

Meteors; or, a plain description of all kind of meteors, as well fiery and ayrie, as watry and earthy. Briefly manifesting the causes of all blazing-stars, shooting-stars, flames in the aire, thunder, lightning, earthquakes, rain, dew, snow, clouds, springs, stones, and metalls / By W[illiam] F[ulke] Doctor in Divinity.

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by William FOLKE

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Meteors ;

O R,

A plain Description
of all kind of Meteors,
as well *Fiery* and *Ayrie*, as
Watry and *Earthy* :

BRIEFLY

Manifesting the *Causes* of
all *Blazing-Stars*, *Shooting-Stars*,
Flames in the *Aire*, *Thunder*,
Lightning , *Earthquakes*,
Rain, *Dew*, *Snow*, *Clouds*,
Springs, *Stones*, and
Metalls.

By *W. F. Doctor* in
Divinity.

L O N D O N,

Printed for *William Leake*, at the Crown
in *Fleet-street*, between the two
Temple Gates, 1670. ob

3095





To the Reader.

I Shall not beg your pardon
for publishing this Book;
for as 'tis none of mine (being
written by a famous and
learned Divine) so I do not
set it forth relying on my
own judgement, but had the
opinions and approbation of
divers persons of known abi-
lities, who knew best what is
most usefull for publique Be-
nefit. And I may (without
breach of Modesty) affirm, that
there is not in our Language
any Book of so small a bulke,

To the Reader.

contains so much of the Doctrine of the Meteors. We daily behold and view divers Meteors, but very few are skill'd in their Causes; but those that are not, may be informed. And I must tell you also, that this Book on perusal hath been found so advantageous, that a person of quality hath lately taken pains to make divers worthy Observations upon it, which here I have subjoyned, because you should not pay for two Books instead of one. These Observations were never published till now, and I trust thou wilt find the Author did thee a Courtesie. Farewell. The

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FINIS.



THE FIRST BOOK.



Or as much as we intend
in this Treatise, to declare
the causes of all those bo-
diesthat are generated in
the earth called *Fossilia*, as
well as those other *Im-
pressions* named of their height *Meteors*
(which no writer hitherto hath done,
that we have seen) the common defini-
tion given by the most Writers, in no
wise will serve us; and whether we may
borrow the name of *Meteoron*, to com-
prehend the whole subject of our work,
we are not altogether out of doubt;
although the Philosopher deriving it
from doubtfulness, giveth us some co-
lour so to take it, and peradventure we
might be as well excused to apply
it to *Minerals*, as other Authors
are to use it for earthquakes: yet to
avoid all occasions of cavilling at
words, we shall both define and also
describe the subject of our matter on
this manner: It is a body compound
without life natural: & yet to stop one
hole

Aristor.

hole, because here wanteth the name of the thing to be defined; it is no new thing to them that have read *Aristotles* Works, to find a definition of that whereof there is no name. But what need you be so precise (will some man say?) mean you so to proceed in all your discourse? no verily, but because many of quick judgement, not considering the stile to be attempered to the capacity of the readers, will impute the plainness to the ignorance of the Author; we thought good in the beginning to pluck the opinion out of their minds, that (as the common saying is) they may know, we have skill of good manners though we little use them.

The Meteors are divided after three manner of wayes: First, into bodies perfectly and imperfectly mixed: Secondly, into moist impressions and dry: Thirdly, into fiery, airy, watry, and earthly. According to this last division, we shall speak of them in four Books following: but first we must be occupied a little in the generall description of the same, that afterward shall be particularly treated of. *why*

Why they be called imperfectly mixed.

They are called imperfectly mixed, because they are very soon changed into another thing, and resolved into their proper elements of which they do most consist, as do all impressions, fiery, airy, watry; as snow into water, clouds into waters, &c.

Why they be called perfectly mixed.

The last sort, namely earthly Meteors, are called perfectly mixed, because they will not easily be changed and resolved from that form which they are in, as be stones, metalls, and other mineralls.

According to the quality of the matter, they are divided into moist and dry impressions, consisting either of Vapors or Exhalations. Vapors are called moist, and exhalations dry, which terms must be well noted, because they must be much used.

The First Book

*Of the general causes of all Meteors;
and first of the material cause.*

The material cause.

THe matter whereof the most part of Meteors doth consist, is either water or earth: for out of the water proceed vapors, and out of the earth come exhalations.

What be vapors, and what exhalations.

Vapor, as the Philosopher saith, is a certain watry thing, and yet is not water; so Exhalation hath a certain earthy nature in it, but yet it is not earth.

What the middle region is, shall be told afterward.

For the better understanding of Vapors, understand that they be as it were fumes or smokes warm and moist, which will easily be resolved into water, much like to the breath that proceedeth out of a mans mouth, or out of a pot of water standing on the fire. These vapors are drawn up from the waters and watery places by the heat of the Sun, even unto the middle region of the air, and there after divers manner of meeting with coldness, many kind of moist *Meteors* are generated, as sometimes clouds and rain, sometime snow and hail; and that such *Vapors* are so drawn up by the Sun, it is plain by experience: for
if

if there be a plash of water on a smooth and hard stone, standing in the heat of the Sun, it will soon be drie; which is none otherwise but that the Sun draweth up the water in thin Vapors: for no man is so fond to say, that it can sink into stone or metall; and it is as great folly to think it is consumed to nothing: for it is a generall rule, That that which is once a thing, cannot by changing become nothing: wherefore it followeth, that the water on the stone, as also on the earth, is for the most part drawn up, when the stone or earth is dried.

A generall Rule.

Exhalations are as smokes that be hot and dry, which because they be thin, and lighter than *Vapors*, pass the lowest and middle Region of the air, and are carried up even to the highest Region, where for the excessive heat, by nearness of the fire, they are kindled, and cause many kind of impressions. They are also sometimes *viscous*, that is to say, clamy, by reason whereof, they cleaving together & not being dispersed, are after divers sorts set on fire, & appear sometimes like Dragons, sometimes like

What Exhalations be.

The First Book

Goats, sometimes like candles, sometimes like spears.

By that which is spoken of *Vapours* and *Exhalations*, it is evident, that out of the fire and aire, no matter whereof *Meteors* should consist, can be drawn, because of their subtilty and thinnesse. For all *Exhalation* is by making a grosser body more thinne: but the fire (we mean the elemental fire, and not the fire of the Kitchen chimney) is so subtil and thinne, that it cannot be made thinner; likewise the aire is so thinne, that if it be made thinner, it is changed into fire; and as the fire, if it were made thicker, would become aire; so the aire being made grosser, would be turned into water. Wherefore to conclude this part, the great quantity of matter, that causeth these *Meteors*, is taken out of the earth and the water. As for the aire and the fire, they are mixed with this matter as with all other things, but not so abundantly, that they may be said the material cause of any *Meteor*, though without them none can be generated. The efficient cause of all *Meteors*, is that cause which maketh them; even as the Carpenter

The efficient cause.

penter is the efficient cause of an house.
This cause is either first or second.

The first and efficient cause is God the worker of all wonders, according to that testimony of the Psalmist, which faith, Fire, hail, snow, ice, wind, and storm, do his will and commandment; he sendeth snow like wool, &c. Almighty God therefore being the first, principall and universall cause efficient of all natural works and effects, is also the first cause of these effects, whose profit is great, & operation marvelous.

The second cause efficient, is double, either remote, that is to say, farre off, or next of all. The farther cause of them as of all other naturall effects, is the same; the Sun with the other Planets and Stars, and the very heaven it self in which they are moved; but chiefly the Sun, by whose heat all or at least wise the most part of the vapors and Exhalations are drawn up.

The next cause efficient as the first qualities, are heat and cold, which cause divers effects in Vapors & Exhalations.

But to return to the heat of the Sun, which is a very near cause, it is for

this purpose two wayes considered.

One way, as it is mean and temperate; Otherwise, as it is vehement and burning. The mean, is by which he draweth vapors out of the water, and exhalations out of the earth, and not only draweth them out, but also lifteth them up very high from the earth into the air, where they are turned into divers kinds of *Meteors*.

The burning heat of the Sun is, by which he burneth, dissipateth and consumeth the vapors and exhalations before he draweth them up, so that of them no *Meteors* can be generated.

These two heats proceed from the Sun, either in respect of the place, or the time; but most properly according to the casting of his beams either directly or indirectly.

In place where the Suns beames strike directly against the earth and the water, the heat is so great, that it burneth up the *Exhalations* and *Vapours*, so that there are no fiery *Meteors*, much less watery: as it is in the South parts of the world, under and near to the Equinoctiall line.

But in places where the beames are
cast

cast indirectly and obliquely, and that where they are not too nigh to the direct beams, nor too far off from them; there is a moderate heat, drawing out great abundance of matter, so that in those Countries many *Meteors* of many sorts are generated, as in the far Northparts are few but watry impressions. Also in *Autumn* and *Spring* are oftner *Meteors* seen, than in Summer and Winter, except it be in such places where the Summer and Winter are of the temper of the *Spring* and *Autumn*. Let this be sufficient for the Efficient causes of impressions, as well first and principall, as second and particular. Concerning the formall and finall cause, we have little to say, because the one is so secret, that it is known of no man: the other so evident, that it is plain to all men. The essentiall Form of all substances, Gods wisdome comprehendeth; the universall chief and last End of all things, is the glory of God. Middle Ends (if they may be so called) of these impressions are manifold profits to Gods creatures, to make the earth fruitfull, to purge the air, to
set

set forth his power, to threaten his vengeance, to punish the world, to move to repentance; all which are referred to one end of Gods eternall glory, ever to be praised, Amen.

*Of the places, in which they
are generated.*

THe places in which *Meteors* are caused, be either the air or the earth: in the air be generated rain, hail, snow, dew, blazing stars, thunder, lightning, &c. In the earth be wells, springs, earthquakes, metals, minerals, &c made, and as it were, in their mothers belly begotten and fashioned. But for the better understanding hereof, such as have not tasted the principles of *Philosophy*, must consider that there be four elements, Earth, Water, Air, and Fire, one compassing another round about, saving that the waters by Gods commandment are gathered into one place, that the land might appear. The highest is the sphear of the Fire, which toucheth the hollowness of the Moons heaven: the next is the air, which is in the hollowness of the fire: the air within its hollowness

hollowness comprehendeth the water and the earth, which both make but one spheare or Globe, or as the common sort may understand it, one ball. So each element is within another, as scales of a perch are one above another: or (to use a gross similitude) as the peeles of an Onion are one within another: after the same sort from the highest heaven to the earth that is lowest, one part that is greater compasseth round about another that is lesser. But for this present purpose it is to be known, that the aire is divided into three regions, the highest the middle and the lowest. The highest because it is next to the region of the fire, is exceeding hot: the lowest being next the earth and waters, is temperate, and by repercussion or striking back of the Sunne beames waxeth hot, and by absence of them is made cold, being subject to winter and summer. The middle region of the aire is alwayes exceeding cold, partly because the Sunne beames cannot be cast back so high, and partly because the cold that is there, between the heat above, and the heat beneath it, is so kept in, that it cannot get out, so

What the regions of the aire be

that

that it must needs be excessively cold: for the water and the earth being both cold Elements, after the Sun setting in the night season do cool the air, even to the middle region. But in the morning the Sun rising warmeth the air, so far as his beames which are beaten back from the earth and the water, can extend and reach; which is not so high as the middle region, and by heat on both sides is inclosed and kept, saving that a little thereof falleth down in the night, which the next day with much more is driven back again. Wherefore this region being so cold, is dark and cloudy, in so much that some doting Divines have imagined purgatory to be there in the middle region of the air. In the highest region be generated Comets or blazing Stars, and such like, of divers sorts. In the middle region clouds, rain, storms, winds, &c. In the lowest region, dew, frost, hoar-frost, mists, bright rods, candles, burning about graves, and gallowses, where there is store of clammy, fatty, or oily substance, also lights and flaming fires seen in fields, &c. And thus much for the general causes of all Meteors. *THE*



THE SECOND BOOK

Of Fiery Meteors.



Fiery impression is an *Exhalation* set on fire in the highest or lowest region of the air, or else appearing as though it were set on fire and burning.

They are therefore divided into flames & Apparitions. Flames are they which burn indeed, and are kindled with fire. These are discerned by four ways: by the fashion of them, by their place, by the abundance of their matter, and by the want of their matter. Their placing is after the abundance and scarcity of the matter whereof they consist: for if it be great, heavy, and gross, it cannot be carried so far as the middle region of the air, and therefore is set on fire in the lowest region: if it be not so great, light, and full of heat, it passeth the middle region, and ascendeth to the highest, where it is easily kindled and set on fire.

According

According to their divers fashions, they have divers names : for they are called burning stubble, torches, dancing or leaping Goats, shooting or falling starres, or candles, burning beames, round pillars, spears, shields, Globes or bowles, firebrands, lampes, flying Dragons or fire drakes, painted pillars, or broched steeples, or blazing starres, called *Comets*. The time when these impressions do most appear, is the night-season : for if they were caused in the day-time, they could not be seen, no more than the stars be seen, because the light of the Sun which is much greater, dimmeth the brightness of them being lesser.

Of the generation of the impression called burning stubble or sparkles of fire.

Sparks of
fire.

THe generation of this *Meteor* is this; when the matter of the *Exhalation* is in all parts alike thin, but not compacted or knit together, then some part of it being carried up into the highest Region, by the fiery heat is set on fire before another part that cometh up after it, and so being kindled by little and

and little, flieth abroad like sparkles out of a chimney, insomuch that the common people suppose, that an infinite number of Stars fall down, whereas it is nothing else but the *Exhalation* that is thin, kindled in many parts, sparkling as when saw-dust or cole-dust is cast into the fire.

Of Torches.

TOrches or firebrands are thus generated: when the matter of the exhalation is long and not broad, being kindled at one end thereof in the highest region of the air, it burneth like a torch or firebrand, and so continueth till all the matter be burnt up, and then goeth out; none otherwise than a Torch when all the stuff is spent, must needs burn no longer.

Torches.

Of dancing or leaping Goats.

Dancing Goats are caused when the exhalation is divided into two parts, as when two torches be seen together, and the flame appeareth to leap or dance from one part to the other, much like as balls of wilde fire dance up & down in the water.

Dancing Goats.

Of

Shooting
Stars.

The Epi-
cureans
Opinion.

Of shooting and falling Stars.

A Flying, shooting, or falling Star, is when the exhalation being gathered as it were on a round heap, and yet not thoroughly compacted in the highest part of the lowest region of the air, being kindled by the sudden cold of the middle region, is beaten back, and so appeareth as though a Star should fall, or slide from place to place. Sometime it is generated after another sort; for there is an exhalation long & narrow, which being kindled at one end burneth swiftly, the fire running from end to end, as when a silk thred is set on fire at the one end. Some say it is not so much set on fire, as that it is directed under some Star in the firmament, and so receiving light of that Star, seemeth to our eyes to be a Star. Indeed sometimes it may be so; but that it is not so alwayes, nor yet most commonly, it may be easily demonstrated. The Epicureans, as they are very gross in determining the chief goodness, so they are very fond in assigning the cause of this Meteor. For they say, that the Stars fall

out

out of the firmament, & that by the fall of them, both thunder and lightning are caused: for the lightning (say they) is nothing else but the shining of that star that falleth, which falling into a watery cloud, and being quenched in it, causeth that great thunder, even as hot Iron maketh a noise if it be cast into cold water. But it is evident, that the Stars of the firmament cannot fall, for G O D hath set them fast for ever; he hath given them a Commandment which they shall not pass. And though they should fall into the clouds, yet could they not rest there, but with their weight being driven down, would cover the whole earth.

Psal. 148.

The greatness of Stars.

For the least Star that is seen in the firmament, is greater than all the earth. Here will step forth some merry fellow, which of his conscience thinketh them not to be above 3. yards about, and say it is a loud lie; for he can see within the compass of a bushel, more than 20. Stars. But if his bushel were on fire 20. mile of, I demand how big it would seem unto him? He that hath any wit, will easily perceive that

A proof of the Stars Greatness.

B

Stars

Stars being by all mens confession, so many thousand miles distant from the earth, must needs be very great, that so far off should be seen in any quantity.. Thus much for the shooting or falling Stars.

Of burning Candles.

Burning
Candles.

When the *Exhalation* carried up into the highest part of the air, is in all parts thereof of equall and like thinness, and also long, but not broad, it is set on fire and blazeth like a Candle, until the *Exhalation* be quite consumed.

Burning
Beames
and round
Pillars.

Of burning Beams and round Pillars:

These are caused, when the *Exhalation* being long and not very broad, is set on fire all at once, and so burneth like a great Beam or Log. The difference of Beams and Pillars is this; for Beams are when they seem to lie in length in the air, but they are called Pillars, when they stand right up, the one end nearer to the earth than the other.

Of Burning Spears.

Burning
Spears.

Burning Spears are generated, when a great quantity of exhalations, which

which may be called a dry cloud, is set on fire in the midst, and because the cloud is not so compact that it should suddenly rend, as when thunder is caused, the fire breaketh out at the edges of the cloud, kindling the thin *Exhalations*, which shoot out in great number like fiery spears, or darts, long and very small; wherefore they continue not long: but when they fail, within a short while after, more fire breaking out, they shoot as many more in their place: and likewise, when they are gone, others succeed, if the quantity of the matter will suffice, more than a dozen courses. This impression was seen in London, *An. Dom.* 1560. the 30. day of *January*, at 8. of the clock at night, the air in all other places being very dark; but in the North-east where this cloud burned, it was as light as when the day breaketh toward the Sun rising, in so much that plain shadow of things opposite was seen. The edge of this cloud was in the fashion like the Rainbow, but in colour very bright, and oftentimes casting forth almost innumerable darts

The Second Book

of wonderfull length, like squibs that are cast into the air, saving that they move more swiftly than any squibs.

Of Shields, Globes, or Bowles.

Shields,
Globes or
Bowles.

These *Meteors* also have their name of their fashion, because they are broad, and appear to be round; otherwise their generation differeth not from the cause of the like impressions before mentioned.

Of Lamps.

Lamps.

