Diseases to which vintners, brewers of beer and malt-makers are liable

After having looked at the sources of liquor that nourishes us at the start of our lives, we shall now look at another one, which cheers our meals and convivial gatherings. If we want to discuss the illnesses that afflict wine-makers, we have to visit the wine-cellar where they make the wine during the autumn and, through distillation, extract spirit of wine, commonly known as aqua vitae. I shall not go into the drunkenness caused by too much wine, but rather that caused by the smell and spirit of wine pervading the air that enter inhale through their mouths and noses. Indeed, since such workers spend the whole day putting wine in bottles and removing the rape from the vats, even those who are abstemious are overcome with drunkenness and suffer accordingly.

Wine and aqua vitae are two of the main products from the Modena region, in particular the area between Secchia and Panaro. Vast quantities of aqua vitae are produced on both sides of the River Po, and each year thousands of casks are sent to Venice, Milan, and other cities. The sight that in autumn it is certainly a sight worth seeing: huge wine-cellar, enormous vats, endless lines of casks and the laboratories where the wine is distilled. Since experience has shown that large quantities of aqua vitae can also be extracted from rape, this is kept in vats for an extended time, pressed down by large beams, left to effervesce and ferment together with the wine for months, even throughout the entire winter. Once the wine has been poured into casks, the rape together with portion of wine is put into large copper vessels and then distilled. The workers used to extract the juice remaining in the rape by pressing this, but then they discovered that greater quantities of spirits could be produced by distillation, even if this
meant a much more laborious process, and as a consequence pressing was eliminated.

Once the distillation process has been completed, the workers then empty the steaming rape from the copper vessels, replace this with new material, then pour the liquid into casks full of aqua vitae. Nearly all the workers become inebriated doing so. Although this work is not usually carried out in cellars or closed rooms, but in spacious arcades, the concentration of aqua vitae vapours produced is so high that if anyone steps inside who is not used to these places is unable to bear the pungent odour for long. Even the chickens and other domestic fowl, pigs, and other animals in these places that feed on the hot rape emptied from the vessels become drunk. Performing such tasks for months or even the whole winter in these locations, these workers become lethargic, weak, gaunt, dispirited, suffer from vertigo and lose their appetite.

If one wants to know what really causes drunkenness, we need to ask the following question - which property of wine causes this? Is it an acid, an alkaline, a fixative or a solvent? Ettmüller looks at this problem in great detail and reviews the divergent opinions of authors on the subject, including their relative arguments. He rebuts the opinions of Tachenius and Becke and others who believe it is the acidic component that causes drunkenness, concluding that it is an alkaline and sulphurous element that possesses the power to inebriate.

I once had the occasion to discuss this subject with a learned man, an experienced chemist, and he attributed this inebriating property to a volatile acid in which wine abounds and that transforms the must to wine. To prove his theory, he presented extremely sound arguments and reasoning that I shall relate in brief. His evidence is as follows:

1. Van Helmont's interesting experiment which shows that under the effect of sal ammoniac aqua vitae congeals into a white mass almost instantaneously, the density of which is proportional to the purity of the spirit of urine used;
2. When mixed with aqua vitae, the effervescence observed in warm blood if admixed with aqua vitae is increased as it is with spirit of vitriol;
3. Tinctures of castor, myrrh and the like prepared with aqua vitae are precipitated by spirit of sal ammoniac; this is because the volatile acid of wine reacts with the saturated alkaline spirit
(e.g., the distilled solution) and releases the substances it had
held in solution;
4. The weakening of strong wine if alkaline absorbents are added such as sulphur, crab's eyes, egg shell; this solution will no longer attack iron and the amount of distilled spirits it yields is both small and weak;
5. Ardent spirit, an inflammable, is extractable vinegar itself, as shown by chemical experiments;
6. The remedies both to prevent and cure drunkenness are derived from the alkaline family, such as the mustard seed commonly taken on an empty stomach; roasted lungs of farm animals, as recommended by Pliny; or garlic, which Hippocrates advises for one who is "inebriated or wants to go out drinking". All the remedies that are usually suggested for drunkenness are rich in alkaline substances; if the property in wine that causes drunkenness were its alkaline and sulphurous components, they would neither prevent nor cure drunkenness; on the contrary, they would make it worse.

These are the arguments this learned man presents to prove it is the acidic component in wine that causes drunkenness. I shall now oppose this with the reasoning and arguments of others who support a different theory, and then go on to put forward my own observations regarding the evidence presented by this learned chemist.

