lated and the blood would have flowed more slowly, thus resulting in cachexia and dropsy. I know of a young man in this city who was suffering from tertian fever. He was persuaded by his doctor to drink as much as he wanted, and the doctor even forced him to at times, after which he became afflicted with ascites. This brings to mind a passage by Terence from *Andria*, when a doctor enters the stage: “Make him drink as I bid, and the quantity I prescribed and I shall return later”. This year the use of water was much more harmful, especially in the country, because the continuous rainfall had made the water muddy and foul-smelling. In the city, however, the use of water was less harmful because our springs are so pure and of marvellous origins. I hope I will soon be able to publish a short history on these springs. Our landsmen were convinced that venesection and drinking water would cure all fevers, as if they were the only mainstays. But is that really so? Certainly neither of them was of any use this season. And one should bear in mind Hippocrates, who says, “Water does not feed a fire”, although by “fire” he meant continuous fevers and not the intermittent kind, in other words, venous not gastric fevers. Perhaps one day, if I have time, I will write something about the abuse of water in fevers.

XLVI. But someone is sure to ask, “Which drink should one administer in these fevers?” I myself have rarely forbidden the use of wine; on the contrary, I have encouraged a moderate intake of stronger, non-oligophorous wine and it has saved many from the clutches of death. This is because bile needs to be stimulated rather than slowed down and the parts of the blood that are richest in spirits need to be aroused, which wine and other volatile alkaline remedies excel at. The country-folk around Modena adopted these remedies by instinct, giving garlic and onions to those with fevers with excellent results. Some chronic diseases have also been cured by administering poor quality food. However, this should be included in the lists of cures that are more by chance than the art of discovery. Thus, Antonio Benivieni and Amato Lusitano observed that lasting quartan fevers were cured by administering garlic with abundant undiluted wine. I believed it appropriate to recommend stronger, not lighter wine, without fearing the effervescence of fever. One is mistaken if one believes there is no danger in giving those with lasting fevers and chronic diseases weaker wine because these are more acidic and therefore increase the acidity in the blood.
exacerbating the cause of the disease. Cratone commented on this mistake once, and while he would recommend modest amounts of undiluted wine for gout, he disapproved of lighter wines because they increase the serosity of the veins. Willis observed the same thing: in the same way that the spirit of wine sweetens the spirits of salt and sulphur, a moderate intake of stronger wine sweetens any acidity in the blood. Unseasonable weather therefore requires a variation in the method.

XLVII. As has already been observed, this year not even the use of cinchona proved beneficial and, all too often, resulted in death. I myself have observed the same, but in a noble virgin in particular. She had been suffering from a double tertian fever for 40 days and after trying all the usual remedies, upon my advice and with the permission of His Most Excellent Antonio Abate, she was given cinchona in the form of a bolus as she refused an infusion of wine. She became groggy and comatose, with such a weak pulse it could hardly be felt, and remained in that condition for three days. When the usual paroxysms then returned, the torpor was dispelled. I would have believed such a remedy to be healthy because since the blood mass abounds in so many undigested and unassimilated components and is denser (as could be seen clearly after bleeding), and since circulation was slower, that daily febrile effervescence would act as a remedy. When it then ceased, there was a sort of stasis and freezing in the vessels, hence the torpor of the animating functions and the interruption of the vital ones. Celsus is therefore right when he says that at times a slow fever must increase. He says, "It might be easier to cure".

I am aware that not only most doctors but also those outside the field of medicine regard such a doctrine with suspicion. For example, Seneca, who describes the advantage of curing a less serious illness resulting from a more serious one with the following words: "So that they could cure them with greater glory, many who had exacerbated the illness could not make them cease, or if they were successful, it was after tormenting the patients even more". Nevertheless, during this season experience showed that febrile effervescence needed to be stimulated rather than slowed down, and that the use of warm substances was more beneficial than cold ones. Vice versa, when writing about Polycrates, Hippocrates said that cold substances were more useful than warm ones, which there-
fore meant that one should not give too much importance to any preconceived judgement regarding the nature of the illness, since experience itself has proven the very opposite. However, it has been observed that cinchona proved more effective when administered to country-folk than to those living in the towns and cities. This is because as soon as they feel the slightest onset of an illness, the country-folk throw themselves into their work, so there was no fear of the harmful effects that can be seen in the townsmen. The learned Ettmüller said that after taking this antipyretic, men who devote themselves to their work and toil are less likely to suffer a relapse than those who are lazy and idle. For this season we can therefore repeat the words Hippocrates once wrote on the subject, but with a truly ingenious comment, as is befitting to such great men who place their trust in things: “Nothing remarkable helped, no convulsions of the stomach, no blood-letting, and none of the other remedies I tried”.

