla trachea penetrava dello spirito (cioè aria) nel cuore; etc.

[ARISTOTLE was, as is known, the teacher of ALEXANDER THE GREAT; he was a poet, rhetorician, physicist, metaphysician, physiologist, physician, naturalist; he discovered the aorta (as he called it), the nerves, from which, and not from reason, he said the knowledge came; he made excellent observations on coitus and the generation of many insects; he claimed that the body was nourished by the blood which was distributed everywhere; he affirmed that from the trachea penetrated the spirit (i.e. air) into the heart; etc.]

(170) PLATONE (430-348 av. Cr.). - Le sue opere son troppo note perchè io debba comunque indicarne un'edizione; qualche dialogo l'abbiamo perfino tradotto durante gli anni degli studi liceali. Ottima è la traduzione di F. ACRI e anche quella di E. ROMAGNOLI.

Egli diceva che la milza serviva a purgare il fegato e a temperare i moti irregolari dell' anima; che le nostre conoscenze ci vengono dalla ragione; pare che accenni alla distinzione fra vene e arterie, ma poi fa una bella confusione; etc.

[He said that the spleen served to purge the liver and to temper the irregular movements of the soul; that our knowledge comes to us from reason; it seems that he hints at the distinction between veins and arteries, but then makes a beautiful conclusion; etc.]

(171) MORSELLI E.: *Op. cit.*, p. 10.

(172) PLINIO C. S.: *Plinii Secundi Historiae naturalis* libri XXXVII, *quos interpretatione et notis illustravit J. Harduinus*, Parisiis, 1741; lib. XXVIII, cap. I, sect. II; (tomo II, p. 443). V. anche il libro XXVI, cap. I, sect. 10: *sanguine ipsius hominis quacumque parte emisso etc*.

(173) L' epilessia, così detta dal greco, era stata chiamata dai Romani « *morbus comitialis* », perchè - come ci dice Q. SERENO (cap. LVI) - « *si quis illo correptus in comitiis concidisset, solvebantur comitia* ».

Fu anche chiamato « *morbus sacer* », « [*Greek*] »; e chi desiderasse saperne il perchè, veda il *Dictionarium medicum* (*excudebal Henricus Stephanus, illustris viri H. Fuggeri, typ.*), 1563, pp. 319-323.

(174) Lezione controversa; al. « *juvantibus* », etc.

(175) CANTÙ C.: *Margherita Pusteria*, cap. XXI.

(176) CELSO C.: *Op. cit.*, lib. III, cap. 23, p. 157.

(177) SCRIBONIO LARGO (scolaro di Ap. Celso; Tiberio e Claudio imperatori): *Compositiones medicae, Jo. Rhodius recensuit*, Patavii, 1655: *ad comitialem morbum*, cap. II, paragr. XVI, pp. 24-26.

(178) Anche PLINIO (lib. XXXII, cap. IV): « *marinarum testudinum sanguis comitialibus instillatur, ore diducto, his qui modice corripiuntur* ».

E nel lib. XXVIII, cap. IV: « *Scribunt comitialem morbum sanari cibo et carne ferae occisae codem ferro, quo homo interfectus sit* ».

E così pure CELIO AURELIANO, *Chron.* lib. I, cap. IV; ARETEO, lib. I. cap. IV.

(179) Paragrafo XVII.

E nella compos. 196 (pag. 107): « *Tauri sanguinis potus quamvis quis difficile caelaverit, hunc tamen vestigia cruoris relicta inter dentium commissuras produnt*... ».

(180) ARETAEI *Cappadocis: De causis et signis acutorum et diuturnorum morborum etc.*, edit. curavit H. BOERHAAVE, Lugd. Batav., 1735.

Inoltre è: *De cur. morb. diutur.*, lib. I, cap. IV, p. 122.

(181) TERTULLIANO Q. S. F.: *Opera omnia*. Parisiis, 1695, pp. 9-I0.

(182) E GIOVE Laziario, che si venerava col sangue umano, e che si dice abbia insegnato agli uomini di curaire l' epilessia col sangue umano.

[Laziario, who was venerated with human blood, and who is said to have taught men to cure epilepsy with human blood.]

(183) Allude certamente alla di cui V. sopra pag. 20.

(184) SALLUSTIO: Catilinaria, cap. XXII.

(185) Lezione assai controversa: a. « *haustui, usui, et. sui*… ».

(186) CELIO AURELIANO (223 d. Cr.): *De morbis acutis et chronicis libri VIII*, Amstelaedami, 1755. - *De morb. chron*. lib. I, cap. IV, p. 314. - Il passo che segue si legge a pag. 318.
(187) Q. SERENI SAMMONICI, poetae et medici clarissimi (del III secolo, Severo e Caracalla imperatori), *de re medica*, etc. Tiguri, 1540, cap. LVI, pp. 233-236; e cap. XXXIII (spec. p. 175). Si leggano anche le pp. 212 e 131.
(188) Libro della Sapienza, trad. di B. BOARETTI. Venezia, 1792, pag. 65.
(189) MARSILIO FICINO: *Op. cit.*, pag. 85;. (Lib. II: *De vita producenda*, cap. XI: *de usu lactis sanguinisque humani pro vita senum*).
Il FACINO, entusiasta oltra « ogni confine » di PLATONE, come dice il PASTOR, nacque in Firenze addì 19-X-1433 e morì nel 1499; era piccolissimo di statura, ma assai colto, tanto che il POLIZIANO ci ha lasciato questo epitaffio:
Mores, ingenium, Musas, Sophiamque supremam
Vis uno dicam nomine? Marsilius.
(190) SPRENGEL C.: Op. cit., vol. III, p. 235.
(191) Cfr.: De vita producenda, cap. XX (pp. 118-119): « *Concludit (Petrus Aponensis) his auctoribus rationìbusque obitum etiam naturalem differri posse, cum astrologiae machinis tum praesidiis medicorurn... Tria nobis ad servandam juventutem pater ille Liber, etc. etc.*
Cap. XII (pag. 88): « *Utrum vero et quomodo frequens adolescentum consuetudo parumper serium retardare valeat, pudicus Socrates consulendus* ».
Cap. XVII (pag. 104): « *Chaldaeorum regula est forte probanda ad juventutem recuperandam, peregrinos humores imbibitos corpori expurgare gradatim, tum interiores competentibus medicinis, tum exteriores frictionibus et lavacris provocationibusque sudoris intereaque salubribus duraturisque alimentis paulatim corpus implere... Nam et juvenes medicinis exquisite purgantibus cito senescere Hippocrates asserit* » (sic).
A p. 78: « *Sunt qui nucleorum eiusmodi drach. unam quotidie post cibos exhibent senibus comedendam. Ego drach. alteram ieiuno etc*. ».
A p. 79: « *Item myrobalanos... sed etiani ad retardandam senectutem valde probat...* »
(192) BICHAT S.: *Recherches physiol. sur la vie et la mort.* Paris, A. XIII, 1805, pag. 1.
(193) BOERHAAVE H.: Cit. dall' HUFELAND: « *Il famoso* BOERHAAVE *fece dormire un vecchio borgomastro di Amsterdam fra due giovinette, e ci riferisce che il vecchio siassi visibilmente migliorato tanto nell'ilarità che nelle forze* ». (*Op. cit.*, vol. I, pag. 6).
(194) HUFELAND: *Op. cit.*, vol. I, p. 7: vi si legge un'iscriz. romana che riguarda il direttore di un orfanotrofio, « *qui vixit annos CXV et dies V* », e che consigliava, di farsi introdurre in bocca, mattina e sera, l'alito di alcune giovinette; ecc.
(195) BORRICCHIO O.: *Op. cit.*, p. 172 (paragr. 12): « … *nam sibi ab incolis persuaderi passus erat in eam fontem reperiri cuius haustu senes iuvenescerent* ».
(196) PARACELSO: Op. cit., p. 498: *De cura caduci: sanguinis humani... destilla post digestionem...*; pag. 542 b: « *calidus et recens sanguis humanus medetur huic morbo si utaris ad tempus pro diaeta* »; pag. 543, pag. 672: « *Vos autem medici bibendum sanguinem exibetis sive praevisione. Qui si infectus est, non bibatur, sed bibatur sanus sanguis* ». Etc.
(197) HURTADO DE MENDOZA: *Op. cit.*, pag. 80.
(198) INFESSORA S.: *Diario della città di Roma*, a cura di TOMMASINI. Roma, 1890, pp. 275-276.
(199) MURATORI A.: *Rerum Italicarum Scriptores*. Mediolani, 1734, t. III, parte II, pag. 1241.
(200) PASTOR L.: *Storia dei Papi*. Roma, 1912, vol. III, pag. 231-232.
(201) *Enciclopedia Ecclesiastica*. Venezia, 1858, vol. IV, pp. 1036-2038.
(202) POSTEL V.: *Historie de l'Eglise*. Lille, 1888.
(203) JOUGHIN J. L.: *Blood transfusion in* 1492. « Journ. Am. Med. Ass. », Chicago, 1914, vol. LXII, pag. 553.
(204) GREGOROVIUS F.: *Storia della città di Roma*, trad. di MANZATO. Venezia, 1875, vol. VII, p. 353.
(205) *Annales Ecclesiastici*, ab anno 1198... auctore RAYNALDO ODORICO. Lucae, 1754, typis L. Venturini, torno XI, pp. 196-197.
(206) SISMONDI S.: *Storia delle Repubbliche Italiane dei secoli di mezzo*. Milano, edit. Pagnoni, t. V, cap. XC, pag. 51.

(207) Il SISMONDI e il VILLARI (come si vedrà) sono gli unici che scrivono senza ambagi si trattasse di trasfusione di sangue, e son pure gli unici a dirci ch'essa fosse già stata sperimentata sugli animali.
Io non so la fonte, eui essi hanno attinto e reputo dubbia l'attendibilita di questa notizia.
[SISMONDI and VILLARI (as will be seen) are the only ones who write without ambiguity that it was a blood transfusion, and they are also the only ones to tell us that it had already been tested on animals.
I do not know the source, and they have drawn on it and I consider the reliability of this news to be doubtful.]

(208) Pare che, invece, si trattasse di ben altro, e cioè che il medico ebreo tagliasse a' quei poveri ragazzi la carotide.
[It seems that, instead, it was a question of something else, namely that the Jewish doctor cut the carotid artery from those poor boys.]

(209) VILLARI: *Vita di G. Savonarola*. Firenze, 1859, vol. I, p. 140.

(210) TOMMASINI ORESTE (V. INVESSURA). Ivi, egli ci dice che nel *Constitutum Constantini* si legge: « *ad haec advenerunt sacerdotes Capitolii dicentes mihi debere fieri fontem in Capitolio et complere hunc innocentium infantium sanguine* ».

(211) R. C.: Blood transfusion in 1492. « Journ. Am. Med. Ass. ». Chicago, 1914, vol. LXII, pag. 633.

(212) CARDANO G.: *De rerum varietate*, libri XVII. Avinione, per Matthaeum Vincentium, 1558; lìb. VIII, cap. 44, pag. 441 (*mutatio morum quomodo fiat*).
Il CARDANO nacque a Milano nel 1501 e morì a Roma nel, 1576. Di lui, meglio di tutti, a mio parere, ha scritto il BOERHAAVE (*Met. Studii*, vol. II, p. 692): « *mirificum illum scriptorem, quo, uti dicit eruditissimus quidam scriptor, sapientior nemo, ubi sapit, dementior nullus, ubi errat* ».
Si consultino SANGIORGIO P.: *Cenni storici sulle due Università di Pavia e di Milano* (opera postuma). Milano, 1831, pp. 148-175; e RIVARI E.: *La mente di G. Cardano.* Bologna, Zanichelli, 1906.

(213) SANTINELLI B.: *Op. cit.*, pag. 7.

(214) CERADINI: *Op. cit.* (Qualche appunto storico critico etc.), pag. 217.

(215) BOERHAAVE H.: *Op. cit.*, vol. I, pag. 304 (nota)

(216) MALPIGHI M.: *De pulmonibus epistola II, praeclarissino et eruditissimo viro Alphonsio Borellio, etc.*; V. anche *Opera omnia*. Londini, 1686, torno II.

(217) REALDI COLUMBI: *Cremonensis, De re Anatomica libri XV*. Venetiis, 1559, p. 177. Egli si esprime così: « *Nam sanguis per arteriosam venam ad pulmonem fertur ibique attenuatur, deinde cum aere una per, arterian venalem ad sinistrum cordis ventriculum defertur* ».

(218) MIGUEL SERVET Y REVES. - Fu arso vivo in Ginevra nel 1553, poco tempo dopo la pubblicazione della sua *Christianismi restitutio*; opera rarissima, ove si legge: « *fit autem communicatio haec non per parietem cordis mediam (ut volgo creditur), sed magno artificio a cordis dextro ventriculo, longo per pulmones ductu, agitatur sanguis subtilis; a pulmonibus praeparatur flavus efficitur et à vena arteriosa (arteria pulnonalis) in arterianì venosam (venae pulmonales) transfunditur* ».
Quest'opera però, secondo quanto scrive il MORGAGNI nella prima delle sue epistole anatomiche (Lugd. Batav., 1728, p. 95) non sarebbe stata divulgata che nel 1714; perciò il COLOMBO doveva ignorarla per forza.
Gli altri due opuscoli di SERVETO sono: *De Trinitatis moribus libri septem*, per M. SERVETO, alias Reves ab Aragonia Hispano, 1531; e l'altro: *Dialogorum de Trinitate libri duo. De justicia Christi capitula quatuor, etc,* 1532.

(219) GIULIO CESARE ARANZIO. Cfr. CERADINI, *Op. cit.*, pp. 96-97.

(220) CERADINI: *Op. cit.*, p. 217.

(221) GALENO C.: *De usu partium*, lib. VI, cap. X.

(222) MALACARNE V.: *Delle opere de' Medici e de' Cerusici che nacquero o fiorirono prima del secolo XVI*. etc. 1786 (nella Stamperia Reale) pagg. 254-255 (nota).