Proof that it is the sulphurous and alkaline components of wine that cause drunkenness is evidenced by:
1. While the inflammability of aqua vitae is well-known, it is an undisputed fact that no acidic spirit is inflammable; on the contrary, spirit of vitriol, of nitre, and of tarter extinguish inflammability; for example, if gunpowder is sprinkled with spirit of vitriol and then dried, it will no longer ignite, while this is not the case if it is wetted by aqua vitae;
2. The fact that wine and aqua vitae are used to in ulcers and gangrene to curb the acidity and corrosive activity that abound in such ulcers fuels them; if aqua vitae were acidic, it would be a grievous mistake to use it for ulcers;
3. It has been consistently observed an indubitable that aqua vitae never degenerates into vinegar; when it ages it only becomes weaker, whereas wines sour as they lose their spirit rather than becoming weaker. It has also been frequently observed that
when wine is about to turn sour, only a very little aqua vitae can be produced, which is not the case with wines that are sagging and musty. This is why people that have been granted public concessions to work in the sector of distilling and selling aqua vitae, buy wines that are sagging and have gone bad at a lower price, but not acidic wine, since all they are able to produce from the latter is an insipid phlegm and an acrid liquid;

4. As is the case with spirit of vitriol, saltpetre, and the like, acid mineral spirits are sweetened when mixed with aqua vitae; if they were acidic and did therefore not cause inebriation, they would not modify other acidic spirits and make them milder, since a substance is unable to weaken one with similar properties, but can only make it stronger;

5. The considerable effervescence produced when aqua vitae is mixed with the spirit of nitre is clear proof that the nature of the former is the complete opposite to the acid spirit of nitre;

6. Refinement of aqua vitae is possible without distillation by means of a repeated infusion of salt of tartar, lime and clavellated ashes. If aqua vitae belonged to the acid family, the principle alkalis salt of tartar and lime would not rectify it and make it stronger; on the contrary, they would weaken it by absorbing the acid. One might object that the salt of tartar absorbs the phlegm and thus purifies the aqua vitae, but why should salt of tartar not absorb that very acid that is supposed to be in aqua vitae and become saturated with that, rather than with the phlegm?

7. Wines strained through a bag (which, just like the others, are always weaker than unstrained wines since, as Pliny says, "We weaken their strength by using the bag") turn acidic very easily, especially in the summer heat; this is not the case for other wines, owing to the abundance of their spirituous particles;

8. Strong wines are less harmful to those suffering from gout than light, acidic wines such as those from the Rhein which De le Boe says should be avoided by those suffering from arthritis, since they contain so little volatile spirit. This very observation had been made much earlier by Crato; in his work *Consolatione medica pro articularis morbi doloribus* he wrote that those who believed light wines to be less harmful were greatly mistaken and that, on the contrary, it would be better to "drink a little Hungarian wine or Malvasia than copious amounts of light wine".
Van Helmont, Willis and other authoritative doctors say the same thing and advise against light, acidic wines as they increase arthritic pains by increasing the level of acid in the body.

To the arguments put forward by the expert chemist above that were meant to prove the existence of an inebriant acid in wine, I shall reply in the following fashion. First and foremost, the coagulation and effervescence produced when aqua vitae is mixed with the spirit of urine is no proof that aqua vitae is acidic. Indeed, there are a great many alkaline substances that produce effervescence when mixed together, such as when the salt of tartar added to oil of tartar. This observation was made by the renowned Johann Bohn, who says one must not necessarily believe it is an acid that is absorbed by tartar, since the very same result is obtained by simply adding water to salt of tartar. There are a great many acids that produce effervescence when mixed with each other, while if one mixes acids with alkalis there is no coagulation. It is therefore impossible to lay down a general rule.

As for the ebullition that takes place when aqua vitae is mixed with freshly drawn blood, which is the same when spirit of vitriol is added, I have observed that this varies considerably and does not always occur in the same way; indeed, the characteristics of the blood may vary – at times too acidic, at others too alkaline, so that when it is mixed with aqua vitae there is considerable effervescence and one is misled into thinking that this is because of an excess of acid. As for the precipitation of tinctures prepared with aqua vitae under the effect of spirit of sal ammoniac, this is of little importance since such precipitations also occur with cold water alone, as in the preparation of the resin jalap and mechoachan. Thus, should aqua vitae be included in the family of acids, recognizing that acids are precipitated by alkalis, one would also have to allow that water is an alkali, while everyone knows that it is an insipid substance and, what is more, one that has no acidic properties; furthermore, it actually corrects acidity and alkalinity.