XLVIII. To my knowledge, this year there has not been a single case of continuous or ardent fever, and only very few cases of quartan fever. The first is not surprising. This is because the blood mass did not abound in rich parts in spirits ready to quicken but in dense, cold juices. Light, acidic wines could therefore not restrain fermentation as easily as stronger wines after the summer heat. What is surprising is that there were so few cases of quartan fever amongst the fevers in particular, if what some people claim is true and that the only difference between quartan and tertian fevers is a greater viscosity of the blood. I then went on to observe that the origins of quartan fever were the same, considering that fever as a fruit that ripens in autumn and is much more bountiful if the summer is hot and torrid. This would explain why during this cold and damp season, with very little dispersion of the serous components via the cutaneous pores, the pancreatic juice was unable to go beyond the degree of stability necessary for the quartan cycle; alternatively, something else was lacking that human weakness is unable to understand, since there is nothing more misleading than the luminaries in the field of medicine in their studies of why febrile paroxysms recur at certain times and with such precision that they even outdo mechanical instruments.

XLIX. We have already observed that verminosis during these fevers was quite common, amongst the country-folk in particular,
and I believe the explanation lies in the poor quality food that is subject to putrefaction, such as fish and seasonal fruit, and also in the ferment of the stomach that was affected by the bad weather and unable to digest the food properly. Since the worm eggs hidden in the food remained intact owing to the modest heat of the stomach – and I think this is probable – I am not at all surprised that the worms proliferated with such ease and in such abundance. From experience I know that cinchona is very effective in killing worms and I believe this is due to the considerable bitterness of the bark, although verminosis is usually treated with bitter substances rather than sugary or honey-like ones. I am also aware that experiments were carried out by our compatriots, who observed that earthworms died very quickly in water solutions of honey or sugar but that they survived for days in bitter liquids. However, I do not believe that the power of medicines should be measured by what we see at first glance. On the contrary, one runs the risk of making a mistake. It is possible that no matter which medicines are administered, they soon lose their natural strength when they come into contact first with the ferment of the stomach in particular, whose trans-mutative powers are well-known, and then in the intestines with the bile, which is by nature an aggressive humour, and then with the pancreatic juice. If they disperse even further, they also have to fight with the lymph in a common receptacle. Thus if Crocus of Mars [ferric oxide] which, as Jungken has observed, is known as an appetizer, does not find an abundance of acid in the stomach so it can be dissolved, it becomes an astringent. The same has been proven in Chirurgia Infusoria, which has shown that if a purgative liquid is injected into a dog's veins, it causes considerable purgation, but hardly any if the same liquid is administered via the mouth, even if in a greater quantity. This is because of the abundance of acid that is naturally found in a dog's stomach, an acid that has no trouble defeating a purifying and emetic substance. This is why, as Celsus says, certain poisons “are harmful in wounds but not if taken via the mouth”, and the Psylli were able to suck the poison from snake bites without being harmed. Bellini gives a brilliant explanation (as if it were no uncommon occurrence) of just how many changes medicines taken via the mouth undergo while they flow through the various parts of the body. I believe that when a medicine is swallowed and is mixed with the juices, a new aggre-
gate is formed which then has its own effects, but these are usually only attributed to the medicine that was swallowed.