(223) FOLLI F.: *Stadera medica, nella quale si bilanciano le ragioni favorevoli e le contrarie*, etc. Firenze, 1680, p. 35.

(224) RAMAZZINI B.: *Opera omnia*, Londini, 1718, p. 12: « *Tam adnirabile ostentum nobis quidem novum... circa huius saeculi sextum lustrum prìmus omnium mundo visendum praebuit celeberrimus Harveius... Ex Italis nostris tamen* (*ut suus cuique honos perstet*) (sic!!!) *ac potissimus a Celeberrimo, et sui saeculi omni scio viro, Paullo Servita, non*

exigua tam famosi inventi documenta Venetiis, ac Patavii hausit Harveius... ». Si veda anche a pag. 495.

(225) HALLER A.: *Elem. physiol.; Bibl. Med.; Met. Stud*. del BOERHAAVE (note); etc. etc.

(226) MACKENZIE: *History of Health and the art of preserving etc*. Edinburgh, 1760. (Nella trad. it., Venezia, 1765, pag. 217).

(227) JAMES: *Op. cit*., p. 381 e p. 415.

(228) MAREY: *Physiol. Méd. de la circulation du sang*. Paris, 1863, p. 3.

(229) BLACK M. W.: *Esquisse d'uze histoire de la Méd. et de la Chir*. trad. par CORAY. Paris, 1798 (a. VI de la Rép.), pp. 243-245.

(230) *Encyclopedie des Sciences Médicales*. Venise, 1841, XXXIII Livraison, p. 416: « *Elle* (la circolazione) *échappa à Césalpin comame l'attraction universelle à Képler, dont les découvertes furent saisies et féconidées par le grand génie de Newton* ».

(231) TOMMASINI G.: *Lezioni critiche di Fisiologia e di Patologia*. Parma, 1803, p. 28: « ... *e d'altronde altri documenti citar si potrebbero che al Fisico Inglese per consenso di storici imparziali garantiscono l'onore di questa scoperta* ». Ma a p. 27: « *Non è però da negarsi che Fabrizio d'Acquapendente e Cesalpino, Serveto e Sarpi l'abbiano per lo meno o colle osservazioni preparata o coi sospetti precorsa e resa più agevole*... ».

(232) FREIND J.: *Op. cit*., pp. 65-66.

(233) BONANDI S.: *Cenni sulla storia della medicina*. Bologna, Zanichelli, 1902, pag. 55.

(234) FLOURENS: *Histoire de la, découverte de la circulation du sang*. Paris, 1857.

(235) FRASER HARRIS DAVID. Cit. dal BILANCIONI (*Un'ultima parola* etc.).

(236) HARVEY G.: *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. Francofurti, 1628.

(237) ERCOLANI: Curiosità storiche e bibliografiche intorno alla scoperta della circolazione del sangue. Bologna, 1873.

(238) VALENTIN: *Versuch. einer physiol. u. Pathol. des Herzens*. Leipzig u. Heidelberg, 1866.

(239) RUINI C.: *Dell'anatomia e dell'infermità del Cavallo*. Bologna, 1598.

(240) FRACASSATI C.: *Tetras anatomicarum epistolarum de lingua et cerebro, clariss*. M. MALPIGHI ac C. FRACASSATI, Bononiae, 1665; nella *Dissertatio epistolica responsoria De cerebro* C. FRACASSATI *ad clar.ss. et exper.ss* M. MALPIGHIUM (pag. 258 dell'*op. cit*.). Si noti appunto il seguente passo: « ... *sanguinis circulatio, galaxia in microcosmo humano, scilicet via chyli ad cor, nonne* CAESALPINUM *agnoscit auctorem, ac* EUSTACHIUM *de vena sine pari? Et tamen solos in scholis auctores crepant Anglos* HARVEOS, *ae*... » (pag. 313).

(241) SBARAGLIA G.: *De recentiorum medicorum studio, Dissertatio epistolaris secunda ad amicum*, (in: *Exercitationes physico-anatomicae*, Bononiae studiorum, 1701, pp. 100-101: « *Innumeri alii doctores hoc ipsum assuerunt, inter quos* CAESALPINUS, *quando circulationem sanguinis propugnat*... ». E cita il famoso passo del CESALPINO: « *Huic sanguinis circulationi ex destro cordis veniriculo*... ». Cfr. anche pp. 50 e 150).

(242) BOERHAAVE H.: *Op. cit*., vol. I, p. 79.

(243) TOURTELLE E.: *Histoire philosophique de la Méd*. Paris, 1804, vol. II, pp. 363-364: « *Ainsi* CESALPIN *peut étre regardé come celui qui le premier a mis in évidence la circulation du sang; et il est ìrès vraisemblable que* HARVEE, *qui étiti à Padoue en, commencement du dix septième siècle et qui y étudia l' espace de cinq ans, y avait entendu parler de cette découverte imprimée depuis plusieurs années, et qui ne pouvaitì pas létre tout à fait ignorée* ».

(244) DOUGLAS. Citato dal TOURTELLE, che così soggiunge: « *Aussi* DOUGLAS, *quoique anglaìs ci compatriote d'* HARVEE, *convieni que* CESALPIN *a le mérite d'avoir découvert la circulation, ci ajoute qu'* HARVEE *a celui d'avoir perfectionné cette découverte* ».

(245) LANDOIS: Fisiologia dell'uomo. Milano, Vallardi, vol. I, p. 186.

(246) SCALZI F.*: In difesa di A. Cesalpino etc. Risposta al dott. Johnson di Londra*. « Boll. Accad. Med. di Roma. », IX, 1883.

(247) CERADINI G.: *Opera Citata*.

(248) LUCIANI L.: *Fisiologica dell'uomo*. Milano. 1920, vol. I, pp. 164-188.

(249) VOSS. Cit. dal LUCIANI, *op. cit*., p. 173.

(250) STUBBS. Cit. dal BILANCIONI.

(251) LANCISI. Cit. dal BILANCIONI.

(252) BILANCIONI G.: *Un'ultimta parola intorno alla controversia sulla scoperta della circolaz. del sangue*. Estr. « Arch. Fisiol. », vol. XIII, fasc. VI, settembre 1915. Si veda anche: *Una controversia riaperta*: CESALPINO o HARVEY? « Arch. di Fisiol. », X, fase. IV, 1912.

(253) CICONE C.: *Andrea Cesalpino, fisiologo, natur., filos*. « Riv. Stor. Crit. delle Se. Med. e Nat. », 1912, III, N. 3.

(254) A. CAESALPINI, *medici clarissimi atque philosophi subtilissimi peritissimique, Peripateticarum Quaestionum libri quinìque*. Venetiis, apud Juntas, 1571 (è la II ediz., chè la prima è del 1569).
Bellissima è l'epigrafe nell' atrio della Sapienza in Roma:

ANDREAE CAESALPINO
domo Aretio Archiatro Eximio
solutissimo Naturae investigatori
quod in generali sanguinis circulatione agnoscenda
ac demstranda caeteros antecesserit
plantas nondum in classes tribuntas
primus ordinandas susceperit
rerum plurimarum impeditam intelligentiam explicuerit
universam morborum doctrinam
magno cum plausu in hoc Archygymnasio tradiderit
Academia Medica Urbis
et X viri a consiliis Archygynnasio regundo
Honoris et memoriae causa
MDCCCLXXVI

(255) BORELLI A.: *De motu animalium*, parte II, prop. XXX: « *Inventum profecto admirabile! partim a* CAESALPINO, *sed postea exactissime ab* HARVEJO *tanta evidentia demonstratum ut nemo supersit qui de eius venitate adhuc dubitet* ».

(256) HURTADO DE MENDOZA.: *Op. cit*., p. 97: la eircolaz. del sangue « ... *traslucida por el aragones* MIGUEL CERVETO, *indicada por* CESALPINO, *y demonstrada por* HARBEO... ».

(257) BROUSSAIS C.: Atlas bistorique et Bibliographique de la Méd., Paris, Baillière, 1834. « A. 1619: HARVEY *enseigne la véritable circulation du sang* »; e per CESALPINO mette un punto interrogativo alla domanda s'egli avesse o no conosciuta la circolazione generale del sangue.

(258) SCUDERI R.: *Op. cit*., p. 48. È semplicemente puerile ciò ch' egli scrive: « *Ma si è ora convenuto tra' letterati, e con ragione, di attribuire la gloria principale ad* HARVEY, *come a colui che la dimostrò con la maggior copia di esperimenti, e con l' evidenza di molteplici e irrefragabili argomenti* » (!!!).
["But it has now been agreed among literati, and with reason, to attribute the main glory to HARVEY, as the one who demonstrated it with the largest copy of experiments, and with the evidence of multiple and irrepressible arguments"]

(259) CAESALPINI A. Aretini, *De Plantis*, libri XVI, Florentiae, apud G. Marescottum, 1583.

(260) CAESALPINI A.: Quaestionum medicarum. Venetiis, apud. Juntas, 1593.

(261) MAJOR J. D.: Si veda più avanti, pagg. 81-84.

(262) DEZEIMERIS: Cit dal BURCI, nel lavoro citato.

(263) BOERHAAVE H.: *Met. Stud*. (già. sit.), vol. I, p. 79.

(264) HALLER A.: Nel *Met. Stud*. del BOERHAAVE, vol. I, pp. 313-314.

(265) HALLER A.: *Bibliotheca chirurgica*. Basileae et Bernae, 1774, vol. I, p. 583.

(266) TOURTELLE: *Op. cit*., t. TI, p. 365.

(267) RIOLAN. È quel medesimo RIOLANO che soleva dire « *qu'il aimait rnieux se tromper avec* GALIEN *que suivre une bonne route avec* PARACELSE, qu'il *régardait comme inspiré par le diable* ». (TOURTELLE, *op. cit*., pag. 366).

(268) IOANNIS PAULI FERRARII: *Zelotypia veritatis in veterum Fallatias et dogmata*. Parmae, 1690, p. 26 (ediz. conservata nella Bibl. dell'Archiginnasio di Bologna). Segnato con un asterisco dopo la seguente frase: « ... *qui volebant... dsputationes esse soluendas et in verba magaistri jurandum; quod evenit etiam in quibusdam Antiquioribus **… ».

(269) FABRI HONORÈ (1606-1688): *De Plantis et de generatione hominis*, libri duo. Parisiis, 1666, Cfr. anche: PORTAL (*Histoire de l'Anat. et de la Chir.*), t. III, p. 323; e l' HALLER (nel *Met. Stud.* del BOERHAAVE, t. I, p. 524).
(270) BARRA P.: *Hippocrate, de la circulation du sang et des humeurs*. Lyon, 1672.
(271) GRAECUS B.: *Hippocratico Galenico neotcricum animae systema de cruoris anatome et febribus, etc.*, Mediolani, 1707.
(272) BLACK: *Op. cit.*
(273) TOMMASINI: *Op. cit.*
(274) PLATONE (430-348 av. Cr.): *Timaeo*. Ficini Lugd. 1590, pag. 543. A parte ciò che già è stato detto intorno alle sue teorie (p. es. la milza serve a temperare i moti irregolari dell'anima, etc.) e il fatto, da taluno sopravalutato, di una possibile distinzione fra vene e arterie, sta di fatto che secondo lui queste traevano origine dal cuore e quelle dal fegato; onde è facile concludere ch'egli non aveva la benchè minima idea nè sui vasi nè sulla loro distribuzione nè tanto meno sul giusto corso del sangue.
[Apart from what has already been said about his theories (e.g. the spleen serves to temper the irregular movements of the soul, etc.) and the fact, overestimated by some, of a possible distinction between veins and arteries, is in fact, according to him, these originated from the heart and those from the liver; whence it is easy to conclude that he had not the slightest idea either about the vessels or their distribution or even less about the proper course of the blood.]
(275) SALOMONE. 1015 av. Cr.
(276) ETTMULLER M.: *Dissertatio de Chirurgia Transfusoria* communicata anno 1682: opera omnia. Venetiis, 1734, vol. I, p. 1467.
(277) GOELICKE: *Op cit.*, p.185.
(278) F. DE LA REYNA: *Albeyteria*, 1564.
(279) FEYJÔÔ: *Cartas Eruditas*. Madrid, 1754, t. III, p. 348.
(280) GALENO: *De utilitate respirationis*, cap. IV.
(281) GALENO: *De locis affectis*, lib. I, cap. I.
(282) GALENO: *De Hippocratis et Platonis dogmatibus*, libri IX; le parole di PLATONE son citate pressoché integralmente nel lib. VI, cap. 15.
(283) FERRARI J. P.: *Op. cit.*, p. 21: « *Quid importatur Galenum sanguinem motum circularem ignorasse, quando nos ab experientia eruditi hunc cognoscere fateamur?* »; e a pag. 9: « *Quid de sanguinis circulari motu (*nostro GALENO non noto*) disputandum?* ».
(284) FABRICII ab Aquapendente *de venarum ostiolis liber*. Patavii, apud L. Pasquatum, 1603 (*Opera omnia*, Lipsia, 1687).
(285) ROMITI G.: *I meriti di F. D'Acquapendente*, etc., « Arch. It. de Biol. », 1883, vol III p. 380. Egli sostiene con l' HALLER (*Met. Stud.* cit. vol. I, p. 138) che il merito spetta al CANNANO.
(286) ETTMULLER M.: *Op. cit.*, p. 1467.
(287) CLARK T.: *A Letter, written to the Publisher by the Learned and Experienced Dr. Timothy Clark, etc. etc.*, PhiI. Trans., N. 35, p. 675.
(288) FREIND: *Op. cit.*, p. 64.
(289) Ecco le sue parole, riportate dal FREIND: « *Pulsuum motus initium habet a corde, et mazime a sinistro eius ventriculo. Diducitur autem vehementer et contrahitur arteria, harmonia quadam ac ratione. Sed dum diducitur, a proximis venis vi trahit tenuem sanguinem, cuius respiratio fit alimentum Spiritui vitali. Dum autem céntrahitur, quod in se fuliginosi est per totum corpus et occulta foramina exhaurit; quomodo cor per os et nares quicquid fuliginosi est expirando sursum expellit* ».
(290) BARZELLOTTI: *Dialogo sulla scoperta della circolazione del sangue nel corpo umano*. Pisa. 1831.
(291) PEGHELIO MAGNO: *Thesaurus rerum selectarum etc.*, 1604.
(292) DENIS J. B.: *Lettre de Denis, prof. de Phil. et de Mat., à M. de Montmor, premier maistre des Requestes, touchant deux expér. de la transfusion faites sur deux hommes*. Paris, 1667, chez J. Cusson; rec. in « Journal des Sçavans » de l'an 1667, Amsterdam, 1679, chez P. Le Grande, pp. 188-189.
(293) ORE: *Nel Nouveau Dict, de Méd. ei de Chir. Pratiques*. Paris, Baillière, 1884, t. XXXVI, p. 80 (voce: *Transfusion*).
(294) CLARK T.: *Philosophical Transactions*. N. 28 (21 ottobre 1667), pag. 524.