If one wants to prove that it is the acid component in wine that causes drunkenness, what has been said regarding the weakening of wines as a result of adding alkalis does therefore not suffice, since when different substances are mixed together, a new one with different attributes is formed. Thus, water weakens both acids and alkalis and dilutes any pungency. While chemists are right
that a certain amount of ardent spirit can be extracted from strong vinegar through distillation, this is still not sufficient proof that this fiery liquid belongs to the acid family. No substance, whether acid or alkaline, is so pure that it does not contain a trace of another one that causes an opposite reaction.

As for the last objection, that is, that the remedies to cure and prevent drunkenness belong mostly to the alkali family, one can reply that they act on the cause of the illness, rather than on the illness itself; indeed, they stimulate urine production and this is an effective way to treat inebriation. These substances have a preventative effect because, as Hippocrates says, "What cures a morbid condition will prevent the condition from occurring." What is more, certain acids are also used to treat inebriation. Ettmüller recommends vinegar compresses be applied to the head, and also a poultice of the juice of *semperwiri majora* with vinegar applied to the testicles, as very effective remedies to dispel drunkenness.

Ettmüller and others therefore believe that it is a volatile alkali or sulphur in wine that narcotizes by the capacity to obstruct the motion of the humours and spirits and that this causes tremors, stupor, and sleepiness, effects observed from opium as a given. The binding and fixative character of wine aside, would it not be more appropriate to say that when considerable quantities of wine are drunk (which is one of the most spirituous of substances and most similar to blood and the vital spirits), it reaches the head via the veins, liquefies, promotes fluidity, opens up the arterial orifices disseminated in the brain and thus saturates and softens the entire cerebral system with so much serum that the nervous tone is relaxed and the aforementioned symptoms arise? And can the same not be said of opium, that is, that it does not bind up or thicken the humours and vital spirits as is commonly believed? Rather, on the contrary, its volatile and vaporous alkaline nature liquefies them, producing that indisputable diaphoretic and diuretic effect. The learned Willis does not go into this matter in enough detail. The popular saying that wine heals the ailments it causes is true, precisely because of its power to attenuate the humours and stimulate diuresis. It is this property Aristotle seems to be referring to when he wonders why those who drink wine diluted or mixed suffer less from the effects than those who drink it neat, and the primary reason he gives is as follows: "Pure wine digests both it-
self and other things”. Hippocrates reminds us that ancient doctors also saw a certain advantage in becoming drunk; in the epistle *De liberaliore potu* cited by Athenaeus and Lange, Mnesitheus, the Athenian doctor said: “while those who drink vast quantities cause serious harm to their body and soul, I believe that those who get drunk occasionally are purging their body and reviving their soul. Indeed, certain bitter liquids accumulate in our body with the drinks and these should be eliminated by urinating; and drinking in company is extremely useful because it purges and washes the body”. According to Mnesitheus, the Spartans purged their body by diuresis, making themselves vomit and cheering their spirits with “the goblet of friendship”.

In autumn, to my great surprise, I have frequently had the chance to observe “when the vintage foams in the brimming vats” and wine is continuously being poured from the vats to the casks, that the workers doing experience profuse urination, up to one hundred times a day, and their urine is as light and clear as water. I believe this is because the spirit emanated from the wine is taken up and in the blood mass causes fusion of the serum. I have observed that new wine stimulates much more abundant diuresis than old wine, even if the latter is undiluted and full-bodied; thus, when excessive serum needs to be eliminated via the urinary passages, I certainly prefer new to old wine, but it must be well-strained and purified of its denser parts.

Going back to our original subject, it is very likely that it is the blood mass of these workers in particular that is affected by the volatile particles of wine that are saturating the air they breathe and this causes a fermentation process that then affects the animal spirits. Everybody knows that wine is similar to blood, as Pliny so rightly reminds us when he quotes the wise Androcydes, who was correct when to curb Alexander the Great of his intemperate wine drinking he advised “Remember, you drink the blood of the earth”. The animal spirits are affected by this similarity and, because of the presence of wine spirit, multiply with such abundance that they crowd the brain; thus the entire animal regimen is perturbed. This is the case with bees when conflicts arise in the hive because of excessive propagation. Thus these workers suffer from vertigo, stupor, and headaches, the vessels plethoric and distended. Ultimately, this alteration in function of the organism as a structured whole leads to weight loss, debil-
ity, and other ailments noted above, usually less serious in workers used to these conditions, but more grave in those carrying out these duties for the first time. According to Abraham ben Samuel Zacutus, a courtier went back to his country-house and when he happeped to enter his wine-cellar, he was overcome by the odour from the wines, fell stricken to the ground, and, within hours, died.

