Moving on to other shops, let us enter that of the apothecary, which one usually believes to be the home of good health; except that, every now and then, it is in hiding just like "death in the pot". If we ask the apothecaries whether they themselves fall ill while preparing remedies to restore the health of others, they will not only admit that is the very case, but that it also occurs frequently and seriously. For example, while preparing opiate tinctures or when pounding dried beetle cantharides to induce blisters or other poisonous substances. While pounding such substances, tiny particles are liberated that enter the body via open orifices. Since opium causes stupor and drowsiness, Etmüller recommends that vinegar should be drunk during the preparation of opiate tinctures since it is the most effective remedy to reduce and neutralize opium's narcotic properties. It has also been observed that when pounded and manipulated with the hands, cantharides causes urinary burning. I met an apothecary in this city who touched his genitals after handling arum root and was afflicted with a serious inflammation that led to gangrene and such extensive haemorrhaging that he almost died.

According to Francis Bacon, vapours given off by pounded colocyth can cause colic and severe diarrhoea in apothecaries. That the active component in cantharides is volatile is a well-known fact and it is in this form that it harms the bladder and kidneys. If the whole cantharides beetle is observed carefully under the microscope, one can see that it armed with pointy prickles. Olaus Borrichius can be consulted on this subject, quoted by Bonet in *Medicina septentrionalis*. He says he has observed that these prickles are smaller on the wings and feet than on the head and thus solved an age-old question as to whether cantharides should be administered without
the head, wings and feet, according to Hippocrates, or whole, as according to Galen.

Ettmüller agrees with Galen and calls this a controversy over nothing, or "goat's wool" to use his very words, since he believes that each part of a cantharides beetle has corrosive properties. Perfume makers should therefore be very careful when they pound these tiny animals to ensure that they do not inhale the powder released in the air. An appropriate precaution either before or while preparing these poisonous substances is to drink abundant melon seed emulsion. Whey and cow's milk are also very effective in alleviating burning on urination.

At times I have observed that not only offensive smells are injurious to apothecaries, for example during the preparation of ointment made with marsh mallow which can cause both nausea and vomiting, but pleasant smells also. It is astounding that these smells have the power to produce marvellous effects, depending on individual idiosyncrasies. In spring, when certain apothecaries prepare rose infusions for golden syrups and the whole shop is redolent as the fabled rose gardens of Paestum, yet some complain of terrible headaches, while others suffer from diarrhoea.

Those who have such a keen sense of smell, like dogs, should therefore avoid them whenever possible, and should constantly leave the shop to take fresh air and smell perfumed objects that they are more familiar with and find pleasant, since they will be able to counteract the effects of the other smells. Sennert and Otto Tackenius in Hippocrates chymicus can be consulted on the subject of the effects of rose fragrance. Lievin Lemmens describes how the natives of Arabia find the excessive sweetness of the perfumes pervading the land so bothersome that their only means of escape is to resort to fetid smells, as if a balsam. In a strange little story Gaspar de los Reyes describes a fisherman in the court of King Sebastian of Portugal who fell senseless to the ground because of the overpowering fragrance of the perfumes and everyone believed him to be dead. He was revived by the renowned Thomas a Vega who had him carried unconscious to the sea and then wrapped in seaweed and mud. He then made a miraculous recovery, just like a pig wallowing in the muck. According to Bacon, when spices that have been stored for a long time are opened, those who first manipulate these materials, releasing the odorous substances, run the risk of a febrile reaction and inflammation.
Chapter XIV

Diseases of latrine workers

Let us now invite the doctors, lovers of elegance and cleanliness, to leave the apothecaries' shops, so full of the aroma of cinnamon and where they feel at home, and take them down to the latrines. There is no doubt that, as the saying goes, they would turn up their noses. Nevertheless, since one of a doctor's tasks is to examine the stool and urine to check the organism's internal functions every day, the very same doctor should not avoid such places. In doing so, they would become aware of the illnesses that afflict latrine workers who clean out sewers. "For a doctor must inspect the unseemly and handle the horrible", says Hippocrates.

Nonetheless, it is not inappropriate for a philosopher to occasionally stop contemplating the sublime and to study more practical things, thus arming himself with practical examples. In Plato's dialogue Socrates was right about this and while discussing the true nature of what is beautiful with Hippias, who was being patronizing, he asked whether it would be more appropriate to use a golden ladle or one of fig wood, when putting a beautiful pot full of vegetables on the fire. Hippias claimed he refused to argue with such a man, and Socrates shrewdly replied: "You are certainly right, my friend, for it is not right that a person such as you, with your beautiful clothes and fine shoes, and renowned throughout Greece for your wisdom, should demean yourself with such language; but there is nothing stopping me from conversing with him". Since the art of medicine has been reduced to a mechanistic pursuit, it is fitting to deal with those who perform mechanical tasks, even at the lowest levels, and to seek nothing other than the truth, as Plato indicates in the aforementioned passage.

I shall now relate the events that first inspired me to write this
Treatise on the Diseases of Workers. Owing to its size, this city is relatively densely populated with houses that are high and close to one another. It is therefore common practice in all these houses, once every three years, to clean the sewers that run along the streets. While this was being done in my house, I realized that one of these workers was performing this task in this “cave of Charon” with the utmost haste. Moved by such a thankless task, I asked him why he was working so quickly and why he did not take it a bit easier so he as not to tire himself overmuch. Raising his eyes from that hole, the poor wretch looked at me and said, “unless they have actually tried it, no one can imagine what it means to be in this place for longer than four hours; it is as if you’re made blind”. When he came out of the sewer I examined his eyes closely and noted that they were extremely bloodshot and clouded-over. I then asked him how latrine cleaners treated such ailments. He replied, “as soon as they get home, as I myself shall now do, they close themselves in a dark room and stay there until the following day, washing their eyes with lukewarm water every now and then; this is the only way to find a little respite”. I asked him if he also had a burning sensation in his throat, difficulty in respiration, headache, or if the smell did not make him feel nauseated. “Not one of these ailments”, he replied, “and with the exception of the eyes, there is not one body part that suffers from this kind of work. If I were to carry on working longer, I would go blind, as has happened to others”. He said goodbye and went home, covering his eyes with his hands.