(295) PORTAL: *Histoire de l'Anatomie et de la Chirurgie, etc*. Paris, chiez Bidot le jeune, 1770, t. II, p. 147, e t. III, p. 301 e p. 313.
(296) LIBAVIO A.: In defensione syntagmatis arcanorum chymicorum. Francoforte, 1615 (cap, « De magicis medicamentis et similibus »).
(297) (Testo di lingua). Firenze, 1863, pag. 50.
(298) SANTINELLI B.: *Op. cit*., pag. 102.
(299) COLLE G.: Nato a Belluno nel 1558, studiò medicina a Padova sotto il CAPIVACCIO, il BOTONI, il CAMPOLONGO; fu medico di Francesco Maria II, duca di Urbino, per 23 anni, etc; poi occupò la prima cattedra di medicina nell'Università di Padova, succedendo al FONSECA con molto onore. Morì a Bologna nel 1631.
(300) CASTIGLIONI A.: *Storia della Medicina*. Milano, 1927, pag. 557.
(301) HOEFFT F.M.: *Op. cit*. p. 31.
(302) HALLER A.: *Elementa physiologiae*. Lausannae, 1757, t. I, pag. 233.
(303) ETTMULLER M.: *Op. cit*., p. 1469.
(304) BOERHAAVE H.: *Op. cit*., t. II, p. 733-734.
(305) MORSELLI E.: *Op. cit*., p. 17.
(306) COLLE G.: *Methodus facile parandi jucunda, tuta et nova medicamenta, etc*. Venetiis, 1628 (cap. VII, pag. 170).
(307) FRACASSATI C.: *De cerebro* (in « Tetras Anat. Epist. » V. s. pp. 313-314.
(308) TOURTELLE: *Op. cit*., t. II, pp. 388-389.
(309) BLACK M. W.: *Op. cit*., pag. 339.
(310) CLARK T.: *A Letter, written to the Publisher by the Learned and Experienced Dr. Tim. Clark... concerning some Anatomical Inventions etc*., « Phil. Trans », N. 35 (18 may 1668), pag. 678 (trad. lat.).
(311) LANDOIS: « Mem. Gazzetta Medica di Vienna », 1867.
(312) FRANCESCO FOLLI da Poppi. - Nacque li 31-V-1624 da Domenico Folli e da Orsina Dombosi. La famiglia Folli, altrimenti detta de' Guicciarelli, fu signora dell' antico castello di Falgizzano, donde passò ad abitare al borgo di S. Sepolero in tempo che questa città era sotto il dominio Pontificio. Lo stabilirsi in Poppi dipende dal fatto che uno degli antenati di essa ebbe a gettare dalla finestra il Governatore di quella città, una sera d'una gran veglia di ballo.
[The Folli family, otherwise known as de'Guicciarelli, was the lady of the ancient castle of Falgizzano, from which they moved to live in the village of S. Sepolero in time that this city was under the Papal dominion. Settling in Poppi depends on the fact that one of its ancestors threw the Governor of that city out of the window, one evening during a great dance vigil.]
Il 19-X-1657 ebbe la condotta di medico della Comunità di Bibbiena e la rinunziò il 13-VIII-1665, nel quale anno venne a dimorare in Firenze in qualità di medico della Corte Medicea, essendo indi passato medico condotto a Citerna, luogo dello Stato Pontificio, distante circa 4 miglia dal Borgo S. Sepolcro. Sposò il 2I-VI-1660, e il 2-VIII-1663 rimase vedovo con un figlio, MARGHERITA TORSI, nipote del Cardinale DOVIZZI da Bibbiena.
[On 19-X-1657 he had the position of doctor of the Community of Bibbiena and renounced it on 13-VIII-1665, in which year he came to live in Florence as a doctor of the Medici Court, being then a doctor led to Citerna, a place of the Papal State, about 4 miles from Borgo S. Sepolcro. He married on 2I-VI-1660, and on 2-VIII-1663 he became a widower with a son, MARGHERITA TORSI, nephew of Cardinal DOVIZZI from Bibbiena.]
Premessi all'òpera *Stadera Medica*, vi sono i seguenti due epigrammi, de' quali il primo è del Canonico PIER FRANCESCO TOCCI, l'altro è di Autore incerto:
[Premise to the work Stadera Medica, there are the following two epigrams, of which the first is by Canon PIER FRANCESCO TOCCI, the other is by an uncertain author:]

I°

Ad Franciscum Follium
Transfusionis sanguinis inventorem
Hic, docet, ut foedus fugiat de corpore sanguis
inque nova immissus viscera sanguis eat.
Sanguine mutato, mutantur viribus anni;
fit juvenis, fecit quema modo ruga senem.

Et quia vult, alii longeva aetate supersint
Illius semper fama superstes erit.

II°

Ad cundem Natura et Mors.
Quis leges audet nostras evertere?
Falcem quis cohibere putat? Follius arte sua.

Fu uomo di mente inventiva; inventò difatti anche lo strumento Mostra Umidaria (graditissimo a FERDINANDO II) per conoscere « l'umido e il secco dell'aria » (p. 805).

(313) TARGIONI TOZZETTI G.: *Notizie degli Aggrandimenti delle Scienze Fisiche in Toscana etc*. Firenze, 1780, t. I, p. 260.

(314) FRESCHI: *Aggiunte alla Storia Pramm. di* C. SPRENGEL (già cit.); nel quadro cronologico riformato a p. 383 dice: « *Domenico* (?) *Folli da Poppi dà la prima idea intorno alla trasfusione del sangue* ».

(315) SCALZI F.: *Op. cit*.

(316) *Elogio degli Uomini illustri Toscani*. In Lucca, 1774, vol. IV, p. DCCC: « *Fr. Folli fu uno dei più ingegnosi medici del sec. XVII, meritevole di occupare un posto distinto in questa raccolta, tuttochè la semplicità, ed innocenza dei, suoi costumi, e la lontananza dalle mire ambiziose, necessarie per sollevarsi sopra la portata de' suoi eguali, e di cui ordinariamente non sogliono esser sprovvisti gli Uomini del suo calibro, abbiano non poco oscurato la, sua memoria*... ». E a pag. DCCCIII: « *Ma ciò che dichiara il Folli uno di quei rari Uomini dotati di genio inventivo, a' quali le scienze devonìo il loro avanzamento, e la Patria una gran parte della sua gloria pem i loro ritrovati, è senza fallo la scoperta della trasfusione del sangue, la quale tuttochè ingegnosa è rimasta adesso soltanto celebre per i letterari litigi delle due Nazioni Inglese e Francese, e per i suoi infausti tentativi. La cognizione del moto circolare del sangue, e quella dell' innesto delle piante svegliavano nella mente del nostro solitario filosofo quell' ardito pensiero di curare alcune infermità lente, e di ringiovanire, ed ingigantire ancora col trasfonder il sangue dal corpo d'un animale sano e giovane in quello d'un altro malato e cadente per mezzo d'idoneo stromento, e fino dal di 13-VIII del 1654 lo manifestò al Granduca Ferdinando II (si veda la « Recreatio physica* », p. 48 e la « *Stad. Med* », p. 35).

« *Ma se egli ebbe il dispiacere di trovarsi prevenuto nello sperimento e nella pubblicazione di questo suo ritrovato, pare che vada senz' altro ascritto alla notizia facilmente acquistatane da quei dotti esteri, massime oltramontani, che in folla concorrevano del continovo alla Corte di quel Magnanimo Principe, il quale contava fra' suoi giornalieri diletti il conversare con i filosofi, ed essere spettatore delle loro peregrine osservazioni, ed esperienze, che sono state. l'aurora della vera sapienza. Nè per questo deve nuocere alla lode di primo inventore della Trasfusione del nostro Toscano il consiglio dato ai vecchi circa a due secoli avanti dal Ficino, per realizzare la favola di Esone, di succhiare il sangue de' giovani, e molto meno sembra verisimile che giovine ed abitante nelle alpestri solitudini del Casentino possa aver conosciuto l' alchimistiche speculazioni del Libavio*... ».

[In Lucca, 1774, vol. IV, p. DCCC: “Br. Folli was one of the most ingenious doctors of the century. XVII, deserving to occupy a distinct place in this collection, although the simplicity and innocence of its customs, and the remoteness from the ambitious aims, necessary to rise above the reach of its equals, and which ordinarily do not usually lack Men of your caliber, have not a little obscured his memory ... “. And on p. DCCCIII: "But what Folli declares one of those rare men gifted with inventive genius, to whom the sciences owe their advancement, and the country a great part of its glory for their discoveries, is without fail the discovery of the transfusion of blood, which, though ingenious, has now remained only famous for the literary quarrels of the two English and French nations, and for its inauspicious attempts. The knowledge of the circular motion of the blood, and that of the grafting of plants awakened in the mind of our solitary philosopher that daring thought of curing some slow infirmities, and of rejuvenating, and enlarging again by transfusing the blood from the body of a healthy animal. and young in that of another sick and falling victim by means of a suitable instrument, and up to 13-VIII 1654 he manifested it to the Grand Duke Ferdinand II” (see "Recreatio physica", p. 48 and "Stad. Med », p. 35).

"But if he had the displeasure of finding himself biased in the experimentation and publication of this discovery of his, it seems that it must undoubtedly be ascribed to the news easily acquired by those foreign scholars, especially from beyond the mountains, who competed in crowds for the count at the Court of that Magnanimous Prince, who counted among his daily delights to converse with the philosophers, and to be a spectator of their peregrine observations and experiences, which have been. the dawn of true wisdom. Nor for this should the praise of the first inventor of the Transfusion of our Tuscan be harmed by the advice given to the elderly about two centuries before by Ficino, to realize the fable of Aeson, to suck the blood of the young, and it seems much less likely than young and living in the solitude of the Casentino mountains may have known the alchemical speculations of Libavio ...".]

(317) DE RENZI S.: *Storia della Medicina Italiana*. Napoli, 1845, vol. IV, pag. 185.

(318) HOEFFT F. M.: *Op. cit.*, p. 39: « *Franciscus Follius quamvis transfusionem ipse non instituerit.... methodum tamen novam excogitavit* ».

(319) ROUSSEL: *Op. cit.*

(320) COX R.: Blood transfusion in the seventeenth century. « Journ. Am. Ass. »; Chicago, 1914, LXII, p. 222.

(321) F. FOLLI da Poppi: Stadera medica, nella quale oltre la medicina infusoria, ed altre novità, si bilanciano le ragioni favorevoli e le contrarie alla trasfusione del sangue, già inventata da Francesco Folli, ed ora dal medésimo descritta. Firenze, 1680, ponderazione II, pp. 35-38.

(322) 13 Agosto.

(323) FOLLI F.: *Op. cit.*, p. 37.

(324) Si tratta evidentemente delle esperienze che andavano istituendo e eseguendo, nelle scienze fisiche e naturali, i numerosi scienziati che ricevevano asilo e conforto dal Granduca.
[These are evidently the experiences that the numerous scientists who received asylum and comfort from the Grand Duke were instituting and carrying out in the physical and natural sciences.]

(325) REDI F.: Nato ad Arezzo il 18-II-1626, primo medico del Granduca Ferdinando II e di Cosimo III. Nelle sue osservazioni intorno alle vipere (Lettera al sig. Conte Lorenzo Magalotti, Firenze, all'insegna del Leone, 1686, pp. 6-7) egli infatti ci dice: « *E se a' nostri giorni non vivono gli Aristoteli, son però sempre stati trattenuti nella Toscana Corte soggetti ragguardevoli, et insigni, et oggi insin dalla di noi per così lungo spazio divisa Inghilterra, e da molte altre parti più remote del mondo vi son venuti uomini di alta fama... Quindi è, che non potrei mai abbastanza, o sig. Lorenzo, spiegarvi, quante esperienze in questa Corte, dopo la vostra partenza, si sono fatte, e per mezzo di quelle a quante menzogne si è cavata la maschera* ».

(326) CLARK T.: Lettera già più volte citata (« Phil. Trans », N. 35, pag. 681): « *Hoc tamen audactor assero, nos in Anglia inventionem hanc a nullo accepisse Perigrino* ». Ci stona alquanto però, quell' audactor!

(327) FOLLI F.: Stadera medica, pag. 98.

(328) FOLLI F.: Recreatio physica in qua de sanguinis et omnium viventium universali analogia circulatione disseritur, ad serenisvinum Ferdinandum II, magnurn Etruriae ducem, auctore Francisco Follio a Puppio. Florentiae, 1665.

(329) FOLLI F.: *Op. cit.*, p. 90. Il periodo suona propriamente così: « *Ex his omnibus sanguinis arguatur praestantia, quantumque eius permutatio ad vitae, et conservationem, et durationem conctucat* ».

(330) MORGAN T.: An essay on the transmutation of blood. London, 1725.

(331) KNIGHT Th.: Vindication of a late essay on the transmutation of blood. London, 1731.

(332) FOLLI F.: *Op. cit.*, p. 48.

(333) FOLLI F.: *Dialogo intorno alla cultura della vite*. Firenze, 1670, p. 44.

(334) STURMIUS: Transfusi sanguinis historiam, methodum ac artificium effecfa item et phaenomena sub praesidio M. Jo. Christophori Sturmii. Altdorf, 1676.