The Lamp consisteth of an *Exhalation* that is broad and thick, but not equally extended; namely, smaller at one end than at another, which being kindled about the middest thereof, burneth like a Lamp. The cause why, as well this impression, as many other, appeareth round, is not for that alwaies they are round indeed, but because the great distance causeth them to seem so. For even the square forms far off seem to be round. It is written, that a Lamp fell down at *Rome*, when *Germanicus Caesar* set forth the sight of sword-play-ers.

Flying
Dragons,
or fire
Drakes.

Of flying Dragons or fire-Drakes.

Flying Dragons, or as Englishmen call

call them, fire-Drakes, be caused on this manner. When a certain quantity of vapors are gathered together on a heap, being very near compact, & as it were hard tempered together, this lump of vapors ascending to the region of cold, is forcibly beaten back, which violence of moving is sufficient to kindle it; although some men will have it to be caused between two clouds, a hot and a cold; then the highest part, which was climbing up ward, being by reason more subtile and thin, appeareth as the Dragons neck, smoking, for that it was lately in the repulse bowed or made crooked, to represent the Dragons belly. The last part by the same repulse turned upward, maketh the tayl, appearing smaller, for that it is both further off, and also for that the cold bindeth it. This Dragon thus being caused, flieth along in the air, and sometime turneth to and fro, if it meet with a cold cloud to beat it back, to the great terrour of them that behold it: of whom some call it a fire-Drake: some say it is the Devil himself, and so make report to others. More than 47. years ago,

on May day, when many young folk went abroad early in the morning, I remember by six of the clock in the forenoon, there was news come to London, that the Devil, the same morning, was seen flying over the Thames: afterward came word that he lighted at Stratford, and there was taken and set in the Stocks, and that though he would fain have dissembled the matter, by turning himself into the likeness of a man, yet was he known well enough by his cloven foot. I knew some then living, that went to see him, and returning, affirmed, that he was seen flying in the air, but was not taken prisoner. I remember also, that some wished he had been shot at with Guns or shafts, as he flew over the Thames. Thus do ignorant men judge of these things that they know nor. As for this Devil, I suppose it was a flying Dragon, whereof we speak, very fearfull to look upon, as though he had life, because he moveth, whereas it is nothing else but clouds and smoak: so mighty is God, that he can fear his enemies with these and such like operations,

rations, whereof some examples may be found in holy Scripture.

Of the Pyramidall Pillar like a spire or broached Steeple.

THis sharp-pointed pillar is generated in the highest region of the air, and after this sort: When the *Exhalation* hath much earthly matter in it, the lighter parts and thinner (as their nature is) ascending upward, the grosser, heavier, and thicker, abide together in the bottom, and so is it of fashion great beneath, and small pointed above, and being set on fire it is so seen, and thereof hath his name. Of Spires.

Of fire scattered in the air.

Fire scattered in the air, or illuminations, are generated in the lowest region of the air, when very dry and hot *Exhalations* are drawn up, and meeting with cold clouds, are sent back again, which motions do set them a fire; whose parts being not equally thick or joyned together, seem as though fire were scattered in the air: Yea sometimes, the whole air seemeth to burn, as though it would rain fire from Heaven, and so it hath Fire scattered.

come to pass, burning both Cities and Towns. Then judge how easie it was for God to rain fire upon *Sodom* and *Gomorrhah*, for their sins & wickedness.

Of lights that go before men, and follow them abroad in the fields, by the night season.

Light that
goeth be-
fore men,
& follow-
eth them
in the
night.

THere is also a kind of light that is seen in the night season, & seemeth to go before men, or to follow them, leading them out of their way into waters, and other dangerous places. It is also very often seen in the night, of them that sail on the Sea, and sometime will cleave to the mast of the Ship, or other high parts, sometime slide round about the Ship, and either rest in one part till it go out, or else be quenched in the water. This impression seen on the land, is called in Latin *Ignis fatuus*, foolish fire, that hurteth not, but only feareth fools. That which is seen on the Sea, if it be but one, is named *Helena*; if it be two, it is called *Castor* and *Pollux*.

The foolish fire is an *Exhalation* kindled by means of violent moving, when by cold of the night, in the lowest region of the air, it is beaten down;
and

and then commonly, if it be light, seeketh to ascend upward, and is sent down again; so it danceth up and down. Else if it move not up and down, it is a great lump of glewish or oylmatter, that by moving of the heat in it self, is enflamed of it self, as moist Hay will be kindled of it self. In hot and fenny Countries, these lights are often seen, and where is abundance of such unctuous and fat matter, as about Church-yards, where through the corruption of the bodies there buried, the earth is full of such substance: wherefore in Church-yards, or places of common buriall, oftentimes are such lights seen, which ignorant and superstitious fools have thought to be souls tormented in the fire of Purgatory. Indeed the Devil hath used these lights (although they be naturally caused) as strong delusions to captive the minds of men with fear of the Popes Purgatory; whereby he did open injury to the blood of Christ, which only purgeth us from all our sins, & delivereth us from all torments both temporall and eternall, according to the saying of the Wise-man, The
souls

souls of the righteous are in the hands of God, and no torment toucheth them. But to return to the lights, in which there are yet two things to be considered. First, why they lead men out off their way. And secondly, why they seem to follow men and go before them. The cause why they lead men out of the way, is, that men, while they take heed to such lights, and are also sore afraid, they forget their way, & then being once but a little out of their way, they wander they wot not whither, to waters, pits, and other very dangerous places. Which, when at length they hap the way home, will tell a great tale, how they have been led about by a spirit in the likeness of Fire. Now the cause why they seem to go before men, or to follow them, some men have said to be the moving of the air, by the going of the man, which air moved should drive them forward if they were before, and draw them after if they were behind. But this is no reason at all, that the Fire which is oftentimes three or four miles distant from the man that walketh, should

should be moved to and fro by that air which is moved through his walking, but rather the moving of the air and the mans eyes, causeth the fire to seem as though it moved, as the Moon to children seemeth, if they are before it, to run after them: if she be before them, to run before them, that they cannot overtake her, though she seem to be very near them. Wherefore these lights rather seem to move, then that they be moved indeed.

Of Helena, Castor and Pollux.

WHen the like substance in the lowest region of the air, over the Sea, by the like occasion is set on fire, if there be one only, it is called *Helena*, if there be two, they are called *Castor*, and *Pollux*. These impressions will oftentimes cleave to the mast, and other parts of ships, by reason of the claminess and fatness of matter. *Helena* was of the Heathen men taken as a Goddess, the daughter of *Jupiter* and *Leda*. *Castor* and *Pollux* were her brethren. *Helena* was the occasion that *Troy* was destroyed; therefore the Mariners by experience trying, that one flame

*Helena,
Castor,
Pollux.*

flame of fire appearing along, signified a tempest at hand, supposed the same flame to be the goddess *Helena*, of whom they look'd for nothing but destruction. But when two lights are seen together, they are a token of fair weather, & good luck: the Mariners therefore believed that they were *Castor* and *Pollux*, which sailing to seek their sister *Helena*, being carried to *Troy* by *Paris*, were never seen after, & thought to be translated into the number of the gods, that gave good success to them that sail, as we read in the last Chapter of the Acts of the Apostles, that the Ship wherein *St. Paul* sailed, had a badge of *Castor* and *Pollux*. A naturall cause why they may thus foreshew either tempest or calmness, is this; One flame alone may give warning of a tempest, because that as the matter thereof is compact, and not dissolved; so it is like, that the matter of the tempest (which never wanteth) as wind and clouds, is still together, and not dissipated, then is it like not long after to arise. By two flames together may be gathered, that as this *Exhalation* which is very thick, is divided: so the
the

the thick matter of tempests is dissolved and scattered abroad by the same cause that this is divided. Therefore not without a reason, the Mariner to his mates may promise a prosperous course

*Of flames that appear upon the hairs
of men or beasts.*

THere is another kind of fiery impression, which is flames of fire upon the hairs of men and beasts, especially horses. These are sometime clammy *Exhalations*, scattered abroad in the air in small parts, which in the night, by resistance of the cold, are kindled, cleaving on horses ears, on mens heads and shoulders that ride or walk. In that they cleave upon hairs, it is by the same reason that the dew will be seen also upon hairs or garments, whose wool is high, as frize mantels and such like. Another sort of these flames are caused, when mens or beasts bodies being chafed, send forth a fat & clammy sweat, which is in like manner kindled, as the sparks of fire that are seen when a black horse is curried. *Livius* reporteth of *Servius Tullius*, that as he lay asleep, being a child,

Flames
upon
hairs of
men and
beasts.

*Livius.
Servius.
Tullius.*

Marius.

child, his hair seemed to be all on a flame, which for all that did not burn his hair or hurt him. The like history he reciteth of one *Marius* a Knight of *Rome*, that as he made an Oration to his Souldiers in *Spain*, they saw his head burning on a light fire, and himself not ware of it. Thus much concerning these Flames.

Of Comets or Blazing Stars.

Comets or
blazing
Stars.

A Comet is an exhalation hot and dry, of great quantity, fat and clammy, hard-compact like a great lump of pitch, which by the heat of the Sun is drawn out of the Earth into the highest region of the Air, and there by the excessive heat of the place is set on fire, appearing like a Star with a blazing tayl; and sometime is moved after the motion of the Air which is circular, but it never goeth down out of the compass of sight, though it be not seen in the day-time for the brightness of the Sun, but still burneth until all the matter be consumed. An argument of the greatness is this, that there was never any Co-

met

met yet perceived, but at the least it endured 7. dayes; but much longer they have been seen; namely forty dayes long, yea fourscore dayes; and some six moneths together. Wherefore it must needs be a wonderfull deal of matter that can give so much nourishment for so great and fervent fire, and for so long a time.

There are considered in a *Comet* specially the Colour and Fashion, which both arise of the disposition of the matter.

Their Colours be either white, ruddy, or blew. If the matter be thin, the colour is white; if it be meanly thick, then is the *Comet* ruddy, after the colour of our fire; but when the matter is very thick, it is blew, like the burning of brimstone. And as the matter is more or less after this disposition, so is the *Comet* of colour more or less like to these three principall colours: some yellowish, some duskish, some greenish, some watchet, &c.

In Fashion are noted three differences; for either they seem to be round, with beams round about, or with a beard

beard hanging downward, or else with a tayl stretched out sidelong in length. The first fashion is when the matter is thickest in the midst, and thin round about the edges; the second is when the Exhalation is upward thick, and in length downward also meanly thick; the third form is like the second, saving that the tayl hangeth not down but lyeth aside, and is commonly longer than the beard.

The temper of the four Quarters.

The time of their generation is oftenest in Autumn or Harvest: for in the Spring there is too much moisture, and too little heat to gather a Comet; in Summer is too much heat, which will disperse and consume the matter that it cannot be joyned together; as for Winter, it is clean contrary to the nature of a Comet, which is hot and dry, Winter being cold and moist: therefore no time so meet as Autumn.

The signification of Comets.

Now for so much as many learned men have gone about to declare the signification of Blazing Stars, we will omit nothing that hath any shadow of Reason, but declare what is written of them.

Such

Such things as are set forth of the betokening of Comets are of two sorts: The first is of natural; The second of Civil or Politick Effects.

They are said to betoken Drought, Barrenness of the Earth, and Pestilence.

Drought, because a Comet cannot be generated without great heat; and much moisture is consumed in the burning of it.

Barrenness, because the fatness of the Earth is drawn up, whereof the Comet consisteth.

Pestilence, for so much as this kind of Exhalation corrupteth the Air, which infecteth the bodies of men and beasts.

The second sort might well be omitted, saving that *Aristotle* himself Aristot. disdaineth not to seek out Causes for some of them.

Generally it is noted of all Historiographers, that after the appearing of Comets, most commonly follow great and notable Calamities. Beside this, they betoken (say some) Wars, Seditions, Changes of Commonwealths, and the Death of Princes and Noble men.

C

For

For what time Comets do shine, there be many hot and dry Exhalations in the Air, which in dry men kindle heat, whereby they are provoked to anger : of anger cometh brawling : of brawling, fighting and war : of war, victory : of victory, change of Commonwealths : then also Princes living more delicately than other men, are more subject to infection ; and therefore die sooner than other men. If it were lawfull to reason in this sort, we might induce them to betoken not only these few things, but all other things that chance in the world.

Yet these predictions have a shew of Reason, though it be nothing necessary ; but it is a wonder to see how the Astrologians dote in such devices, they are not ashamed to an earthly substance to ascribe an heavenly influence, and in order of judgment to use them as very Stars. Surely, by as good reason as to the celestiall Stars they attribute divine influences and effects. But this their folly hath been sufficiently detected by divers godly and learned men, and this place requireth no

no long discourse thereof. Wherefore this shall suffice, both for the natural Causes of Blazing Stars, and also for all Flames in general. It followeth therefore, that with like brevity we declare the Causes of Fiery Apparitions.

Of Apparitions.

AN Apparition is an Exhalation in ^{Apparitions.} the lowest or highest Region of the Air, not verily burning, but by refraction of light either of the Sun or of the Moon, seemeth as though it burned: which appearance of colour riseth not of the mixtion of the four qualities, as it doth in bodies perfectly mixed, as Herbs, Stones, &c. but only the falling of light upon shadow: the light is in stead of white, and the shadow of darkness in stead of black. These diversly mixed according to the divers dispositions of the Exhalation, which ministreth variety by thickness or thinness, cause divers Colours.

There be commonly recited three kinds of Fiery Apparitions; Colours,

C 2

Wide-

Wide-gapings, and Deep holes, which appear in the Clouds.

Of Colours.

Colours
in the Air.

Colours are here meant, when there is nothing else to be noted but the Colours of the Clouds: and they are caused (as it is said) by casting the light into the shadowy Cloud, according as it exceedeth more or less in thickness; whereof some be very bright-white, and that is when the Exhalation is very thin; some yellowish, when the Exhalation is thicker; some ruddy, when it is meanly thick; and very black, when it is very thick. The red and ruddy Colours are seen in the morning and evening, when the light of the Sun is not in his full force: for at other times of the day his light is too vehement, clear, strong, and piercing. Thus much of Colours.

Of Wide-gaping.

Wide ga-
ping of
clouds in
the Air.

Wide-gaping is caused when an Exhalation is thick in the midst, and thin on the edges, then the light being received into it causeth it to appear as though the sky did rend, and fire break out of it.

Of

Of round opening Hiatus.

These holes, called *Hiatus*, differ from Wide-gapings in nothing but that they be less, and therefore seem as though they were deep pits or holes, and not rending or gaping; And these be those Apparitions that appear Fiery, and yet be not so indeed. Therefore let this be sufficient to have shewed the natural Causes of all Fiery Meteors.

Round opening in the Air.



THE THIRD BOOK.

Of Airy Impressions.



Under the name of Airy Impressions, bee comprehended such Meteors, whose matter is most of the Air. Of this sort be Winds, Earth-quakes, Thunder, Lightnings, Storm-Winds, Whirlwinds, Circles, Rain-bowes, The White Circle, called of some *WATLING street*,

many Sunnes, many Moons.

Of Winds.

Winds.

THE Wind is an Exhalation hot and dry, drawn up into the Air by the power of the Sun, and by reason of the weight thereof being driven down, is laterally or sidelong carried about the Earth. And this Definition is not to be understood of generall Winds that blow over all the Earth, or else some great Regions; but besides these there be particular Winds which are known but only in some Countries, and them not very large. These Winds oftentimes have another manner of generation, and that is on this manner;

The second kind of Winds.

It must needs be confessed, that within the globe of the Earth be wonderful great holes, caves or dungeons, in which when Air aboundeth (as it may by divers Causes) this Air that cannot abide to be penned in, findeth a little hole in or about those Countries, as it were a mouth to break out of, and by this means bloweth vehemently

mently: yet that force and vehemency extendeth not far; but as the wind that cometh forth of bellows, near the coming forth is strong, but far off is not perceived: so this particular Wind, in that particular Countrey where it breaketh forth, is very violent and strong, in so much that it overthroweth both trees and houses, yet in other Countries not very far distant, no part of that boisterous blast is felt. Wherefore this Wind differeth from the generall Winds both in Qualities and Substance or Matter: for the Matter of them is an Exhalation, and the Qualities such as the nature of the Exhalation is, very Airy, but not Air indeed: but of this particular Wind the Matter and Substance is most commonly Air.

There is yet a third kind of Wind, which is but a soft, gentle, and cool moving of the Air, and cometh from no certain place (as the generall Wind doth) yea it is felt in the shadow under trees, when in the hot light and shining of the Sun it is not perceived. It cometh whisking suddenly,

The third
kind of
Wind.

ly, very pleasant in the heat of Summer, and ceaseth by and by; this properly is no Wind, but a moving of the Air by some occasion.

As for the general Winds, they blow out of divers Quarters of the Air, now East, now West, now South, now North, or else inclining to one of the same Quarters: Among which the East-wind following the nature of the Fire, is hot and dry; the South-wind expressing the quality of the Air, is hot and moist; the Western blast agreeing with the Waters property, is cold and moist; the North that never was warmed with the heat of the Sun, being cold and dry, partaketh the condition of the Earth. The middle Winds have middle and mixed qualities, after the nature of those four principall Winds, more or less, as they incline toward them, more or less.

The qualities of the winds and the four quarters of the world.

The quality of middle winds.

The profit of winds.

Generally the profit of all Winds, by the wonderfull wisdom of the Eternal God, is very great unto his Creatures. For besides that these Winds alter the Weather, some of them bringing rain, some driness, some frost and snow, which

which all are necessary; there is yet an universall commodity that riseth by the only moving of the Air, which were it not continually stirred as it is, would soon putrifie, and being putrified would be a deadly infection to all that hath breath upon the Earth. Wherefore this Wind, whose sound we John 3^d hear, and know not from whence it cometh nor whither it goeth (for who can affirm from whence it was raised, or where it is laid down?) as all other Creatures beside, does teach us the wonderfull and wise providence of God, that we may worthily cry out with the Psalmist, and say, *O Lord, how manifold are thy works! in wisdom hast thou made them all, &c.* Let this be sufficient to have shewed the generation of the Winds.

Psal. 104.

Of Earthquakes.

AN Earthquake is a shaking of the Earth, which is caused by means of wind and *Exhalations*, that be enclosed within the caves of the Earth, and can find no passage to break forth, or else

Earth-
quakes.

else so narrow a way that it cannot soon enough be delivered.