Afterwards, I observed that many workers of this sort had become either purblind or blind altogether and were begging along the city streets. I am not at all surprised that such putrid fumes can harm an organ as delicate as the eyes. On the same subject, Bail­lou described the case of a Parisian worker whose eyes were also afflicted and which he ascribed to his job duties – he worked as a street cleaner. I was and still am amazed that it is usually only their eyes that are afflicted and the other organs remain unharmed such as the lungs, which are also extremely delicate, and the brain, which can be reached via the nose. Indeed, there is no logical explanation for this phenomenon.

I am inclined to believe that a volatile acid is released when the sewer is disturbed. This is supported by the way in which copper and silver coins that the latrine cleaners sometimes have in their
pockets, and by the copper utensils in the kitchens nearest to the privy that usually tarnish; furthermore, paintings exposed to such fumes blacken. But such fumes should also damage the lungs and blood, since nothing harms the former more than inhaling acids, and the latter is naturally sweet, as is testified by its very taste. However, these fetid fumes only attack the eyes with the greatest ferocity, with piercing barbs that deprive them of their very life—light. The curiosity of researchers might be satisfied by the fact that certain poisons exist in nature that are particularly harmful to specific organs of the body. For example, the sea hare attacks the lungs; cantharides beetle, the bladder; cramp-fish, the nerves; and over a period of three years between cleanings, undergoing various degrees of putrefaction, the fumes of human faeces become particularly damaging to the eyes, but not to other organs. Certainly, if someone else gave me such an explanation, I would not be convinced. And it is for this very reason that I do not like proffering it as a plausible explanation to others.

If the truth be told, there is nothing doctors like better and nothing they will discuss more heatedly than the particular effect of a certain substance on specific organs of the human body. In this manner they are able to rid themselves of difficult questions without great ado, but what it really means is that they are explaining something unknown with something else that is even less known. As per Bonet, Olaus Borrichius denies that cantharides is more harmful to the bladder than to the other organs. It cannot be denied that when administered orally or applied externally as a vesicant, this causes ulcers and act as an irritant, to the bladder in particular. According to the author, this is because when the volatile salts of the cantharides are mixed with the blood and carry the urine to the bladder, the latter is exposed without protection of any mucus and can therefore be pierced and excoriated. It does not have such an effect on the other organs because it does not reach them mixed together with only the serum, but are also with blood and mucus and this lessens their impact. Based on this, would one say that the putrid vapours from sewers damage those organs that are the most exposed and sensitive, in this case the eyes, with tiny particles that are like barbs eliciting lachrymation, to which it admixes generating a novel by product particularly harmful to the eyes alone, but not to the other organs where no similar by product
is produced? Olaus Borrichius describes the case of a wine-maker who would shiver and break out in a cold-sweat at the mere sight of vinegar and he asks himself, “Is it possible that the acid vapours affected his eyes and nose?”.

No matter what the cause and mechanism that results in the eyes of latrine cleaners and not their other organs being attacked by those awful vapours, it is a well-known fact that owing to their very nature, the eyes can both suffer from and pass on in equal measure. Eyes can be contagious: experience teaches that morbid ocular effluvia affects healthy eyes and medical experts concur in this view. As Ovid so rightly says: “Healthy eyes are infected by looking at infected eyes”.

It is therefore my belief that the spells commonly attributed to the power of one’s gaze are actually the result of an emanation of rays from the eyes of the spellbinder penetrating the eyes of the other as cognate elements and they then infect them. Plautus says: “In the name of Jupiter, take leave with your evil eyes”.

I met a young noble woman who was suffering from an incurable wasting illness until, upon my advice, she was distanced from her elderly doting grandmother and was brought up with other young girls. This caused a massive argument with the elderly lady who accused me of besmirching her as a witch in front of her young, dearly beloved granddaughter. No matter how I tried, I was unable to convince her that one of the characteristics of advancing age can be the production of ocular emanations harmful to the young. Eyes can transmit both love and hate, but it is more natural that those of the young express love, while those of the elderly all too often transmit gloominess and grimness.

This is not the right place to dwell on the eyes in greater detail, but I would like to cite a famous passage by Plato that describes Socrates while he is explaining how the famous inscription on the entrance of the temple of Delphi is to be interpreted: “Know yourself”.

Socrates says to Alcibiades: “Have you ever noticed that when a man looks another in the eyes, his image is reflected in the pupil of the other as if in a mirror? This central point of the pupil is called the living mirror of the one who looks in it. The eye therefore sees itself when it looks into the eyes of another and especially so, when it focuses on the point upon which his ability to see depends. In short, if the eye is to see, it has to look into another eye.”
However, to go back to our subject, it is medicine's duty to help these workers in some way. Their work is so indispensable in every city that the Civil Laws promulgated an edict protecting those who clean-out sewers from being subject to any forcible action, even if they trespass another's property. I recommended that these workers cover their faces with transparent bladders, as do those who work with red-lead, or that they should remain as briefly as possible in the sewers that they are cleaning; otherwise, if their eyesight is naturally weak, they should change trades and devote themselves to another so that they are not forced to go begging once they have become blind after working for a pittance.

I agree with the measures adopted by some of these workers as a result of their experience, such as staying in a dark room, rinsing their eyes with lukewarm water to soothe the burning and reduce the pain which, like a thorn, causes the nerves to contract with subsequent inflammation. Should the eyes become too bloodshot and there is danger of true inflammation, I institute venesection. When the inflammation has receded, I have them rinse their eyes with aromatic white wine, which has proved beneficial in these cases. Indeed, it stimulates the animal spirit to return from the brain and optic nerve and to reinvigorate the eye that they had abandoned because of that putrid odour.

