A VIEW
OF THE
PRESENT STATE
OF
DERBYSHIRE;
WITH AN ACCOUNT
OF ITS MOST REMARKABLE
ANTIQUITIES;
ILLUSTRATED BY
AN ACCURATE MAP AND PLATES.
IN TWO VOLUMES.

VOL. I.

By JAMES PILKINGTON.

Derby: Printed and sold by J. Drewry;
Sold also by J. Johnson, No. 72, St. Paul's Church-Yard;
And J. Deighton, Holborn, London.

M,DCC,LXXXIX.
PREFACE.

TRUTH and accuracy should be objects of the first moment in the execution of every literary undertaking; and I hope, it will be found, that I have not been regardless of their importance in either of the volumes, which I now submit to the inspection of the public. But I do not expect, notwithstanding the pains and care, which have been taken, that they are free from errors. In collecting materials, I may inadvertently have fallen into mistakes myself, or been misinformed by others. Should any errors be discovered, I shall esteem it a favor, if those, by whom they are perceived, will, by letter, or in any other way, point them out with candour and civility.

I doubt not, but that to some readers the plan of this work will appear defective. Those, who may expect to see it formed after the model of Dugdale, Thoroton, Chauncy, and other writers of the same description, will certainly be disappointed. On the subjects of armoury, genealogy, history, and antiquities, they will find, that much has been omitted. A complete investigation of these points would have been too laborious and expensive an undertaking. It would have been also an unnecessary application of my time and attention, as I have been informed,
informed, that an eminent antiquarian, through the chief period of a long life, has been engaged in preparing a work of this kind for the press.

There is another class of readers, whose approbation I have but little hope of obtaining. In the opinion of some I may have gone to the other extreme; I may have been too minute, and prolix. Those, who are well acquainted with subjects of natural history, will probably think, that what is contained in the first volume, might have been comprized in a much smaller compass. But tho' many things are noticed, which to men of science may appear unworthy of attention, yet it is presumed that to persons of inferior attainments in knowledge, they will be new and interesting. Nor is there, I apprehend, any room to doubt, whether there is not a considerable majority of the latter class of readers.—Perhaps it will also be thought, that in the second volume the account, which is given, of the ancient and present state of towns, villages, churches, religious houses, castles, seats, families, state of population, arts, manufactures, customs and manners is too particular. But I flatter myself, that it will not be found tedious by those, who have a taste for enquiries respecting these different topics. If in this instance I have failed of giving satisfaction, much useless pains and expence have been bestowed upon this part of the undertaking.

With a view of giving as clear an illustration of this work as possible, it is accompanied with a map and three plates. The map is a diminished copy of
that, which, about twenty years ago, was published by Mr. Burdett from an actual survey of Derbyshire at that time. It is corrected to the present state of the county, and designed to give a clearer idea of some subjects, which are discussed in this work, than any form of words could convey. The canals have been introduced, the course of the new turnpike roads has been marked, and the extent of the beds of limestone and coal has been distinguished by two different lines, surrounding each of them.

During several years a considerable portion of time and attention has been given to the collection and arrangement of the materials, of which this work consists. My enquiries have been carried into every part of the county; and to some places repeated excursions have been made, that the most full and accurate information might be obtained.

I should be wanting in gratitude, if I neglected to acknowledge the civilities, which I have received, in prosecuting my researches in different parts of the county. Tho' I was frequently an entire stranger, very small is the number of instances, in which the requested information was withheld.

There are a few gentlemen, to whom I am under more especial obligations. In what particular way they have communicated their assistance will be generally seen from the parts of the work, in which their names are mentioned. However I take the liberty of pointing out more distinctly the chief favours, which I have received. In the mineralogical part,
part of the work Peter Nightingale of Lea, esq; has been so kind, as not only to furnish me with several valuable remarks himself, but has been the means of procuring information from other persons, engaged in mineral pursuits. The public will see, how much I am obliged to Dr. Darwin, of Derby, for his natural history of the Buxton and Matlock waters. I am in no small degree indebted to the Rev. Dewes Coke of Brookhill-hall near Mansfield, for his catalogue of plants, growing spontaneously in this county. I beg also, that the Rev. Richard Gifford of Duffield, and the Rev. Samuel Pegge of Whittington will accept of my grateful acknowledgments for their obliging answers to the enquiries, which I have made respecting the antiquities of Derbyshire. Nor would I omit to mention, that my thanks are due to Mr. David Harrison late of Doveridge for his useful extracts from books on the same subject.