I. After being afflicted by these fevers for so long, as I said earlier, there were also several cases of parotitis and the fevers persisted just as tenaciously even after the patients had been suppurated. This is surely a sign that the humours were not being assimilated in the whole venous system, but this was not the main cause or stimulus of these fevers because it was clear that the stimulus lay in the stomach and in the pancreas in particular. After countless febrile paroxysms, many were then also afflicted by diarrhoea and dysentery, since the body was stimulated by both the abundance and viciousness of the juices. In these cases there was no room for hesitation, because in the end the cause of these fevers was malignant, even though they were intermittent. However, more died of diarrhoea than of dysentery, perhaps because in those who had diarrhoea, the evil was transported via the blood mass that secreted an acrid serum through the intestinal glands while in those who were suffering from dysentery the stimulus of this ill did not lie in the veins, while viscid, acidic mucus abraded and ulcerated the intestines. There were frequent relapses, but not just because of a poor diet. They were caused rather by something more common, that is, the contaminated air that stimulated the dormant febrile miasma. This was also why these fevers were so tenacious, as nothing could eliminate the true cause while they continued to breathe the air. The climate was responsible for such a serious disease. The disease seemed to have no intention of abating until the damp, foggy weather was replaced by fair, dry weather towards the end of the year. Thus, to use Hippocrates' words, "The diseases which increase in summer, ought to end in the winter", and this is simply the result of natural changes in the seasons; the best remedy for this epidemic will be the return of a more vital climate.

II. I mentioned earlier that in comparison to the vast number of those who fell sick, both in the country and towns, very few actually died, and this ran contrary to the general opinion of doctors, who feared a much more devastating outbreak. In epidemics, men mainly die of two causes, either diachysis of the humours or of stasis, to use Hippocrates' words, that is, the fluidification of the blood mass caused by acrid and alkaline salt, or because of the agglutination of the aforementioned since it becomes prevalently acidic. How-
ever, *diachysis* of the blood usually results in death more frequently than *stasis*. Thus, while the plague is raging, the acids are dominant. However, since the acids were dominant during this season although the effervescence of the fever fought against it, it was unable to induce that lethal stasis and obstruct the flow and return of the blood, hence the reason why despite the fact so many men fell ill at the same time, very few actually ended up in the hands of Libitina, the goddess of death. It is therefore not surprising that being of a weaker disposition and less active, women and children suffered most at the hands of this epidemic, and even more so those being breast-fed, as their blood was more likely to coagulate because of the contaminated milk flowing through their veins. Hippocrates also describes a constitution in which "of those who fell ill, it was the adolescents in the bloom of youth, with their pale, smooth skin, who had been idle, that succumbed to death". The children then became jaundiced because their livers were obstructed by an abundance of viscid mucus and were aroused by the ardour of the fever, which was attached to the liver and therefore hindered the secretion of bile. Indeed, all of them had a tense, hard liver. The cases in which the acrid and acidic serum went to the brain membranes died of convulsions and, although this disease has been common in children in the past, it was a particular characteristic of this constitution since it had encouraged the acidity of the blood mass.

LII. However, if somebody asks me why this bad weather afflicted the country-folk more than those living in towns or cities, I think it suffices to reply that the main cause was the air that had been contaminated by dirty exhalations, due to the abundant rainfall that flooded the fields and homes of the country-folk, which was not the case in cities and higher-lying places. An additional cause might be their poor, unhealthy diet, and in particular an excessive consumption of fish, which they are not accustomed to and which putrifies easily in their stomach. Other highly esteemed doctors have also told me that fish is usually recommended for those who are ill, but even more so for those who are healthy. However, as the learned Plemp observed, "it is inappropriate for athletes, and soldiers on duty", and I would add that neither is it suitable for country-folk, since beef and pork are more beneficial to them. Galen says the same thing when he recommends that idle men, the elderly and sick eat fish, but not those who are undergoing physi-
cal training. It should be added that according to Athenaeus, the fish that is caught in fast flowing rivers is the best; so this would actually mean the fish they ate was the worst of all, since it was caught in stagnant waters.

LIII. Other possible causes are working under incessant rain, which results in constriction of the skin pores, reduced sweating in such cold and damp weather, while in the summer they were used to sweating much more as they toiled without pause; these causes are uncommon amongst those living in towns and cities, who eat better and are not exposed to the mercy of the weather. Furthermore, this rural epidemic seemed to be limited to the cities and larger towns, therefore Modena and Reggio, because these were the boundaries, and those closer to the Apennines suffered less from this scourge, while Ferrara and the towns belonging to Mantua, which are closer to the Po, suffered more and it was there that the most children died, as far as I have learnt from correspondence with numerous professors and the like. It was none other than this vast plain, surrounded by these places and inhabited by country folk, where the waters stagnated for such a long time that became the home of this epidemic.