(335) VEHER IRENEO: Dissert. praesidium novum chirurgicum de methaemochymia. Francofurti, 1668.

(336) ETTMULLER M.: Op. cit., p. 1469.

(337) HOFFMANN Maurizio: n. 1621 - m. 1698.

(338) MAJOR J. D., (Prof. all' Univ. di Kiel): n. 1634 - m. 3 agosto 1693.

(339) HALLER A.: *Bibi. Chir.*, t. I, p. 369.

(340) PORTAL: *Op. cit.*, t. III, p. 211.
(341) BLACK M. W.: *Op. cit.*, p. 339.
(342) GOELICKE A.: *Op. cit.*, p. 243.
(343) ETTMULLER M.: *Op. cit.*, p. 1469.
(344) Si vedano partic. quelle indirizzate all' HORST, e datate la prima il 7 settembre 1664 da Amburgo, e la seconda il 4 gennaio 1665 pure da Amburgo; e riportate dall' HORST nelle prime pagine del suo *Judicium de Chirurgia infusoria Jo. D. Majoris, viri clarissimi*, 1665.
(345) Scrissero difatti al MAJOR, fra gli altri: J. SACHS, J. VAN HORNE, T. BARTOLINO, MARCHI, SCHENCK T., GARMANN, HORST, J. MICHAEL, J. TACK, etc.
(346) MANFREDI. - Cit. dal CLARCK, nella famosa lettera pubblicata nelle « Phil. Trans. », N. 35, (18 may 1668), pag. 680.
(347) BARTOLINO T. - Lettera riportata dal MAJOR, nel suo libro *Chirurgia infusoria etc*.
(348) MICHAEL Jo. - Lettera riportata dall' HORST a pag. 64, del suo *Judicium de Chirurgia Infusoria* etc.
(349) TACKI Jo. - Lettera ad HORSTIUM, da questi riportata a p. 95.
(350) HORSTII Jo. D. - *Iudicium de Chirurgia infusoria Jo. Danielis Majoris viri clarissimi, apud G. Fickwirt*, 1665, pag. 67. Cfr. anche il MAJOR (*Chir. Inf.*).
(351) HALLER A.: *Elem. physiol.* t, I, p. 226.
(352) MAJOR J. D.: *Chir. Inf.*, Kiloni, 1667, Dubium VIII, paragr. 7, p. 212.
(353) MAJOR J. D.: *Chir. Inf.*, Obiectio I, pag. 20.
(354) MAJOR J. D.: *Prodromus inventae a se Chirurgiae infusoriae, sive quo pacto Agonizzantes quidam pro deploratis habiti, servari aliquamdiu possint, infuso in venam sectam liquore peculari*. Lipsiae, apud Wittigau, 1664. Cfr. anche il lavoro dell' HORST, a pag. 37.
(355) MAJOR J. D.: *Chirurgia infusoria*, pag. 22, paragrafo 30.
(356) VAN NORNE Jo.: *Microtechne seu methodica ad chirurgiam introductio*. Lugd. Batav., 1668, pag. 217.
(357) JO. TACK: *Il epistola ad Horstium*. Darmlstad, 1665, (a paga 95 del *Judìcium de Chir. Inf.* dell' HORST (già cit.)): il periodo su citato è a p. 97.
(358) CLARK T.: « Phil. Trans. », N. 35, 18 May 1668, pag. 672.
(A Letter, written to the Publisher by the Learned and Experienced Dr. Timothy Clark one of this Majesties... concerning some Anatomical Inventions and Observations, particularly the Origin of the Injection into veins, the Transfusion of blood, and the Paths of generation).
(359) ETTMULLER M.: *Op. cit.*: « *Primi fuerunt Angii, et inter cos primos Auetor dicitur Wren... qui anno 1657, primitus erga illustrem Boyleum huius rei mentionem fecit*... ».
(360) SANTINELLI B.: *Op. cit.*, p. 8.
(361) Du HAMEL J. B.: *Regiae Scientiarum Academiae Historia*. Lipsiae, 1700, Lib. I, cap. III, pag. 20.
(362) LOWER R. - Nato nel 1631 (?) e morto il 17 gennaio 1691.
(363) WREN CH. - Astronomo, matematico, architetto : n. 1632 - m. 1723.
(364) ANONIMO (THOMAS?). - *An account of the Rise and Attempt, of a Way to conveigh Liquors immediately into the Mass of blood*. « Phil. Trans. », N. 7, 4 dic. 1665, pag. 128.
(365) SPRAT THO: The history of the Royal Society of London, etc. London, 1722, pag. 317: « *He* (cioè il WREN) *was the first Author of the noble Anatomical Experiment of Injecting Liquors into the veins of Animals* ».
(366) BIRCH T.: *The history of the Royal Society etc.* (V. appresso).
(367) BOYLE R.: *Exercitationes de utilitate philosophiae naturalis experimentalis etc*. Lindaviae, 1692, Parte II, Exercitatio Ii, paragr. 38-40, pp. 146-148: « ... *Posterior autem Virtuosorum istorum* (cioè il WREN: l' altro virtuoso è il WILKINS) *viam venenum liquidum immediate in ipsam sanguinis massam perducendi commodam, sententia quidem sua, reperiri posse asseruit*... » etc.
(368) CUMSTON C. G.: *Histoire de la Méd.*, trad. da Mad. ma Dispan de Floran. Paris, 1931, p. 381: « *En 1657, sir Christ. Wren proposa d' introduire directement les médicaments dans les veines*... ».
(369) ETTMULLER M. - V. sopra.
(370) HALLER A.: *Elem. Physiol.* (già cit.), t. I, p. 226.
(371) HALLER: *Bibl. Med.* (già cit.), t. III, p. 184.

(372) *Journal des Sçavans*, 1666, N. 42, p. 490.
(373) MAHON P. A. O. - *Histoire de la Méd. clinique*. Paris, 1804, p. 268; egli se la cava con poche parole: « *Lower, Major, Tardy, Lamy, Denis, Manfredi, Libavius, sont les noms les plus connus dans l' histoire de la transfusion quoiqu' aucun d' eux n' en soit l' inventeur, dit M. de Haller, puisque c'est Wrenius, anglais, et Boyle, qui en ont traitè les premiers, l'un cornne auteur de l'idee, l'autre de l'appareil* ».
(374) CLARK. - V. sopra; poi: *De infusione et transfusione quorum illam Christophore Wren tribuit, qui anno 1656 a se ipso excogitatam primus administraverit; tum Clarkius a*. 1657.
(375) HEISTER L.: *Institutiones chirurgicae*. Amstelaedami, 1739, t. I, p. 449.
(376) FRESCHI. - *Nella Storia prammatica* dello SPRENGEL, vol. III, p. 235, in nota: « *Forse la trasf. del sangue fu un arcano de' Croce-rosei e di altri fanatici anteriori, preso ed adottato in un con altre e disposizioni e fantasticherie loro da Cr. Wren* ».
(377) SPRENGEL C.: *Op. cit*., vol. III, p. 235.
(378) BIRCH T.: *The history of the Royal Society of London for improving of natural knowledge, etc*., London, 1756, vol. I, p. 281: « *Dr. Clark being called upon for his tryals of the ìnjections into veins, promised to give them in a fortnight after* »; p. 294: « *Dr. Clarke was desired to bring in his experiments of injection, as they were then; and to make an addition hereafter of those, which he should try farther* »; p. 303. (sett. 16 1663): « *Dr Clarke read his experiments of the injections, which he had made of several liquors into the veins of dogs; and was desired to prosecute this subject; and the account brought in by him was ordered to be registered...* » Etc.
(Questi esperimenti sono riportati nelle « Phil. Trans. » N. 7).
« ...*Some proposed the experiment, to let the blood of a lusty young dog into the veins of an old one, by the contrivance of two silver pipes fastened to the veins of such two dogs with a leather pipe between both to move the blood forward; be which means the extravasating of the blood night be avoided*... » Etc.
Vol. 11, pp. 30-31: il CLARK riferisce altri esperimenti di iniezioni endovenose e il BOYLE suggerisce una variante, etc.; a p. 50: « *Experiment of injecting the blood of one dog into another*... »; Etc.
(379) HALLER A. *Elem. phys*., t. I, p. 233: « *et quidem Th. Clarke anno 1657 transfusionem administrare molitus est, atque instrumenta paravit, non tamen absque multiplici difficultate, quam ipse expertus est, et Henshavius, ut omnino successu exciderent*... ».
(380) MERKLIN G. A.: *De ortu et occasu transfusionis sanguinis tractatio med. curiosa; qua haec, quae sit e bruto in brutum, a foro medico penitus eliminatur: illa quae e bruto in hominem peragitur, refutatur; et ista, quae ex homine in hominem exercetur, ad experientiae examen relegatur.* Norimbergae, apud J. Ziegerunì, 1679.
(381) ETTMULLER M.: *Op. cit*., p. 1468: « *Primi auctores fuerunt Angli, D. Tim. Clarke... ut et nob. Henshaus anno 1657*... ».
(382) *Diz. Encicl*., vol. V, p. 192: « ..*fin dal 1658 l' inglese dott. Henshaw l'aveva praticata*... ».
(383) BOYLE R. - Nato a Lismore in Irlanda addì 25-1-1627 e morto il 30-XII- 1691.
(384) BOERHAAVE H: *Met. stud*., I, p., 58.
(385) BAROLINO T.: Lettera « *De Chirurgia Infusoria* », riportata dal MAJOR nella sua *Chir. Inf*. pag. 45.
(386) LOWER R.: *Tractatus de corde, item de motu, colore et transfusione sanguinis*. Lugd. Batav., 1740, cap. IV, p. 194.
(387) « Phil. Trans. », N. 39, pag. 352: « *The success of the Experiment of Transfusing the blood of one Animal into another* ».
(388) « Phil Trans. » N. 20, pag. 353 (07 dec. 1666): « *The method observed in Transfusing the Bloud out of one Animai into another.* ».
(389) LOWER R.; *Op. cit*. p. 203.
(390) PORTAL: *Op. cit*., t. III, p. 301 e p. 313.
(391) HALLER A.: *Bibl. Med*., t. III, p. 164: « *transfusionis sanguinis historia, varios in venas vivorum animalium liquores se ante multos annos injectsse; deinde transfusionem feliciter esse molitum*... ».
(392) CUMSTON C. G.: Op. cit., p. 381: « *En 1665, Richard Lower, qui l'avait déjà experimentée, proposa la transfusion du sang pour les malades très affaiblis*... ».
(393) ORÈ: *Nouveau Diction*. etc. (già cit.): « *mais ce qui est bien certain c'est que Richard Lower, le premier, fait connaitre un procedé complet pour opérer la transfussion* ».

(394) GOELICKE A.: Historia chirurgiae, Halae Magdeburg, 1713, p. 242: « *Clark T. et Henshaw de hoc experimento adornando primi cogitarunt... sed plurimis difficultatibus praepediti negotium ipsum practice suscipere numquam conìati sunt*... ».
(395) HALLER A.: *Elem. Physiol.*, p. 233.
(396) TARGIONI TOZZETTI: *Notiz Aggrandim.*, vol. I, p. 262.
(397) DE CRISTOFORIS M.: *Op. cit.*, p. 13.
(398) BIRCH T.: *Op. cit.*, vol. II, p. 125 (seduta 21 nov. i666): Trasfusione di sangue da un cane in un altro:
« In obedience to your commands, we tried this experiment; first by ourselves upon two sheep, viz. Having tied them, and placed them in a convenient posture, we laid bare the carotid artery of the one sheep, near two inches, dividing from it the nerve of the eighth pair; then we made a ligature upon the upper part of the artery (next the head) and tied a false knot; which done, we made another ligature upon the other end next the clavicle with a riding-knot; then we made an opening on this side of the riding-knot, at a convenient distance, and put in a brass pipe, and tied it fast in, the which pipe was stopped very close, and brought over the skin again till we had prepared the other sheep, as follows, viz. We laid bare the jugular vein about the same distance as before, rather more, and made a ligature at either end, with a riding-knot; the on this side of each knot (having made apertion) we put in a brass pipe, both tied very fast in, and close stopped. Then we ordered the position of the sheep, so as we might conveniently plant other pipes (which were of quills) to convey the blood from the artery of the one sheep to the vein of the other, which does immediately flow, upon the slipping of the riding-knots, the recipient sheep being placed a little lower than the emittent, and the position kept steady. Then we presently slipped the riding-knot also of the upper part of the jugular vein, and received blood from thence, proportionally to watch was admitted into the lower part of it, or near it: We did take away by the upper part of the vein, between four and five pints according to guess; about which time the emittent grew faint, which made the owner very earnest to kill it the usual way; which he did, but could not get half a pint of blood, and upon opening the same sheep, confessed, he never saw mutton look whiter in his life. The other sheep, which was the recipient, seemed as well as if she had been unconcerned in the experiment. We staid also to see her killed too, and she bled at the rate as is usual, and as much in quantity.
We repeated the same experiment the last Wednesday before the society, upon a small bulldog and a spaniel, much after the same manner, as many of you were eyewitnesses; only we were more exact in the performance, by letting the mastiff bleed into the spaniel tilt the mastiff died: and we took account, as near as we could, by weighing the blood taken from the spaniel, which we reckon was sixty-four ounces or thereabouts. The spaniel was next morning very well and brisk, and so continues ».
E così continuavano gli esperimenti di trasfusione da cane giovane in vecchio (and a young healthy dog into an old and sick one), quello sano e questo malato; etc. etc.
(399) HALLER A.: *Elem. physiol.*, t. I, p. 234.
(400) CLARK T.: *A letter written* etc. « Phil. Trans ». N. 35. pag. 677.
(401) Cfr. ad. es. il N. 22 (11 febbr. 1666) delle « Phil. Trans. », a pag. 385: « *Tryals proposed by* M. BOYLE *to Dr*. LOWER *to be made by him, for the improvement of transfusing blood of one live Animal into another* »; etc.
(402) Cfr. ad es. il N. 39 (21 sett. 1668) delle « Phil. Trans. », a pag. 766: « *An Extract of a letter Written from Dantzick to the Honourable* R. BOYLE *containing the success of some experiments of infusing Medicines* .... ».
(403) BOYLE R.: *Exercitationes de utilitate philosophiae naturalis experimentalis etc*. (già cit), pp. 146-148. Si vedano anche le, pp.: 185-190-225-398-399, etc.
(404) Eccone alcuni:
a. un cane che abbia malattie di sangue, potrà esser guarito trasfondendogli sangue sano?
b. si può, contemporaneamente al sangue trasfuso, associarvi dei medicamenti, e l'azione di questi è diversa da quando essi son dati per bocca?
c. trasfondendo ad un cane il sangue di un altro cane, cui si sia dato un purgante, il primo resterà purgato?
d. un cane, cui si inietti un sangue ricco di chilo e cavato da un altro cane nel tempo della digestione, perderà l'appetito?
e. si potrà mantenere in vita un cane cui si inietti il chilo di un altro animale?

f. un cane, dopo una trasfusione sanguigna, presenterà mutamenti nel polso, nell' orina, negli, escrementi, nel respiro?
g. che cosa succede quando si fa la trasfusione tra animali di specie diversa?