In the past, this lowly task of cleaning sewers was considered a death penalty, as was digging in the metal mines, as we have already stated. Pliny relates that in a letter Emperor Trajan gave him instructions that those who had been sentenced to not more than ten years had to serve their sentence, while the older convicts, who had been sentenced to more than ten years, were to clean out the baths and the sewers, a task that was not all that different to the death penalty. Some readers might feel nauseated by the fact that I have dwelt so long on latrines and sewers. But there should be nothing that repels anybody who studies nature and even less so a physician. In Cassiodorus, a letter by Theodoric the Great puts the prefect of the city of Rome in charge of the cleaning of the sewers, "those splendid municipal sewers of Rome that astound its visitors, a marvel surpassing that of all other cities".
Diseases of cleaners of cloth

The word "fuller" occurs with great frequency in the writings of the ancients, but today many of us are ignorant as to what exactly this profession entailed. Pliny cites the Lex Metella regarding fullers which the censors Gaius Emilius and Lucius Camillus presented to the people for approval. In the next to last clause on questionable cases, one can read the following in this law: "a certain Jabollenus, who owned Flaccus, a dyer, and Filonius, a baker, bequeathed his to wife Flaccus the baker, as a slave". Ulpianus includes fullers amongst tradesmen, while Varro includes them amongst those employed in country villas.

From what we can glean from ancient writings, the art of the fuller consisted in cleaning woollen cloth, in particular, vestments. The Romans wore white togas that were easily stained and had to be given to fullers to clean and bleach which, according to Pliny, they did using the fumes of burning sulphur. To this day this procedure is still adopted to bleach woollen and silk garments. Indeed, it is true that the acid fumes of sulphur can bleach red roses as white as milk.

Just as it is today, in the past the city of Rome was full of mud and dust and so togas were soiled and sent to the fullers to be cleaned. First they would wash them with common clay, before using another kind of clay known as "Cimolian". Today, when oil stains a garment women also put potters' clay on it to stop the oil penetrating and spreading; then they leave it until the clay dries and comes off by itself. The spot disappears partly, if not completely, because the oil, which is so rich in acid, is absorbed by the clay, which has certain characteristics in common with lead and therefore precipitates acids.
Fullers also used human urine to dye garments red-purple. There is a witty epigram by Martial listing the various fetid smelling things for which a certain woman named Bassa was renowned. One of these was wool twice-dyed purple. In another epigram Martial says that Thais gave off such a rank-smelling odour that not even “the old vessel of a greedy fuller that broke in two on the street” could smell as vile.

I shall not go into the interpretations of various authors regarding the strong smell of wool dyed twice in purple and a miserly dyer’s old vessel that gave off such a rank smell. I shall limit myself to some observations the learned Zarotti includes in his book *De medica Martialis tractatione*.

Fullers, wool-workers, and dyers use human urine in their craft. This can be deduced from Pliny when he writes that “human urine cures gout and fullers are never afflicted by this illness”. The same thing can be inferred from Galen when he relates a quip by Quintus, a famous physician in Galen’s times. Unlike many others at that time and today, too, who claim they can diagnose many illnesses from the chamber pot as if it were an the tripod vessel off the oracle, he placed no importance on the study of urine and claimed that any analysis of that kind was more appropriate to a fuller than a physician. Another testimony comes from Athenaeus, who records the opinion of Mnestheus, an Athenian doctor, who used to say that unless an abundant amount of wine had been imbued beforehand, our urine is more acrid and therefore better used by dyers to clean garments.

If in antiquity urine was used regularly in the fuller’s trade for cleansing wool and garments, this practice has still not been completely abandoned in our time. Inside the workshops of cloth-weavers where wool is carded and woven, one can see small barrels for the workers to urinate in. Before being used, this urine is stored until it putrefies. On my visits to such workshops, at times I have noted the most terrible smell. When I asked where it came from, I was shown a barrel full of urine which, according to the rules of their trade, all the workers had to urinate into.

Our fullers use urine in the following manner – once the cloth or other fabrics have been woven, to remove oil and any other dirt they are soaked in a wooden vessel filled with equal amounts of urine that has been thus stored and luke-warm water, together with
a piece of Venetian soap. Immediately afterwards, the garment is trampled on underfoot so that the mixture penetrates through and through and the cloth is completely soaked; this operation is then repeated two or three times, throwing away the previous liquid and replacing it with a fresh mixture. Once this is done, the dyers squeeze the liquid out with a press and then wash the cloth with clean water and Venetian soap. This is how cloth makers bleach their cloth so it can take on any colour more readily. It is to be assumed that the earliest fullers also soaked their wool garments in urine and then trampled on them with bare feet. This might be why Pliny claimed that fullers were not readily afflicted by gout.

In Rome in the past, a densely populated city where silk was little or rarely used, fullers and dyers were always busy cleaning soiled togas and dying wool purple. When the stone vessels used to store the urine broke, the shards thrown on the street would torment the passers-by with their rank smell.

Being surrounded by the disgusting smells of putrefied urine and oil, in hot rooms and often half-naked, fullers and cloth-makers nearly all become cachectic, pale, short of breath, cough-ridden, and nauseated. This stale air, saturated with such corrupting odours reaches the vital organs; the lungs are harmed and obstructed by the oily and putrid particles that also reach the principal visceral organs and all the body, thus affecting the entire blood mass. Here it must be added that the cutaneous pores are easily obstructed by those oily substances and, as a result, these workers are afflicted by all those illnesses caused by such blockage.

Hippocrates makes abundant reference to the illnesses of fullers and Marinelli includes several: “a fuller’s neck and head, etc.”, “a frenzied fuller of Syros with leg inflammation, etc.”. Hippocrates also mentions a strange almost epidemic-like illness afflicting many fullers: “they had hard painless swelling in the inguinal area, similar masses in the pubic area and neck, fever up to ten days, spasmodic coughing, etc.”. In his comment on this passage, Valles claims that Hippocrates was describing just a single fuller and to suppose that many were all afflicted by the same illness is an invention. However, commentators such as Foes, Mercuriale, Marinelli and others interpret the passage as a reference to numerous workers, if not the whole class of fullers and indeed, in Greek the text says “the fullers with buboes”. It is likely that Hippocrates was referring to a
complex set of pathological phenomena that arise more frequently in fullers than in other workers, not just because of their poor diet, but in particular because of the toils of their trade which, as we have already seen, cause diverse illnesses. Hippocrates himself states that very often it is none other than the excessive dampness in the air that causes illnesses, adding that more men than women are afflicted and of the latter, slaves are more seriously afflicted and nearly all die, while free women are afflicted by forms that are “of a more benign nature”. Pliny also agreed that “it has been observed that not only servants, but at times the upper class can also fall ill!” In my work, *Constitutiones mutinenses*, I described a rural epidemic of tertian fever that afflicted only farmers in 1690; the following year there was another epidemic, but this time it afflicted only the townspeople with the exception, however, of Jews. Quoting Schenck, Paulmier also says that in Paris during a terrible plague, leather tanners were the only ones that did not fall ill. Thus it is very likely that Hippocrates was describing an illness of fullers as a class affected because of the adverse atmospheric conditions and suffered the same fate as any others carrying out such a filthy trade. (To understand how an illness can be caused by adverse atmospheric conditions, it suffices to consider how the south winds can melt and liquefy dense humours and carry them to the glands in the groin and neck).