LIV. I shall not go into the other illnesses that accompanied this fever, for example apoplexy, epilepsy, heavy catarrh, cachexia and dropsy. Indeed, these were also the offspring of the same season and a sign of the prevalence of acid that made both the blood and other fluids coagulate, and attacked the nervous system. All of this was proof that Hippocrates' oracle was true – that "the diseases that occur most frequently following heavy rainfall are long fevers, evacuation of the bowels, putrefaction, epilepsy, apoplexy and angina".

LV. As far as the future is concerned, which is also a case of partial prophecy, all we can do is wait and see whether this disease will abate considerably if not completely, or is actually just an omen of worse to come. It is right to hope that there will be an end to this bad constitution, since the last two months of this year the weather was nearly always serene and the air tranquil. Indeed, as Da Monte says, "The seasons that come and are according to nature, correct the vices of the past ones that went against nature"; but there is also the fear that an increase in the cost of food will make the farmers even more miserable, as they will be forced to placate their hunger by eating black bread and a poor diet.
There is the fear that next spring and summer will bring new calamities with them. Thus in Cephalonia, a city of Thrace, according to Hippocrates, "Women and men who ate legumes in continuation lost the strength in their legs"; Galen says the same and adds that this often happens due to an increase in the cost of food, which then leads to lethal illnesses. The word limos, which means hunger, only differs from the word denoting a pernicious epidemic by one diphthong, hence ek demou loimos ("fat leads to the plague"). It would appear, however, that at times foods with bad juices can be digested properly, but as Galen so admirably exhorts, "Without us realizing, after a lengthy period the bad juices from this collects in the veins and then they putrefy at the slightest chance, leading to malignant fevers". May Divine Clemency keep all ills away and return this region to its former health.
Urban Epidemic Constitution
of the year 1691

To the Most Illustrious and universally-renowned Wilhelms Gottfried Leibniz, historian and councillor of the Serene Ernest Augustus, Duke of Brunswick-Luneburg

Most Illustrious Lord,

as is so often the case in all things, and literary matters are no exception, certain figures undertake tasks they are not quite up to, and they later regret their attempts; if it so pleases you, a man of infinite learning, you may now count me amongst them. Indeed, it is only now that I realize just how far I have let my intellectual enthusiasm lead me, so that without ever thinking that my shoulders might not be able to bear such weight, I have decided I have to write about and publish the constitution and medical history of each year. I began this task last year and published a study on the subject, dedicated to the learned Magliabechi, the honour of Tyrrenia. However, since one has no choice but to go ahead, be it for no other reason than to keep one’s promise, I myself have done the best I could this year, despite being distracted by a thousand other tasks, and it is my wish that this dissertation should bear your illustrious name. I am sure that Magliabechi himself would be more than pleased if I were to treat you both in the same way, out of deference to both of you, as I know you are very close friends, and it was thanks to the former that I had the great luck to meet you and enjoy your delightful company when you were on your way back from Germany two years ago and stopped in Modena for one month, although I never once dared approach you. What a
shame, because I would have become much the wiser. The words Pliny once wrote about Aristone are just as true of you, so learned in every field of the sciences, and that is, “There is nothing a person might want to know, that you cannot teach him”. For a long time my heart delighted in the fact that you two, two princes amongst the scholars (let envy not rear its head!), are friends and so kind to me and in the end I felt I had to make these feelings public with this publication. As far as Magliabechi is concerned, I have done all that was in my power to fulfil my promise, and now I would like to fulfil a further one. Oh man of such wisdom, receive my booklet, which is on the epidemic diseases amongst our compatriots, but in a more popular form, with your usual kindness; consider it a tiny gift, but one that is a sign of my regard for you. One day, if you do not mind wasting a little time (and I know you love devouring books), leaf through this little booklet. I take my leave, oh illustrious honour of Germany, and hope you go on loving this deferential admirer of your famous name,