(405) HALLER A.: *Bibl. Med.*, t. III, p. 113.
(406) *Phil. Trans.*, 6 May .1667, N. 25, P. 449.
(407) BIRCH T.: *Op. cit.*, vol. II, p. 112.
(408) Cfr. BIRCH, *op. cit.*, vol. II, p. 115.
(409) Cfr. BIRCH, *op. cit.*, voi. II, p. 123.
(410) BIRCH: *Op. Cit.*, vol. II, p. 202.
(411) *An account of the experiment of Transfusion practised upon a Man in London*. « Phil. Trans. », 9 dic. 1667, N. 30, p. 557.
(412) Vedi la memoria del BILANCIONI: *Un nemico e una vittima del salasso, etc*. Estr. « Riv. Storia Crit. Sc. Med. Nat. », A. VI, N. I, 1915.
(413) PORTAL: *Op. cit.*, t. III. p. 119.
(414) *Journ. des Sçavans*, 1668, p. 318 (*Extrait du* « *Journ. d'Angleterre* »).
(415) Cfr. *Phil. Trans.*, N.i 25 e 28.
(416) V. *Acta Anglic.*, p. 361.
(417) BIRCH: *Op. cit.*, vol. II, p. 50.
(418) Cfr. *Phil. Trans.*, N. 25, p. 451: « *An account of another Exper. of Transfusion viz. of Bleeding a Mangy into a Sound Dog* ».
(419) WALLIS: V. BIRCH, op. cit., vol. II, p. 98.
(420) CAMPBELL M.: *Journ. Am. Med. Ass.*, Chicago, 1914, LXII, p. 147. (*Blood transfusion in 1666*).
(421) BIRCH: *Op., cit.*, vol. II, p. 207 (7 nov. 1667).
(422) CAMPBELL: Loco citato.
(423) Cfr. *Phil. Trans.*, numero 7 (già cit.), N. 27, p. 489: « *An advertisement concerning the Invention of the Transfusion of Bloud* »; e N. 28, p. 517: « *An account of more Tryals of Transfusion, accompanied with some Considerations thereon, chiefly in reference to its circumspect Practise on Man; together with a farther Vindication of this Invention from Usurpers* ».
(424) HOEFFT F. M.: *Op. cit.*, p. 26.
(425) TIRABOSCHI G.: *Op. cit.*, vol. VIII, p. 309.
(426) CASSINI GIO. DOMENICO. - Si veda appresso. Inoltre: ETTMULLER, *op. cit.*, p. 1470; HALLER, *Bibl. Med.*, III, p. 255; TARGIONI TOZZETTI, *Aggrandim.*, I, p. 249 e 521, II, p. 349; *Journ. des Sçavans*, lundy 19-XI-1668, p. 455 (*Extrait du « Journ. d'Italie* », etc.); etc.
Come notizia, diciamo così, di curiosità mondana, dirò che il conte LORENZO MAGALOTTI, scrivendo le impressioni suscitate in lui dopo che l' ebbe visto per la prima volta alla Corte del Granduca, ebbe a conchiudere che l'avrebbe « *battezzato per pretto malcreato* », perchè si dava dell'aria. - Le sue comunicazioni astronomiche sono riportate nel Journ. des Sçavans, 1666, p. 294 e 497; anno 1668, p. 495 ; etc.
Ma quanta stima avessero di Lui il Granduca FERDINANDO e il Card. LEOPOLDO,, sì veda a p. 521 degli *Aggrandim*, del TARGIONI TOZZETTI.
(427) MONTANARI G. - Già professore a Bologna, indi a Padova. V. TARGIONI TOZZETTI, *Aggrandim.* Vol. I, pag. 303 e pag. 523; vol. II, parte II, pag. 721.
(428) *Giornale dei Letterati di Roma*, per il TINASSI, 1668, pag. 91: « *Relatione del successo di alcune trasf. di sangue fatte negli animali* ».
(429) GHISELLI A. F.: Nella sua cronaca, della quale V. appresso.
(430) *Memorie antiche manuscritte di Bologna, raccolte et accresciute sino a' tempi presenti dal canonico* ANTONIO FRANCESCO GHISELLI. Volume XXXV (1667-1671), pp. 99-100.
Manoscritto Numero 770 della B. U. B.
Le altre cronache della Biblioteca Universitaria di Bologna non dicono nulla di particolare; quelle contenute nella Biblioteca dell'Archiginnasio altrettanto, poiché le due lettere che si trovano nel Manoscritto B 160, a pag. 4 e a pag. 147, non riguardano l'argomento nostro.
(431) È evidentemente un errore del cronista; si tratta della carotide; ed è lapalissiana la correzione.
[It is obviously a chronicler's error; it is the carotid artery; and correction is self-evident]
(432) MAGNANI IPPOLITO. - Egli non pubblicò nessuno scritto.

(433) Dalla *Relazione dell'esperienze fatte in Inghilterra, Francia e Italia intorno alle celebre e famosa Trasfusione del sangue per tutto maggio 1668, in cui oltre all'oppugnationi, e difese si vede la sanità restituita ad alcuni infermi, e partic. a un pazzo. Dedicata all'Ill.mo sig. Virgilio Maria Davia*, Bologna, per Manolessi, l668, p. 52. (V. tav. VI).
Da questa relazione io ho tratto molti altri passi e riferiti integralmente.
[From this report I have taken many other passages and reported in full.]
(434) SANTINELLI B.: *Op. cit.*, p. l6 e p. 25.
(435) RIVA G. - Non si sa la data della sua nascita con assoluta certezza; si sa che nacque in Asti e che morì in Roma nel 1676, secondo la testimonianza di Mons. LANCISI. Comunque, intorno a lui si leggano: TIRABOSCHI, *op. cit.*, vol. VIII, p. 307; e A. MARINUCCI, *Antol. Romana*, N. I, luglio 1788.
(436) MERKLIN: *Op. cit.*
(437) DIEFFENBACH: *Die Transfusion des Blutes und die Infus. der Arzen. in die Blutgefasse*, Berlin, 1828.
(438) IPPOCRATE. - *De arte*: « *obiiciat nobis adversarius, quod miulti iam aegri, etiam medico non utentes, sanitatem recuperaverint ...* ».
(439) HALLER A.: *Elem. phys.*, t. I, p. 235.
(440) HALLER A.: *Elem. phys*, t. I, p. 236.
(441) MERKLIN G. A.: *Op. cit.*, p. 25 e p. 85.
(442) SPRENGEL C.: *Op. cit.*
(443) MACKENZIE: *Op. cit.*, p. 269 (notizia però desunta dal MERKLIN).
(444) DE RENZI S.: *Op. cit.*, t. IV, p. 187.
(445) *Diz. Encicl. di Chir.*, t. V, p. 193.
(446) SCALZI F.: *Esper. sulla trasf. del sangue in Roma*, « Giorn. di Roma » aprile 1866.
(447) FRESCHI: *Op. cit.* (Storia dello SPRENGEL), p. 275.
(448) D. JOHANNIS GUILIELMI RIVAE *de triplici infusionis sanguinis experimento a* D. J. G. ELSNERO *exibitum, Misc. Cur. sive Ephem. Med. Phys. Acad. Nat. Cur., Francofurti et Lipsiae*, 1684; Dec. I, A. I, oss. 149, pag. 286.
(449) TIRABOSCHI G.: *Op. cit.*, vol. VIII, p. 309.
(450) MANFREDI P.: *De nova et inaudita operatione medico-chirurgica sanguinem trasfundente de individuo in individuum*, Romae, 1668; e l'altra: *Ragguaglio degli esperimenti fatti sotto la direzione di* PAOLO MANFREDI, Roma, 1668.
(451) Cfr.: *Miscellanea Curiosa sive Ephein. Med.-Phys., Academia Naturae Curiosorum, Francofurti et Lipsiae*, 1684, pp. 289-291.
(452) *Giorn. dei Letter. di Roma*, 1668, p. 92.
(453) Si veda la *Relazione* già cit., p. 72. Si veda anche il Journal des Sçavans, 19-XI-1668, p. 456; l' ETTMULLER, *op. cit.*, p. 1470; etc.
(454) Vedi la *Relazione* già citata, pag. 73.
(455) Vedi la solita *Relazione* etc., a pag. 74.
(456) D. ANTONII VALLISNERII, *examen Experimenti Loweriani, Misc. Acad. Nat. Cur.*, Cent. III e IV, oss. 85, pag. 207.
Si veda intorno a Lui il lavoro del prof. G. FRANCHINI: *Antonio Vallisneri, on the second century of his death, etc.* « Annals of Medical History. », vol. III. n. I. January 1931, p. 58.
(457) DENIS J. B. DE MONTPELLIER, « *princeps horum experimentorum laudator* », come dice l'HALLER, nella sua *Bibl. Med.*, t. III, p. 250. Nacque a Parigi e vi morì il 3-X-1704. Ebbe il titolo di medico consulente ordinario di Luigi XIV. Rifiutò il posto di Archiatro offertogli da Carlo II.
(458) LANDOIS L.: *Manuale di Fisiologia umana*. Milano, Vallardi, t. I, p. 187.
(459) LANDOIS: *Die Transfusion des Blutes*. Leipzig, 1875, p. 304.
(460) Dalla « *Lettre de* DENIS, *prof. di Philosophie et de Mathématique, à* M. DE MONTMOR, *premier Maistre des Requestes, touchant deux expériences de la Transfusion faites sur deux hommes*. Paris, chez Cusson, 1667; rec. in « Journ. des Sçavans » (dell'anno 1667, ma pubblicato nel 1679 ad Amsterdam), pag. 182.
(461) Cfr. *Relaz.*, più volte citata, pp. 31-32.
(462) Cfr. « Journ. des Sçavans », 1667, p. 93.
(463) *Extrait d' un lettre de* M. DENIS, *prof. de Phil. et de Math., à M. xxx, touchant la transf. du sang*. Paris, 9 marzo 1667; cfr. « Journ. des Sçavans », 1667, p. 89.
(464) *Extrait d' un lettre de* M. DENIS, *prof. de Phil. et de Math., à M. xxx, touchant la transf. du sang*. 2 avril 1667; rec. in « Journ. des Sçavans », 1667, p. 125.

(465) Dalla *Relazione etc.*, più volte citata, pag. 22.
Ho preferito riportare la traduzione italiana, come ivi si legge, anziché l'originale francese, perchè tale traduzione mi è parsa di una efficacia descrittiva e pittorica veramente singolare.
[I preferred to report the Italian translation, as we read there, rather than the French original, because this translation seemed to me to have a truly singular descriptive and pictorial effectiveness.]

(466) Sempre dalla *Relazione*, pag. 26.

(467) *Lettre de* J. DENIS, *Docteur en Méd. et Prof. de Phil. et de Math., touchant une folie inveterée qui a esté guiérie par la transfusion du sang*. Paris, chez Cusson, 1668; rec. in « Journ. des Sçavans », 1668, p. 320.

(468) Cfr. il N. 32 (10 febbr. 1668): « *An extract of another Letter etc*. ».

(469) Cfr. *Abregé des Transact. phyl. de la Soc. Royale de Londres*, 1790, parte VI, p. 387, e il *Dictionn. des Sciences de Neufchatel*, t. 26.

(470) TARDY C.: Nativo di Langres, fu medico del Duca di Orleans. *Di lui si veda: Traité de l'écoulement du sang d'un homme dans les veines de l'autre.* Paris 1667.

(471) *Diz. Encicl.*, vol. V, p. 192.

(472) Cfr. rec. in « Journ. des Sçavans », 13 juin 1667, p. 257.

(473) *Lettre de* M. TARDY, *Docteur en la Fac. de Méd. de Paris, à* M. LE BRETON, *Doct. en' la même Faculté, touchant l' usage de la transfusion*, Paris, 1668; rec. in « Journ. des Sçavans » 1668, p. 317.

(474) Dalla lettera scritta dal DENIS al sig. di MONTMOR, il 25 giugno 1667; così trad. dalla *Relazione* etc., p. 24, dalla quale l'ho qui riportata.

(475) *Diz. Encicl.*, vol. V, p. 192.

(476) GADROYS CLAUDIO, morì giovanissimo, nel 1678, a 36 anni appena.

(477) *Lettre à M. l' abbé* BOURDELOT, *Docteur en Médecine de la Faculté de Paris, pour servir de réponse à la lettre écrite par* M. LAMY *contre la transfusion*, Paris, chez Cusson, 1668; rec. in « Journ. des Sçavans », 1668, p. 308.

(478) DE GURYE G. S. DE MONTPOLLI. - Cfr. PORTAL, *Op. cit.*, t. III, p. 353; HALLER, etc.

(479) *Lettre de* G. DE GURYE *à M. l'Abbé* BOURDELOT, *Dòct. en. Méd. de la Faculté de Paris, touchant la transfusion*, Paris, chez J. Cusson, 1668; rec. in « Journ. des Sçavans », 1668, p. 313.