However, if one is searching for a simple way to protect the health of these workers and free them of the foul material they have in and on their skin, one must resort to the most effective remedies offered by pharmaceutical science. First and foremost, emetics have proven themselves the most effective in the cases of cachexia and low grade fevers these workers labour under. Next come the stronger laxatives that are able to purge the denser humours; the milder ones cause more trouble than they help because they constipate and make the humours passive. Relatively effective are aperitifs and decongestants such as Fernel’s Cachectic Syrup, the alkaline wines described by Willis, spirit of urine, or pure urine itself, taken orally. Blood-letting should be performed with caution. It is not that I disapprove if the illness is severe, but since the blood of these workers is unhealthy and thick, I believe blood-letting should not be carried out as freely as is the case with others.

In ancient times, in Rome in particular where there used to be
countless public baths, the workmen who carried out certain trades benefited greatly from washing the filth off their bodies every now and then and reviving their lagging strength, something Baccio rightly points out in *De thermis*. Nowadays, however, this excellent practice has been abandoned and urban workers have been deprived of this singular benefit. To eliminate the grime that is hindering their perspiration and to get rid of their characteristic smell, as soon as they fall ill, I make sure they wash their bodies with a sponge drenched in heated aromatic white wine and that they let themselves be scrubbed. As a precaution, I usually encourage them to wash carefully in their own homes, on holidays at least, and to put on clean clothes when they go out. Indeed, it is surprising how the soul is revived by washing and wearing clean clothes. For this reason I cannot criticize enough the current opinion, one also encouraged by a number of doctors, stating that those who are ill in bed should not have their clothes or sheets changed to avoid sapping their strength. The Divine Preceptor himself made a fundamental statement on this subject: “The sick like to have their food and drink served with cleanliness and delicacy; to see and be touched by softness”; Valles wrote a well-expressed comment on this passage.

At this point I find it even more surprising that in his book *De febribus doctrina nova*, Lazar Meyssonier criticizes doctors who say those with a fever should have their sheets and nightshirts changed, saying that nightshirts that have just been washed have an alkaline quality and thus favor coagulation. However, the detergent and resolvent capacities of lye are generally well-known. With all due respect to such a great man, I fail to see how soiled garments may increase the strength of one with a fever, as claimed by the learned Verulamio in his book *Historia vitae et mortis* that Meyssonier quotes to support his opinion. It is true that Hippocrates wrote that “clean clothes should be worn during the winter, while soiled garments soaked in oil should be worn during the summer”. However, even though Galen believed this statement actually came from Polybius and not from Hippocrates, it is significant that it refers to the diet of the healthy and ways to make the thin gain weight and the obese to lose weight. Indeed, it is true that the thin should not bathe or change their clothes too often in the summer, to avoid losing further weight through excessive perspiration and dispersion of the spirits.
Here I have no choice but to quote the words of the much-learned Valles: “Common physicians err when they forbid the sick to change their nightgowns, their bedding, to wash their hands and faces, and to follow other hygienic practices, especially in the case of a lengthy illness; it is as if it were greatly advantageous to the sick person to roll around in his own as if this would not augment the putrification”. Lievin Lemmens and Gaspar de los Reyes may also be consulted on this subject. Personal hygiene and a change of clothes should be recommended repeatedly to fullers and any other workers in dirty trades to impede, as far as possible, illnesses caused by rankness and filth.

Before leaving the fullers’ workshops to visit others, I would like to digress and repeat an admiral comment made by the learned Zarotti on the previously mentioned epigram by Martial. Since it was frequently the case in Rome during Martial’s days that passers-by were bothered by the vile smell from vessels the fullers had thrown on to the public streets, Zarotti speculated as to why Vespasian, according to Suetonius, imposed a tax on the urine of the Romans. It is very likely that during that period there were amphorae placed in public places to collect urine, in view of its extensive use to clean garments and apply red-purple dye. Zarotti states that it is probable that Vespasian used this as an opportunity to impose a tax, since money smells good, no matter where it comes from, and according to Cedrenus, Byzantine emperors were also quick to do the same. When Macrobius has Quinto Titius rebuke the drunken jurymen with the following words, “There is not one amphora they do not fill in the alleys, because their bladders are always bursting with wine”, he lets it be understood that these urinary jars were available to everyone.

Since I have considered urine in such detail, I have no choice but to include an observation that I have made more than once, and that is, its ability to remove obstructions and stimulate menstruation. I have met numerous young nuns who managed to have a regular cycle by drinking their own urine after not having any menstruation for months and not being able to find any other remedy. This made menstruation reappear. It should also be added that this kind of remedy has become common practice in convents.