It is known that the same thing happens in those regions where beer is brewed instead of wine, for example in Germany, England, and nearly all the northern countries. Although vines grow in the aforementioned countries, much of the time the grapes do not ripen, so instead, they make a beverage using barley and the other cereal grains that are to be found there in abundance; they leave them to ferment until they germinate and then mix them together with the hop capsules. Beer drinkers "stagger as if they had drunk undiluted wine", as Ovid said of the waters of the River Lyncestis. From the verses of Virgil, where he speaks of the peoples from the North under Roman dominion, we know that in the past these northern people made such drinks: "Here they pass the night in games, and with beer and bitter meads joyously counterfeit draughts of the vine".

I have been told by learned men and have read in the works of writers that those who brew beer in cellars suffer from the same illnesses as our wine-makers and distillers. This is because beer is also highly intoxicating, so much so that one can extract an ardent spirit from it that Platter ascribes to the hops. The workers who prepare, brew, and fill barrels, suffer from headaches, vertigo and physical distress. Beer and wine have much in common. As everyone knows, when the vines begin to flower in the spring, the wine is changed by the perfumed effluvia permeating the air; according to Van Helmont, the same thing happens to beer when the barley flowers. He says that just as when drunk in excess wine and aquavitae take away one's appetite completely, so too does beer if drunk before eating; he goes on to add that it breaks down and weakens the ferment of the stomach. Expressing his amazement at the inebriant property of drinks made with barley, Pliny wrote: "How wonderfully inventive the vices, finding a way to get drunk on water".

Which remedies can medicine offer to alleviate the illnesses of wine-makers and distillers who toil to prepare something that is so important and essential to life and so useful in the compounding of pleasant, effective medications? Indeed, if there were no aqua
vitaee in laboratories, chemistry would never have achieved such prestige. This notion came to Galen and he wanted to find a way to distil and separate the different constituents of wine. He wrote that "He would have faced any danger if it meant he could find a tool or method to separate wine into its opposing elements, as has been done with milk". When I treat these workers, whether they are kept to bed by these illnesses or whether I myself go to where they work, I always try to persuade them to abstain from wine, and from aqua vitae even more so, indeed to become abstemious, at least for the period they are engaged in this work. I recommend that they keep their face as distant as possible from the wine vapours, that they douse their faces with cold water, and that they step out into the fresh air now and then. When these workers are forced to take to their beds and therefore have to give up their jobs, the common remedies that cure drunkenness and its accompanying ailments need to be prescribed. Many authors of medicine have written on this subject, Ettmüller in particular. Such remedies may include vinegar, castor and especially the spirit of sal ammoniac. Nothing is as effective as the latter in curing the ailments resulting from the abuse of wine, since it contains the volatile spirit of urine.

Pliny also gives numerous remedies to prevent inebriation, all of which are well-known, for example bitter almonds, cabbage and nearly anything that is sweet. The moderns have added many more; in Praxi medica Platter lists them all to tedious length. This author deplores the sad state of his fellow countrymen who had introduced what was believed to be a civilized tradition of competing at meals to see who could drink the most. In his treatise he gives a long list of preventive remedies to delay and avoid drunkenness, such as wormwood, rue, milk, roasted animal lung, water and vinegar, and acidic fruits; as well as compound medicines such as sedatives and various other mixtures that ward off drunkenness if taken beforehand.

Workers whose pitiful living conditions do not allow them to avail themselves of such choice remedies must be given simpler ones that are easier to find, such as cabbage, which has been known for centuries to be excellent at preventing and curing drunkenness; and radishes and water mixed with vinegar, which Platter calls the best antidote of all for drunkenness.
Chapter XXII

Diseases of bakers and millers

Hippocrates wrote “There are a great many trades that cause fatigue and ailments to those who do them but which, at the same time, are agreeable and useful to those who need them – and the profession of doctor is to be included here”. One that must certainly be included is that of the baker. What is more useful to the life of man, or rather more necessary, than bread? What trade is more disadvantageous and burdensome than working as a bread-maker? Sieving the flour, mixing or kneading it, and baking bread in ovens entails very hard labour that is fatiguing, causing vulnerability to various illnesses. Furthermore, bakers work at night, so when the others who have completed their day-time profession can fall asleep and recoup their strength, they have to work all night and then sleep nearly all day like Solifugae who are afraid of the sun. This means that in every city there are “antipodes”, men whose way of life runs contrary to that of others.

“Get up, the baker is selling the slaves their breakfast”, Martial said, since this breakfast had already been prepared at night. Indeed, at dawn when the townsfolk return to their usual tasks, bread has to be ready, otherwise hunger would lead to rebellion. There is ample evidence from history that the lack of bread has led to riots in large cities. Indeed, just a short while ago the Spanish King feared an outbreak amongst the people for this very reason. This is why Juvenal recommended “panem et circenses”, i.e. plenty of grain and public spectacles to keep the masses content with their lot.