DERBY, July 1789.

CORRECTIONS.

Vol. I. p. 146, line 8, strike out the crown, but are leased by.
Vol. I. p. 472, l. 14, for accessible, read inaccessible.
Vol. II. p. 49, l. 4, for 25,206, read 25,895; and for 124,465 read 125,465.
Vol. II. p. 51, l. 29, for 1350, read 1600 besides those employed by the bosiers of Nottinghamshire.
Vol. II. p. 303, l. 1, for them, read the cylinders.
CONTENTS OF THE FIRST VOLUME.

CHAPTER I.
Situation, boundaries, figure, extent, and general surface of the county.—Mountains and remarkable eminences page 3.—Vallies and dales 8—Castleton 9—Matlock 11—Monsal 15—Dovedale 18—Middleton 22—Scenes of picturesque beauty 22.

CHAPTER II.
Atmosphere and climate.—Quantity of rain 26.
Atmosphere clear and transparent 30.—Temperature of the climate 31.—Purity and healthfulness of the atmosphere 36.

CHAPTER III.
Subterraneous geography.—Extent of limestone, coal, and gritstone land 46.—Arrangement of the measures 50—Caverns and subterraneous passages, Peak's-hole 63.—Poole's hole 66. Elden hole 68.—Arrangement and position of the measures, where coal is found 81.

CHAPTER IV.
Mines and ores with the method of working each.—Lead mines 95.

SECTION I. Iron ore and works 130.
SECTION II. Calamine mines and works 138.
SECTION III. Copper ore 142.
SECTION IV. Coal mines 143.
SECTION V. Origin and uses of plasterstone 146.
CONTENTS.

CHAPTER V.

Fossils 149.
SECTION I. Native Fossils 151.
SECTION II. Extraneous Fossils 196.

CHAPTER VI.

Medicinal waters and baths 205.—At Buxton 211.—At Matlock 223.—At Stoney-Middleton 232.—Sulphureous waters.—At Kedleston 235—Cawley 238—Shuttlewood—Agnes. and Mudge Meadow.—Shottle.—Wirksworth 240—Chalybeate waters—At Quarndon 243.—Buxton 224.—Morley and Whittington.—Chesterfield 246.—Tibshelf.—Duffield and Bradley—Martial-vitriolic spring at Heage 248.—Salt spring near Hope 250.—Intermitting springs—At Barmour 251—Tideswell.—Dr. Darwin’s letter on the natural history of Buxton and Matlock waters 256.

SECTION I. Rivers 276.
SECTION II. Navigable canals 279.

CHAPTER VII.

Soil, Agriculture, and produce 283.
SECTION III.—Animals 311.

CHAPTER VIII.

A catalogue of some plants growing spontaneously in Derbyshire 319.

CHAPTER IX.

Birds 480.
A VIEW
OF THE PRESENT STATE OF
Derbyshire, &c.

CHAP. I.
The situation, boundaries, figure, extent, and
general surface of the county.

DERBYSHIRE lies nearly in the middle
of England. It is not easy to say, whether
its distance from the eastern or western
coast is the greatest. But it is evidently situat-
ed somewhat nearer to the northern than the
southern extremity of the kingdom. Accord-
ing to the observation of Mr. Flamsteed,* the
latitude of Derby is 52 degrees and 57 or 59
minutes, and the longitude 5 or 6 minutes
west from London.

It is bounded by Nottinghamshire and a part
of Leicestershire on the east, by another part

*B Phil. Trans. abridged by J. Lowthorp, V. 1, p. 360.
of the latter county on the south, by Staffordshire and Cheshire on the west, and by Yorkshire on the north.

The form of the county is extremely irregular. If it bears a resemblance to any determinate figure, it is to that of a triangle. But the likeness is rendered very imperfect by the numerous curves and projections, which appear in the lines, by which it is bounded.