I am well aware that drinking urine in various illnesses is no new practice, such as in dropsy, despite what Celsus said hap-
pened to one of King Antigonus' servants, who died after drinking his own urine. But the self-same author reassuringly adds that the man was well-known for his excesses. My observation that urine stimulates the menstrual flow corresponds with what Pliny writes, which is that "the vapours of urine from prepubescent young boys cause the menstrual flow in women". This remedy does not appear illogical and it would be easy to demonstrate, especially if the urine is from the early morning, that is, what Van Helmont calls the "urine of the blood". However, sal ammoniac or its spirit are administered to remove visceral obstructions. Human urine together with common salt produces artificial sal ammoniac, while the natural product, which used to be imported from Africa, is found in the sands around the Temple of Jupiter Ammon and is made with camel urine. Once it has absorbed the various salts and serum of the blood mass and enters circulation in the form of a serous fluid, human urine acts as a laxative. Solenander says he obtained good results when he told peasants to drink their own urine in the case of the hardening of the liver and spleen. However, for those who are willing to imbibe a medicine produced in the chemical workshop of the bowels, I believe it is more hygienic if they drink the urine of a healthy rather than a sick man, as Doctor Rosinus Lentilius so skilfully showed with such foresightedness in the Ephemerides wherein he dealt with this very subject. However, it is not at all easy to persuade people to drink the urine of another person, unless it is that of a child which is, on the other hand, weaker than that of an adult. Indeed, it is lighter in colour and weaker and does not contain much spirit and volatile salt.

In all likelihood there is not a single chemist who has studied human urine without recognizing its soap-like and detergent properties. However, due to the great diversity of the salts it contains, no one has been able to determine what its main active substance actually is. When it circulates through the vessels, the watery fluid, or rather the blood serum, absorbs diverse salts from the great variety of food and drinks we imbibe with their multitude of varied flavours, taking them to the renal tubules and then the bladder. This would then explain the greatly differing tastes of urine, although the predominant one is salty and slightly bitter. Willis wrote an excellent treatise in which he claims that human urine is mainly made up of watery fluid, a smaller percentage of salt, sulphur, earth,
and a certain amount of spirit. Chemical analyses have shown very clearly that there is a considerable amount of common salt in human urine, so much so that an acid spirit can be extracted from it. However, it is not easy to determine what urine salt actually is, or what characteristics it has, despite the extensive efforts chemists have made in this area.

Van Helmont simply says that urine salt is one of a kind in the system of nature. Indeed, it is not “sea-salt, salt from springs, rock-salt, sal-gem; it differs from saltpetre, from mineral salts, alum, borax; in short, it differs not only from natural salts, but also from the salt in animal urine”. I believe it is more difficult to determine the nature of human urine than that of any other animal species in view of the fact that the diet of animals is much more simple than that of humankind that eats food from all sources “mixing roast and boiled, and oysters and thrushes”, as Horatio says. However, everyone knows that human urine is used in the preparation of specific remedies to cure various illnesses, especially chronic ones, and even today, the spirit of sal ammoniac, which is a derivative of urine, is considered a universal remedy.

To go back to the subject of the putrid urine that fullers use to clean garments, I know that although chemists have analyzed both fresh urine from healthy people and aged urine that has been ripened for a considerable time with horse manure, and they have not been able to determine which salts and volatile spirits can be extracted from either. The fact is that for their experiments, the authors of Collectanea Chymica Leydensia only used fresh human urine, while fullers are aware that the detergent characteristics of fetid urine are much stronger than fresh urine, even if they are ignorant as to why this is so. Aristotle wonders why urine is smellier the longer it remains in the body. His reply is complicated since he says that it might be because the urine becomes denser the longer it is retained, whereas fresh urine is more similar to the drink that has just been imbibed. Yet, a more helpful answer might be that urine retained in the body for longer periods is smellier because it is the urine of the blood, and this means it has absorbed all the impurities of the blood mass, while the other is the urine of what has been drunk. In all likelihood, human urine that is kept for a long time, such as that used by fullers, ferments in the jars that are impregnated with rot and the watery part evaporates, thus making
it more pungent and giving it greater cleansing powers therefore making it suitable for cleaning. Columella recommends that to treat sheep with scabies old human urine should be infused through the mouth or nose. And he goes even further, recommending that a scabbed sheep should be placed on its back in a ditch in front of the entrance to its stall so that the entire flock can urinate on it. He claims this will restore it to health.

Some might object that if the properties of human urine are so extraordinary and it is used in the preparation of countless remedies to remove obstructions and cure chronic ailments, and if this is why fullers are not afflicted by podagra then why, as has already been pointed out previously, do fullers suffer from cachexia and are subject to low grade fevers and other illnesses caused by the blockage of humours? My immediate reply is that it is not due to the offensive smell of fetid urine but rather the wool impregnated with in oil and extended periods confined and filthy spaces labouring half-naked that affects these workers. However, there is no doubt that the constant intake through the mouth and nose of such rank-smelling fumes fouls the purity of the animal spirit. Just as remaining in a place that is saturated with pleasant odours for a length of time can cause ailments, the same occurs with unpleasant odours, even if they can, at times, stimulate an otherwise torpid spirit.

Before closing this chapter I would like to mention that in antiquity, in this city the fuller's trade (of which only a few vestiges remain) excelled and was so exceedingly lucrative that there was one fuller so wealthy he wanted to sponsor for the inhabitants of Modena a gladiatorial exhibition. A cobbler did the same in Bologna on the same date. Mocking the unhealthy pride of these two workers who were seeking popularity by squandering their own wealth Martial has the following epigram: "Oh, Bologna, home of culture, a Cobbler has given you a show, a fuller did the same in Modena; who knows where the innkeeper is to give his?"

In ancient times the quality of wool from the Modena region was so highly appreciated, especially the wool from flocks that grazed on the plain and in the countryside between the Panaro and the Secchia, that Columella ranked the wool from sheep that "graze in the arid fields around Parma and Modena" as the best of all the Gallic wools.
Chapter XVI

Diseases of those exposed to harmful substances such as oil pressers, tanners, and in other dirty trades

There are still a great number of foul-smelling workshops we have yet to visit that guarantee not only lucrative compensation, but also a wealth of illnesses: these are the workshops of oil-pressers, tanners, string-makers, butchers, sellers of fresh fish, sellers of salted fish, cheese-makers, string-makers for musical instruments, and candle-makers. I must confess that every time I set foot in one of these places my stomach turns and I am unable to stand the rank smell for long without having a headache and wanting to vomit. The law correctly forbids these workers from carrying out their trades in their homes so that they must work outside the city walls or in the suburbs, as we can read in Cepolla, Paolo Zacchia, and other authors. Let us start this chapter by discussing oil-pressers.