Wherefore, with great force and violence it breaketh out, and one while shaketh the Earth, another while rendeth and cleaveth the same: sometime it casteth up the Earth a great height into the Air, and sometime it causeth the same to sink a great depth down, swallowing both Cities and Towns, yea and also mighty great Mountains, leaving in the place where they stood nothing but great holes of an unknown depth, or else great lakes of Waters.

Of divers kinds of Earthquakes.

Divers
kinds of
Earth-
quakes.

DIvers Authors write diversly of the kinds of Earthquakes, some making more and some less, but we shall be content at this time to comprehend them in four sorts.

The first kind is when the Earth is shaken laterally, to one side, which is when the whole force of the wind driveth to one place, and there is no other contrary motion to let it. This wind, if it be not great, shaketh the Earth,

Earth, that it trembleth as a man that hath a fit of an ague, and doth no more harm: but if it be great and violent, it looseth the foundations of all buildings, be they never so strong, and overthroweth whole Cities, but especially the great buildings, and not only such buildings, but sometimes also casteth down great Hills, that cover and overwhelm all the valleys under them. Many noble and great Cities have been overthrown by this kind of Earthquake. It is written, that twelve of the most beautifull Cities, and most sumptuous buildings in all *Asia*, were overthrown & utterly destroyed with an Earthquake. How often *Antiochia*, yea within short time was destroyed, they which have read the Histories, can testifie.

Twelve
Cities o-
verthrown
with one
Earth-
quake.

How terrible was the Earthquake that shook *Constantinople* a whole year together, that the Emperour and all the people were faine to dwell abroad in the fields under tents and pavilions, for fear their houses would fall on their heads, it is recorded in the Chronicles, and worthy to be remembered.

Constanti-
nople the
chiefest
City of
Greece,
now the
Turks Pa-
lace.

The second kind is, when the Earth
with

The se-
cond kind.

with great violence is lifted up, so that the buildings are like to fall, and by and by sinketh down again: this is, when all the force of the winds striveth to get upward, after the nature of gunpowder, and finding some way to be delivered out of bondage, the Earth that was hoisted up, returneth to his old place.

The third
kind.

Earth-
quake on
the Sea.

The third kind is a gaping, rending, or cleaving of the Earth, when the Earth sinketh down, and swalloweth up Cities, and Towns, with Castles, and Towers, Hills, and Rocks, Rivers, and Floods, so that they be never seen again.

Yea the Sea in some places hath been drunk up, so that men might have gone over on foot, untill the time of tide or flood returning covered the place with Waters again. But in the land, where this Earthquake swalloweth up any City, or Country, there appeareth nothing in the place thereof, but a marvelous wide and deep gulf, or hole. *Aristot.* *Aristotle* maketh mention of divers places, and regions, that were overthrown with this kind of Earthquake.

The

The fourth kind is, when great mountains are cast up out of the Earth, or else when some part of the land sinketh down, and in stead thereof arise Rivers, Lakes, or Fires, breaking out with smoak and ashes. It causeth also overflowings of the Sea, when the Sea bottome is lifted up, and by this means arise many Islands in the Sea, that never were seen before. These and other such miracles are often found in the Writers of Histories, also in the *Philosophers*, as *Aristotle*, *Seneca*, and *Plinius*.

Nevertheless, the effects of some as most notable, it shall not be unprofitable to recite. *Plato* in his *Dialogue* entituled *Timæus*, maketh mention by the way of a wonderfull Earthquake, whereby not only *Africa* was rent asunder from *Europe* and *Asia* (as it is indeed at this day, except a little neck by the red Sea) the Sea entring between them that now is called *Mare Mediterraneum*: but also a wonderfull great Island, which he affirmeth, was greater than *Africa* and *Asia* both, called *Atlantis*, was swallowed up, and covered by the Waters, in so much, that

The fourth kind.

New Islands in the Sea.

Aristot.
Seneca.
Plinius.

Plato.
A wonderfull Earthquake.

Africa, Europe, Asia, the three parts of the earth *Mediterraneum*, because it goeth thorow the midst of the earth.

Atlantis an Island.

on

on the Sea called *Atlanticum*, for a great while after no Ship could sail, by reason that the same huge Sea, by resolution of the Earth of that mighty Island, was all turned into mud.

Seneca.
Theron &
Therea.
Arist. He-
rodotus.
Egypt
sometime
a gulph of
the Sea.

The famous Ile of *Sicilia* was also sometime a part of *Italy*, and by Earthquake rent asunder from it. *Seneca* maketh mention of two Islands, *Theron* and *Therea*, that in his time first appeared. It should seem both by *Aristotle*, and also by *Herodotus*, that *Egypt* in ancient time was a gulph of the Sea, and by Earthquake made a dry land. During the reign of *Tiberius* the Emperor, twelve notable Cities of *Asia* were overthrown in one night, &c.

*How so great Winds come to be
under the Earth.*

THe great Caves and Dens of the Earth must needs be full of Air continually: but when by the heat of the Sun the moisture of the Earth is resolved, many *Exhalations* are generated as well within the Earth as without; and whereas the places were full be-

before, so that they could receive no more, except part of that which was in them were let out in such Countries where the Earth hath few pores, or else where they are stopped with moisture, it must needs follow, that these *Exhalations*, striving to get out, must needs rend the Earth in some place, or lift it up, so that either they may have free passage, or else room enough to abide in.

Of signs and tokens that go before an Earthquake most commonly.

THe first, is the raging of the Sea, The signs
of an
earthquake when there are no tempestuous Winds to stir it, yea, when the Air is most calm without Wind.

The cause why the Sea then rageth, is, that the Wind beginneth to labour for passage that way, and finding none, is sent back, and soon after shaketh the land.

The second sign is calmness of the Air, and cold, which cometh to pass, by reason that the *Exhalation* that should be abroad is within the Earth.

The third sign, is said to be a long
thin

thin strake of Cloud seen, when the sky is clear, after the setting of the Sun. This (say they) is caused, by reason that the *Exhalation* or Vapor, which is the matter of Clouds, is gone into the Earth.

Others affirm, that it is the *Exhalation* that breaketh out of some narrow hole of the Earth, out of which the rest of the Wind cannot issue, neither will it wait the time: wherefore within a while after, it seeketh and maketh it self, by sudden eruption, a broader way to be delivered out of prison.

Also the Sun, certain dayes before it, appeareth dim, because the Winds that should have purged and dissolved the gross Air, that causeth this dimness to our eyes, is enclosed within the bowels of the Earth.

The Water in the bottome of deep wells is troubled, and the savour thereof infected, because the pestilent *Exhalations* that have been long enclosed within the Earth, do then begin a little to be sent abroad. For thereof cometh it, that in many places where Earthquakes have been, great abundance

dance of smoak, flame, and ashes, is cast out, when the abundance of brimstone that is under the ground, through violent motion is set on fire, and breaketh forth. Finally, who knoweth not, what stinking Minerals, and other poysonous stuff do grow under the Earth? wherefore it is no wonder, if Well-water, before an Earthquake, be infected: but rather it is to be marvelled, if after an Earthquake there follow not a grievous Pestilence, when the whole mass of infection is blown abroad.

Last of all, there is heard before it, in the time of it, and after it, a great Thunder-noise and sound under the Earth, a terrible groaning, and a very Thundring, yea, sometimes when there followeth no Earthquake at all, when as the wind, without shaking of the Earth, findeth a way to pass out at. And these for the most part, or at least some of them, are forewarnings, that the most fearfull Earthquake will follow, than the which there is no naturall thing that bringeth men into a greater fear. Cato was very curious to

Thunder-
ing under
the earth.

Cato.

D

confess

confess himself, that he repented that ever he went by water, when as he might have gone by land. But what land can be sure, if it be the Lords will by this work of his to shake it? what building so strong, that can defend us, when the more strong, the more danger, the higher, the greater fall?

Of Thunder.

Thunder.

THunder is a sound caused in the Clouds, by the breaking out of a hot and dry Exhalation, beating against the edges of the Cloud. It is often heard in Spring and Summer, by reason that the heat of the Sun then draweth up many Exhalations, which meeting in the middle region of the Air with moist and cold Vapors, are together with them enclosed in a hollow Cloud: but when the hot Exhalation cannot agree with the coldness of the place, by this strife being driven together, made stronger, and kindied, it will straight break out, which sudden and violent eruption causeth the noise which we call Thunder. A Similitude

multitude is put by great Authors, of moist wood that cracketh in the fire: we may adde hereunto the breaking of an egge in the fire, of an apple, or any like thing; for whatsoever holdeth and withholdeth inclosed any hot wind, so that it can have no vent, it will seek it self a way by breaking the skin, shell, or case. It were no ill comparison to liken Thunder to the sound of a Gun, which be both caused of the same, or very like causes.

A similitude.

The sound of Thunder is divers; after which men have divided the Thunder into divers kinds, making first two sorts, that is, small Thunder and great. But as for the diversity of sounds, generally it comes of the divers disposition of the clouds, one while having more holes than at another; sometime thicker in one place than in another.

Divers kinds of Thunders.

The small or little Thunder is, when the Exhalation is driven from side to side of that Cloud, making a noise, and either for the small quantity and less forcibleness, or else for the thickness of the Clouds walls, is not able to break them, but rumbleth up and

Small Thunder, and the kinds thereof.

down within the cloud, whose sides be stronger than the force of the Exhalation is able to break, it runneth up and down within, and striking against the cloud and moist sides, maketh a noise not unlike the quenching of hot iron in cold water.

And if the Exhalation be meanly strong, and the cloud not in all places of like thickness, it breaketh out at those thin places with such a buzzing, as wind maketh blowing out of narrow holes.

But if the cloud be so thin that it cannot keep in the Exhalation, although it be not kindled, then it bloweth out with like puffing, as wind cometh out of a pair of bellows.

Great
thunder,
and the
kinds
thereof.

A great Thunder is when the Exhalation is much in quantity, and very hot and dry in quality; the clouds also very thick and strong, that easily will not give place to the wind to escape out.

Wherefore if the Exhalation do vehemently shake the cloud, though it do not at the first disperse it, it maketh a long and fearfull rumbling against

gainst the sides of the cloud, untill at the last being made stronger by swifter motion, it dissolveth the cloud, and hath liberty to pass out into the open Air; the cloud dissolved droppeth down, and then followeth a shour of Rain.

Otherwhiles it shaketh the cloud not long, but straightway rendeth it a long space and time, whose sound is like the rending of a Broad-cloth, which noise continueth a pretty while.

And sometime it discusseth the cloud at once, making a vehement and terrible crack like a Gun, sometime with great force casting out stones, but most commonly fire, which setteth many high places on fire. As in the year of our Lord 1561. the fourth day of June, the steeple of St. Pauls Church in London was set on fire, as it hath been once or twice before, and burned.

The noise of Thunder though it be great in such places over which it is made, yet is not heard far off, especially against the wind; whereof we had experience also in the year of our

How far
thunder is
heard.

Lord, 1561. on Saint *Matthias* day in February, at the evening, when there was a great flash of Lightning, and a very terrible crack of Thunder following; they that were but 15. Miles from *London* Westward heard no noise nor sound thereof; the Wind that time was Western.

The profit
of thunder.

The effect of Thunder is profitable to men, both for that the sweet shower doth follow it, and also for that it purgeth and purifieth the Air, by the swift moving of the Exhalation that breaketh forth, as also by the sound, which dividing and piercing the Air, causeth it to be much thinner: which may be verified by an History that *Plutarch* in the life of *Quincius Flaminius* reporteth, that there was such a noise made by the Grecians, after their Liberty was restored, that the Birds of the Air that flew over them were seen fall down, by reason that the Air divided by their cry, was made so thin, that there was no firmity or strength in it to bear them up. And let this suffice for Thunder, which Lightning succeedeth in treaty, that seldom is from it in nature.

Plutar-
chus: T.
Quincius
Flaminius.

Of

Of Lightning.

AMong the divers kinds of Lightning
nings which Writers in this
knowledge do number, we shall treat
only of four kinds; yet so, that under
these four all the rest may be compre-
hended. The names we must borrow
of the Latin Tongue; the first is *Ful-*
getrum, the second *Coruscatio*, the third
Fulgur, the fourth *Fulmen*.

Fulgetrum
Corusca-
tio, Fulgur
Fulmen.

Of *Fulgetrum*.

F*ulgetrum* we call that kinde of
Lightning which is seen on Sum-
mer nights and evenings, after a hot
day. The generation hereof is such;
when many thin, light, and hot Exha-
lations, by the immoderate heat have
been drawn up from the Earth, and by
the absence of the Sun, be destitute of
the force whereby they should have
been drawn further upward, yet some-
thing ascending by their own nature,
in that they be light and hot, they meet
with the cold either of the night in the

lowest region, or else of the Air in the middle region; and so by resistance of contraries (as it hath been oft before rehearsed) they are beaten back, and with vehement moving set on fire. This Lightning commonly goeth out in the Air terrible to behold, not hurtfull to any thing, except sometime when the matter is earthy and gross, being stricken down to the earth, it blasteth corn and grasse, with other small hurt. Sometime it setteth a barn or thatched house on fire.

The colour of this Lightning as of all other, is divers, partly according to the matter, and partly according to the light. If the matter be thin, it is white; if the substance be gross, it is ruddy, like flames of fire. In great light, as in the day, it appeareth white; in the night, ruddy: yet sometime in the day time we may see it yellow, which is a token that the matter is wonderfull thick and gross. Old Wives are wont to say, that no night in the year except one passeth without Lightning, but that is as true as the rest of their Tales, whereof they have great store.

of

Of Coruscation.

CORUSCATION is a glistering of fire, rather than fire indeed; and a glistering of Lightning, rather than Lightning it self; which is two manner of wayes: One way, when clouds that be lower than the upper part of the Earth, without the compass of our sight are enflamed, and the reflection of that flame is cast up into our sight, appearing in all points like Lightning, saving that the Air where it appeareth, is so clear, that we are perswaded no Lightning can be there caused. Another way is, when there be thick clouds over us, and commonly a double order of clouds, one above another: if Lightning or any other Inflammation be in the upper part of these clouds, the light of them pierceth thorow the lower parts, as thorow a glasse, and so appeareth as though it Lightned, when perhaps it did Lighten indeed, yet that which we saw was but the shadow thereof: and this is often without Thunder.

Of

Of Fulgur.

Fulgur.

The lightning is not before the thunder, though it seem so.

Sight preventeth hearing.

Fulgur is that kinde of Lightning which followeth Thunder, whereof we have spoken before. For when that violent Exhalation breaks forth, making a noise as it beateth against the sides of the Cloud, with the same violence it is set on fire, and casteth a great light, which is seen far and near. And although the Lightning appear unto us a good pretty while before the Thunder-clap be heard, yet it is not caused before the noise, if any Thunder at all follow, but either is after it, or with it. Wherefore that we see it before we hear the Thunder, may be ascribed either to the quickness of our sight that preventeth the Hearing, or else to the swift moving of the fire, and the light thereof to our eyes, and the slow motion of the sound unto our ears and hearing.

These three kinds of Lightnings are more fearfull than hurtfull, but the fourth seldome passeth without some damage doing.

Of

Of the fourth kind, called
Fulmen.

THe most dangerous, violent, and hurtfull kind of lightning is called *Fulmen*, whose generation is such as followeth: What time a hot *Exhalation* is enclosed in a Cloud, and breaking the same, bursteth forth, it is set on fire, and with wonderfull great force stricken down toward the Earth.

The crack of Thunder that is made when this Lightning breaketh out, is sudden, short, and great, like the sound of a Gun. And oftentimes a great stone is blown out with it, which they call the Thunder-bolt, which is made on this manner.

In the *Exhalation* which is gathered out of the Earth, is much earthly matter, which clottering together by moisture, being clammy by nature, consisting of brimstone, and other metallick substance, by the excessive heat is hardened as a brick is in the fire, and with the mighty force of the *Exhalation*, strongly cast toward the Earth, and

The thunder-bolt
cast out of
the clouds.

Ari-

Strongest
things are
most hurt
of Light-
ning.

How deep
a thunder-
bolt goeth
into the
earth.

Aristot.
Seneca.
Plinius.

Day light-
ning.

strieth down steeples, and high build-
ings of stone, and of wood, passeth tho-
row them, and setteth them on fire;
it cleaveth trees, and setteth them on
fire: and the stronger the thing is that
resisteth it, the more harm it doth to
it. It is sharp-pointed at one end, and
thick at the other end, which is caused,
by reason that the moister part, as hea-
vier, goeth to the bottome of it; so is
the top small, and the bottome thick.

Men write, that the thunder-bolt go-
eth never above five foot deep, when
it falleth upon the Earth: which stan-
deth with reason, both because the
strength of it is weakened before it
come so near the ground, and also
because the continuall thickness of the
Earth breaketh the force, were it never
so great.

Both *Aristotle*, *Seneca*, and *Plinius*,
divide this lightning into three kinds.

Of the first.

The first is dry, which burneth not
to be felt, but divideth & appear-
eth with wonderfull swiftnesse. For be-
ing subtile and pure, it passeth thorow
the

the pores of any thing, be they never
so small; and such things as give place
unto it, it hurteth not; but such things
as resist, it divideth and pierceth. For
it will melt money in mens purses, the
purses being whole and unharmed. Yea,
it will melt a sword in the scabberd,
and not hurt the scabberd at all. A wine
vesse it will cleave, and yet the wine
shall be so dull, that by the space of
three dayes it will not run out. It will
hurt a mans hand, and not his glove.
It will burn a mans bones within him
to ashes, and yet his skin and flesh
shall appear fair, as though nothing
had come to him. Yet otherwise the
whole man in the moment of an hour
shall be burned to ashes, whereas his
clothes shall not seem to have been
touched. It will also kill the child in
the mothers belly, and not hurt the
mother: And all because the matter is
very subtile, and thin, burning, and
passing thorow whatsoever it be, that
will not give it free passage.

Money
melted in
mens Pur-
ses, and
swords in
Scabberds.

Why
it
burns
black

How
it
burns

of
B

Of the second kind.

Moist
Lightning.

Why it
maketh
black.