No matter how much they protect their faces, the workers who separate the flour from the bran with sieves or shake and empty the sacks cannot help but inhale flour dust. This ferments in the salivary juices and forms a paste that not only obstructs the throat,
but also the stomach and lungs. Very often the consequences are
coughs, shortness of breath, hoarseness and ultimately asthma be-
cause the trachea and the pulmonary passages become encrusted,
impeding the free circulation of air. Flour particles also cause seri­
ous ailments to the eyes, not infrequently inducing bleariness.

I have to confess that I am unable to recommend any suitable
preventives against these noxious effects. The habit bakers have of
covering their mouth with a linen bandage is commendable, but it
is insufficient to prevent the smallest flour particles in the inspired
air from penetrating deeply into the chest. This habit of covering
their mouth with a bandage is centuries old, as we may see from
Pignoria's admirable work on slaves, citing Athenaeus. However,
this was not out of any compassion for the bakers, but more as
a sybaritic luxury, i.e. to stop the sweat dripping from theirs skin
or their breath lowing upon the flour. It will help these workers if
they rinse their faces with water, gargle frequently with water and
vinegar, drink oxymel, and occasionally take a purgative; should
they have difficulty breathing, they can also take an emetic to expel
the impacted material, a remedy that I have seen restore some who
were at death's door.

Workers who knead the dough with their hands, shape it into
loaves and rolls, and bake it, usually carry out these tasks in heated
rooms, especially in winter so that the bread rises properly. When
they then go from this exceedingly hot place out into the open air
and return to their homes to sleep, it is natural that the pores of
their skin constrict suddenly and that they then fall ill with head
colds, hoarseness, and chest morbidities such as pleurisy and pneu­
monia, that are so frequent that everyone knows their remedies.
Nevertheless, it is essential to understand the primary cause of the
illness and then restore the body's natural perspiration, by staying
in a warm room, by having oil rubs, and internal administration of
medicine that promotes diaphoresis. Much to my amazement, more
than in any others in these workers I have seen that in those with
severe pleurisy, even at the outset and without any spitting, the
illness reaches a crisis with profuse sweating. I believe that this is
because a very high fever, which is the main symptom, accompa­
nied by a pain in the side, is caused by an external factor, i.e. by the
sudden blocking of the skin pores, and not a corrupted state of the
humours. This means that when the skin pores are opened up and
Sweat is profuse, both the fever and pleuritic pain resolve together, since the material that had flown into the chest is resorbed since its flux is no longer blocked. Thus, according to the advice Hippocrates gives when discussing Stimargos' maidservant, it is important "To identify the occasional cause and its origin."

At times I have also seen bakers with unduly enlarged hands that also are painful; all of such worker's hands become coarse due to the constant pressure on them from kneading dough; the nutritive juices are pressed out of the artery openings and are retained, since the fibres restrict their easy return. A baker need only reveal his hands for you to know his trade; no other manual worker has such coarse hands. As Avicenna says, "an organ kept at use enlarges", and this statement also holds true for other employments. Bakers should wash their hands frequently with lye, strong white wine, and the like.

There is another illness that is very common amongst bakers: bow-leggedness, that is, the legs are bent outwards just like in crabs and lizards. This is because of the method used to work the dough in the areas on both sides of the River Po. They use a firm or a three-legged table, attaching above it a smooth conical block of wood that can be rotated in all directions. Once a large quantity of dough has been placed below the block, one baker exerts all the pressure he can on it with his forearms and knees, while someone else turns the dough over. While doing this kind of movement, the legs bend outwards since the weakest part of the knee joint is being strained. There is no escaping this fate. Even the youngest and most robust soon become bow-legged and, in the course of time, lame.

Those who are responsible for putting the bread in the oven are probably the best off, although they, too, are afflicted by serious illnesses; in summer in particular, when they put the bread in the ovens and take it out, you can see them dripping with sweat. But it should also be said that the fragrance of freshly-baked bread refreshes them considerably. Indeed, freshly-baked bread is invigorating and its mere fragrance cheers one's spirits, as is observed by Wedel in De sale volatilis plantarum and Becker in Phisica subterranean. The latter ranks the fragrance of bread higher than the invigorating virtue of pearls.

I have observed that in crowded cities these workers fall ill more often than other workers. This is because here people prefer to buy bread and it also costs less, unlike in the small villages and in
the country where everyone bakes their own. According to Pliny, from the very founding of their city until the year 530, the Romans had no bakers because the citizens did it themselves at home and this task was entrusted to the women. Later, once the population of Rome had increased considerably, this new profession was established and was carried out by publicly-owned slaves. No matter what their illness, when these workers need to be treated, it is essential to know the surroundings they work in and what exactly they have to do.