This part of the country is a great producer of nuts and a considerable amount of nut oil is produced which everyone uses for illumination at night, since it is much cheaper than olive oil. In all the areas on both sides of the River Po, olives are not typically cultivated and the olive oil that we consume generally is imported from Tuscany. Oil is extracted from the nuts in the same way as from olives. The kernels are ground in a mill until they form a soft paste that is then boiled in a large copper skillet; the paste is then put through a press to squeeze out the oil. During this process, black fumes and offensive smells are produced such that the workers cannot help but inhale these rancid vapours. As a result, those who mix the paste, and those cooking it in the cauldrons in particular, are afflicted by serious illnesses such as cough, difficulty breathing, headache, vertigo, and cachexia. In addition, these workers always wear filthy clothing and are often very dirty themselves, so their skin pores are blocked and suffer, therefore, from acute illnesses,
particularly affecting the chest, since this is a trade that is only carried out during the winter. Anybody who has been in a closed room without ventilation, either reading, writing, or doing something else for a number of hours by the light of lamps burning nut oil, will know just how injurious to the head the smoke given off from nut oil is. When the room is full of smoke, one comes out with a severe headache, vertigo, and feeling stuporous. I have met various people who have suffered from the fumes of this oil in a closed space and it was just as harmful as coal smoke. This was the case with a scholar who was forced by poverty to use that oil late into the night to study in his small room and was then lethargic for several days.

Workshops where linseed oil is prepared are no better. This oil is frequently used in this region for illumination at night, in particular when nut oil is difficult to come by; and those who extract it are afflicted just as seriously.

The same applies to tanners who steep animal hides in a vat with lime and gall, treading them with their feet, washing and cleaning them before greasing them with tallow. Thus these workers are exposed to stench and putrid vapours; they appear cadaverous of face, morbidly swollen, sallow, short of breath, and are nearly all suffer from disorders of the spleen. I have noted that many of these workers suffer from dropsy. Living continually in such damp places and inhaling the air polluted by the harsh vapours of half-putrefied hides, how is it possible for the spirit, whether vital or animal, not to be poisoned, thus corrupting the entirety of the body as a structured whole? I have often observed that no matter what stimulus is offered or how much one insists, it is impossible to force horses to go past such workshops because as soon as they smell that stink, they go straight back into the stall as if they were mad, and no longer heed the reins. Just as with all the other dirty trades, this is why the establishments in which tanning is carried out are situated near the city walls or outside them altogether, as in Modena, to ensure the air remains unpolluted. In his case history of Philiscus, who died of a malignant fever after six days' illness, Hippocrates perceptively describes the place where he lay ill: "Philiscus lived near the city walls"; in his annotations to this passage, the esteemed Mercurial points out that the Divine Preceptor "added the words, 'near the city walls' to indicate the unhealthy place the sick man was living in: the areas along the walls are always the
most unhealthy, because usually all the city rubbish is taken there, animal carcasses, and the other foul materials”.

In ancient times in Rome it was in the Tiber area that the dirtiest workshops were to be found, in particular those of tanners, as Martial said when he listed the rank smells of Thais, also mentioning those of dog pelts soaking in the Transtevere area: “More than a he-goat fresh from love-making, than lion’s breath, than a skinned Transtiberine dog”.

Juvenal also mentions the characteristics of the district where the poor lived and the dirtiest trades were done: “Nor should you be disgusted by wares that must be banished across the Tiber”.

On account of this, the air of this area was infamous among the Romans, marked by the tremendous stench resulting from such filthy crafts and rank wares. According to Philo, this was why in ancient times the Jews, who had settled in that part of the city since it was forsaken and cheap, gave off such a rank smell; and not because this stench was inborn or innate, as even now is commonly given credence.

Those who make strings for musical instruments can also be placed in the same class as tanners – since they have to remain in damp, smelly rooms where they prepare animal intestines, washing and opening them out; as a result they are afflicted by the very same ailments: sallow-faced, cachectic, and with swollen legs.

Cheese-makers also belong in the class of those who work with filthy materials whose stench is their own hell to bear. In particular, I am referring to those cheese-makers who produce huge wheels of cheese from cow’s milk, just like the ones from Luni mentioned by Martial: “One Etruscan cheese stamped with the crest of Luni will supply a thousand lunches for your slaves”. The same can be said of our Parmesan cheese or those from Piacenza, Lodi or other towns in both the Cispadane and Transpadane. The smoky, acrid fumes from this cheese are extremely harmful to the workers. In Italy, this kind of work is rarely performed in urban areas and is relegated to the farms and the countryside. However, in this city the Jews, who for religious reasons do not eat things they have not prepared by their own hands, make cheese with the milk brought to them in the summer from nearby farms, and one can smell a terrible stench that attracts all the flies in the workshops where they produce it.

In his treatise De casei nequitia, Johann Peter Lotich describes
a street in Frankfurt where cheese is produced; a terrible stench comes from that street and he believes that was what caused the plague that wracked the city.

However, it is my belief that there is no Cave of Charon, no Camarine swamp stirred up, as the old adage goes, where the workers are more afflicted by the stench than in those places where tallow candles are made. Indeed, it is not just the workers, but also the inhabitants in nearby houses who suffer the consequences. This might be why such production is banished to the poorest city districts and along the city walls. Zacchia rightly points this out, in particular noting the workshops where tallow candles are melted. Indeed, when the goat, ox and pig fat begins to boil in the metal cauldrons, fetid and nauseating vapours are given off that torment the entire neighbourhood. The workers standing over these boiling metal cauldrons take up through the mouth and nose fatty particles that then obstruct the tubular tissue of the lungs, impeding respiration and causing headache, and especially nausea and vomiting. Nothing causes nausea or the urge to vomit more than fat, indeed its very sight, let alone ingesting it. This might be why most find fat women with excessively large breasts abhorrent. Martial banished this stock of women faraway: "fleshy" he declared, "not fatty". It is a well-known fact that fatty, oily substances, even if they also contain acids, neutralize the gastric juices that stimulate hunger. To satiate voracious hunger, Galen rightly advises fatty, oily foods, since they blunt the sharp elements of the acid that erode the membranes of the stomach. For the same reason, Avicenna recommends that fatty foods such as cow's fat should be part of a traveller's diet and describes, how after having drunk one pound of violet oil together with fat, one such traveller had no difficulty at all in fasting for ten days. It is therefore not at all surprising that these workers suffer perpetually from loss of appetite and nausea.