THe second kind is moist : and because it is very thin, it burneth not to ashes, but only it blasteth or scorseth trees, corn and grasse : and by reason of the moistness it maketh all things black that it cometh near, as moist wood burning is smoaky, and maketh things near it to be black and smoaky.

Of the third kind.

Gross
Lightning.

THe third kind is most like our common fire that we have here on the earth, of gross and earthly substance : wherefore it leaveth a print where it hath been, or else consumeth it into ashes, if it be such a body as will be burned with fire.

*Of the Marvels of Lightning,
and their causes.*

The mar-
vell of
Lightning.

BEsides the wonderful effects of lightning, that have been already remembered,

membred, there be many other which hereafter ensue, with the reason and causes unto them belonging; as thus :

The nature of Lightning is, to poyson beasts that are stricken therewith, as though they had been bit by a Serpent.

Lightning
poysoneth

The cause of this is, that the matter of Lightning is much infected with Brimstone, and other poysonous metallike substance, because it is thin, and giveth thempassage into everypart of the body

It is notable that *Seneca* writeth, how wine-vessels of wood being burned with lightning, the wine would stand still, and not run out : the reason hereof, is, the swift alteration and change, whereby also all the clamminess of the wine is drawn to the outwardmost part, and so keepeth in the wine as in a skin, that by the space of three dayes it will not run. It will also poyson wine, insomuch that they which drink thereof shall either be mad or die of it : the cause hereof was set forth before.

Seneca.
Wine not
running,
the Vessels
being broken.

Lightning that striketh a poysonous beast, purgeth it from the poyson, in so much that it causeth a Serpent or

Lightning
purgeth a
poysonous
Snake
beast.

A Snake
breedeth
no Worms

Snake which it killeth to breed worms, which otherwise it would not do: but being purged from the naturall poyson, by the swift piercing of the Lightning, nothing letteth but that it may breed worms, as all other corrupt flesh will do.

Lightning
openeth
his eyes
that sleep-
eth, and
closeth
his that
waketh.

If Lightning strike one that sleepeth, it openeth his eyes; and of one that waketh it shutteth the eyes. The cause is this, that it waketh him that sleepeth, and killeth him, before he can close his eyes again. And him that waketh, it so amazeth, that he winketh, as he will do at any sudden chance: so he dieth, before he can open his eyes again.

Living
things
turn their
face to-
ward light-
ning.

All living things turn their face toward the stroke of the lightning, because it is their nature to turn their head, if any thing come suddenly behind them. The rest that have their face toward it when it cometh, never turn before they be killed.

The Reason why it killeth the child in the mothers womb, not hurting the mother, is the tenderness of the one, and the strength of the other, when the
Light-

Lightning is not vehement; otherwise both should die together.

Sometime Lightning burneth only the garments, shooes, or hair of men, not hurting their bodies, and then the Exhalation is nothing vehement.

Sometime it killeth a man, and there appeareth no wound without, neither any hurt within, no not so much as any sign of burning: for then the Exhalation, which being kindled is called Lightning, is wonderfull subtile and thin, so swiftly passing thorow, that it leaveth no mark or token behind it.

They that behold the Lightning, are either made blind, or their face swelleth, or they become Lepers; for that Fiery Exhalation received into the pores of their face and eyes, maketh their face to swell and break out into a Leprosie, and also drieth up the ChrySTALLINE humour of their Eyes, so that consequently they must needs be blind.

Eutropius sheweth, that the same day in which *Marcus Tullius Cicero* was born, a certain Virgin of *Rome* riding into *Apulia*, was stricken with

Garments
burnt, the
body un-
hurt.

Lightning
causeth
blindness,
swelling,
or Lepro-
sie.

Eutropius.
Marcus
Tullius
Cicero.
Apulia.

E Light-

Lightning, so that all her garments being taken from her without any rending, she lay stark naked, the lasing of her breast being undone, and her hose-garters untyed, yea her bracelets, collars, and rings, being all loosed from her: Likewise her horse lay dead, with his bridle and girts untyed.

The
wounds of
Lightnings
cold.

The places of them that are burnt with Lightning, are colder than the rest of their bodies, either because the greater heat draweth away the lesser, or else because that by the great violence, the vitall heat is quite extinguished in that place.

Sea-Calf
not hurt
with Light-
ning.

The Sea-Calf is never hurt with Lightning: wherefore the Emperors Tents were wont to be covered with their skins.

Bayes and
Box Trees
seldome
hurt with
Lightning.

The Bay Trees and Box Trees are never, or seldome stricken with Lightning; The Cause of these may be the Hardness of their Skinne, which hath so few Pore-holes, that the Exhalation cannot enter into them.

The Eagle,
Jupiters
harness-
barer.

The Eagle also among Fowls, is not:

not stricken with Lightning; Wherefore the Poets feign, that the Eagle carrieth *Jupiters* Armour, which is Lightning. The Reason may be the thickness and driness of her feathers, which will not be kindled with so swift a fire.

Of Storm-Winds.

A Storm-Wind is a thick Exhalation, violently moved out of a Cloud, without inflammation or burning. Storm winds.

The Matter of this Storm is all one with the Matter of Lightning, that hath been spoken of: namely, it is an Exhalation very hot and dry, and also gross, and thick, so that it will easily be set on fire; but then it hath another name and other Effects.

The Form or Manner of the generation is such;

When abundance of that kind of Exhalation is gathered together within a Cloud, which needs will have one way out or other, it breaketh the Cloud and causeth Thunder, as it hath been

taught before: but if the matter be very thick, and the Cloud somewhat thin, then doth it not rend the Cloud; but falling down beateth the Cloud before it, and so is carried as an arrow out of a bow.

It doth alwayes go before a great sudden showr: For when the Cloud is broken, the water must needs fall down. Also it is so gros and so thick, that it darkneth the Air, and maketh all the Lowest Region of the Air to be in a manner as a dark Smoaky Cloud.

It causeth Tempests in the Sea, and Wonderfull great Danger to them that bear Sail; whom if it overtake, it bringeth to utter destruction.

So sudden is this kind, that it cannot be resisted with sudden help: so violent it is, that feeble force cannot withstand it.

Finally, It is so Troublesome with Thunder, Lightning, Rain, and Beasts, besides these, Darkness and Cold, that it would make men, at so near a Pinch, to be at their Wits End, if they were not accustomed

med to such Tumultuous Tempests.

Wherefore it were profitable to declare the Signs that go before it, to the End Men might beware of it.

But they are so common to other Tempests, that either they are known well enough, or else being never so well known, in a Seldom Calamity they would little be feared.

The Sea-ships subject to more Danger, have more Help, if it be used in Time: But no Signs fore-known can profit the Dweller on the Land, to keep his House from Ruine, except it were to save his Life from the fall of his Mansion.

The sudden violence of this Tempest to him is more seldom times, but more incurable when it cometh, than to the Mariner, who hath some Aid to look for by his coming: the other if he escape with his life, may comfort himself that he was near a great danger, and cast with himself to build up his House again.

Of Whirlwinds.

Whirle-
winds.

A Whirlwind is a Wind breaking out of a Cloud, Rouling or Winding round about, overthrowing that which standeth near it, and that which cometh before it, carrying it with him aloft in the Air.

It differeth from a Stormy Wind in three points.

First, in the Matter, which is less in Quantity, and of thinner Substance.

Secondly, in the Moving, which is Circular, Winding about: whereas the Storm bloweth aslope and Sidelong. Also a Whirlwind in the Moving divideth not it self abroad, and bloweth Directly, as the Storm doth.

And Thirdly, in the manner of the generation; for a Storm doth alwayes come out of one Cloud; but a Whirlwind sometime is Caused by means of two Contrary Winds that meet together.

In

In likemanner, as we see in the streets of Cities, where the wind is beaten back from two walls, meeting in the midst of the street, there is made a little whirlwind, which whisking round about, taketh up the dust, or straws, and bloweth it about, after the very similitude of the great and fearfull whirlwind.

The reason of the going about is this, that when the walls beat back the wind from them, which aboundeth in that place, and those winds when they meet, by reason of equall force on both sides, can neither drive one the other back again, nor yet pass thorow one the other; it must needs be, that they must both seek a way on the side at once, and consequently be carried round about, the one as it were pursuing the other, untill there be space enough in the air, that they may be parted asunder.

The matter of a whirlwind is not much differing from the matter of storm and lightning, that is, an *Exhalation* hot and dry, breaking out of a cloud in divers parts of it, which causeth the blowing about. Also it is cau-

The troubles of
whirle-
winds.

sed, as it hath been said, by two, or more winds, blowing from divers places, which may be of particular causes, that have been shewed before in the Chapter of winds; this tempest is noisome to man and beast, Sea and Land, things living, and life lacking: For it will take up both men and beasts, stones and clods of earth: which when it hath born a great way, will not be so courteous as to set them down again, but negligently letteth them fall from a great height, or else violently throweth them down to the earth.

It breaketh Trees, winding them about, and pulling them up by the roots. It turneth about a Ship, and bruiseth it in pieces, with other mischiefs besides.

Of fired Whirlewinds.

Fired
whirle-
winds.

Sometime a whirlewind is set on fire within the cloud, and then breaking forth, flieth round like a great Cart-wheel, terrible to behold, turning and overthrowing all dry things that it cometh near, as Houses, Woods, Corn, Grass, and whatsoever else standeth in the way. It

It differeth not from a whirlwind, saving that it is kindled and set on fire, so appearing, else the generation of both is called one.

Of Circles.

THE Circle called *Halon* is a garland of divers colours, that is seen about the Sun, the Moon, or any other Star, especially about *Jupiter* or *Venus*, for their great brightness. It is called of the Greeks a compassed plat, of the Latines, a Crown or Garland.

Circles about the Sun, the Moon, and other Stars, Jupiter & Venus Planets.

The matter wherein it is made is a cloud of equall thickness, or thinness, coming directly under the body of the Sun, the Moon, or other Stars, into which the light of the heavenly body is received, and so appeareth round, because the Star is round: as a stone cast into the water maketh many round circles, dilating in breadth, untill the violence of the moving is ended; so is it in the air; the light beams piercing it, cause broad circles to be dilated, which appear white, purple, black, red, green, blew, and other colours, according

Circles in the water.

The colours of circles.

according to the disposition of the clouds matter. The cause of such colours is shewed before, in the peculiar treatise of colours.

This circle is oftner seen about the Moon, than about the Sun, because the heat of the Sun draweth the vapors too high, where it cannot be made. Also, because the night is a more quiet time than the day from wind, it is more often in the night, than in the day. Seldome about other Stars, because their light beams are too weak often to pierce a cloud: yet oftner about smaller Stars than the Sun, because the light of the Sun pierceth the cloud more forcibly, than that this *Halo* can many times be cause.

Circles about a candle.

Otherwhiles it is seen about a candle, which must be in a very thick and gross air, of such proportionate thickness, that it may receive the light, as the cloud doth from the Stars, as in the smoaky places, or hot houses.

This kind of circle is sometimes like a Rainbow, saving that it is a whole circle, unless the Star under which it is caused, be not all risen, or else

else the cloud, in which it is seen, be not all come under the Star, or after it hath come under some part thereof, be dissolved from the rest.

The signs of these Circles.

These Circles be signs of tempests and winds, as witness both *Virgil*, and *Aratus*.

Virgilius,
Aratus,
Poets.

The Wind shall blow from that quarter, where the Circle first beginneth to break. The cause whereof is this, that the Circle is broken by the Wind that is above, which is not yet come down towards us; but by this effect above, we may gather both that it will come, and also from what quarter.

A great Circle about the Moon, be- tokeneth great cold and frost to follow after.

Sign of frost.

But if it vanish away and be dissolved altogether, it is a sign of fair weather.

Sign of fair weather.

If it be broken in many parts, it signifieth tempest.

Sign of tempest.

If it wax altogether thicker and darker, it is a forewarning of rain.

Sign of rain.

One alone, after *Ptolomie*, pure and white, vanishing away by little and little, is a token of fair weather.

Ptolomeus Sign of fair weather.

Two

Sign of
Snow.

Two or three at once portendeth tempest: if they be ruddy, they shew wind to come; and toward snow, they seem as it were broken and rocky.

Being dark or dim they signifie all these foresaid events, with more force and abundance: it is oftner caused in *Autumn* and Spring, than in Winter or Summer: the cause is the temperateness of the time.

Aristotle.
Antipho.

The cause why it appeareth sometime greater, and sometime lesser, is in the quality of the matter, which as it is gross or thin, will more or less be dilated and stretched abroad, and also, as some will have it, of the weakness of mans sight. Of which, *Aristotle* bringeth an example in one *Antipho*, which did alwayes see his own image before him in the air, as in a glass: which he affirmeth to have been for the weakness of his sight-beams, that could not pierce the air, so that they were reflected again to himself.

And thus much for *Halon*, and the causes, signs, or tokens of it.

Of the Rainbow.

THe Rainbow is the apparition of Rainbow.
certain colours in a cloud, opposite against the Sun, in fashion of half a Circle. *Possidonius* said, it was the *Possidonius* Suns looking glass, wherein his image was represented, and that the blew colour was the proper colour of the cloud; red of the Sun; all the other colours of commixtion.

It differeth manifoldly from *Halon*: for the Rainbow is alwayes opposite against the Sun: but *Halon* is directly under it.

They differ not only in place, but also in fashion: the Rainbow is but half a Circle: the *Halon* is a whole Circle.

Likewise they vary in colour: for the Rainbow is more dim, and of purple colour; the *Halon*, whiter and brighter.

Also, in continuance; for the Rainbow may continue longer than *Halon*.

The image of the Rainbow may be seen on a wall, the Sun striking thoro-
row a six-pointed stone, called *Iris*, or *Iris*.
A precious stone called *Iris*.
any

any other Christall of the same fashion; also thorow some glass window.

Halo is seen about Candles, in smoky places, as are baths and kitchings.

A similitude.

The manner of the generation of the Rainbow is such: There is opposite against the Sun a thick watery cloud, which is already resolved into dewy drops of rain, is (for a gross similitude) seen on the potlid, when the Water in the Vessel hath soddened, or is very hot, the lid will be all full of small drops of water, which come from the water in the Vessel; first, by heat resolved into smoak; after, when it cannot go at large, it is resolved again. Wherefore upon such a cloud, the Sun beams striking as upon a smooth glass, do express the image of the Sun unperfectly, for the great distance. Or else the Sun beams striking into a hollow cloud, where they are refracted or broken, and so come to the eyes of him that beholdeth the Rainbow.

The similitude of the Rainbow.

The similitude thereof is seen, when men sail or row in Boats, the Sun shineth upon the water, which casteth on the vessels side the colours and image of the Rainbow. Like-

Likewise, water in an urinall holden against the Sun, receiveth the light, and sheweth colours on the wall.

There be two kinds of Rainbows, one of the Sun, another of the Moon; the one by day, the other by night: the Rainbow of the Sun often, but of the Moon very seldome, in so much that it can be but twice in fifty years, and that when the Moon is in the East or West, full in perfect opposition.

Rainbow
of the Sun.
Rainbow
of the
Moon.

It hath not been many times seen since the writing of Histories, yet sometimes, and for the rareness, is taken for a great wonder. Yet is it in colour nothing so beautifull as the Suns, but for the most part white as milk: other diversities of colours are scant perceived. When it appeareth, it is said to signifie tempest.

The time of the Rainbow is often after the point of *Autumn*; both for the placing of the Sun in competent lowness, and also for abundance of matter, seldome or never is the Rainbow seen about the midst of Summer.

There may be many Rainbows at one time, yet commonly but one principall,

cipall, of which the rest are but shadows and images; the second shadow of the first, the third of the second, as appears by placing of their colours.

It remaineth to shew why it is but half a circle, or less, and never more; and why the whole cloud receiveth not the same colours that the Rainbow hath. The cause of the first is, because the center or middle part of the Rainbow, that is *Diametrally* opposite to the center of the Sun, is alwayes either in the *Horizon* (that is, the circle cutting off our sight of Heaven by the earth) or under it. The cause why the whole cloud is not coloured, is, because that in the midst the beams, as strong, pierce thorow, but on the edges where they are weaker, they are reflected or refracted.

Now for so much as G O D made the Rainbow a sign and Sacrament of the promise, some think it was never seen before the flood: their reason may be this, that the earth after the first creation was then so fruitfull, that it neededd none or very little Rain, so that such dark clouds were not often gathered,

thee

the fruitful ground not so easily remitted his moisture, that then was fat and clammy, hard to be drawn up: so it might be that there was no Rainbow before, as we cannot find that ever it rained before. But whether it were or not, it is certain that then it became a Sacrament, whereas it was none before: which when we behold, it becometh us to remember the truth of God in all his promises, to his glory and our comfort.

The milky way, called of some the way to St. James, and Watling Street.

THe milkyway is a white circle seen in a clear night, as it were in the firmament, passing by the signs of *Sagittarius* and *Gemini*. The white Circle seen in the night.

The cause thereof is not agreed upon among Philosophers, whose opinions I thought best to report, before I come to the most probable causes.

First of all, *Pythagoras* is charged with a Poeticall fable, as though it had been caused, by reason that the Sun did Pythagoras

F once

once run out of his path-way, and burned this part, whereof it looketh white.

Anaxagoras.
Democritus.

Others, as *Anaxagoras* and *Democritus* said, that it was the light of certain Stars, shining by themselves, of their own light, which in the absence of the Sun might be seen. But this opinion is also false; for the Stars have no light of themselves, but of the Sun: also if it were so, it should appear about other Stars.

Cardanus.

Democritus is also reported to have said, that it was nothing else but innumerable little Stars, which with their confuse light caused that whiteness: to this opinion *Cardane* seemeth to subscribe.

Phaeton.

The Poets have four fables of it: one of *Phaeton*, which on a time guided the Chariot of the Sun, and wandering out of the way did burn that place, wherefore of *Jupiter* he was stricken down with lightning.

Ovid.
Meta. Pr.

The second, That it is the high street in Heaven, that goeth straight to *Jupiter's* palace, and both sides of it the common sort of gods do dwell.

Hebe.