I consider it appropriate to include millers here among those clothed in white, too, since they are always white owing to the tiny, floating particles of ground grain filling the mill-house. Whether they want it or not, the millers find this powder in their mouth, nose, eyes, ears and sprinkled all over their body. Many of them become asthmatic and after a time slip into dropsy. They often suffer from hernias as well, since they carry such heavy sacks of grain and flour on their shoulders, breaking asunder or weakening the peritoneum. Nearly all of them are half-deaf because they spend all night and day surrounded by the repetitive noise of wheels and millstones and the roar of water falling from a height; the eardrum, subjected to more powerful noise than it can tolerate and unremitting blows loses its tone. It should also be pointed out that millers and bakers often suffer from phthiriasis, and so commonly that people jokingly call lice the millers' white fleas. It is not quite clear if this happens because millers are nearly always covered in dirt and rarely remove their clothes when they go to sleep, or because the combination of the flour with the sweat and dirt on the skin is a perfect breeding ground for this tiny animal). What is certain, however, is that millers are always accompanied by these bodyguards and, if Daniel Heinsius had known, he would undoubtedly have given them the place they deserve in his elegant oration in praise of lice, De laudibus pediculi ad conscriptos mendicorum patres.

In antiquity, millers suffered from much more serious illnesses than they do nowadays, for they did not have the machinery we have now to grind the grain, using the water flowing along a canal to turn the enormous wheels. However, an ancient writer, Palladius, was actually referring to grinding grain by water when he wrote: “If there is more than enough water, the millers should catch what
flows out of the baths and once they have set up the water-mills, they can grind the grain without using the strength of animals or men”. They used to use pounding-mills in the past for grinding grain, but now they are only used for bruising or splitting the grain or for removing the husks. These mills were not only turned by pack animals but also by men, slaves, and women; hence the name of “push-mill” since it required all the strength of a person to make them turn. Convicted criminals would be sent to work there; according to Plautus, the most frequent, ominous threat for a slave was the word “mill”. When Lucius Apuleius had been turned into an ass, he says, “He was tied to a mill with his face covered so that he would follow his own footsteps and not know where he was going”. From the Scriptures we also know that once Samson had been blinded by the Philistines, he was made to turn a mill, which must have been a push-mill. Slaves made to do this work would be blinded to stop them from becoming vertiginous.

This work was therefore extremely tiring and this was the fate of both male and female slaves, who would die from exhaustion and fatal illnesses. In his laments, Job includes this as another of his afflictions: “Let my wife grind unto another”. According to Vatable and other commentators, she had become a poor serving woman; others, however, see a more sexual meaning in this expression, such as August Pfeiffer in De antiquitatibus Hebraicis. The Romans also had numerous mills, and each district in Rome had a set number, as can be read in Publio Victor’s De urbis regionibus. Once there was sufficient water to be found nearly everywhere, water-mills were built because they were more productive and push-mills are now only used for bruising and splitting grain. Furthermore, ever since Christianity lifted the yoke of slavery, the work of millers is no longer so hard and trying or dangerous as it was in the past. If suffering from the effects of inhaling flour, millers should be treated in the same way as bakers. If they are suffering from a hernia as a result of carrying such heavy weights, they should always wear a truss, something they should always do as a preventive measure.

To drive away that living pest known as lice, first and foremost these workers should look after their personal cleanliness and change their clothes more often. They should also use lotions and boiled extracts of sweet wormwood and peach leaves; centaurion majus and
minus stavesacre and lupines. Quintus Serenus also recommends bran soaked in vinegar. Other effective remedies include liniment with a portion of “quicksilver extinct” with admixed saliva, or the linen cloth a goldsmith has used for polishing plate after gilding.
Chapter XXIII

Diseases arising from starch processing

Starch-makers may also be afflicted by serious illnesses. The method used to prepare it is well-known and nearly every woman knows how to do it since it is frequently used for whitening linen garments and collars. In these regions it is produced by those in monastic orders who then sell it to apothecaries and the like. The starch is produced in the summer: they place wheat in marble vessels and leave it there to macerate until it sprouts; servants then tread the wheat with their bare feet in the same way they tread grapes after harvest. Although this is done outdoors, the smell that the effervescent material gives off is so noxious that those involved in the process – those who tread it with their feet or the servant girls who collect the wheat with their hands once it has been pressed and then squeeze out the liquid to dry it out in the sun – all complain of headaches, serious breathing difficulties, and troubling cough, so that they are compelled to leave off work every now and then, or else run the danger of suffocation. I have often seen this with my own eyes and I really did find the smell intolerable, it was like the odour emitted by some penetrating acid. It is possible that the abundance of volatile acid to be found in wheat is set in motion by fermentation, becomes separated from the other components, and is then nearly all dispersed in the air, thus causing headache, dyspnoea, and cough. Indeed, there is nothing more harmful to the delicate tissue of the lungs and other membranes than acid exhalations, such as the fumes from sulphur fumes and other acrid emissions.