I have frequently had occasion to observe women who live near such workshops suffering from hysterical passion caused by none other than those corrupted odours. Some might find this strange, given that Hippocrates recommends holding an offensive smelling substance to one's nostrils for a hysterical condition. Pleasant smells do not always bring on suffocation of the womb; on the contrary, there are some, such as cinnamon, nutmeg and the like, that are recommended as a remedy for women suffering from such ailments.
Orazio Augenio himself says that they are “infallible remedies” in such cases, and not even the learned Etmüller or Hippocrates contradicts this and, in De natural mulierum, the latter recommends highly aromatic wine. Similarly, hysterical fits are not always calmed by putting foul smelling substances to the nose, as Foreest observed. The fact that the fumes of a snuffed out lantern can induce hysterics and kill a foetus is ancient observation. I am not in the least surprised that the putrid stench of tallow puts the animal spirits in irregular movement and, simultaneous to nausea, the stomach is contracted upward and the uterus is overthrown. Sometimes I have even seen delicate women faint or be overcome by hysterics because of the smell of tallow candles being used for light at night.

Solenander discusses the danger of tallow candle smoke and describes how his brother Johann, who was studying hard in candle light, was afflicted by a serious illness of the lung and brain. He also adds that ox tallow gives off an even more noxious smell than that of ewes or rams. I believe, however, that the most rank smelling tallow candles are those with pig fat mixed in. An interesting report published in Acta Medica et Philosophica Haffniensia describes the case of a woman who, while making candles intended for market, was overcome with a terrible headache, vertigo, reddened eyes, and difficulty breathing. Olaus Borrichius treated this woman by inducing emesis and then administering waters beneficial to the chest, prepared with oxymel of squill and honey. According to the author, this appeared to put the enemy to sleep but just a short while later, once these remedies were left off, she experienced orthopnea and had to take the medication again, cursing her trade and urging her fellow workers to carry out their trade outdoors if they wanted to protect their chests.

I would also urge scholars not to use tallow candles when they are studying, if possible, and, if they have the financial means, not to use wax candles, but rather lamps with the olive oil that was so sacred to Pallas Athena, as did the ancient scholars of science, whose works were praised if they smelt of the lamp. Fortunatus Plemp gives the same advice, while adding that the smell of tallow candle smoke can cause miscarriage, as can the lamp smoke mentioned by Pliny.

The remedies suggested by the illustrious Borrichius should be used to cure these workers – first and foremost emetics, such as
antimony; strong cathartics; and acrid abisters, especially those prepared with vinegar such as oxymel of squill and the like, since nothing breaks up and cleans away fat better than vinegar.

Every effort must be made to detach and remove those greasy particles that obstruct the viscera and skin of these workers, both internally and externally, and which affect the spirits and block transpiration, both in the above-mentioned illnesses and in any other illness caused by climatic conditions. The suspicion must always remain that once inhaled while working, those noxious particles can harm both the humours and spirits. This is why caution is called for when prescribing blood letting for these workers. Indeed, if too much blood is drawn, their strength and spirits diminish and they are inherently weak and feeble given that they are nourished by tainted blood.
Diseases of tobacco workers

If permitted, I would now like to go from such filthy and rank smelling trades, to those that delight both the eye and nose in our days, that is, the workshops where they prepare tobacco (to use a term that has now come to be adopted). This powder, made from the grass of Nicotine is an invention (or rather a vice) of this century (at least in Italy). Its consumption has become so widespread amongst men, women, and even children, that its purchase has become part of a family’s daily expenses. The workers who prepare powdered tobacco know all too well what harm it does to the head and stomach. Amongst the many goods that arrive from overseas, in particular through Livorno, the Tuscany port, is a kind of coil made of the leaves from the aforementioned plant, twisted into a cord, which the workers have to open out, unroll, and place in a mill, reducing it to powder. While blindfolded horses are working the mill, the workers continually have to turn the leaves over, and, until they get accustomed to it, they are troubled by major headaches, vertigo, nausea and incessant sneezing. In summer in particular, when the particles are ground fine, such strong odours are given off that the whole neighbourhood complains of it and is frankly nauseated. Even the horses working the mill frequently toss their heads, coughing and snorting, thus attesting to the how the tobacco vapours attack them. I met a young Jewish girl (tobacco, as is the case for other goods that are subject to taxation and “contracted out to Jews, whose sole belongings consist of a basket and a little hay” [Juvenal]), who would spend the entire day unwinding those flat coils of tobacco and as a result suffered from a great urge to vomit and frequent attacks of diarrhoea; she also said she had profuse bleeding from her haemorrh after sitting on the tobacco rolls.
This is not the appropriate place to go into the use and abuse of tobacco; others have already done so. For further reading on the subject see the treatise by Magnen and the much-learned Ettmüller whose work, recently republished in Frankfurt with considerable additions, contains a very detailed treatment of tobacco and the medicines prepared from it. Everyone admits that the excessive use of tobacco is extremely harmful; other authors also testify to this. For example, van Helmont, who abhors smoking and claims that it is none other than smoking that causes the yellowing of the stomach he has observed, attributing this to an unidentified poison.

Both Simon Paulli and Morton claim that the lungs are weakened and dried out by tobacco smoke which slowly but surely induces a wasting state. Theophile Bonet can also be consulted on this subject. On the basis of numerous autopsies, he claims that the lungs and brain are damaged not only by smoking, but also by taking snuff. The fact that tobacco contains a strong pungency, as do all substances that induce sneezing, is clearly demonstrated by the irritation it causes when put in the nose or when chewed; its poisonous reek always makes a smokers' breath offensive.

Thus, these odours and the tobacco powder itself, which is just as harmful because it is so fine, are to be found in the air in large quantities and enter the nose and mouth of the workers whose lungs and tracheal membranes are irritated and dried out. These poisonous fumes cloud the spirits in the brain until they are ob­tunded by their narcotic qualities, while also altering stomach fer­mentation by weakening its acids.