The third, that *Hebe*, one which was *Jupi-*

Jupiters Cupbearer, on a time stumbled at a straw, and shed the Wine or Milk that was in the Cup, which coloured that part of Heaven to this day: wherefore she was put out of her office

The fourth, That *Apollo* stood there *Apollo* to fight against the Giants, which *Jupiter* made to appear, for a perpetuall memory.

Theophrastus, a Philosopher, affirmed, That it was the joyning together, *Theophrastus* or seam of the two half Globes, which made it appear more light in that place than in others.

Others said, it was the reflexion of the shining light of fire or star light, as it is seen in a glass, but then it should be moveable.

Diodorus affirmed, that it was Hea- *Diodorus*. venly fire, condensed or made thick into a circle, and so became visible, whereas the rest, for the pureness, cleannes, & thinnes, could not be seen.

Possidonius, whose mind to many *Possido-* seemeth very reasonable, said, it is the *nus* infusion of the heat of the Stars, which therefore is in a Circle, contrary to the Zodiack, (out of which the Sun never Zodiack.

wandereth) because it might temper the whole compass with vital and lively heat ; although in my mind he hath rather expressed the finall cause, than the efficient.

Aristotle. *Aristotles* opinion is, that it should be the beams of a great Circle which is caused by a cloud or *Exhalation*, drawn up by those Stars which be called

Sporades. *Sporades.* This opinion of *Aristotle* is misliked of most men that have travailed in this science ; and worthily : For if it were of the nature of elements, as *Exhalations* are, it would be at length consumed. But this circle never corrupteth, therefore it is not of *Exhalations*. Also it neither encreaseth nor diminisheth, which is a plain proof that it consisteth not of elemental matter, although *Aristotle* seem to make a double circle, one celestial, another elemental.

The last opinion is, of them that say it is the nature of Heaven, thicker in substance than other parts of Heaven be, having some likeness to the substance of the Moon, which being lightened by the same, as all the Stars be,

ap-

appeareth white. And this opinion I take to be most probable, because that sentence of Star light seemeth not so reasonably, to be only in that place, and not elsewhere.

The finall cause of this Milk-white circle, hath been already touched in the opinion of *Possidonius*, whereunto also *Plinius* in the 18. Book, and 29. Chapter of his natural History agreeth, affirming, that it is very profitable for the generation and fruitfull encrease of things that grow on the earth.

Possidonius.
Plinius.

The *Mathematicians* that have measured the breadth thereof, affirm, that toward the north it passeth over the Eccentricall line of the ninth sphere, from the 18. degree of *Gemini*, unto 2. degrees of *Cancer*, which is 13. degrees, and toward the South, from the 8. degree of *Sagittarius*, to the 13. degree of the same sign: and because it is there divided into two branches (as may easily be seen in a clear night) it reacheth from 24. of *Sagittarius*, to the 2. degree of *Capricorn*.

The breadth of this circle.

This circle, if it be of the nature of Heaven, is improperly placed among

Meteors or impressions : but because of *Aristotles* mind, who will have it to be an impression kindled, and their opinion which think it proceedeth of the light of Stars, it is not without good cause in this place treated of.

Of beams, or streams of light, appearing thorow a Cloud.

Beams or
streams.

THere is yet another kind of impression caused by the beams of the Sun, stricken through a watery cloud, being of unequall thinness, and is thinner in one part than in another, so that it cannot receive the beams in any other form, than that they appear direct, or sloped downward of divers colours ; and the same that are the colours of the Rainbow, though not so evident, because the reflexion is not so strong. They vary in colours : some are more purple or ruddy, when the cloud is thicker ; some yellow and whitish, when the cloud is thinner, and so other colours are caused likewise, whereof you may read the proper cause in

in the colours of clouds, and other like parts of this Treatise.

The common people call it the descending of the holy Ghost, or our Ladies *Assumption*, because these things are painted after such a sort. Others say that it is rain, striking down in another place, as though they could see the drops falling. And they are not altogether deceived, but in the time; for soon after it will rain, because this impression appeareth out of a watry cloud. They are called by divers names, as Rods, Wands, Cords of Tents, unto which they are not much unlike staves and little pillars, when they seem greater and thicker, many being joyned together.

The Rainbow, the Circles, and these light Beams, are all of one manner of generation, insomuch that if you divide the Circle, it shall be a Rainbow; if you draw it straight in length, it maketh streams or beams. Herein they agree, namely, in form and matter, but they differ in outward form, which we may call fashion, as the one is round, the other half round, and the third

direct, straight, or falling aslope. Also they differ in place about which they stand: for streams are only about the Sun; Rainbows about the Sun often, and seldome about the Moon; but circles both about the Sun and the Moon, and also about any other of all the Stars, yet rather and oftner about bright Stars.

To make an end of these streams, they appear diversly, after the fashion and place wherein the cloud hangeth, in respect of the Sun; for sometime they are seen only in the edge of a cloud, all the breadth of that cloud: sometime thorow the midst of a cloud, being thinner there than in other parts and then they are spread round about like a tent or pavilion used in War. They are most commonly seen in such times as there is great abundance of rain, which they by their apparition do signifie not yet to be ended.

And thus much concerning direct light beams, called Rods, &c.

Of

Of many Suns.

IT is strange and marvellous to behold the likelihood of that, which *Alexander the Great*, sending word to *Darius*, said to be impossible, that Two Suns should rule the World. But oftentimes, men have seen, as they thought, in the firmament, not only two Suns, but oftener three Suns, and many more in number, though not so often appearing. These, how wonderfull soever they appear, proceed of a naturall cause, which we will endeavour to expresse. They are nothing else but Idols or Images of the Sun, represented in an equall, smooth, and watry cloud, placed on the side of the Sun, and sometimes on both sides, into which the Sun beams being received, as in a glass, expresse the likeness of fashion and light that is in the Sun, appearing as though there were many Suns, whereas indeed there is but one, and all the rest are images.

Many
Suns at
once.
Alexander
the great.
Darius.

This thick and watery cloud is not said to be under the Sun; for then it would

would make the Circles, called crownss or garlands : it is not opposite to the Sun, for then would it make the Rainbow : but it is said to be on the side where the image may be best represented. Also it may not be too far off, for then the beams will be too feeble to be reflected : neither yet too near; for if it so be, the Sun will disperse it : but in a competent and middle distance: for so representation of many Suns is caused.

They are most often seen in the morning and evening, about the rising, or going down of the Sun, seldome at noon time, or about the midst of the day, because the heat will soon dissolve them: yet have there been some seen, which began in the morning, and continued all the day long, unto the evening. Sometimes there appear many little Suns, like unto little Stars, which are caused after the same sort, as we do see a mans face to be expressed in all the pieces of a broken glass. So when the cloud hath many separations, there appear many Suns, on one side of the true Sun, sometimes great and sometimes

Many smal
Suns like
Stars.
Similitude

times little, as the parts of the cloud separated are in quantity.

They do naturally betoken tempest and rain to follow, because they cannot appear but in a watery disposition of the Air.

The signification of many Suns,

Also, if they appear on the South-side of the Sun, they signifie a greater tempest, than if they appear on the North-side. The reason is alleadged, because the Southern Vapor is sooner resolved into Water than is the Northern.

For a supernaturall signification, they have oftentimes been noted to have portended the contention of Princes of Kingdomes: As not long before the Contention of *Galba*, *Otho*, and *Vitellius*, for the Empire of *Rome*, there appeared three Suns. Also of late, toward the slaughter of *Lewis* King of *Hungary*, were seen three Suns, betokening three Princes that contended for the Kingdome, namely *Ferdinando*, since Emperor, *John Vayvode*, and the great Turk.

Galba,
Otho, and
Vitellius.

Of many Moons.

Many
Moons.

After the treaty of many Suns, it were not hard for any man without farther instruction, to know the natural Cause of many Moons; For they are likewise Images of the Moon, represented in an equall Cloud, which is watery, smooth and polished, even like a glass.

Plinius.

Some call them (as *Plinius* saith) night-Suns; because they, joyned with the light of the true Moon, give a great shining light, to drive away the shadow and darkness of the night.

It were superfluous to write more of their Causes or Effects, which are all one with those that have been declared of the Suns.

Why o-
ther Stars
are not so
represent-
ed.

It may be doubted why the other Stars do not likewise express their image in watery Clouds; and so the number of them as to our sight should be multiplied.

It may be Answered, that their light or beams are too feeble & weak, to express any such similitude or likeness in
the

the watry Clouds. For although they have garlands or circles about them, that are caused in a Vapour that is under them, yet it is manifest that this Apparition hath not need of so strong a light, as is required to print the images of them in the Clouds. Again, the Garlands are direct under, and therefore apter to receive such Apparition.

It may be again Objected, that the Stars have their Image perfectly and sufficiently expressed in glasses here on the Earth; yea and at the day-time, when their light is either none, or most feeble and weak: as we see it is used at Midsummer, to behold that great Star called *Syrius* in a glass, even at Noon-days.

Objection.

Syrius a great Star seen at noon in Summer.

Also we see every night the image of the Stars in calm and quiet standing waters: then what should let but that their images might also be expressed in watry Clouds?

Hereto may be answered, that the Let is in the Cloud, which is neither so hard as is the glass, nor yet so continuall as is the water, but consisteth of

An Answer

in-

innumerable small drops: so that except the light of the Stars were stronger, it can in them express no uniform images of them, as it doth in glasses and in the water. Notwithstanding, in Writers of Wonders we read some such like thing sometime to have chanced.

There hath been often seen many Suns in the day-time, and after the Sun setting: at the rising of the full Moon, there have appeared many Moons, which was by this means, that the same Cloud that received the Sun-beams in the morning, tarried in the same place, and at the Moons rising was ready also to receive her image.

Of Wonderfull Apparitions.

Wonder-
full appa-
ritions.

WE will close this Book with a brief declaration of the natural Causes of many things that are seen in the Air, very wonderfull and strange to behold, which in these latter Years have been often seen and beheld, to the great admiration of all men, not without the singular providence of God, to fore-

forewarn us of many dangers that hang over us in these most Perillous Times.

The apparitions of which, as it is most wonderfull, so the searching of the Cause to us is most difficult: a great deal the rather, because no man hath hitherto enterprised (to my knowledge) to seek out any cause of them, but all men have taken them as immediate miracles, without any naturall mean or cause to proure them.

And I truly do acknowledge that they are sent of God as wonderful signs to declare his Power, and move us to amendment of life; indeed miraculous, but not yet so that they want a natural cause; for if they be well weighed and considered, it is not hard to find that they differ much from such Miracles as are recorded in the Scripture, and admitted of Divines. So that as I abhor the Opinion of *Epicurus*, to think that such things come by Chance, but rather by the determined purpose of Gods providence: so I consent not with them, that suppose when any thing is derived from any natural cause,
God

God the chief and best Cause of all things is excluded.

Some of these Wonderfull Apparitions consist of Circles and Rainbows, of divers fashions and placings, as one within another, the edge of one touching another, one dividing or going thorow another, with like placing of small Circles about great Circles, or parts of small Circles; some with the ends upward, some downward; some aside, and some across; but all for the most part in uniform order, constituted or placed for the order of them pleasant to behold, but for the strangeness somewhat fearfull. Such a like Apparition is made with the Suns or Moonss images, joyned unto these Circles, sett also in good and uniform order.

Optice.
Catoptrice

The cause of all these is the meeting together of all those severall Causes that make the Circles, Rainbowes, Streams and Images of the Sun or Moon, which joined all together, make the wonderfull sight of Rainbows, positions of Circles, Crosses, and divers Lights, which pertain to the knowledge of *Optice* and *Catoptrice*; that teach how

Now by divers refractions and reflections of beams such visions are caused. So that he which will know how they are generated, must return into the several Treatises of Rainbowes, Circles, Streams, & Images of the Sun or Moon: and if in them he find not knowledge sufficient to instruct him, I must send him to the Demonstrations of Perspective, where he shall want nothing.

Another sort of them, no less often beheld within these few years than the former, but a great deal more strange and wonderfull to look upon, are the Sights of Armies fighting in the Air, of Castles, Cities, and Towns, with whole Countries, having in them Hills, Vallies, Rivers, Woods, also Beasts, Men, and Fowls, Monsters, of which there are no such kinds on the Earth, and finally all manner of things and actions that are on the Earth, as Burials, Processions, Judgments, Combates Men, Women, Children, Horses, Crowns, Armes of certain Noble men and Countries, Weapons of all sorts, sometimes Stars, Angels, as they are painted with the Image of Christ crucified,

fied, besieging of Castles and Towns, many things and gestures done by men or beasts, the very similitude of Persons known to the Beholders; as of late was seen the very Image of the Emperor *Charles*, insomuch that they which beheld it, put off their Caps, thinking verily it had been he: and of *John Frederick*, Prince Elector of *Saxony*, who at that time was Prisoner with the Emperor: Also the Image of small Crosses, which hath been not only in the Air, but also on the Earth, on mens apparell, on dishes, platters, pots, and all other things, so that the Jews have been full angry, that they could neither wash nor rub them out of their apparell. In *Germany* also Fires, and many such things, as it were long stories: seen in the Air.

All these wonderfull Apparitions; may be caused two manner of wayes; the one Artificially, the other Naturally.

Artificially, by certain glasses and Instruments, made according to a secret part of that knowledge which is called *Catoptrice Catoptrice*; and so peradventure some off

of them have been caused; but

The most part (doubtless) Naturally, when the disposition of the Air hath been such, that it hath received the image of many things placed and done on Earth.

And because it is apt to receive divers images, as well in one place as in another, these monstrous forms, and strange actions, or stories, proceed of the joyning of divers forms & actions; as if two Histories were confusedly painted in one, the whole Picture would be strange; or (as the Poet saith) if a Painter to a mans head should set a horses neck, and after, divers feathers. Sometimes also one image is multiplied in the Air into many or infinite, as are letters and crosses which fill the Air, even beneath; And the light of the Sun received into little parts, maketh to appear as it were many small Stars.

Horatius

Let this suffice concerning these wonderfull Apparitions; once again admonishing the Reader, though I have enterprised to declare these by naturall Reason, yet verily believing that not so much as one Sparrow falleth to the

The Fourth Book

ground without Gods providence. I do also acknowledge Gods providence bringeth these to pass, to such ends as before I have shewed, using these causes as means and instruments to do them.



THE FOURTH BOOK.

Of Watery Impressions.



Howe be Watery Impressions that consist most of Water.

In the Treaty of them are wont to be handled these Impressions, namely, Clouds, Rain, Dew, hoar Frost, Hail, Snow, Springs, and the great Sea it self.

off

Of Clouds.

A Cloud is a Vapor cold and moist, Clouds.
drawn out of the Earth and Waters by the heat of the Sun, into the middle region of the Air, where by cold it is so knit together, that it hangeth untill either the weight or some resolution causeth it to fall down.

The place wherein the Clouds do hang, is said to be in the middle region of the Air, because men see it is necessary that there should be a cold, which should make those Vapors so gross and thick, which for the most part are drawn so thin from the Earth, that they are invisible as the Air is.

And although they are known often times, as *Aristotle* witnesseth, to be Aristot.
in the lowest region of the Air, near to the Earth, insomuch that sometimes they fall down to the Earth with great noise, to the great fear of men, and no less loss and danger: yet may it be reasonably thought that these Clouds were generated in the middle region of

the Air far distant from the Earth, which by their heaviness do by little and little sink down lower into the lowest region, and sometimes also fall down to the Earth.

The height
of the
Clouds.

The common Opinion is, that they go not higher than nine mile; which because it leaneth to no reason, is uncertain.

Albertus
Magnus.

Albertus Magnus whose reason also is to be doubted of, affirmeth, that the Clouds do scarce exceed three miles in height when they are highest.

And some let not to say, that oftentimes they ascend not past the half of one mile in height.

Again, Others pretending to finde out the truth by Geometricall Demonstrations, make it above fifty mile to the place where the generation of Clouds is.

How these men take the distance from the Earth, it is uncertain: whether that they assign the least distance, and mean it from the highest parts of the Earth, as are hill tops, or from the common plain.

Again, whether they that assign the
highest

highest distance to be from the lowest valleys of the Earth, or from the hill tops.

The Reason before shewed moveth me to think that the most usuall and common generation, I mean the condensation or making thick of these thin Vapors into clouds, is in the middle region of the Air: but for the distance of the clouds when they be generated, I think they be sometime nine mile, sometime three mile, sometime half a mile, and sometime less than a quarter of a mile from the Earth,

Of Mists.

THere be two kinds of Mists; the Mists.
one ascending, the other descending.

That which ascendeth, goeth up out of the Water or the Earth as Smoak, but doth not commonly spread over all other parts: it is seen in Rivers and moist places.

The other Mist that goeth down toward the Earth, is when any Vapor is

lifted up into the Air, by the heat of the Sun, which being not strong enough to draw it so high that the cold may knit it, suffereth it after it is a little made thick, to fall down again, so it filleth all the Air with the gross Vapors, and is called Mists, being usually a sign of fair Weather.

Of empty Clouds.

Empty
clouds.

THere be certain Clouds that are empty, and send no Rain; they come of two sorts.

One sort are the remnants of a Cloud that hath rained, which cannot be converted into water for their dryness.

Another sort is of them that are drawn up out of wet and dry places, and be rather Exhalations than Vapors; that is, they be dry, hot, and light, so that it were hard for them to be turned into Rain; they look white like flocks of wooll, when the light striketh into them.

There be also empty Clouds, which when the Winds have dispersed abroad
any

any Cloud, are scattered over all the sky : but these Clouds though for a time they be empty, yet because they consist of such a substance as is watry, they may be, and are oftentimes gathered together, and give plentiful Rain.

Of the colours of Clouds we have spoken in the Second Book of Fiery Meteors, where those Colours and the causes of them are described, which seem to be Fiery, or may be thought to be Inflammations or burnings, as to be Red, Fiery, and Yellowish.

Of the colours of Clouds.

But besides those there be White, Black, Blew, and Green.

White clouds be thin, and not very watry ; so that the light received in them, maketh them to appear White.

Black clouds be full of thick, gross, and earthly matter, that makes them look so dark.

Blew clouds be full of thick dross, and earthly, as the Black : so the light received in them, maketh them to seem Blew.

Green clouds are altogether watry, resolved into water, which receiving
into

into them the night, appear Green as Water doth in a great Vessell, or in the Sea and Rivers.