I usually advise these workers to perform their tasks, as far as possible, out in the sun, with ample space, not in confined quarters. When they fall ill, they should take oil of sweet almond, emul-
sion of melon seeds, barley infusion, draughts of strong wine, the odour of sal ammoniac solutions and theriac water.

At this point I would like to look at the characteristics of starch a little more closely, because this may differ from what is commonly known to physicians. Both the ancients and the moderns agree that starch is able to temper acid humours, stop an abnormal flow of fluids, and heal ulcers. Pliny recommends starch for the spitting of blood and bladder pain. Galen greatly praises starch for diarrhoea, inflammation of the trachea, ocular lachrymation, and, if necessary, to soften and smooth over ulcerated areas. In De sacra philosophia, wherein Valles describes Elisha’s experiment when he threw flour into a pot in which colocynth had been boiled and the bitter taste was counteracted, he states that he preferred starch to all other remedies for dysentery and blunting various acrid effects. Furthermore, others writing about starch are in agreement with this.

I have always believed this theory to be plausible, not only because starch is insipid in taste and completely lacking flavour and therefore uncommonly good at absorbing acrid material and particularly effective in treating the above-mentioned ailments, but also because I was convinced that any acidity and bitterness in the fermenting wheat evaporated into the air during preparation. I also believed that when it was exposed to the sunlight to dry, it lost its acidic humours; indeed, as Gorris says, “It must be dried under a scorching sun because if any moisture remains, it will become acrid”.

Observations made by several women made me begin to doubt the true nature of starch, so we must not be misled by its brilliance. Starch is commonly used in all homes in this region and among Religious Orders in particular, to whiten and stiffen linen and make it more elegant with various pleats. The women who do this have noticed that when the linen garments are left to soak in starch, they soon begin to wear through. To stop this from happening, when they start to become stained, they leave them in clear water to rinse out the starch and leave them like that until they have to send them to the laundress to be cleaned. Such an observation is clear proof that starch is quite acrid, even though this is not easily discerned by the sense of taste. Thus, if after a short while garments, collars and other linen fabrics begin to wear through, with what faith can we prescribe it for diseases of the chest, sore-throats, dysentery or, as Galen says, when an emollient is required? Although he recom-
mends it for these illnesses, as stated a little earlier, even Pliny is aware that its true properties are suspect when he says, “Starch enfeebles the sight and contrary to common belief, has not utility for the throat”. In this regard, one must praise the foresight that some women show when they mix starch with gum-arabic to prevent it from eating away the linen.

A great many everyday substances are believed to be harmless, while in actual fact they are slowly and stealthily causing harm. It is only when the hidden effects of these substances become clear that general opinion changes. Many foods seem easy to digest, but later on they deposit fluid secretions in the veins. As Avicenna so wisely says, “A man who can digest unwholesome food should not let himself be deceived, because as time passes, bad humours will be formed in his body, bringing on illness if not death”. Galen says the very same when he studies the properties of food: “Without our realizing, with time, a harmful fluid secretion accumulates in our veins, which then results in malignant fevers at the slightest occasion for putrefaction”.

Diseases of sifters and measurers of grain

Whether stored in ditches or pits as in Tuscany, or in storehouses and roofed buildings as in nearly the whole region on both sides of the Po, all kinds of grain, and wheat in particular, are always mixed with a very fine dust. This consists not only of the dust produced during threshing, but also of a more dangerous kind that is produced by the grains themselves when they are stored a long time. Since cereal seeds are rich in volatile salts, if they are stored without having been properly dried in the summer sun, they quickly become overheated, turn to dust and tiny particles drop from outermost part the seeds. In addition, there is the dust residue and decay caused by tinea, teredines, weevils, and other parasites gnawing at the grain, together with their excrements. The workers who have to sift the wheat and other kinds of grain for grinding or who weigh it when merchants take it elsewhere, suffer such serious harm from this dust that when they have finished their work, they can only curse it. The organs that suffer most are the throat, lungs and eyes; the throat is choked and dried out with this dust; the pulmonary passages are incrusted with a coat of dust, resulting in a dry, obstinate cough; and the eyes become visibly inflamed and watery. Whether sifters or measurers, nearly all the workers in this trade suffer from shortness of breath and cachexia and rarely grow old together; on the contrary, they are often afflicted with orthopnoea and dropsy. This dust is so corrosive that it actually causes intense itching all over the body, which can sometimes be observed in association with essera.