Bernardino Ramazzini

Modena, 31 December 1691

I. The rural epidemic that afflicted the inhabitants around Modena and the neighbouring areas so seriously last year was followed by an urban epidemic that was not at all urban in nature. On the contrary, it spared absolutely nobody, and the poorest of the poor suffered the most. Remaining faithful to my intention to describe the past constitution at the end of each year, now I am more than happy to do so because this constitution was so utterly different from what we experienced last year. It provides a vast amount of information to stimulate the mind and we all know that there is nothing more useful in the field of medicine than comparing the succession of constitutions to enable us to determine which measures are most suitable when the same conditions and illnesses reappear. If professors were also to pay closer attention, there might not be this desire for comparative medicine, just as the learned Francis Bacon expressed a wish for comparative anatomy. He said that with comparative anatomy they would have been able to compare the internal organs of one individual with another, and have
attributed the causes of diseases not so much to the humours, but the mechanical construction of the organs, since they are often in such poor condition that any kind of medical intervention or empty promise is in vain.

II. As I said in the dissertation I published on the subject, the weather last year was generally extremely wet and muddy owing to the frequent, heavy rainfalls. This resulted in both a serious epidemic and an increase in prices. This year, however, the extremely dry and dusty weather was caused first by the northerly winds, and then by the continuous scorching heat. As we have already said, at the end of the past year, the beginning of winter was tranquil and fine, and this continued in the New Year until the end of January, when the northerly winds were blowing and such a bitter cold set in that the rivers froze over and everything was covered in ice overnight. However, since it did not snow even once, the winter was not only bitterly cold, but also extremely dry, so much so that in the areas to the south and north of the Po, the roads were as dusty as during the month of August when the scorching heat burns the fields, which is extremely uncommon around here. As a result, the "bitter cold of the Boreas" burnt the fields that had been sown since they were unprotected by their usual blanket of snow.

III. The illnesses that abounded during these seasons were apoplexy, pleuritis, pneumonia, heavy catarrh, angina and erysipelas. However, the most common illnesses were those of the chest and these resulted in death. The blood obtained from blood-letting contained a great deal of mucus and polypous concretions. In our hospital, autopsies were carried out on people who had died of cachexia and chest ailments and polyps were discovered not only in the heart cavities but also in the aorta. The most common and effective remedies were those that were able to separate the compact mixture of the blood and make it more fluid, for example, the spirit of smelling salts, stag-horn, spermaceti and the like. However, those who knew of sulphur's reputation as a balsam for the lungs prescribed the spirit of sulphur for similar ailments, together with pectoral waters. But they alone knew whether what they were doing was appropriate.Nevertheless, there is no doubt that the components of a concretion have completely different characteristics to the concretion itself, just as the spirit of sulphur is completely different to sulphur. As was the case before, repeated blood-letting
was ineffective. The people in the city suffered more than those in the country during this bitterly cold season, and the elderly were in great danger, as this ill, “which hid so it could not be seen”, misled the doctors who were frequently thinking of something completely different. In fact, after having taken their time over dinner, almost as if presiding at a funeral banquet, they would suddenly die and those whose blood had been let died even more quickly.

IV. The multitude of these extremely complex and diversified diseases originated from the same root and therefore had to be eradicated in the same way. Reason then went on to insist that theory and practice were identical for both and it was admissible to attribute the main reason to a poor disposition that made the blood coagulate. Thus, the combination of the cold and wet climate last year and a poor diet because of a scarcity of food led to a general poor disposition of the blood mass. It was therefore not surprising that with the onset of such a harsh, northern-like winter, it was even more likely to coagulate. This meant that any illnesses that originated from the stasis of the blood in various parts developed because the circulation had slowed down.