(480) GAYANT Louis. - Mori nel 1673.
Credo sia il medesimo che cita così l'ETTMULLER (Op,. cit., p. 1470): « *Dominus* GAYEN... *sanguinis cani detraxit, eidemque totidem ex alio instillavit, qui vero post quinque dies mortuus est*. ».

(481) Cfr. *Phil. Trans.*, 1667, N. 26.

(482) PURMANN M. G. - Chirurgo militare, le cui opere sono: *Chirurgia curiosa*, Francofurti, 1669; *Curiosae observationes chirurgiae*, Lipsiae, 1710; *Grosser u. neu gewundener Lorberkranz der Wundarzney etc.*, Leipzig, 1692.

(483) HALLER A.: *Bibl. med.*, t. III, p. 474.

(484) KAUFMANN BALDASSARRE. - Cfr. HALLER, *opere citate*.

(485) ELSHOLTZ J. S.: *Clysmatica nova, seu ratio in venam sectam medicamenta immitti possunt, addita inaudita sanguinis transfusione*. Berolini, 1667.

(486) HALLER A.: *Bibl. Med.*, t. III, p. 135.

(487) GOELICKE A.: *Op. cit.*, p. 244 (*Hist. med.*).
Si veda anche il PORTAL, *op.. cit.* t. III, p. 331.

(488) ETTMULLER M. - N. 26-V-1664, m. 1682; quindi, come dice l' HALLER, « *ante diem vitae finem fecit* ».

(489) HALLER A.: *Bibl. Med.*, t. III, p. 173.

(490) ETTMULLERI *Dissertatio de Chirurgia trausfusoria, communicata anno* 1682; nelle *Opera omnia*, Venetiis, 1734, vol. I, p. 1467.

(491) I) *Chirurgia transfusoria est possibilis, sed simpliciter contra naturae institutum*. - II) *Sanguinis transfusio citra sanitatis dispendium et consequenter citra vitae periculum, applicari vix potest*. - III) *Chirurgia transfusoria ad longaevitatem conciliandam, aut vires juveniles insenibus restituendas... frustranea est*. - IV) *Pro vitiis sanguinis morbosis corrigendis sanguinis transfusio nonnisi rarius, idque emolumento non adeo insigni, locum habere videtur.* - V) *Provitiis partium solidarum restituendis sanguinis transfusio nil valet.* - VI) *In febrium cura nullus sanguinis transfusioni est locus.* - VII) *Cachecticis, hypocondriacis, scorbuticis, ictericis, cordisque palpitatione laborantibus,*

non confert chirurgia transfusoria. - VIII) *Melancholicis et maniacis quibusdam aliquid videtur conferre sanguinis transfusio sed circumspecte instituta.* - IX) *Inflammationibus, indeque natis abscessibus et exulcerationibus partium quarumcumque tranfusio sanguinis nil confert.* - X) *Haemorrhagiis nimiis obnoxiis, ac periculosius inde habentibus, sanguinis transfusio prae aliis conveniens videtur*. - XI) *Contabescentibus et Atrophia correptis inutilis est Chirurgia trausfusoria.* - XII) *Ad arthritidis curam nii facit chirurgia transfusoria*. - XIII) *Epilepticis nullum perfectum ex Chirurgia transfusoria auxilium*.- XIV) *Scabiosis, leprosis, lua venerea affectis nil emolumenti ex, sanguine transfuso expectandum*.
Questo è l' indice de' capitoli.
[This is the index of the chapters.]

(492) HALLER A.: *Bibl. Med.*, t. III, p. 295: « *Huc facit caput de sanguinis transfusione, exceptum ex libris Gallorum et Loweri... Chirurgiae infusoriae brevis historia* ».

(493) LAMZWERDE J. B.: *Appendix ad armamentarium medico-chirurgicum*. Amstelaedami, 1671.

(494) VAN HORNE J.: *Microtechne seu methodica ad chirurgiam introductio*. Lugd. Batav., 1668.
Si vedano di lui anche le lettere (giä citate) al MAJOR.
[See also the letters (already cited) of him to MAJOR.]

(495) VAN HORNE J.: *Op. cit.*, p. 218.

(496) GIANFORTI R.: *Consulti e risposte medicinali*, cit. dal DE CRISTOFORIS, *Op. cit*. p. 32, oltre che dal FOLLI nella *Stadera*.

(497) Dal « Journ. des Sçavans », lundy 6 fevrier 1668, p. 305.

(498) LAMY G. - Nativo di Caen, e chiamato dall' HALLER « *impius homo* », ma forse per i suoi, *Discours anatomiques*. Paris, 1675.
I. *Lettre écrite à* M. MOREAU, *doct. en Médic. de la Faculté de Paris, contre les prétendues utilités de la transf. du sang.* Paris, 1668; rec. in « Journ. des Sçavans », 1668, p. 305;
II. *Seconde lettre écrite à* M. MOREAU, *doct. etc., pour confirmer les raisons qu' il a apportées etc*. Paris, chez J. de Laumay, 1668; rec. in « Journ. des Sçavans », 1668, p. 311.

(499) PORTAL. A.: *Op. cit.*, t. III, p. 346

(500) EUTYPHRONIS *Philosophi et medici de nova curandorum morborum per transfusionem sanguinis Dissertatio*. Parisiis, apud A. Cramoysy, 1668; rec. in « Journ. des Sçavans », 1668, p. 315.

(501) Dalla prec. dissertazione; tradotta (e tolta) alla *Relaz*. etc., pp 61-62.

(502) Dal « Journ. des Sçavans », 1668, pp. 316-317.

(503) PERRAULT C. (N. 1613 - M. 9-X-1668). - *Essai de Physique*, Paris, 1680 (3 vol.); il IV comparve nel 1688, ed è precisamente in questo ov' egli disapprova la trasfusione.

(504) PORTAL: *Op. cit.*, t. III, p. 390.

(505) PORTAL: *Op. cit.*, t. III, p. 391.

(506) P. MARTIN DE LA MARTINIERE: *Opuscules contre les circulateurs et transfusions du sang*. Paris, 1668.
Si veda anche l' HALLER: *Bibl. Med.*, t. III, p. 251.

(507) MERKLIN G. A. (figlio; nacque nel 1664 e mori nel 1702): *Op. cit*.

(508) GOELIKE: *Op.cit*. (hit. med.), p.243

(509) Dalla *Thèse* de NICOLAS: *Essai sur la transfusion du sang*. Paris, 1860.
Si veda anche il N. 36 delle Phil. Trans., 15 giugno 1668, p. 713.

(510) BARKER G.: *Saggio sopra la conformità della medicina degli antichi e dei moderni*. Venezia, 1774.

(511) B. ALBINI, *oratio de ortu et progressu medicinqe* (tenuta il 19-X-1702). Lugduni Batavorum, apud J. Luchtmans, 1702, pp. 19-20.

(512) Cioè l' HARVEY, Già vedemmo che molti, anche allora, lo ritennero lo scopritore.

(513) MAGENDIE: *Précis élém. de Physiologie*. Paris, 1825, t. II, pagg. 427-428.

(514) TOMMASINI G.: *Op. cit.*, vol. III, p. 23: « *celebre esperienza nella quale l'ingegno dell'uomo non fu pago di procurarci una luminosa prova della circolazione di questo liquido, ma osò progettaire ancora un presidio medicinale per la cura delle più disperate infermità* ».

(515) BOERHAAVE H.: *Institutiones medicati*: Lugd. Batav. et Roterodami, 1734, p. 100 (*De circulatione sanguinis*): « *confirmavit illam* - cioè « circulationem » - *infusio, transfusio, microscopium vero ad' oculum* ».

(516) MAHON P. A. O.: *Op. cit.*, p. 268: « *quoiqu'il en soit, l'effet que cette maladie a produit, ne méritait pas tant de débats pour honorer son auteur* ».

(517) THRUSTON. - Cfr. l' HALLER: (*Bibl. Med.*, t. III, p. 254): « *Vindobonae optimo successu in canibus sanguinema transfusum esse etiam a* MALACHIA THURSTON; *sed animal recipiens a coacto cruore suffocatum esse* ».
Si veda anche il PORTAL, *op. cit.*, t. III, p. 411.

(518) MAJOW: Cit. dal DE CRISTOFORIS, p. 34.

(519) CROUNE: Cit. dal DE CRISTOFORIS.

(520) DOLEO G.: *De transfusione sanguinis in cane*, Misc. Cur. sive Ephem. Med.-Phys., Acad. Nat. Cur., Norimbergae, 1690, Dec. II, A. VIII, oss. 131, p. 288.

(521) HALLER A.: *Bibl. Med.*, t. III, p. 407.

(522) BRUNNER G. (Prof. a Heidelberg; n. 1653 - m. 1727). *De pancreate*, Amsterdam, 1683.

(523) WEPFER G. J. (n. 23-XII-1620 - M. 28-I-1695). Fu colmato d'onori nella Svizzera, e fu medico del principe di Wittemnberg. - *De cicuta aquatica liber*, Basileae, 1679.

(524) HALLER A.: *Bibl. med.*, t. III, p. 63.

(525) PEYER G. C.: Parerga anatomica et medica septem. Genevae, 1681.

(526) PORTAL: *Op. cit.*, vol. III, p. 534.

(527) CAMERARIUS R. J. - Cfr. anche l' HALLER, *Bibl. Med.*, t. III, p. 312.

(528) PORTAL: *Op. cit.*, vol. III, p. 626.

(529) ETIENNE C. - N. 1503 - m. 1563 (?).

(530) PORTAL: *Op. cit.*, vol. I, pp. 328-341. Egli riporta di lui il seguente periodo: « *porro autem, ne sanguis qui elaboratur in hepate, interdum regurgitet, facti sunt a natura quidam veluti exortus et apophyses membranarum quae huius modi periculo obsint, quemadmodum in corde valvulae ad spiritus conservationem* ».

(531) Cfr. anche, a proposito del periodo della nota prec., il nostro MORGAGNI, *Epist. Anat.*, n. 82.

(532) FOLLI F. *Recreatio physica*. (già cit.), pag. 83.

(533) Cfr. l' HALLER, *Bibl. Med.*, t. IV, p. 39.

(534) RAMAZZINI B.: *Opera omnia*, Londini, 1718, p. 13.

(535) ROSA M.: Lettere fisiologiche, Macerata, presso Cortesi e Capitani, 1786 (II ediz.). Si vedano anche: Esper. LV, vol. I, p. 90 (sopra due vitelli: 17 febbr. 1783 trasf.ne); esper. LVI, p. 98 (8 marzo 1783; l' esper. non riuscì, ma bella è la conclusione: « *la debolezza non è buona nè per vivere nè per morire* »); esper. CXXVII (sopra un montone, p. 228).
Si leggano inoltre le considerazioni sulla trasfusione a pag. 42 e 46 e 54 e 56 del vol. II.
L'esperimento narrato e qui da me trascritto è il CXXIX, a pag. 267 del vol. II.

(536) Si cfr. la seguente lettera dello SCARPA al marchese GHERARDO RANGONE (dalle *lettere di vari illustri Italiani del secolo XVIII*, Reggio, 1841, t. IV, pp. 188-189):
« *Una nuova che interessa più da vicino V. E. è la seguente. Dopo il mio arrivo a Vienna s' è parlato colà molte volte della trasfusione e ravvivamento. Il conte di Dietrichstein, Rosemberg, e molti altri signori avevano gran volontà di vedere lo sperimento. Mi sono offerto di servirli. Due giorni avanti la mia partenza il conte di Dietrichstein ha fatto preparare l'occorrente, e lo sperimento è stato fatto due volte in un quarto d' ora con un successo anche più brillante di quelli di Modena. Nel numero degli spettatori si è trovato Inghen-hausen. Non posso dirle quanto grande sia stata la sorpresa di tutti e l'ammirazione. Hanno confessato esser questa una delle più belle, ed interessanti sperienze fatte in questo secolo. La nuova s' è sparsa subito per tutta Vienna* ».
["A new one that interests V. E. more closely is the following. After my arrival in Vienna there has been talk of transfusion and revitalization there many times. The Earl of Dietrichstein, Rosemberg, and many other gentlemen had great will to see the experiment. I offered to serve them. Two days before my departure the Count of Dietrichstein had the necessary preparations prepared, and the experiment was done twice in a quarter of an hour with an even more brilliant success than those of Modena. Inghen-hausen was among the spectators. I can't tell you how great everyone's surprise and admiration was. They confessed to be one of the most beautiful and

interesting experiments made in this century. The new s' spread immediately throughout Vienna."]
Da Dresda, 3 settembre 1784.