Since I found it so surprising that a product that is as useful and harmless as wheat can produce such a noxious dust, I began to suspect that it must be hiding tiny worms imperceptible to our senses
that through sifting and measuring of the grain are activated; dis­
persed in the air, they have no difficulty in clinging to the skin, thus
causing itching and inflammation all over the body. The renowned
Anton van Leewenhoek says that when he studied wheat under the
microscope he saw some tiny worms which he appropriately called
'wolves'. One may therefore believe that it is this type of worm that
afflicts these workers so grievously.

Just as surprising is the fact that when it has been stored for
a long time in a closed space, underground for example as is the
case in Tuscany, wheat can produce such poisonous fumes that it
kills whoever enters without leaving the door open for a while to
let the air escape. This is why Zacchia thinks that not only should
one's neighbours not be allowed to build such grain-storages, but
that the ones that have already been made should be destroyed. He
also points out that it would be more hygienic if they were situated
in outdoors locations, as far from houses as possible. I have been
told that the Republic of Lucca has a sensible custom that should
be more widely adopted. During the month of August the grain is
taken from the public granaries, is sieved, and then left out in the
sun for several days; in this manner, much to the benefit of every-
one, the grain is safe from boring insects and decay for years.

Theophrastus wonders why wheat is dustier and lasts less than
other kinds of grain and believes the answer lies in the granaries
that are plastered smooth with lime and sand. He says, "The wheat
is exposed to greater heat, making its dust hot and dry and the lay­
er of lime increases the temperature". This is why the wheat putre­
fies and is reduced to dust. In his comment on the aforementioned
passage, G. Cesare Scaligero disagrees, saying that not only do hot,
dry substances not promote putrefaction, but on the contrary, they
preserve wheat from such a fate. He believes that the grain crum­
bles to dust because when it is in large mounds, it does not receive
enough ventilation and "When suffocated it heats up and putrefies".
However, not even this theory is completely satisfactory, for it is
well-known that if grain is dried and well-looked after when stored
in granaries, it keeps longer in large quantities and packed tight if
it is not disturbed. I myself believe that the tendency of grain to
crumble and the fact it lasts less than other kinds of grain depends
on the abundance of the volatile particles it abounds in, as well as
on the looser texture of its fibres.
There are many more aspects one could look at in more detail here, but I do not want to digress, and would doubtless be criticized for doing so. For instance, it would be interesting to discover why I have observed in the past years that darnel, which is rightly believed to be a degenerative form of wheat that grows during the heavy spring showers, remains in excellent condition for 20 years and more, while wheat is reduced almost completely to dust within four years? It might be because the structure of darnel is more compact and harder than wheat; indeed, if you want to split it, it is much more resistant and this might be why other grains such as broad beans, chickpeas and vetches keep much longer than other kinds. Or is it because the larvae and borers dislike darnel because it is bitter and unpalatable?

Because of the “carbuncle infestation” of grain in this region over the last few years, it had to be washed carefully in clean water in large vessels and then dried in the sun. I noticed that the bread made from this grain was as white as snow, so I think it may be worthwhile washing it carefully and drying grain before taking it to the mill even were it not infested. The workers who do these tasks usually cover their mouths and noses with a kerchief to avoid being suffocated by the dust; they frequently rinse their throat and eyes with cold water and they shake out their clothes. But not even all these precautions are sufficient.

These workers would certainly benefit from taking baths to eliminate the dust and sweat sticking to their skin, but public baths are no longer customary and, as a result, these poor workers have been deprived of something that would have benefited them greatly. One should not believe that the founders of the cities (and also smaller towns) and the law-makers established these costly and magnificent public baths just for the luxury and pleasure of those idle men and women who “Only go to the baths to show themselves off”. They were also thinking of those exhausted workers who could thus rid themselves of both dirt and fatigue at little expense and revive their toil-worn bodies. A curse on those who discredited such a fine institution, as it was precisely because their shameful, promiscuity that the baths were abolished by a pious Christianity.

I usually recommend workers suffering from illnesses caused by wheat dust to drink barley infusions, emulsions of melon seeds, whey, and boiled mallow extract to alleviate the extreme corro-
siveness of that dust. If they are suffering from asthma and other illnesses, they need more effective remedies. But the principle is always the same – one has to keep an eye on the weakest part of the body to make sure the illness does not strike there.