Derbyshire is a county of moderate extent. Its greatest length from north to south is about 55; its greatest breadth from east to west about 33; and its circumference about 204 miles.

These calculations are founded upon Mr. Burdett’s survey. The scale, by which he has constructed his map, is that of an inch to a mile; and by converting the number of inches into miles, the extent of the county may be ascertained with a tolerable, and perhaps sufficient degree of accuracy.

There are very few counties in England, the general surface of which exhibits so irregular an appearance, as that of Derby. Indeed the southern and northern parts of it are a striking contrast to each other. The former is not particularly remarkable for its hills and valleys. Whereas
Whereas the latter is distinguished in an eminent degree by a long and continued succession of both.

In this part of the kingdom the country begins gently to rise into hills, which in their progress to the north swell gradually into mountains. These extend in one great chain to the southern extremity of Scotland. They first divide Lancashire from Yorkshire. Then entering Westmoreland, they spread over the whole face of that county, and a part of Cumberland. After this, they contract again into a ridge or chain, and form the limits betwixt Cumberland and Northumberland. Continuing their direction northward, they at length enter Scotland.

These mountains in their course are distinguished by many different names, and vary considerably from each other in their respective elevation and circumference. Ingleborough in Yorkshire has been estimated at 20 miles in circumference at its base,|| and 600 Yards in height above the neighbouring valley; and the mountains of Kelwellin and Skiddon are, according to the plan of Mr. Smeaton,§ elevated 1000 yards above the valley lying betwixt them.

In respect to that part of Derbyshire, where these high lands begin, it may be proper to observe,

|| Annual Register, 1761, p. 100.
Mountains and remarkable eminences.

observe, that tho' the mountains may not be equal in height or extent to those, which have now been mentioned, yet they approach nearer to them, than may at first sight be imagined. The ground in the southern extremity of the Peak gradually rising into hills, and these lying one beyond another in a continued series; a common traveller can scarcely form an accurate idea of their elevation above the surrounding country. However, of this he becomes fully sensible, when he begins to descend into the neighbouring western counties. In some particular situations, the prospects into Cheshire and Lancashire are remarkably distant and extensive.

The two highest eminences in the north-west part of Derbyshire are Ax-edge, and Kinder-scout. The former, which is situated about three miles south-west of Buxton, is, according to the calculation of Mr. Whitehurst† about 2100 feet higher than the town of Derby, and 1000 feet above the valley in which Buxton-hall stands. But the exact height of the latter mountain has not, I believe, been ascertained. It is however generally supposed to have a greater elevation, than any other eminence in the county. Though surrounded

† Note to Dr. Pearson's Account of Buxton Waters.
surrounded by hills on every side, it overlooks them all, and furnishes a most magnificent and delightful prospect. I am informed, that with the naked eye may be seen from it the towns of Stockport, Manchester, Bury, and Bolton, the range of hills near Darwent, Rivington Pike, the towns of Wigan and Warrington, and the hill near Liverpool, the city of Chester, and some high mountains in North-Wales.

That the mountains of Ax-edge and Kinder-scout have a greater elevation, than any part of the neighbouring country, is manifest from observing, that the clouds frequently rest upon their summit, when they pass over the high land, with which they are surrounded. This circumstance cannot be ascribed to any other cause than that now mentioned. Nor could it be perceived, unless these eminences were considerably higher, than any other in this part of the country.

There is another ridge of high ground, which begins to appear about a mile to the south of the village of Crich. It extends northward from hence along the east side of the river Derwent, and continues in this direction, till, above the town of Hathersage, it joins the chain of mountains, which lies on the west side of the county. This ridge is at least
Mountains and remarkable eminences:

least twenty miles in length, and generally about five or six miles in breadth. But it is not intersected in its course by any wide and deep vallies, though it be constantly bounded by one on the western side.

Betwixt this high ridge of land and the chain of hills and mountains on the west side of the county lies what is called the Peak of Derbyshire. This likewise, it may be presumed from the very name, abounds with several ridges, mountains, and high points of ground.