(537) SCHEEL P.: *Die Transfusion des Blutes und Einspritzungen der Arzneienin die Adern etc*. Kopenhagen, 1802-1803; parte II, paragr. 134.
(538) Dal *Diz. Encicl di Chir*. (già cit.), t. V, p. 193.
(539) CARMINATI B.: *Eventus experimentorum atquc observationum in vasis sanguinis etc.*, Papiae, 1783, IV, p. 53. Si veda anche: *Commentarii de rebus in scientia naturali et medicina gestis*. Lipsiae, 1785, pp. 489-491.
(540) HUFELAND E.: Dissertatio de usu transfusionis etc., Berolini, 1815.
(541) DE GRAEFE: Dissertatio de novo infusionis methodo, Berolini, 1817.
(542) HAEFNER: Dissertatio de infusione et transfusione, Jeniae, 1798.
(543) TIETZEL: Dissertatio de transfusione sanguinis, Berolini, 1824.
(544) DUMAS et PREVOST: Bibl. Univ. de Genève, T. XVIII, p. 226.
(545) BLUNDELL J.: *Sperimenti sulla trasfusione del sangue*. « Annali Univ. di Med. Omodei », 1819, Vol. XII, pp. 351-361.
(546) Dal BLUNDELL J.: *Caso di vomito pertinace in cui si è tentato di prolungare la vita inietando sangue nelle vene* (però con esito infausto). « Annali Univ. di Med. Omodei », 1823, vol. XXVI, pp. 437-442.
(547) DIEFFENBACH: *Ricerche fisiologiche sulla trasfusione del sangue*. « Ann. Universali di. Med. Omodei », 1830, vol. LIII, pp. 572-586.
Egli ha studiato con lunga cura: I) Effetti della trasf. immed. sopra animali rifiniti di forza per emorragia; II) Effetti della trasf. mediata; III) Per quanto tempo il sangue conserva la proprietà di richiamare in vita un animale esangue (sua conclus.: dopo la terza ora comincia a perderlo); IV) Effetti della trasf. di sangue di animale in altri di specie differente, etc.; V) se la trasf. trasmetta le malattie, etc. (dice che non le trasmette sempre); etc.
Da ultimo, egli riferisce che « *di niun pro è la trasfusione contro l'idrofobia* ».
(548) GOUDIN: Journal des Progrés, 2a serie, t. II; rec. in « Ann. Univ. di Med. Omodei », 1830, vol. LVI, p. 599.
(549) SCHNEEMANN: *Transfusione del sangue per emorragia post partum etc*. « The London med, Gaz. », May, 1833.
(550) POLLI G.: *Trasfusione del sangue*. « Ann. Univ. di Med. Omodei », 1852, vol. 139, p. 440,
(551) GIACOMINI C.: *Trattato filosofico sperimentale de' soccorsi terapeutici*, t. V, p. 338.
(552) WALLER CH.: *On transfusion of blood*, « Ostetricai Transact. of London », 1860.
(553) NUSSBAUM: Ueber Transf. u. s. w., in « Bayer arztl. Inteli. Blatt. », 1862.
(554) MOSSO A.: *Sopra alcuni esperimenti di trasfusione del sangue*. « Lo Sperimentale », fasc. 10, ottobre 1872.
(555) GESELLIUS D.: *Die Transf. des Blutes* u. s. w., Pietroburgo, 1873.
(556) ALBERTONI P.: Cosa avvenga del sangue nella trasfusione, Milano, 1876. - ID.: *La trasfusione sanguigna e lo scambio materiale*, « Arch. Sc. med. », vol. VI, N. 16.
(557) HAYEM G.: *Leçons de thérapeutique*. Troisième série. Paris, Masson, 1891, p. 16. - ID.: *Maladics du sang, etc*.
(558) HEDON: *Sur la transf., après les hemorragies, des globules rouges purs etc*. « Archiv. de Méd. Expér. », tome XIV, 1902.
(559) BERGMANN: *Die schicksale der Transf. im letzten Decennium*, 1884.
(560) BATTISTINI E SCOFONE: *Ricerche sperimentali sugli effetti della trasfusione etc*. « Atti R. Acc. Se. », Torino, vol. XXXII, seduta 13-VI-I897.
(561) ORÈ J. R.: Etudes historiques et physiologiques sur la transf. du sang. Paris, Bailière, 1868.
(562) ALBINI G.: *Il Morgagni*, 1874, XVI, pp. 19-28.
(563) MARMONTER C.: *De la transf. du sang*. Paris, Masson, 1869.
(564) LIVI C.: *La lipemania stupida e la trasf. del sangue*. Milano, 1875.
(565) MONCOQ: *Thèse de Doct. de Paris*, 1864, N. 185.
(566) MICHETTI A.: *La trasfusione del sangue* (Comunicazione al I Congresso Med. Alienisti in Imola) Arch. Malatti Nervose, 1875, fasc. I. e. 3.
(567) PORTAL: *Op. cit.*, vol. VI, p. I69. Si veda anche l'epist. Anat. N. 69 del nostro MORGAGNI.

(568) BERENGARIO DA CARPI - Anno di nascita molto incerto: 1466 (?); anno di morte 1530 (in Ferrara, mentr'era ospite di ALFONSO I d'Este).
(569) Dal PORTAL: *Op. cit.*, vol. I, p. 280.
(570) EUSTACHIO B. - Nacque a Sanseverino nelle Marche, nel 1500; fu medico del Cardinale d'Urbino; morì nel 1563 (?).
(571) PORTAL: *Op. cit.*, vol. I, p. 634.
(572) RIOLAN J. - Nato a Parigi nel 1577 e morto a Parigi nel 1657.
(573) Cfr. l'appendice della sua opera: *Enchiridium anatomicum et pathologicum*. Parisiis, 1648 e 1658.
(574) Dal *Manuel Anatomique et pathologiquc*. Paris, 1659, p. 753.
(575) DE RENZI S.: *Op. cit.*, vol. IV, p. 186.
(576) BARTOLINO G.: *Descrizionte di un nuovo istrumento per iniettare i preparati anatomici*. Atti dì Copenaghen, 1676.
(577) PORTAL: *Op. cit.*, vol. III, p. 505.
(578) Dal libro del BARTOLINO: *De preparatione viscerum*, p. 118, dell'opera: *Diaphragmatis structura nova. Accessit modus novus praeparandi viscera per injectiones liquidorum, cum instrumenti novi descriptione*. Parisiis, 1676.
(579) WILLIS TH. - N. 6-II-1622 - M. 21-XI-1675 (o 1678, sec. altri).
(580) GLISSON - Morì nel 1677 a Londra.
(581) BELLINI L,. - Nato a Firenze nel 1643 e morto ivi, addì 8-I-1703; fu professore a Pisa. *De structura rerum observatio anatomica*. Florentiae, 1662.
(582) SWAMMERDAM J. - N. ad Amsterdam il 12-II-1637 - M. il 25-II-1680.
(583) BILS: Exemplae fusioris codicilli in quo agitur de vera humani corporis anatomia, Roterodami, 1659.
(584) KERKRINGIUS J. T. - Medico in Amsterdam.
(585) HALLER A.: *Bibl. Med.*, t. III, p. 268.
(586) PORTAL: *Op. cit.*, vol. III, p. 404.
(587) ROUHAULT P. S. - Chirurgo del Re di Sardegna Vittorio Amedeo, morì, nel 1740. - *Sur les injections anatomiques*. « Mém. de l'Acad. des Sciences », 1718.
(588) PORTAL: *Op. cit.*, vol. IV, p. 562.
(589) AMATU5 LUSITANUS, ovvero J. RODERICUS DE CASTELLO ALBO - Fiori verso il 1550 (nacque nel 1511 a Castel Branco e morì nel 1568). Il papa GIULIO III lo consultò, più volte.
(590) RUYSCH F. - N. 23-III-1638 - M. 22-II-1731.
(591) Cfr. il BOERHAAVE*, Met. Stud.*, voi. I, p. 451.
(592) TOMMASINI G.: *Op. cit.*, vol. III, p. 33.
Cfr. anche: JAMES, *Discorso istorico sopra la Medicina*. Venezia, 1752, p. 417; e, *per le iniez. nell'utero e nell'orecchio*, il « Diz. Encicl.. di Chir. » (già cit.), vol. III, pp., 71-75.
(593) BOHNIUS J. - N. 20-VII-1640 - M. 19-XII-1718.
(594) DRELINCOURT: *Experimenta anatomica ex vivorum sectionibus petita per E. G. Heyse*. Lugd. Batav. 1681, 2, 4.
(595) LE CLERC D.: Bibliotheca anatomica, etc. Genevae, 1699, t. I, pp. 950-95I.
(596) Vedi la Bibliografia. N. 73.
(597) LADEVI-ROCHE: Histoire des injections dans les veines depuis leur découverte jusqu' d nos jours. Paris, 1870.
(598) ALCAZAR A. (Prof. all'Univ. di Salamanca): *Chirurgiae libri sex in quibus multa anatiquorum et recentiorum interpretantur*. Salmanticae, 1575; e *De vulneribus capitis liber*. Saimantitae, 1582.
(599) PORTAL: *Op. cit.*, vol. II, p. 59.
(600) PLAZZONO F: *De vulneributs sclopetorum*, cap. XXXIII; cit. dal MAJOR, *op. cit.*, p. 245.
(601) DI SEGNI M.: *Rivendicazione nazionale. Il contributo italiano alle origini della transfusione del sangue* etc. « Boll. Ist. S.I.D.A.S. », 1930. marzo-agosto, pag. 35.
(602) FIORAVANTI L.: Cfr. HALLER, Bibl. Med., II, p. 149.
Desiderando altre notizie, cfr. FANTUZZI, - V. appresso - vol. III, p. 328.
(603) FRACASSATI C. - Laureato il 14-II-1656, fu promosso l'anno 1660 alla lettura di Chirurgia, e fu professore a Pisa.
Desiderando di Lui notizie biografiche, cfr. FANTUZZI G.: *Notizie degli Scrittori* Bolognesi. Bologna, 1783, tomno III, p. 359.

(604) BORELLI A.: *De motu animalium*, parte II, prop. 224: « *Dum Pisis degerem solertissimi et docti Anatomici* CAROLUS FRACASSATUS *et* SYLVESTER BONILIOLUS, *me praesente, infuderunt intra canis vivi jugularemn Venam Olei sulphurei unam vel alteram drachmam, et post aliquos eiulatus, ligata vena, canis solutus adeo vegetus, et immunis a febre remansit, ut avidissime ossa corroderet, debitis temporibus ederet, et dormiret, ut nullum signum invalitudinis ostenderet et sic permansit usque ad diem octavum, quando aufugit a cubiculo in quo detinebatur* » etc.
(605) MAJOR J.: *Chir. Inf.*, Dub. XIII, par. 6, p. 256; Dub. XV, par. 8, p. 271.
(606) ELSHOLTZ: *Clysm. nova* etc., cap. V, p. 25 (II ediz.).
(607) *Phil. Trans*. N. 27, p. 490 e N. 29, p. 551.
(608) *Dissertatio epistolica responsoria de cerebro* CAROLI FRACASSATI etc. (nelle *Tetras anatomicarum epistolarum de lingua et cerebro* M. MALPIGHI *ac* C. FRACASSATI. Bononiae, 1665); pag. 374, e segg.
(609) BONFIGLIOLI S.: Cfr. anche, il TARGIONI TOZZETTI, *Aggrandim.*, Vol. I, p. 294.
(610) FRACASSATI C.: *Op. cit*. p. 402. e segg.
(611) BAGLIVI G.: Opera ornnia. Bassani, 1737, pag. 493.
(612) ID.: Id. id., pag. 348.
(613) Nota dell'HALLER nel vol. I. p. 533. del *Met. Stud*. del BOERHAAVE.
(614) LANZONI G.: De chirurgia infusoria in canibus. Oss. 204, p. 376; e *De variis lìquoribus, infusis in venas animalium variorum et circa haec observatis*. Oss. 21, p. 34; « Misc. Acad. Nat. Cur. Dec. 3 », A. 9-10.
(615) GOELICKE A.: *Op. cit.*, pp. 244-245.
(616) HALLER A.: *Bibl. Med.*, vol. IV, p. 32.
(617) MALPIGHI M.: *Praeclariss. et eruditiss*. Viro Jo. A. BORELLIO etc. *De pulmonibus observations anatomicae*. Bononiae, 1666, typis Jo. B. Ferronii, p. 4.
(618) BASTIANI A.: Cfr. « Diz. Encicl. » del RUGGIERI, vol. V, p. 194.
(619) GUAZZI G.: Cfr. « Diz. Encicl. », vol. II, pp. 250-25I.
(620) R. DE GRAAF: De virorum organis generationi inservientibus, de Clysteribus et de usu siphonis in Anatomia. Lugd. Batav., 1668.
(621) Dal « De Clyseribus », pag. 209 dell'op. cit.
(622) Dal « De usu siphonis », a pag. 231. dell'op. cit.
(623) SCHMIDT J. - Medico di Danzica, che mori poco dopo aver compiute le proprie esperienze infusorie.
(624) HALLER A.: *Bibl. Med*, vol. III, p. 12.
(625) Dal « Journ. des Sçavans », 1668, p. 301. (Extr. du « Journ. d'Angleterre »).
(626) ETTMULLER M.: *Op. cit.*, p. 1468.
(627) Extrait du « Journ. d'Angleterre », *contenant le succèz des expériences faites à Dastzic, de l' infusion, des médic. dans les veines*, nel « Journ. des Sçavans », lundy 12-XI-1668, pages 436-437.
(628) Cfr. « Journ. des Sçavans », poco sopra cit., p. 301.
(629) GARMANN CRIST. FED. (di Schemnitz) Lettera scritta nel giugno 1667 al MAJOR, e da questi riprodotta, insieme con molte altre di molti altri scienziati (SACHS J., van HORNE, MARCHI, SCHENCK T., J. D. HORST, etc. - V. s. -) nel suo libro (già più volte cit.) *Chirurgia Infusoria*, pag. 102, paragrapho 8.
(630) Cfr. il volume del MAJOR: *Chir. Inf.*, pag. 96, paragrafo 22.
(631) HALLER A.: *Bibl. Med.*, t. III, p. 135.
(632) PURMANN M.: V. la nota a pag. 114. - Cfr. anche il BLACK, p. 405, n. I.
(633) HALLER A.: *Bibl. Med.*, t. III. p. 474.
(634) SBARAGLUA Jo. HIER.: *Oculorum et mentis vigiliae* etc., Bononiae, 1704, p. 121.
(635) SACHS J.: Dal volume del MAJOR, *Chir. Inf.*, p. 36.
(636) SCHMUCKER: *Miscell. Chir.*, vol. I. - Cfr. anche il *Diz. Encicl*. del RUGGIERI, vol. V, p. 194.
(637) KNOPF. - Cfr. il *Diz. Encicl*. del RUGGIERI, vol. V, pag. 194.
(638) SCHEEL e VIBORG: Vidi il *Diz. Encicl*. del RUGGIERI, vol. V, pag. 194.