Of Rain.

Rain.

After the generation of clouds is well known, it shall not be hard to learn from whence the Rain cometh.

For after the matter of the cloud being drawn up, and by cold made thick (as is said before) heat following, which is most commonly of the Southern wind, or any other wind of hot temper, doth resolve it again into Water, and so it falleth in drops, to give encrease of fruit to the Earth, and move men to give thanks to God.

There be small showers of small drops, and there be great storms of great drops.

The showers with small drops, proceed either of the small heat that resolveth the clouds: or else of the great distance of the clouds from the Earth.

The streams with great drops, contrariwise,

trariwise, do come of great heat, resolving or melting the cloud, or else of small distance from the Earth. Whereof we see a plain experiment, when Water is poured forth from an high place, the drops are small; but if it be not from high, it will either have no drops, or very great.

The cause why rain falleth in round drops, is both for that the parts desire the same form that the whole hath, which is round; and also that so it is best preserved against all contrary qualities: like as we see Water poured upon dry or greasie things to gather it self into roundels, to avoid the contrariety of heat and driness.

It is not to be omitted, that rain Water, although a great part of it be drawn out of the Sea, yet most commonly it is sweet not salt.

Why rain water is not salt.

The cause is, because it is drawn up in such small Vapors, and that salt part is consumed by the heat of the Sun.

The rain Water doubtless doth more encrease and cherish things growing on the Earth, than any other Water where-with they may be Watered, because the rain

rain Water retaineth much of the Suns heat in it, that is no small comfort to all growing plants. The Water that cometh from Heaven, in rain, will sooner come to putrifaction, or stinking, than any other, because it hath been made very subtile by heat, and also for that it is mixed with so many earthly and corruptible substances.

Avicen.

Rain water, that falleth in the Summer, by *Avicens* judgement, is more wholesome than other Water, because it is not so cold and moist as other Waters be, but hotter and lighter.

Salt rain.

Sometime there is salt rain, when some *Exhalation* which is hot and dry, is commixed with the *Vapor*, whereof the rain consisteth.

Bitter rain

Sometime it is bitter, when some burnt earthly moisture is mixed with it.

This rain is both unwholesome, and also unfruitfull in these countreys; there is great store and plenty of rain, because the Sun is of such temperate heat, that it gathereth many *Vapors*, and by immoderate heat doth not consume

sume them. But in the East parts, in some hot Countreys, it never or seldom is seen to rain, as in *Egypt* and *Syria*, but in stead of rain, *Egypt* hath the River *Nilus*, whose overflowings do marvellously fatten the Earth. In *Syria* and other like Countries they have more plentiful dew than we have, which doth likewise make their Earth exceeding fruitfull.

The River
Nilus.

Seneca testifieth that the Rain soaketh no deeper into the Earth than ten foot deep. *Seneca.*

Of the Signs of Rain.

First, If the Skie be red in the morning, it is a token of Rain, because those Vapors which cause the redness, will be shortly resolved into Rain.

Signs of
Rain.

If a dark cloud be at the Sun rising, in which the Sun soon after is hid, it will dissolve it, and rain will follow. If then appear a cloud, and after Vapors are seen to ascend up to it, that betokeneth rain.

If the Sun or Moon look pale, look for rain.

If

If the Sun in the East seem greater than commonly he appeareth, it is a sign of many *Vapours* which will bring rain.

If the Sun be seen very early, or few Stars appear in the night, it betokeneth rain.

The often changing of the Winds, also sheweth tempest.

The most sure and certain sign off rain is the Southern wind, which with his warmth alwayes resolveth the clouds into rain.

When there is no dew at such times as by nature of the time there should be, rain followeth; for the matter off the dew is turned into the matter off watry Clouds.

If in the West, about the Sun setting there appear a black cloud, it will rain that night, because that cloud shall want heat to disperse it.

When much dust is raised up, and when the woods make a great noise, some tempest is towards.

Hard stones will be moist, and sweat against rain; lamps and candles by sparkling, frogs crying, Trees breaking,

breaking, leaves falling, and dust clot-
tering, forewarn us of tempest.

Fleas, Flyes, and Gnats, bite sore to-
ward a tempest, Kine feed greedily,
Birds seek their victuals more busily:
for in the gross Air disposed to rain,
their stomachs are hotter, and they
more hungry. But these kind of signs
pertain not so properly to *Meteoro-*
logie, as to Mariners and Husbandry,
which have a great many more than
these. And *Virgil* in his first Book of
Georgicks, hath a great number for
them that list to learn. Wherefore let
these hitherto suffice.

Of monstrous or prodigious rain.

Hitherto we have made mention
only of naturall rain, and that
which is common, which no man doth
marvell at. But there is sometime such
rain, that worthily may be wondred at:
as when it raineth worms, froggs, fish-
es, blood, milk, flesh, stones, wheat,
iron, wooll, brick, and quicksilver.
For History maketh mention, that at
divers times it hath rained such things,
whose

Of mon-
strous
Rain.

Worms &
Frogs.

Fishes.

Milk.

Blood.

whose naturall cause for the most part we will go about to expresse, notwithstanding accounting them among such wonders, as God sendeth to be considered for such ends as we have before declared, Worms and Froggs may thus be generated: The fat *Exhalations* are drawn up into the Air, by a temperature of hot and moist; such vermine may be generated in the Air, as they are on the Earth, without copulation of male and female. Or else: that with the Exhalations and Vapors, their Seed and Eggs are drawn up, which being in the clouds brought to form, fall down among the rain.

Likewise the spawn of fishes being drawn up, maketh fishes to rain out of the clouds. The vehement heat of the Sun in Summer, and specially in hot Countries, draweth milk out of the Paps of Beasts and Cattell, which being carried up in Vapors, and dissolved again into milk, falleth down like rain.

After the same manner the Sun also from places where blood hath been spilt, draweth up great quantity of blood, & so it raineth blood. It

It raineth flesh, when great quantity of blood being drawn up, it is clotted together, and seemeth to be flesh. Flesh.

Avicen saith, that a whole Calf fell out of the Air; and some would make it seem credible, that of Vapors and Exhalations, with the power of heavenly bodies concurring, a Calf might be made in the Clouds. But I had rather think that this Calf was taken up in some storm of Whirlwind, and so let fall again, than agree to so monstrous a generation. Avicen;

It is a great deal more reasonable, that stones of earthly matter gathered in clouds, should be generated, as we said before, of the Thunder-bolt. Yet some men think, that wind in Caves of the Earth breaking upward violently, carrieth before it earth and stones into the air, which cannot long abide, but fall down, and are counted among prodigious rain. Exhalations that be earthly and drawn out of clay, have much gross substance in them, which gathered together, and by great heat burned in the clouds, make brick, which is no great marvell. Stones.

H

He

Wheat.

He that hath seen an Eggs-shel full of dew drawn up by the Sun into the Air, in a May morning, will not think it incredible, that Wheat and other Graine should be drawn up in much hotter Countries than ours is, much rather the Meal or Flower which is lighter.

Wool.

A certain moistness, like Wool, as is upon Quinces, Willows, and other young Fruits and Trees, is drawn up of the Sun among the Vapours and Exhalations, which being clotted together, falleth down like locks of Wooll.

Quicksilver.

Quicksilver, all men know, with small heat will be resolved into most thin Vapours, whereof when quantity is drawn up, it falleth down again. As it is read, that once at Rome it rained Quicksilver, wherewith the Brazen Money being rubbed it looked like silver.

T. Livius.
Chalk,

Titus Livius maketh mention that it rained chalk, whereof the cause cannot be hid to them that read how stones and brick come in the Air.

Iron hath also rained out of the clouds, and sundry times, as Histories witness, whereof this hath been the cause. The generall matter of all metals, which is quicksilver and brimstone, with the special matter of mixtion that maketh Iron, were all drawn together, and there concocted into the metal: so came the strange Rain of Iron.

Avicen saith he saw a piece of Iron that fell out of the clouds, that weighed about an hundred pound weight, whereof very good swords were afterwards made.

Of Dew.

Dew is that Vapour which in Spring and Autumn is drawn up by the Sun in the day time, which because it is not carried into the middle region of the Air, abiding in the lower region, by cold of the night is condensed into water, and falleth down in very small drops.

There is common Dew, and sweet Dew.

One kind of sweet Dew is called

H 2

Man-

Manna. Manna, being white like Sugar, which is made of thick and clammy Vapors, which maketh it so to fall thick and white. It falleth only in the East parts.

As for that Manna which God rained to the *Israelites*, it was altogether miraculous.

Plinius.
Arabia.
Ladanum.
Cusus. In *Arabia* (as *Plinius* writeth) is a very precious kind of Dew that is called *Ladanum*, which falling upon the herb *Cusus*, and mixed with the juyce of that herb which Goats do eat, is gathered off Goats hair, and kept for a treasure.

There is another kind of sweet Dew that falleth in *England*, called the *Mil-dews*, which is as sweet as honey, being of such substance as honey is: it is drawn out of sweet herbs and flowers.

Bitter dew. There is also a bitter kind of Dew that falleth upon herbs, and lieth on them like bran or meal; namely because it is of an Earthly Exhalation, and so remaineth when the moisture is drawn away: This Dew killeth herbs.

The:

The common Dew drunk of Cattle doth rot them, because the matter is full of viscosity, bringing them to a fluxion.

There be three things that hinder Dew from falling; that is, great heat, great cold, and wind; for Dew falleth in the most temperate calm time.

Of Hoar-Frost.

Hoar-frost, or white frost, is nothing else but dew congealed by overmuch cold. The South and East wind do cause dew, but the North and Northern winds do freeze the Vapors, and so it becometh hoar-frost; which if that excessive cold had not been, should have turned into dew.

Hoar frost.

The dew and the hoar-frost agree in three things, namely, in matter, in quality of time, and place of the generation. In matter they agree, for they are both generated of a subtile and thin Vapor, and also small in quantity.

In quality of time they consent, for both are made in a quiet and calm time:

for if there were great wind, it would drive away the matter, and so could there be no generation.

Aristot.

Thirdly, they are both generated in the lowest Region of the Air; for (as Aristotle affirmeth) upon the high hills there is neither dew nor hoar frost.

They differ also in three things. For the hoar frost is congealed before it be turned into water; so is not the dew.

Secondly, The dew is generated in temperate weather, the white frost in cold weather.

Last of all, hot Winds, as the South and East, do cause dew; but cold winds, as the North and West, do cause hoar frost.

Hoar frost doth often stink, because of the stinking matter whereof it consisteth, which is drawn out of lakes, and other muddy and stinking places.

Of Hail.

Hail,

HAil is a hot Vapor in the middle Region of the Air, by the cold of that Region made thick into a cloud, which falling down to the sudden cold off

of the lowest Region, is congealed into Ice.

There be so many kinds of Hail, as there be of rain: The fashion of Hail is sometime round, which is a token that it was generated in the middle region of the Air, or very near it, for falling from high, the corners are worn away.

When the Hail stones are square, or three-cornered, the Hail was generated near the earth.

Oftentimes there is heard a great sound in the Cloud, as it were of Thunder before Hail, or of an Army fighting, &c. The cause is, That Vapors of contrary qualities being inclosed in the Cloud, do strive to break out, and make a noise, even as cold water doth, being put into a seething pot.

In Spring and Harvest-time is often Hail, seldom in Summer and Winter. In Winter there want hot Vapors, in Summer the lowest region is too hot to congeal the rain falling down. In Spring and Autumn there want neither hot Vapors to resist the cold, nor sufficient cold to harden the drops of that hot shower of rain.

The Fourth Book

The hail stones are sometimes greater, and sometimes lesser; greater, with greater cold; and lesser, with lesser cold.

There is seldom hail in the night, for want of hot vapors to be drawn up.

Sometime hail and rain fall together, when the latter end of the cloud, for want of cold in the lowest region, is not congealed.

Hail stones are not so clear as Ice, because they are made of gross and earthy vapours, Ice is congealed of clear water.

Hail is sooner resolved into water, than Snow, because it is of a more sudden and swift generation.

Of Snow.

Snow:

Snow is a cold congealed by great cold, before it be perfectly resolved from vapours into water.

Snow is white, not of the proper colour, but by receiving the light into it, and so many small parts; as in some, or the white of an egg beaten.

Snow is often upon high hills, & lieth long there, because their tops are cold,

cold, as they be near to the middle Region of the Air; for oftentimes it raineth in the valley, when it snoweth on the Hills.

Snow melting on the high Hills, and after frozen again, becometh so hard, that it is a stone, and is called *Chry-stall*.

Originall
of Christal

Other matter of Snow, because they are common with Rain, are needless to be spoken of. To be short, sleet is generated even as Snow, but of less cold, or else beginneth to melt in the falling.

Snow causeth things growing to be fruitfull, and encrease, because the cold driveth heat unto the roots, and so cherisheth the plants.

Of Springs and Rivers.

THe generation of Springs is in the bowels of the Earth, and therefore something must be said of the body of the earth. The earth, though it be solid and massie, yet hath it many hollow gutters and veins, in which is alwayes air to avoid emptiness: for the ignorant in Philosophy must be admonished,

Nothing is empty. ed, that all things are full, nothing is empty; for nature abhorreth emptiness; so that where nothing else is, there is Air and Vapors, which by cold, as it hath often been said, will be resolved into drops, as we see experience in marble Pillars, and such like hard stones toward rain.

This Air and Vapors therefore being turned into drops of water, these drops sweat out of the earth, and find some issue at the length, where many being gathered together, make great abundance of water, which is called a Fountain or Spring. The cause why such Spings do run continually, is, because that Air can never want in those veins, which by cold will alwayes be turned into water, so that as fast as the water runneth forth, so fast is Air again received into the place, whereby it cometh to pass, that so many Springs are perpetuall, and never dried: but if any be dried up, it is in a hot Summer, and such Springs also they be, whose generation is not deep in the earth, and therefore the Vapors may be made dry, and the earth warm, so the Spring may fail. There

There be four kinds of springs;
fountains, brooks, rivers, and lakes.

Of Fountains.

Fountains be small springs, which
serve for wells and conduits, when
there is but one place where the Water
is generated; and that is not very a-
bundant, either because it is of small
compass, or small veins, and not
many.

Fountains.

Of Brooks.

Brooks, boorns, or fords, be small
streams of Water, that run in a
channell like a river. They are caused,
when either the spring occupieth a
great compass, or else two or three
small springs meet together in one
channell.

Broo

Of Rivers.

Rivers are caused by the meeting
together not only of many
springs, but also of many brooks & fords
which

Rivers.

which being received in divers places as they pass, are at the length carried into the broad Sea for the most part. Howbeit some Rivers are swallowed up into the Earth, which perchance run into the Sea, by some secret and unknown channels: some Rivers there be that hide their heads under the Earth, and in another place, far off, break out again. They Write also, that some Rivers being swallowed up of the Earth in one Island, do run under the bottome of the Earth and Sea, and break forth in another Island. There be also many great Rivers, that run under the Earth in great Caves, which never break forth. *Aristotle* sheweth of ponds and lakes that be under the Earth. And *Seneca* speaketh of a pond that was found by such as digged in the Earth, with fishes in it, and they that did eat of them, died. As Eeles that be found in dark places, as Wells that have been dammed up, &c. are poison.

Aristot.

Seneca.

Of

Of Lakes.

LAkes are made by the meeting together of many Rivers, Brooks, and Springs, into one deep valley: whereof some are so great, that they have the name of the Seas, as the Lake called *Hircane*, or *Caspian Sea*. These Lakes sometimes unlade themselves into the Sea by small Rivers, sometimes by passages under the Earth.

The cause of the swiftnes of Rivers is double; for they are swift, either for the great abundance of waters, or else because they run down from an hilly place, as the River *Rhene* falleth down from the top of wonderfull high hills.

Of hot Baths.

SOME waters that are generated and flow out of veins of Brimstone, are sensibly warm, and some very hot, because they run out of hot places. These waters being also drying by nature, are wholesome for many infirmities, specially breaking forth of scabs, &c. Such are

are the Baths in the West Countrey¹⁹ and St. Anne of *Buck-stones* well in the North part of *England*, and many other elsewhere.

Of the divers tastes that are perceived in Wells.

Tastes of
waters.

FOr a generall reason, the waters receive their taste of that kind of earth thorow which they run, as thorow a strainer. Some salt, that run thorow salt veins of the earth: some sweet, that be well strained, or run thorow such minerals as be of sweet taste: some bitter, that flow out of such earth as is bitter by adustion, or otherwise.

Aristotle.
Well wa-
ter used
for Vine-
gar.
Bohemia.

Some sour or sharp, like vinegar, which run thorow veins of Allom, Coperas, or such minerals. *Aristotle* writeth of a Well in *Sicilia*, whose water the Inhabitants used for Vinegar.

In *Bohemia* near to the City called *Bilon*, is a Well that the people used to drink of in the morning, in stead of burnt wine.

And in divers places of *Germany*, be Springs that taste of such sharpness.

Some

Some have the taste of Wine; as in *Paphlagonia* is a Well that maketh men drunk which drink thereof; which is, because that water receiveth the fumosity of Brimstone and other Minerals, thorow which it runneth, and so filleth the brain as wine doth. Paphlagonia.

A recitall of such Rivers and Springs as have marvellous effects, whereof no naturall cause can be assigned by most men, although some reason in a few may be found.

C*litumnus*, which maketh Oxen that drink of it white, is a River or Spring in *Italy*, *Propert. lib. 3.* This may be the quality of the water, very flegmatick. In *Boetia* is a River called *Melas*, that maketh sheep black if they drink thereof. Marvellous waters.
Clitumnus
Propert.
Boetia.
Melas.

Seneca speaketh of a River that maketh red hairs: These two with the first may have some reason, that the quality of the reason may alter complexion, and so the colour of hairs may be changed, as we see in certain diseases. Seneca.

In *Lybia* is a Spring, that at the Sun rising

Seneca.

rising and setting is warm, at mid-day cold, and at mid-night very hot. This may be by the same reason that well-water is colder in Summer than it is in Winter. *Seneca* writeth, that there be Rivers whose waters are poyson: this may be naturally, the water running thorow poysonous Mineralls, taking much fume of them. Other Wells that make wood, and all things else that can be cast into them, stones, such wells be in *England*, the cause is great cold.