In the neighbourhood of Castleton in particular is a high mountain known by the name of Mam-Tor. It is calculated to rise 800 feet above the valley, in which the town is situated, and has been regarded as one of the wonders of the Peak, but manifestly without any just cause for such a distinction. For the circumstance, which gave occasion to it, is not by any means extraordinary. According to tradition and common report, a large quantity of earth and stone have been for centuries shivering down from its top, and sides without any sensible diminution of its size. Whereas the fact is, that its dimension is very considerably lessened. The most superficial observer may perceive, that the part, which fronts Castleton, is so much altered by the frequent shivering of the earth and stone, that the line of the encampment
Mountains and remarkable eminences.

In the neighbourhood of Castleton there are other eminences of equal height with Mam-Tor, Win-hill and Lose-hill in particular rise with very high and conspicuous points to the east, and by their form may be distinguished from all other mountains in that part of the county.

The Low Peak likewise abounds with hills of various height and extent. Brassington-Moor, Alport near Wirksworth, and Crich Cliff are more especially deserving of notice. They command very extensive views into Leicestershire, Staffordshire, and Shropshire. I am informed, that from Alport the Wrekin near Shrewsbury may be seen.

On the east side of the county also there is a high ridge of considerable length, and extent. It begins with a gentle rising to the south of Hardwick, and having gained its greatest

† About two Years ago, as some gentlemen were pursuing the diversion of coursing, they put up a hare on this mountain. Running directly towards this part of it, and finding herself closely followed by three greyhounds, she had no alternative, but suffering immediate death by them, or throwing herself down the abrupt and perpendicular precipice. She made choice of the latter; and the dogs, from the impetuosity of the pursuit, were carried down the same dreadful descent. The fate of each was such, as might reasonably be expected. They were all found dead at the bottom by the gentlemen, who were witnesses of so singular and extraordinary an incident.
greatest height at this place continues in a northern direction, as far as the very extremity of the county, where it enters Yorkshire. In its course many large bays appear, and upon the points, which project into the neighbouring country, may be seen, at considerable distance from each other, Hardwick Hall, Bolsover Castle, and the town of Barlborough.

The northern part of Derbyshire, which is so much distinguished by the number, height, and extent of its hills and mountains, is no less remarkable for the great depth and width of its vallies, and the beauty and variety of its dales.

The width and depth of the vallies are generally in proportion to the height of the ridges and mountains by which they are bounded. Accordingly the broadest and deepest are found in the high Peak. But even here their width, I believe, never exceeds two miles, and their depth 1000 feet.

There is one circumstance, in which these differ from the narrower dales, and which seems deserving of notice. I do not recollect any one instance, in which the angles and projections on the opposite sides of the latter do not correspond to each other. Whereas in the former such a correspondence is not always to be observed.
Vallies and dales.

The merit of the scenery, by which each of them is distinguished, also depends upon different circumstances. Upon looking into the broad deep vallies of the high Peak, the mind is filled with grand and sublime ideas. But diversified beauty is the prevailing characteristic of the narrow dales of the low Peak. And perhaps there is no country, which can boast of finer scenes of this latter kind than Derbyshire.

The valley in the high Peak, which has appeared to me most striking is that, in which the town of Castleton stands. The first view you get into it, when you enter it from the south, is the best, more especially at a point, where the road makes a sudden and abrupt turning along the edge of a high and steep precipice down into the town of Castleton. The valley, which is at least 800 feet deep, and in many parts nearly two miles wide, extends directly eastward to the distance of five or six miles. A number of lesser dales from the north and south are seen at various distances to open into it. The steep sides of the valley are also rendered very beautiful by a series of well cultivated enclosures, which rise one above another to its very edge. The village of Hope with its spire church, which stands at the distance of two miles to the east down
down the valley, has a very agreeable effect. Directing your eye along the edge of the north side of the valley, you see the country boldly swelling into hills, and at length terminating in two high points at a considerable distance from each other.

When you descend from this elevated situation, a fresh set of objects present themselves no less striking and picturesque. At the bottom, you observe the town of Castleton. On a very high and steep eminence to the south of it, the ruins of an ancient castle now and then catch your eye. And directly beyond the town the celebrated Mam-Tor raises his lofty head, and with an awful majesty seems to overlook all this scene of beauty and grandeur.