However, I do not want it to be said that I am speaking ill of a plant that is so famous it has been honoured with the title "Queen"; one that is so pleasing to Europeans, in particular in those countries where its commerce is a source of such profitable revenue to the State. Illustrious authors have also written a great deal on the virtues of Nicotiana which, without a doubt, deserves its place amongst medicinal plants. The only thing that might be criticized is its excessive and inopportune use, which has made it so popular, but also given it such a contradictory reputation. There is more than sufficient proof that tobacco leaf contains many volatile salts, and this explains its quality as a cleansing agent that is so useful in alleviating excessive acids. This is why Epifanio Ferdinandi recommends its use in the form of a boiled extract for empyema, praising
it as one of medicine's greatest remedies. It is a well-known fact that when chewed, tobacco leaf induces abundant phlegma, but there is one detail that needs clarifying—chewing and drawing our copious fluids are not salubrious to everyone in the same manner. Those who are obese and abound in "thick juices" will benefit from snuff, but not those with a bilious and irascible temperament as Wilhelm Pison so rightly points out. I myself have met a considerable number of people who have wasted away from this sort of chewing. When they see the constant dribbling from their mouth falling like rain, they mistakenly flatter themselves they are looking after their health, and I have had great difficulty in persuading them that there was no point drying up the sources of saliva and thus depriving the entire body of this nutritive fluid. This incurable bad habit of chewing tobacco leaves and inhaling smoke has conquered so many men that I believe this vice is one that is "always condemned, yet always retained".

Many claim that when chewed or smoked in a pipe, tobacco suppresses the appetite, so much so that it is possible to go on long journeys without being troubled by pangs of hunger or a rumbling stomach. Willem Piso claims that during his travels in deserted places he would chew tobacco and felt neither fatigue nor hunger. Van Helmont asserts the same thing stating that occurs "not because Nicotiana satiates hunger in the sense of a satisfying the want of food, but because it abolishes the sensation of such want, at the same time blocking functional activity". Etmüller says much the same as Van Helmont when he claims that, like all narcotics, tobacco makes the spirit stuporous and its volatile, oily salt impedes the acidic fermentation of the stomach which, in turn, inhibits pangs of hunger. If the truth is to be told, more than once I have had occasion to observe that those who smoke and chew tobacco, just like immoderate wine-drinkers, are nearly always afflicted by lack of appetite. In the same way that wine and spirits render ineffectual and break down the stomach acid, constant chewing of tobacco and smoking also debilitate the salivary fluid and the hardness of the stomach, thus the sense of craving is scarcely perceived. The learned Plemp affirms this, stating that tobacco has absolutely no nutritional value but, with abundant pituitous humours thus drawn into the mouth and then swallowed, it satiates a stomach that is actually hungry and in need of food.
Just as in the art of cooking, it is surprising how resourceful the nose is in inducing and devising so many ways and tricks to season and prepare tobacco, whether coarse or fine, aromatic or unscented, to meet each person's particular taste. Tobacco is pleasing not only to the nose, but also to the palate and, when it is inhaled with the smoke, it is exhaled via the mouth and nostrils. Each time I happen to see these tobacco users drawing snuff up the nose so avidly, or inhaling the smoke and then puffing it out again, I think of Ariosto's Orlando who restored his lost wits through to his brain through his nose, or of Cacus fighting Hercules in a cave on the Aventine: "Black clouds he belch'd and flaked of livid fire - a river of smoke and floods the cavern with dark blinding fog".

But what remedies does medicine offer for tobacco-workers? When the cause of their illness cannot be eliminated and the sweet smell of monetary gain makes that of tobacco less perceptible and offensive, these workers should be given the following advice - when grinding, sifting or handling these materials in any way (and to do without them would be the same as doing without wine and bread, since our spirits would suffer, as would all social life), they should try and protect themselves as best as possible against that particles floating in the air by covering both their nose and mouth, inhaling fresh air whenever possible, washing their faces with cold water and frequently sipping water and vinegar to rinse their throats; and they can even drink a little because nothing is more suitable than acid beverages for washing away and neutralizing the particles that have adhered to the throat and stomach. Melon seed emulsions, pearl barley brew, cow's whey, and rice boiled in milk have proved effective measures to lessen such effects. Since the work is carried out in closed, damp rooms, especially grinding tobacco leaves, and the workers complain of headaches and nausea, I tend to prescribe emetics as the quickest way to eliminate the dust they have inhaled, given that by its very nature it provokes vomiting.

Since smells, whether pleasant or unpleasant, can cause serious harm to workers, I would have liked to digress and take a closer look at various aspects of the nature of odours. However, I have shied away from the vastness of this subject since, if I had not done so, my interest in the matter would have distracted me too much from my original aim. Having considered this problem and I have seen that both ancient and contemporary doctors and philosophers
have written a considerable amount on odours, yet from the perspective of natural sciences a complete and detailed work still has to be published. Thus I have thought through this idea and see how to go about writing a natural medical history of smells – a study of the nature of smells according to the philosophical opinions of the ancients and moderns; differentiating them into classes according to their characteristics, idiosyncrasies, causes, where they arise, their composition and combinations, and then do the same for the ointments of the ancient. From there I then would have studied the medicinals derived from odorous substances which, according to the moderns was the origin of the spirituous medicinals, and I would then have gone on to describe the perfumes of the Bible mentioned in sacred texts and used by the Jews in their sacrifices as well as those used by various other nations such as the Greeks, Romans, Egyptians, and Indians for incense and expiatory ceremonies to placate and invoke the gods. I soon realized, however, that these subjects would have to encompass complete and universal history, thus creating a single work that included all of the above-mentioned, with the addition, however, of my own observations in various experiments. Some time ago in his outstanding philological dissertation, De odoribus, the Roman doctor Petrus Servius promised to write a physical treatise on this topic, but as far as I know, he has not fulfilled this. However, I have no intention of pledging myself to such an undertaking that would require “too much time and too much oil”. From afar and at first glance there are a great many things that appear smooth and easy, but then one discovers just how arduous and full of difficulties they are. And as the poet so rightly said: “Our plans are impressive and our greatest undertakings done as rapidly as possible”. 