Another Well maketh men mad that drink thereof. This also may have as good reason, as that which maketh men drunk: As also that Well which maketh men forgetfull, by obstruction of the brain.

The same *Seneca* speaketh of a Water, that being drunk, provoketh unto lust and lechery. And why may not that quality be in a Water which is mixed with divers Minerals and kinds of earth, which is in herbs, roots, fruits, and liquors?

St. August.

St. Augustine speaketh of a Well in *Egypt*, in which burning Torches are quenched, and being before quenched, are lighted. A-

Among the *Garamants* is a Well so *Garamants*
cold in the day, that no man can abide
to drink of it: in the night so hot,
that none can abide to feel it.

It is incredible that is written of a
Well in *Sicilia*, wherof if Theeves *Sicilia.*
did drink, they were made blind.

In *Idumea* was a Well that one quar- *Idumea.*
ter of a year was troubled and muddy,
the next quarter bloody, the third
green, and the fourth clear.

Seneca writeth of another Well that *Seneca.*
was six hours full and running over,
and six hours decreasing and empty:
perchance because it ebbed and flowed
with the Sea, or some great River that
was near it.

In the Hill *Anthracinus* is said to be *Anthracinus*
a Well, which when it is full, signifi-
eth a fruitfull year: when it is scarce
and empty, a barren and dear year.
The sufficiency of moisture maketh
fertility, as the want causeth the con-
trary.

Men say there is a River in *Hungary*, *Hungaria.*
in which Iron is turned into Copper:
which may well be, seeing Ink in
which is but small Copperas, and artifi-
cially

cially mixed of Iron, doth counterfeit Copper in colour. In this stream may be much Copperas, and that is naturally mixed.

Seneca. Both *Seneca* and *Theophrastus* witness that waters there be, which within a certain space, being drunk of sheep, (as *Seneca* saith) or of birds (as *Theophrastus* will have it) changeth their colours from black to white, and from white to black.

Vitruvius. *Vitruvius* writeth, that in *Arcadia* is a Water called *Nonacrinis*, which no Vessel of Silver, Brasse, or Iron, can hold, but it breaketh in pieces, and nothing but a Mules hoof will hold it and contain it.

Illyria. In *Illyria*, Garments that are holden over a most cold Well, are kindled and set on fire.

Andros. In the Isle of *Andros*, where the Temple of *Bacchus* stood, is a Well, that the fifth day of January floweth wine.

Isidore. *Isidore* saith, there is a Well in *Italy*, that healeth the wounds of the eyes.

Chios. In the Isle of *Chios* is a Well that maketh men dull-witted that drink thereof.

There:

There is another that causeth men to abhor lust.

Lechnus, a Spring of *Arcadia*, is good *Lechnus* against abortions.

In *Sicilia* are two Springs, of which *Sicilia*. one maketh a woman fruitfull, and the other barren.

In *Sardinia* be hot Wells that heal *Sardinia*. fore eyes.

In an Isle of *Pontus*, the River *Astares* overfloweth the fields, in which *Pontus*. *Astares*. whatsoever sheep be fed, do alwayes give black milk.

In *Aethiopia* is a Lake whose water *Aethiopia*. is like Oyl.

Also many Springs of Oyl have broken forth of the Earth, which cometh of the viscosity or fatness of the same Earth.

The Lake *Clitory* in *Italy* maketh *Clitory*. men that drink of it to abhor wine.

The Lake *Pentafium* (as *Solinus* saith) *Pentafium*. *Solinus*. is deadly to Serpents, and wholsome to men.

Seneca writeth of certain Lakes that will bear men which cannot swim.

And that in *Syria* is a Lake in which *Syria*. bricks do swim, and no heavy thing will sink.

Rhene.

It is said, that the River *Rhene* in *Germany* will drown bastard Children that be cast in it, but drive aland them that be lawfully begotten.

Hypanis.
Sythia.

The River in *Hypanis* in *Sythia*, every day brings forth little bladders, out of which flies do come, that die that same night.

Matrona.

Matrona the River of *Germany*, as the common people say, never passeth a day, but he taketh some prey.

Of the Sea.

The Sea.

THE Sea in this Treatise hath place as a mixed substance: for else the element of Waters being simple, were not here to be spoken of.

The Sea is the naturall place of the Waters, into which all Rivers and other Waters are received at the length.

The naturall place
of the water.

And here it is to be understood, that the very proper and naturall place of the water, were to cover all the Earth, for so be the elements placed: the Earth lowest, and round about the Earth the Water, about the Water, the Air, and about the Air, the fire.

Gen. 1.

But God the most mighty and wise creator

ator of all things, that the Earth might in some parts be inhabited of men and beasts, commanded the Waters to be gathered into one place, that the dry land might appear, and called the dry land Earth, and the gathering of Waters he called Seas.

In the Sea are these two things to be considered; the saltness, and the ebbing and flowing.

Of the saltness of the Sea.

THe saltness of the Sea, according to *Aristotles* mind, is caused by *Aristot.* the Sun, that draweth from it all thin and sweet *Vapors* to make rain, leaving the rest as the setting or bottom, which is salt. But men of our time, peradventure more truely, do not take this for the only and sufficient cause, to make so great a quantity of water salt, but say, that the Sea by Gods wisdom is gathered into such valleys of the Earth, as were otherwise barren and unfruitfull; such Earths are salt, the Sea Water then mixed with that Earth must needs be salt; else Rivers by *Ari-*

stotles mind, should be salt as well as the Sea. The Reader may choose which opinion is most probable.

Of the ebbing and flowing,

Ebbing &
flowing.
Aristor.

THe ebbing and flowing of the Sea, as *Aristotle* seemeth to teach, is by reason of *Exhalations* that be under the Water, which driveth it to and fro, according to contrary bounds and limits, as upward and downward, wide and narrow, deep and shallow. This opinion of *Aristotle* also, as more subtile than true, experience teacheth men to mislike, and to ascribe the cause of ebbing and flowing to the course of the Moon, which ruleth over moisture, as the Sun doth over heat: for from the new Moon to the full, all humors do encrease; and from the full to the new Moon decrease again. Also, the very true time of the ebbing and flowing may be known by the course of the Moon, with whom, as the Lady of moisture, we will close up the fourth Book, of moist and watery impressions.

The

The Fifth Book.

[Of earthly Meteors, or bodies
perfectly mixed.



His last Treatise con-
taineth such bodies
whose chief matter is
the earth, & are called
perfectly mixed, be-
cause they are not
easily resolved into the chief matter
whereof they are generated. These are
divided into four kinds. The first be di-
vers sorts of Earth: The second be Li-
quors concrete: The third be Metalls
and Metallikes: The fourth be Stones.

Earthly
bodies.

This division is not altogether per-
fect, both for that there be many of
these Minerals which partake of two
kinds, and also for that the names of
these kinds may be said of others. Yet
minding as plainly as can be to declare
the things themselves; the controver-
sie and cavillation of names shall not
greatly trouble us, especially seeing we
pretend not to teach Philosophers, but
such as need a ruder and plainer in-
struction:

struction. They may therefore be content with this division, which shall not serve them to dispute of these matters, but to understand the truth of these things that they desire. Of these four therefore we will speak orderly and generally, not minding to treat of every particular kind (for that were infinite) but to open such universall causes, as they which have wit may learn (if they list) to apply unto all particulars.

Of Earths.

Of Earths.

THE Earth is an element, one of the four, cold and dry, most gross and solid, most heavy & weighty, the lowest of all other in place. When I say an Element, I mean a simple body uncompounded. This Earth is no Meteor, but as it was shewed in the water, to the end there should be generation of things. There is no Element that we have which is pure and simple, but all are mixed and compound. Our fire is gross and compound, so is our air, our water, and our earth: but the earth notably and above the rest, is mixed.

For

For the pure and naturall Earth is dry and cold; but we see much to be moist, and much to be hot. The natural earth is black of colour: but we see many Earths white, many yellow, and many red. So that first the greatest part of the Earth is mixed with water, that maketh it to cleave together with air and some fire, which make an oyly, fat, or clammy earth, as is clay made, &c.

Another great part is dried, not into the naturall driness of the first quality, but as a thing once mixed, and after dried, either by cold, as sand, gravell, &c. or else by heat, as chalk, oker, &c. And yet somewhat more plainly and particularly to discourse upon these causes, admitting the natural colour of the Earth to be black, of the water to be blew, of the air to be white, and of the fire to be ruddy, it followeth, that upon the mixtion of these colours, or chief domination of them, all things have their colour.

The gross substance of the Earth therefore being diversly mixed with other Elements, and those mixtures again being estsoons altered by divers
and

and sometime contrary qualities, hath brought forth so many kinds of earth, as clay, marble, chalk, sand, gravell, &c. Clay is mixed with fat moisture, taking his colour of the mixture with red from white; but being cold, it is not so fruitfull as Marble, which is not alwayes so moist as it. Chalk is an Earth by heat concocted after divers mixtions, and dried up. Oker, both yellow and red, with such like, are of the same nature, with mixtion of red, more or less.

Sand and gravell are dried Earths, as it were frozen by cold: gravell is gross and apparent; sand though it be finer, is of the same generation, consisting of many small bodies, which are congealed into stones. Sand seemeth to be clay dried by cold, and clotted together into small stones; whereof some are thorow-shining, which were the moist parts; the thick were of the gross part: the same is gravell, but of greater stones consisting. The like judgment is to be given of all other kinds of Earth, whose generation by the similitude of these will not very hard to
to

to find out. They that list to know the divers kinds of Earths, must have recourse to *Plinius*, *Cardanus*, and other Writers, that recite a great number of them : but these are the chief and most common kinds.

Plinius.
Cardanus.

Of Liquors concrete.

WE take not Liquors concrete so largely as the word doth signifie, for then should we comprehend both the other kinds following. But only those liquors, called in Latine *Succi*, which are at it were middle between metals and stone, of which, some being fat and oily, do burn as Brimstone, Sea-coles, Jet, *Bitumen*, &c. and the kinds of all these. Othersome do not burn, as Salt, Allum, Copperas, Saltpeter, &c. and the kinds of these.

Of the first sort which are generated of Earthy and Airy Vapors, Fumes and *Exhalations*, the chief and most notable is Brimstone, which seemeth to be the matter of all dry and hot qualities that are in Earthly *Meteors*. The rest are generated of such like Vapors

Vapors as Brimstone is, but then they be diversly mixed : as the coals have much Earth mixed with Brimstone ; Jet seemeth to be all one, but better concocted than coals. Of Amber is great contention, whether it be a minerall, or the sperm of a Whale : for it is found in the Sea, cast upon the shore. Now the Whales seed being of the very same qualities, is taken more and less concrete of divers hardness ; some almost as hard as Amber : some softer, and some liquid : yet *Cardan* plainly defineth, that Amber is a Mineral. Whether he have reason or experience, contrary to the vulgar opinion, let them consider that list to contend. These Minerals that will resolve with fire, it is apparent that they were concrete with cold : in that they burnt, it is manifest they have a fat and clammy substance mixed with them, as the other kind hath not, which will not resolve so well with fire as with Water ; which be salt, copperas, saltpeters, &c. These burn not, being watery, earthy, and not fat, unctuous, nor clammy.

These be of divers colours, black, as
Coals,

Coals, and Jet, because there is much Earthy substance mixed with their sulphurous matter. Some be sheer, as Salt, and Allum, having a substance Watery dried, and concrete. Copperas is green, because it hath much cold matter that is blew mixed with it. Salt, the most common and necessary of all these liquors concrete, that be moist and not fatty, hath two manner of generations; one natural, and the other artificial. The natural generation is when it is first generated in the Earth; after cometh the water of the Sea, and is infected with it; out of which the Salt is again artificially gathered. Of these liquors concrete, be those strange wels and springs infected, of which was spoken in the latter end of the fourth Book. Most notably Brimstone causeth the hot Baths, and burneth in *Ætna* of *Sicilia*, and *Vesuvius* of *Italy*, casting up the Pumice stones, of which is no place here to treat.

Of

Of Metals.

Metals.

Metals be substances perfectly mixed, that will melt with heat, and be brought into all manner of fashions that a man will.

Mercury.

Of these the Alchymists say there be seven kinds to answer to the seven Planets; Gold, Silver, Copper, Tinne, Lead, Iron, and Quicksilver, that they call Mercury. But saving their Authority, Quicksilver is no more a Metal than Brimstone, which is as necessary to the generation of Metal as Quicksilver is. For they all agree, that all Metals are generated of Sulphur, that is Brimstone, which because it is hot they call the father; and Mercury, that is Quicksilver, which because it is moist, they call the mother: so by as good reason may they call Brimstone a Metal as Mercury.

Then there remaineth but six perfect Metals; Gold, Silver, Copper, Tinne, Lead, and Iron.

Of

Of Gold.

THat most unprofitable and hurt- Gold;
full of all Metalls, Gold which
most men dispraise, and yet all men
would have, is of all other Metalls the
rarest: it is only perfect, the rest are
corruptible.

Gold never corrupteth by rust, be-
cause it is pure from poysonous infe-
ction, and most solid, that it receiveth
not the Air into it, which causeth all
things to corrupt. It is perfectly con-
cocted with sufficient heat and mixture
of Sulphur: all other Metals either
are not so well concocted, or else they
have not the due quantity of Brim-
stone.

Why Gold
rusteth not

This opinion hath also place among The opinio
the Alchymists, that because Nature in on of the
all her Works seeketh the best End, she Alchymists
intendeth of all Metals to make Gold;
but being lett, either for want of good
mixture, or good concoction, she brin-
geth forth other Metals, indeed not so
precious, but much more profitable;
and the less precious, the more profi-
table:

table : for there is more use to the necessities of mans life in Iron and Lead, than in Gold and Silver ; but either the beauty, or the perfection, or at least the rareness of Gold and Silver, have obtained the estimation of all men, so that for them is sold all manner of things, holy and profane, bodily and spiritual.

What pains do not men take to win Gold? Every man hath one way or other to hunt after it : but the Alchymist despising all other ways as slow, unnatural, and unprofitable, laboureth either to help Nature in her work, as of imperfect Metals to make perfect, or else to force Nature to his purpose by his Quintessences and Elixars, so that what by purging, what by concocting, what by mixing of Sulphur and Quick-silver, and much other like stuff, at length he turneth the wrong side of his gown outward, all the teeth out of his head, and his body from health to a Palsey, and then he is a Philosopher, and so he will be called,

Of Silver.

Silver, the most pure Metal next un- Silver.
So Gold, hath indifferent good con-
coction in the Earth, but it wanteth
sufficient heat in the mixture, that ma-
keth it pale.

It is found (as they say) running in-
to divers veins, as all other Metals be,
but this most specially, after the shape
and fashion of a tree lying along, with
a body or stock, of proportion like to
the body of a tree, also with arms,
branches, leaves, and fruits.

This Metal Silver lacketh sufficient
heat, and therefore cometh neither to
the colour, solidity, nor perfection of
Gold, and is generated in cold Coun-
tries, near unto the North and South
Poles, in so great quantity, that the
Husbandmen when they plow their
ground, turn up silver among the clods
in their daily labours, which they do
hide and conceal, lest the greedy
Princes for covetousness of the Me-
tal, should overturn and destroy their
land.

The Gold Mines are contrariwise most found in the hot Countries of *India* and *Aethiopia*, because in them is sufficient of heat for that unhappy generation.

This Silver also the Alchymists would faine make by Art; but Mercury the chief Master of the Work, is so subtile and so fly, that nothing can hold him, nothing can kill him: for if the glass be not very thick, he will soon break out of prison, and so there is nothing left.

Of Copper.

Copper in colour coming nearest to Gold, being not so solid nor massy, (for of all Metal Gold is the heaviest) giveth way to corruption, being infected with that green Mineral Copperas.

Hereof be divers kinds, Brasse, Latine, and such like, which differ in digestion; the Copper being purest, is of best digestion, and nearest unto Gold: and so the rest in like degrees.

Copper is most like Silver in the weight

weight and in the hammering: wherefore the Alchymists have learned to make it white, that it deceiveth mens sight and handling: but the Goldsmiths do easily try it, and by the taste of counterfeit Silver make Copper again.

Copper or Brasse doth alwayes grow near to the Mine of Copperas, which running with it in the digestion or natural concoction, hindereth it of perfection, maketh it to stink, and to be eaten of a green rust.

Much ado the Alchymists have to turn it into Gold, if it might be: they dispute very reasonably, and conclude almost necessarily in their Talk, that it may be converted into Gold, as a body that wanteth little of perfection, which may be easily added unto it: but in conclusion of the work, it is an harder matter to bring to pass, than it was to purpose, before they had done it, to build an Abbey at every miles end upon Salisbury Plain, as one was minded.

Of Tin.

Tin.

TIn, whereof great plenty groweth in the West parts of *England*, in beauty and colour cometh nearest to Silver, and of Silver wanteth nothing but solidity and hardness: for Tin is a raw and undigested metal, also very porose and compact, which causeth it to crash when it is broken or bitten: so it faileth of heat in the commixtion, and also sufficient digestion in the Earth: otherwise it is a fair and profitable metal, to serve the use of them unto whom Silver and Gold are not so plentiful.

Of Lead.

Lead.

Lead, also found in great abundance within this Realm, is a raw and undigested metal as Tin is, but yett of better digestion than commixtion: for it is mixed with a gross earthy substance, which maketh it to be in colour so black and so foul to corrupt: so that of the same Fumes and
Exha-

Exhalations (which if they had been pure and well digested, if the place and matter would have suffered, should have been concrete into Silver) for lack of the same Lead is generated, which coming plentifully, doth better service than Silver.

Of Iron.

IRon, the most necessary and profitable Iron: table of all other metals (and yet as ill used of many as any other) is generated of such substance as Silver is, but mixed with a red Mineral, which eateth it with red rust; and also being of too extream digestion, passing all other metals in hardness. And as other metals to the perfection of Silver want sufficient concoction, whereby they come not to the same hardness: so Iron passeth and exceedeth Silver in immoderate digestion. But though it come not to the perfection of Silver, God forbid that all Iron had been turned into Silver: for then we should more have missed it than silver or gold the want of which would hinder us nothing at all.

*Of Quick-silver.*Quick-
silver.