V. All the moderns agree that apoplexy, pleuritis, pneumonia, heavy catarrh, erysipelas and the other diseases mentioned are caused by the stasis of the blood, owing to a predisposition to do so, despite the fact that doctors in times gone by were convinced of the opposite and believed that in such illnesses, a stronger part was the giver while the weaker part received. Galen elucidated the double cause of the flow, in which the same part attracted the humour, the other in which the humour was sent from the stronger part to the weaker one. Van Helmont was perhaps the first who began to contradict this doctrine. Indeed, the latter observed that there is no instigator in these flows, no leader, no archer and no sentinel. However, he did not explain this well with his example of the thorn in a finger owing to his ignorance of the circulation of the blood and how sedimentation takes place in the humours. This only occurs because once the blood flow is interrupted through the veins either because of a change in the fibres (like a spasm) or because of the fatty, dense constitution of the blood mass, the humours are kept around the extremities of the vessels or in the porosity of the flesh. Thus, if we wish to express ourselves more correctly, we should call it retention rather than flow.
VI. In the meanwhile, I have devoted myself to the considerable task of convincing those who are full of prejudice that it is totally wrong to believe that when one part becomes inflamed and swollen, the humours move towards it with greater impetus than towards others, if the law of the movement of blood circulation is fact not a myth. Once this has been accepted, further countless illustrious beliefs of the moderns can and will be accepted and with each one, another belief of the ancients will fall by the wayside. In fact, if we pay attention to mental acuity, blood moves more slowly towards the part that is inflamed than it does towards other parts where the path is free and there are no obstacles that delay the flow of the blood. Then there are others who judge facts purely at a cutaneous level without looking any further, and when they see a part that becomes swollen in a short space of time, for example in phlegmon, they believe the blood flows there with a gush since there is room. When a blood vessel bursts, the blood flows into a cavity or flows outside the body, but this is not the case in the formation of phlegmons or other kinds of inflammation. These only occur because once the blood circulation has been obstructed, more blood flows to various body parts via the arteries than returns via the veins. This may be because of the uliginous constitution of the blood or because of the change in the motor fibres owing to the strength of a pain, for example in injuries or nerve spasms. When they put a ligature around the arm before venesection, they would aid the search for truth if they were try to understand the real reason why the veins swell below the joint together with the flesh, which does not happen since at that moment the blood is flowing much more quickly (it had been pushed even more quickly before when there was no obstacle and it had to overcome less resistance), but because it is kept there the reflux of the same blood via the veins to the heart has been hindered.

VII. Another example is the source of catarrh, as doctors disagree both on its nature and origin. An ancient common belief is that the head is the source of catarrh, hence the usual flow to the throat, chest and even the extremities. Modern anatomists such as Willis, Richard Lower, Stensen, Rolfink, Ettmüller, Blanckaert and our learned landsman Bellini eliminated this belief about the origin and descent of catarrh from schools, hence its etymology (the word itself means descent and efflux, which is why Galen used the
words *katarrhopos* and *anarrhopos* for the descent or rise of the humours). After careful examination of all the proof claiming the head is guilty of this crime, since there is absolutely no way for the head to expel its waste into the throat and chest, all in the court of anatomy declared its total innocence. However, there are still those who persist in obstinately defending the beliefs of the ancients and continue to punish the head for any diseases of the chest, not only with medicine, but also with iron and fire. The renowned Stensen claims that one of the things to be studied is via which ducts the brain is able to secrete the excess of humours unless this secretion takes place in the jugular ducts observed by Blanckaert.

VIII. Yet others would have absolutely no qualms in claiming that the source of catarrh is the source of life itself, i.e. it is the heart that carries this catarrh via the artery ducts all through the body, hence rheumatism, swelling, and everything else called a flux. One of these is Rolfink, while Schneider, Vedelius and others are in agreement, claiming that on the basis of various observations, catarrh is the result of a serum of the blood mass. Richard Lower's experiment on a dog is rather famous. After tying its jugular veins tightly, he observed that all the parts above the ligature became swollen. Tears flowed in abundance from its eyes and there was excessive salivation from the mouth. It died of suffocation as in angina and when he dissected it, he found that no body part had been invaded by blood and that only all the muscles and glands appeared to be full of a transparent serum. Very few disagree with this opinion, while others believe the glands are the source of catarrh, for example, Stensen, Ettmüller and others. If we study the gland structure closely, we can see that it consists of a small bundle of arteries, veins, nerves and excretory vessels, so the serum of the arteries and something superfluous from the nerves is deposited there. This opinion is highly plausible and is coherent with what the actual use of glands might be in our body.

IX. However, we refuted this doctrine on the origin of catarrh from blood juice in favour of that of the glands by Van Helmont, who was probably the first to absolve the head of being responsible for catarrh, which was why it was so often cauterized. In fact, although this author was unaware of the circular movement of blood, he was still ingenious enough to conceive that the substance that was believed to flow out of the brain was none other than a se-