BIBLIOGRAPHICAL NOTES

In addition to the works already mentioned, the following can also be consulted:

1. ALHAIQUE A.: *Storia della Chirurgia*. « Giorn. Inter. Sc. Med. », XXXVIII, 1915.
2. AUGUSTIN F. L.: *Tavole cronologiche della storia della Medicina*, etc. Berlino, 1822.
3. BACCELLI G.: *La via delle vene aperta ai medicamenti eroici*. Roma, 1907.
4. BARCHUSEN: Vedi lo SCHEEL (*Die Transf. des Blutes etc.*).
5. BARDUZZI D.: *Manuale di storia della medicina*. Sten Ed., Torino, 1923.
6. BARDUZZI D.: *La medicina dell'antica Roma* etc., « Riv. Crit. », X, 1919, p. 55.
7. BARTOLINO T.: *Act. Hafn.*, III, Obs. 53.
8. BERNHARDI C.: *De transfusione sanguinìs*. Berolini, 1867.
9. BERNIR J.: *Storia della medicina e dei Medici*. Parigi, 1695.
10. BLUNDELL: *Exper. of the Transf. of blood*. « Med. Chir. Trans. », 1818, IX, 66.
11. BLUNDELL: *Transfusion*. « Med. Chir. Trans. », 1819, vol. IX.
12. BLUNDELL: *Researches physiol. and pathol. on Transf. of blood*. London, 1824.
13. BOLDT G.: *De transfusione*. Berolini, 1863.
14. BORRICCHIO O.: *Dissertatio de sanguine*. Hafn., 1715.
15. BOS A.: *Cenno storico sulla trasfusione del sangue*. Imparziale, Firenze, 1874, XIV, pp. 723-733.
16. BOVIO Hy: *Novi flores medicinales* etc. Venetiis, 1675.
17. BRAMBILLA G. A.: *Storia delle scoperte fisico-medico-anatomiche-chirurgiche fatte dagli Uomini illustri Italiani*. Milano, 1780.
18. BROUSSAIS E. J. V.:, *Esame delle dottrine mediche, o critica dei sistemi dall'orig. della medic. sino ai giorni nostri*. 1829.
19. BRUNTORF: *Dissertatio de chirurgia infusoria*. Rostoch, 1703.
20. BURCHARDI J.: *Diarium, sive rerum Urbanarum Commentarii*, Parigi, 1883.
21. BURGKHARD E.: *Zur Urheberschaft der Eigenblutinfusion*. Zentr. f. Gynak., Leipzig, 1920, XLIV, 724.
22. CARRÈ: *De la transfusion*. Paris. 1844.
23. CARSTENS C. J.: De sanguinis transfusione. Jenae, 1803.
24. CARTER F.: *An account of the various systems of medicine from the days of Hippocraty to the present time*. London, 1788.
25. CASELLI: *Considerazioni sulla trasf. del sangue e nuovo cannello per eseguirla*. Bologna, 1874.
26. CETTI: *Nachricht von neuen Versuchen mit der Uebergiessung des Gebluts* (*Transfusio*). « Mayers Samml. Physik. Auf der Gesellsch. Bohmischer Naturforscher », Bd. III, S. 388.
27. CHEREAU A.: *Note sur deux points de l'histoire de la transfusion*. « Union Méd. », Paris, 1874, XXVIII, pp. 397-402.
28. CHOULANT L.: *Tavole cronologiche per la storia della medicina*. Lipsia, 1822.
29. CORRADI: *Ann. Univ. Med.*, Omodei, 1885, p. 438.
30. CORSINI A.: *Francesco Folli e la trasf. del sangue*, periodico « La Crociata ». Ed. Mondadori, Anno I°, N. 4. aprile 1925.
31. CRUGENER M.: *Ortus et progressus clysmaticae novae*. 1677.
32. DE BARIL L.: *Reflexions sur les disputes qui se fonìt à l'occasion de la transf. du sang*. Paris, 1667.
33. DE BOER P.: *Dissertatio physiol. med. de transfusione sanguinis*. Groeningae, 1817.
34. DE LA CHAPELLO: Cit. dallo SCHEEL.
35. DE LA VAUGUYON: *Traité complet des opérations de la Chirurgie*. Paris, 1696.
36. DE SORBIERE: *Discours touchant diverses expériences de la transfusion du sang*. Romae, dec. 1668.
37. DIEFFENBACH: *Die Transf. des Blutes und die Infus. der Arzen. in die Blutgefasse*. Berlin, 1828.
38. DIONIS P.: *Cours d'opérations de Chirurgie*. Paris. 1707.
39. DREESEN J.: *De transfusione sanguinis*. Kiliae, 1861.
40. DRINKARD W. B.: *History and statistic of the operation of transf. of blood*. Nat. M. J. Wesh, 1871-1872, II°, pp. 180-194.
41. DUBOIS A.: *La transf. du sang au XVII siècle: sentence rendue au Châtelet le 17 Avril 1668*. « France Méd. », Paris, 1877, XXIV, pp. 353-356.

42. DUJARDIN et PEYRILHE: *Histoire de la Chirurgie*. Paris, 1774.
43. DU VERNEY G. J.: *Observat. sur l'effet de l'injection de l'eau froide dans la veine crurale d'un chien*. « Mém. de Paris », t. II°, p. 24.
44. Du VERNEY G. J.: Sur leffet de l'esprit de vitriol seringué dans la jugulaire d'un chìien. « Mém. de Paris », t. I°, p. 120.
45. EMMERLING. C.: *De transfusione sanguinis*. Jenae, 1857.
46. FULLER: *Some new hints. relative to the recovery of persons drowned*. London, 1785.
47. GAVINZEL J. C.: *Etude sur la transfusion*. Paris. 1876.
48. GOULARD L. U.: *De la transf. du sang*. Paris, 1866.
49. GUILLAUME A. C.: *La transf. du sang: son passé, son présent, sort averir*. « Nature », Paris, 1918, XLVI, pp. 56-61.
50. HANEMANN L.: *Nova ars clysmatica enervata*. Stad., 1670.
51. HANEMANN L.: *De motu cordis*. Kiloni, 1706.
52. HASTREITER J.: *Ueber Transf. des Blutes*. Munchen, 1869.
53. HECKER J. F.: *Die Lehre vom Kreislauf von Harvey*. Eine historische Abhandlung, Berlin, 1831.
54. HEIJNIS. G.: *Historisch-kritische beschouwing van de transfusion sanguinis*. Zaandijk, 1864.
55. HEISTER L.: *Progr. quo inquiritur an sanguinìs circulus veteribus fuerit incognitus*. Altorf. 1714.
56. HEMMANN J. A.: *Medizinisch-chirurgische Aufsatze historisch-praktischen Inhalts*. Berlin, 1778.
57. HENCKELMANN H. A. F.: *Historischer Ueberblick der Transfusion und Infusion*. Inaug. Abband., Wurzburg, 1833.
58. HIRSCHFELDER F. G. J.: *Ueber die Transfusion des Blutes*. Berlin, 1867.
59. HORST G. C.: *Damnonomagie, oder Geschichte des Glaubens an Zauberei und Damonische Wunder* etc. Frankfurt, 1818.
60. JANTZON G. A.: *De sanguinis transfusione quaedam atque novo ad eam perficiendam instrumento*. Regiomonti Prussorum, 1840.
61. JONAS H. D.: *De chirurgia infusoria*, Berolini, 1825.
62. JULLIEN L.: *De la transf. du sang*. Paris, 1875.
63. KHON A.: *De chirurgia infusoria, eiusque ope chronicis et ferme desperatis quibusdam morbis egregie depulsis*. « Misc. Acad. Nat. Cur. Dec. » III°, A. 9-10, Oss. 77, p. 144.
64. KLEIN F.: *An transfusio sanguinis utilis sit et admittenìda*. Herbipoli, 1680.
65. LASSUS: *Pr. Roy. et Insp. du Coll. de Chirurg. Discours historique critique*. Paris, 1783.
66. LEACOCK: *Dissertatio de haemorragia et transfusione*. Edinburgh, 1817.
67. LEROUX X. E.: *De la transf. du sang*. Paris, 1856.
68. LESSER: *Transfusion und autotransfusion*. « *Samml. Klin. Vortr*. ». Leipzig, 1875, N. 86, 665-684.
69. LIPARI L.: *Disquisitio de corde etc.*, 1694, Oss. 24.
70. LIPHARD T. G. S.: *De transfusione sanguinis et infusionìe medicamentorum in venas*. Berolini, 1837.
71. LOEWENTHAL W.: *Ueber die Transfusion des Blutes*. Heidelberg, 1871.
72. LUTHENITZ G. F.: *Sistemi dei medici da Ippocrate a Brown*. Dresda, 1810.
73. MALACRIDA G.: *Cenni storici sulle iniezioni endovenose*. Milano, G. Rechiedei e C., 1893.
74. MANTOVANI V.: *Cenni sulla letteratura med. prat.*, « Giorn. Soc. Incoraggiamento », Milano, 1809.
75. MATTHIAS: *Conspectus historiae medicorum*. Gottingae, 1761.
76. Mc CLURE R. D.: *History of transf. of blood; report of one hundred and fifty transfusions*. « Tr. Clin. Soc. Univ. Mich. », Ann. Arbor. 1916-1917, VIII°, pp. 41-47.
77. Mc CLURE R. D.: *Johns Hopkins Hosp. Bull. Balt.*, 1917, XXVIII, pp. 99-113.
78. Mémoires de l'Académie de Paris avant le renouvellement ad ann. 1667.
79. MONTANARI G.: *Pensieri sopra alcune esperienze fatte in Bologna intorno diversi effetti de' liquidi in cannuccie di vetro et altri vasi*. Bologna, 1667.
80. MONTANARI G.: Lettera al Sampieri in risposta ad alcune obbiezioni intorno i suoi pensieri. Bologna, 1667.
81. MOREL L. C.: *Recherches à propos de la transf. du sang*. Paris, 1856.
82. MOULIN A.: *An account of an experiment of the injection of mercury into the blood and its ill effects on the lungs*. Phil. Trans., 1691, p. 486.

83. MULLEN: Cfr. BIRCH, voI. IV°.
84. MUSGRAVE W.: *Account of what happened on syringing warm water into the thorax of a bitch.* « Phil. Trans. », 1698, p. 181.
85. NUCK A.: *Esperimenta et operationes chiruìrgicae*. Lugd. Batav., 1692.
86. NYSTEN: An advertisement concerning the invention of the transfusion of blood. « Nouv. Bull. de la Soc. Philomath. », T. I°, A. 1667, p. 489.
87. NYSTEN: *On the antiquity of the transf. of blood from one animal to another*. « Phil. Trans. », 1668, p. 731.
88. OLDENBURG H.: *Of the rise and attempts of a way to conveigh liquors immediately into the mass of blood*. « Phil. Trans », 1665, p. 128; e 1667 pp. 490-55I.
89. PACI A.: *Contribuzione alla storia della trasf. del sangue*. « Lo Sperimentale », Firenze, 1875, XXXV, pp. 271-283.
90. Padre RIDOLFO ACQUAVIVA: Poemetto « *de sanguinis transfusione* », dedicato al Conte Lorenzo Magalotti.
91. PANELLI G.: *Memorie degli Uominì illustri e chiari in medicina del Piceno*. Ascoli, 1757.
92. PARI A.: *Gli studi sulle morti apparenti e quelli sulle trasf. di sangue*. « Estr. Archiv. Med. e Chir. e Igiene », anno V°, fasc. 7.
93. PATIN C.: *Circulationem sanguinis veteribus notain fuisse*. Patav. 1685.
94. PENSUTI V.: *Saggio sugli errori princ. nella Storia della Medicina*. « Gazz. Med. », Roma, 1900.
95. POLLI G.: *Glorie e sventure della trasf. del sangue*. « Ann. Univ. di Med. », Milano, 1866, CXCVIII, p. 237.
96. POPP G. J.: *De trausfusione seu chirurgia transfusoria*. Monachii, 1835.
97. PREWITT T. F.: *Transfusion; its history and present status*, St. Louis M. e S. J. 1876, n. s. XIII, 169-188.
98. QUINCHE P. H.: *Recherches sur la transf. du sang*. Paris, 1858.
99. *Recueil des quelques nouvelles obsérvations de la transf. du sang et de l'infusion des médicaments dans les veines*. Haye, 1668.
100. REGNAUDOT: *Dissertatio de chirurgia infusoria renovanda*. Lugd. Batav., 1780.
101. RIEHL F.: *De sanguinis transfusione*. Berolini, 1867.
102. ROBOLOTTI F.: *Storia della Medicina* « Encicì. Med. It. Vallardi ».
103. RUGGI G.: *Nuova cannula per la trasf. del sangue*. « La Riv. Clin. », luglio, 1871.
104. SCHAPER: *Dissertatio super Medicinam curiosam*. Rost., 1698.
105. SCHILTZ M. V.: *De transfusione sanguinis einsqne usu therapeutico, cum historia chiirurgiae transfusoriae et infusoriae*. Bonnae, 1852.
106. SCHWARZ F. H.: *Herophilus und Erasistratus. Eine historische Parallele*. Inaug. Abhandl,, Wurzburg, 1826.
107. SPRENGEL C.: *Literatura medica externa recentior*. Lipsiae, 1829.
108. TRILL B. O.: *Historia de la transfusion de la sangue*. « Pebellon Med. », Madrid, 1874, XIV, p. 301.
109. VALLISNERI A.: *Dissertatio de utilitate corticis Peruviani* (*fausta in demorso a vipera*...).
110. VAN DER LINDEN Jo. A.: *Hippocrates de circuitu sanguinis*. Lugd. Batav., 1661.
111. VIVIANI U.: *A. Cesalpino. etc*., Castiglion Fiorentino, Bennati, 1917.
112. VOSSCHULT H.: *Geschichte der Transf. des Blutes*. Halle, 1873.
113. WALCKER: *Memoirs of Med., including a sketch of medica! history from the earliest accounts to the eighteenth century*. London, 1799.
114. WALLER: *Observations on the Transfusion of blood*, 1825.
115. WALLER: *Dissertatio inauguralis de sanguinis in haemorrhagia uterina transfusione*. Erlangen, 1832.
116. WILLER C.: *On Transfusion of blood; its history and application in cases of severe haemorrhage*. « Tr. Obst. Soc. Lond. », 1859, I°, 61-72.
117. WILKS S.: *The origin of the transfusion of blood*. Lancet, London, 1874, II°, p. 571.
118. ZOELLER T.: *Ueber In und Transfusion*. Wurzburg, 1838.