THough Quick-silver be no metal, yet because it is the mother of all metals, something is here to be spoken of it.

There be divers and sundry opinions, both of the generation, and also the qualities of it, which make the generation hard to find out. For if the quality were certainly agreed upon, there were an easier way found to try out the generation.

Some affirm that it is exceeding hot, and that they would prove by the swift piercing thereof into other things that be porose.

Others say it is exceeding cold, and that they prove by the exceeding weight of it. As for the piercing, they say it is caused of the exceeding moistness, of which quality both parts do grant that it is. Concerning the generation, some have said that it is pure and Elemental water: some again have thought that it droppeth out of heaven, and is a part of the heavenly sub-

stance. And others say that it is generated in the Clouds, and falleth down in the fields in a Circle, on those round Circles which are seen in many fields, that ignorant people affirm to be the rings of the Fairies dances.

It is certain that Quick-silver hath divers times fallen out of the Clouds, as we have declared in the Treatise of Wonderfull and Marvellous Rain: but whether it so fall in Circles it is doubtfull. The most probable opinion is, that it is generated of moist *Vapors* of the Earth, coacted by cold, much like to Water, as Brimstone is of hot fumes coacted by cold, much like to fire. And thus much of metals.

Of Stones.

STones, the fourth kind of Earthly Stones.
mixed bodies, have two manner of generations, by most contrary qualities, for heat doth harden moist bodies into stones; and we see that clay it maketh exceeding hard Brick.

Also the Thunderbolts in the clouds

are generated by heat, as before hath been shewed. But cold doth by congealing generate many more stones than heat doth; for the most part of all the stones that are digged out of the Earth, are generated by cold, which is able to convert any other kind of mixed substance into stone, as hath been partly shewed in the nature of wels and springs, of which there be some in *England*, which by their cold turn wood, or any like thing, into stones. I have seen a piece of rotten wood, which to sight was very light, and like wood, but in handling, a very stone that was taken out of such a Wel. Also of other things taken out of the Earth, turned into stones; I have seen and found my self, flies, with head and wings, very hard stones; also I have seen a heart, a birds tongue, a beasts stone, a pear, a plumme, and divers other things, turned into hard stones.

of

Of divers kinds of Stones.

Stones may first be divided into rude and beautifull: the rude contain those great Rocks which are generated by many small parts, joyned together, & the common pebble stones that be found every where in the Earth, among gravell, and on the shore of the Sea, or banks of the Rivers. These are generated of gross and earthly humours, congealed by cold: and because they be neither fair of colour, nor thorow shining, and also common, they are contemptible. The fair or beautifull stones be either great or small. The great be as marble of divers kinds and colours, alabaster, and such like, which being hard and well concocted, may be polished and become beautifull. Their colour is as they are mixed, being uncongealed, so is their pureness. The small are more precious, and they be either thick or pellucide. The thick be neither so fair nor so precious, as the *Achates*, the *Jasper*, *Prassios*, &c. These consisting of a pure mat-

Rocks.

Pebble stones.

Marble.

Achates,
Jasper,
Prassios.

Diamond.
Saphir.
Emerald.
The praise
of precious
Stones.

matter, and not very watery, are congealed into such stones. The clear stoness be liquors concrete, as the *Diamond*, the *Saphir*, the *Emerald*, &c. they are praised for their greatness, hardness, clearness, and fair colours, of which enough hath been spoken, saving that some be of opinion, that these be generated by heat, because the best are found in hot countries, in the East, and in the South. Answer may be made, that the hotter the Air is, the colder is the earth: so that reason is of small force.

Of the vertue of Stones.

The vertue
of
Stones.

SOME perchance would look that we should make a long discourse of the vertue of stones, and would be well content that we should treat of divers properties of gemms and precious stones, which matter though it be out of our purpose (which considereth only the generation) yet seeing it is not out of their expectation, something briefly, and yet sufficiently shall be said of the vertue of stones.

That vertue that is ascribed unto them,

them, is either Natural or Magical. Natural vertue is either that which is known to have a natural cause, or a natural effect, as the *Magnes* or Loadstone to draw Iron, which is by a similitude of nature, & such an appetite as is between the Male and the Female. Also the said *Magnes* moveth toward the North, and as some say, there is another kind found in the South, that draweth toward the South. They say, that there are great hills of this stone in the North and South, which maketh it look that way.

Others bring a Mathematical reason, which because it is more curious than can be understood of the common sort, not exercised in Geometry, I omit.

The Jet and Amber draw hairs, chaff, and like light matter, but being before chafed, for heat is attractive.

Also the precious Stone called *Astroites*, moveth it self in Vinegar, the sharpness of the Vinegar piercing it, and the air excluded driving it forward.

These vertues because I have seen, I have set for an example; generally all other

The vertue of Stones, either natural or magical. *Magnes*.

Jet and Amber draweth chaff.

Astroites, a Stone moveth in vinegar.

other like natural vertues, proceed off like natural causes, which by their effect, the ingenious must seek to find out.

As for Magical Vertues, they be they which are grounded on no reason, or natural cause; which if they take effect, it is rather of the superstition and credulity of him that useth them, than of the vertue of the stones. As that an Emerald encreaseth love, a Saphir favour, a Diamond strength, and such like vertues, of which *Albertus*, in his Age surnamed the Great, took pains to write a Book, which I suppose to be Englished.

Albertus
Magnus.

To conclude with the cause why Stones melt not, as Metals do, may be gathered by that which hath been said before, because they are congealed past that degree, and also because there is left in them no unctuous or clammy matter. Let this suffice for Stones; and so the whole purpose is at an end.

Ob-

OBSERVATIONS
ON
Dr. F. his BOOK
OF
Meteors.

By *F. W.*



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C H A P. I.

Of the Earth.

T is a great Question amongst Philosophers, whether the External and Visible Riches and Plenty which groweth and springeth on the face of the Earth: or the Internal and Hidden Treasure be more precious and valuable?

Flowers and Fruits, Corn and Cattel, and all other external terrestrial Births are of most rare and exquisite use for mankind: but the Earth is an Element not only beautified without, but most richly stored within with great Varieties of admirable Creatures, both pleasant, rare, and profitable, for humane Content and Conservation.

From

* Ils l'ap-
pelloient
la mere
grand &
la mere de
dieux.

Antoine
du verdier
En la Rel-
ligions de
Pagens.

From this very Consideration the Philosophers of old reckoned and esteemed the Earth as the first and most ancient of all the Gods, and so stiled her

* The Grandmother or Mother of all the Gods. And the Heathens did not only honour the Earth as a Mother, but did adore her as a Goddess, giving her the names of *Ops*, *Cibele*, *Rhea*, *Proserpina*, *Vesta*, *Ceres*, and other Appellations, to signifie the diversities, and several effects, and vertues, which she produced.

Ops.

The Earth was called *Ops*, which signifyeth *Aid*, because she affordeth aid and comfort to all Creatures inhabitant on her: And *Pausanias* reports, that near the River *Crasside* in *Greece*, there stood a little Temple dedicated to the Earth, wherein she was adored, *Dea largi pectoris*, as the Goddess of the open and large brest, freely feeding all her Children, which in numerous companies were ranged by her.

Her Robe was rich and glorious, embroidered with the most pleasant flowers of all colours: and she was adorned with a Mantle of Tissue, whose
ground

ground was a beautifull Green, signifying her great Plenty of all things, wherewith Mankind might be affected, as most valuable and precious; and such are her rich Mines of Gold, Silver, Copper, Brass, and Iron: or yet more highly priz'd Commodities, as precious Stones, and rare rich Gems of all kinds.

C H A P. 2.

Of Metals.

THe visible beauty of the Earth is obvious to every eye, which is not the Subject here in hand: Her abstruse and hidden riches, *Preciosa pericula terra*, as *Boetius* calls them; her precious Metals and Mines, which force men to be so bold and ingenious, are the matter of this Discourse: These *Aristotle* calls *Corpora perfecte mixta*, inanimate bodies of compleat mixture, made up of Sulphur and Quick-silver, the veins of the Earth being composed of a fit temper for such production: Some Philosophers make the Etymon

mon of *Metallum*, from μεταλλεῖν, which signifies a change effected in the Subterranean Veins, with long labour and much difficulty.

Some Naturalists are more short, and seem more plain; affirming, That Metals is that which is plyable by the hammer, and hard: Stones are hard, but not plyable, and Wax and Mud are plyable, but not hard.

C H A P. 3.

Of the number of Metals.

Metals are seven in number, as the Planets are; Gold, Silver, Amber, Iron, Lead, Brass, Copper. Gold presenteth the Sun, Silver the Moon, Amber, called Electrum, Mercury, Iron Mars, Lead Saturn, Brass Venus, and Copper Jupiter; or else the seven may be distinguished thus: All Metal is perfect, soft, and pure, as Gold; or it is pure and hard as Silver; or it is hard and impure as Iron; or it is soft and impure as Lead: And for Amber, it is compounded of Gold and Silver, as
Cyprus

Cyprus Copper is made of Brasse and Iron, containing an equall substance of Brasse and Iron, which causeth that too much concocted, and high tincted, is easily changed into Brasse, and re-changed again into Copper.

C H A P. 4.

Of Gold.

Gold is *Metallum purissimum*, the purest Metal of all others; and nature never took delight to make a more perfect elementary substance than Gold is; and therefore in price and estimation is far above all other riches.

The composition of Gold is proportioned in equall quality, fitly correspondent in the symmetry of the elements which compound it; it is even in the Originals so purified already, as are the simple & pure Elements, in such sort, that by their conjunction together in equal power, there is engendred so delicate and perfect a mixture of indissoluble union, composing an accord so faithfully, that there is made there-

by an incorruptible Paste, which is permanent to all eternity, in the excellency and goodness thereof; wherefore Gold cannot be vanquished by injury of time and antiquity; neither can contain in it self, nor support any excrescency and superfluity of Rust; for though it be put into the water or fire, and there remain a long space; yet it is never stained, nor accepteth it any other quality but what is natural. Nor yet doth Gold fail any whit, which is a sole priviledge belonging to this royal Metal, all other being subject to alteration and corruption; for though Gold be drawn into the smallest wire, and be extenuated as fine as the threds in the Spiders web; and though it be buried in the most piercing medications, as are Sublimatum, Verdigrease, Salt, Vinegar, and that it remain three thousand years therein, it will not for all that be corrupted, but rather the more refined, provided the Gold be perfect, and not sophisticated and false.

CHAP.

C H A P. 5.

Where Gold is found.

GOLD is found in divers manners, to wit, mixt with Sand, as in *Bohemia*: on the shore-side amongst the water, near to *Goldborough & Risegrond*; and amongst the stones in mountains, as in *Calecut*, and in the *Indies*.

The generation of Gold is usually on the tops of Mountains, because that there in the highest places, the Sun doth more easily purifie that which retaineth too much earthiness in it: and when the Rain and Torrents do flow down, they carry the Gold down with them to the foot thereof, where it is gathered amongst the sand, or else in waters near thereunto, whither it is driven by the violence of floods, except the Ground perhaps open with those inundations, and the Gold fall into the gaping jaws of the Earth, and so stick there. Now it is observable, that that which is found in the entrance of the Mine, is not the purest, but is as an earnest to invite to farther labour

bour and pains. That which is found in Waters and Rivers is fished for, and is in form of little Grains: In Rocks and Mountains it is taken out by delving and digging. And there be three sorts of Mines, some are called Pendent, some Jacent, and some Oblique and turning: Pendent are those which are found in the superficies, and tops of Mountains: Jacent are low, and lie in plain fields: Oblique have a cross course, whether it be to that which is Pendent, or Jacent, all whereof is driven by Rivers into the next floods.

C H A P. 6.

Of Silver.

THE most noble among Metals next to Gold, is Silver, for though Copper in colour, and Lead in weight, do nearest approach unto Gold, yet in tenuity of substance, in pureness and fastness, Silver is so like unto it, that good Silver may be rightly said to be imperfect Gold in substance; failing in colour, and that by succession of time, it is sometimes changed into Gold, as
in

in many years space Lead turneth into Silver. The Mines of Silver are more ordinary than Mines of Gold; and it is usually engendred in four manners, to wit, either in the Earth, or in Brasse, or in Lead, or in Stones, which being purged and melted, yeeld some quantity of Silver. In the Mountain called *Mons Regius*, stones retain very much Silver, which being put in the fire, there is found in every pound of Silver that runneth out of them, half an ounce of Gold at least.

Silver is many times found to be mixed with Copper, as in *Alsatia*, near to the *Rhine* in the Mountains of *S. Aun*, and in *Messein*. When Silver is separated from Lead, it leaveth a scum which is called *Lytbargyrium*, which is a kind of impure Lead.

C H A P. 7.

Of Quick-silver.

Quick-silver is called *Materia Metallaris*, the matter of the Metals; and though it have the name of Silver, yet in nature it approacheth nearer to

Gold; for it is like unto it in tenuity and weight, and to Silver only in colour. And notwithstanding the opinions of many *Chymists*, Quick-silver is not a Metal, but a Water condensate, not by heat (for it is not hardned) nor by cold (for then it would be a stone or metal) but by some other terrestrial rare and pure portion, whereby it cometh to be weighty and cold, splendid and liquid, and is therefore ranked amongst those metalline substances, which differ but little from water; and it is common in experience, that the Mountains wherein Quick-silver is found, are very green and full of fountains.

C H A P. 8.

Of Electrum or Amber.

MAny Authors, Philosophers, and *Chymists*, disagree in their opinions and discourse of Amber; some reckon Amber amongst plyable and hard metalline substances; others will not acknowledge it but to be the gum of a Tree, producing Rosin, which is common in *Arabia*.

Phile.

Phileman writeth, that in two places of *Scythia*, Amber is digged out of the ground like a kind of stone, and in one place it is white, and in another it is yellow; to omit this Argument, and to agree with those who allow Amber to be a Metal, is most consonant to reason: The nature and property of it is a mean betwixt Gold and Silver, and such is the true and natural Amber; as for that which is used for Beads, it is but artificial.

Amber partaketh more of Gold than Silver, because it is more pure, & more apt to be wrought; for if it consist more of Silver, it could not endure the forge and hammer.

Vessels are made of Amber, some for beauty, some for profit; and if composed of true and good Amber, they will discover poysons by cracking, and making signs of an Arch within: for when the rare humidity thereof cometh to be consumed by the force of venome, it cracketh, and the colour changing in the Vessel, it seemeth in stead of the great splendor thereof, there doth a kind of stain represent it self

self like unto an Arch. Now that this Metal is more rare, is ignorance, that knoweth not the vertue; or avarice, that greedily thirsteth after Gold and gain.

C H A P. 9.

Of Iron.

IRon is taken out of the Earth, and to make it Malleable, the mass thereof is laid to dry in the Sun; and that which is earthy, doth soften and moulder with the Rain, as that which is moist doth melt with the Sun; which as the venome of it is consumed in the Furnace by the fire, by how much more it is purged in the fire, by so much the more it is pure in its goodness, in such sort as that which is earthy doth at last turn to schales and dross, and the most subtile part thereof doth convert into Steel.

C H A P. 10.

Of Steel.

THe common Steel is artificiall extracted Iron, Iron more excellently

lently purged, and a little Marble added thereunto; but in many places there is Natural Steel, namely in *Ptrisia* very good, and in the *Chaldean* Isle, and near *Damascus*; whereof the best Cemiters and Faulchions in the world are made, which cut so well, that there is no Razor, be it never so well steeled and tempered, that hath a more keen and sharper edge; for this cause some say, That there are some kinds of Steel and Iron so excellent, that weight for weight, they are esteemed of greater price than Gold.

C H A P. II.

Of Lead.

Lead is a gross, dull Metal, Procreated and Consistent of more impure Quicksilver, and more feculent and cras Sulphur; it least endures the fire of any Metal, and therefore soonest melteth, *Galen* saith, Lead buried long in moist subterranean caves and holes, encreaseth in magnitude and weight, and therefore is a Cover (if well considered) less proper for any buildings;

dings, but where the Roofs are of infinite strength: There be divers kinds of Lead, some red, some white, some black, and a fourth sort of a mean quality betwixt white and black, found in the mountains of *Bohemia*. The Ore of Lead is melted in furnaces, and is let run through pipes out of the furnace, whither the Workmen will. Lead is an incongruent and malignant Metal to all others; and if but one ounce be mixt, incorporated with one hundred ounces of Silver or Gold, the mixture will render the whole mass brittle and fragil; and so it will be in all like proportions.

C H A P. 12.

Of Tin.

Tin is a white Metal, somewhat like to Silver for its splendor & whiteness, and yet not much above Lead for its softness and porosity. And this is the difference betwixt Tin and white Lead, that the one is engendered where there is some Silver mine or vein, but the

the other is generated apart, without the company of so rich a Neighbour.

C H A P. 13.

Of Brass.

BRass is a more impure Metal, which composed of much sulphurous matter, is more hot, light, and less pory, and so less subject to corruption and rust, by reason of all moisture and humidity (almost) consumed in it.

In times past, it was very usuall to make Shields and Bucklers, and Pikes, & Launces thereof, as *Homer* reports how *Menelaus* pursued *Paris* with a brazen Launce. This Metal is proper for Trumpets, because it maketh a great noise in Dorick musick, and enflameth men to Combat : That of Cyprus is harder, and therefore better than any other.

C H A P. 14.

Of Copper.

Copper, or Orichalcum, is Latin, or as some call it *as factitium*, artificial brass; it represents with it a golden

Com-

Complexion, but is somewhat more yellow than Gold; some because Copper make two kinds of Brasse, the one Natural, the other Artificial; the best hath spots of shining Gold intermingled; and the Merchants tell us that in *Nova Hispania* in *America*, a piece of it hath been found of two hundred pound weight. The Artificial brasse commonly called Copper or Latin, is very ordinary; and the most excellent is that, which in four pounds of brasse doth contain in it one pound of white Lead. Also when the white Lead is mixed to the eight part of brasse, then is the Copper very good; but it is base when mixed with black Lead: the use of Copper is chiefly for fair instruments, as Ordnance, Cauldrons, and such like, wherein it is more excellent than brasse, and it giveth no ill taste or smell to meat boyled in it.

FINIS.

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