This valley does not extend westward beyond the town of Castleton, but here forms a most noble and magnificent amphitheatre, its back rising in many parts at least 1000 feet, and the diameter of its front measuring nearly two miles. If pursued in a contrary direction, it will however be found to be of very great length, extending to the distance of 40 miles, even below the town of Derby.

In the course of this valley the views are extremely diversified. In some places it becomes very narrow, and its sides are so thickly clothed with
with wood, as to render it almost impassable. It then gradually opens again, and you have a wide extended prospect before you. Every mile, nay almost every step presents fresh objects and scenes, some of them the most grand beautiful, and romantic, which can be conceived. Whoever has followed the course of the river Derwent from Hathersage by Chatsworth, Darley, Matlock, and Duffield, as far as the town of Derby, will have a clearer idea of the highly varied and charming scenery of this valley than any words can convey. However, it may perhaps be worth while to attempt a description of that part of it, which passes near the village of Matlock.

Before you reach Matlock, when you approach it from the south, you are presented with a specimen of the scenery, by which the dale is distinguished. It is a piece of rock at the bottom of Cromford hill, which is finely varied on its surface, and beautifully fringed with wood.

The entrance into Matlock dale from hence, is thro' a rock, which has been blasted for the purpose of opening a convenient passage. It was intended to have left a rude arch, when this passage was made. The idea was a happy one, and had it been carried into execution would have had an excellent effect. But even
in its present state the views from this place are very striking; and, if the eye has not already been accustomed to behold such scenes of natural beauty, the mind of the spectator must be strongly impressed with the extraordinary one, which is here displayed to his sight.

On the left hand high and prodigious ledges of bare and large rocks appear. Casting your eye on the contrary side of the dale, you see others rising in some places to the perpendicular height of two or three hundred feet, and forming a most magnificent rampart. But the horror, which they would otherwise inspire, is greatly diminished by the variety of trees and shrubs, with which several of them are adorned. These give a softness to the scene, and render it both beautiful and sublime. Whilst the lower part of the dale is covered with wood, and branches of trees hang in a very pleasing manner over the edge of the river, the most stupendous rocks are seen above, boldly projecting forward, some entirely bare, and others partly covered with shrubs, which have no nourishment or support, but what are found in the crevices of these rocks.

The beauty of this scene is very much heightened and improved by the constant windings of the dale, which extends in nearly the same romantic style to the distance of two miles.
miles. But, to render the charms of this delightful place more complete, the river Derwent, which has been already observed to pass thro' it, flows in some parts with a noisy and rapid current, and in other with such a deep and gentle stream, that its unruffled surface clearly reflects the rocks and wood near its margin. Thus do rocks, trees, shrubs, and water conspire at once to fill the mind of the spectator with admiration and delight.

Matlock dale will be seen with still additional advantage by crossing the river in a boat above the old Bath. It is observable here, that art has contributed to improve the natural beauty of the place. On landing three walks are seen pointing thro' the wood in so many different directions. Two of them, by various and frequent windings along the side of the dale, at last bring you to its summit; and from the edge of a very high and steep precipice you have a new and different view of all the beautiful scenes, thro' which you have passed. The other path which I have mentioned, is called the Lover's Walk, and runs along the side of the river. It has been cut thro' the wood, and is beautifully arched by the branches of the trees, with which it is enclosed. Besides these, there is another very pleasant walk thro' a grove, which lies betwixt the old and new Baths.
Vallies and dales.

But there is no one object in Matlock-dale so striking, as a grand and stupendous rock, known by the name of the High Tor. It rises almost perpendicularly from the river to the height of about three hundred feet, and boldly projects its broad front into the valley. The upper part is one solid mass, and for sixty yards appear to be entirely perpendicular.

Directly opposite to the High Tor, is a very high eminence called Masson Hill; and a good and easy ascent has lately been formed to its summit. This point is called the Heights of Abraham, and furnishes a view of almost the whole length of the valley. As you are now raised to a considerable height above every object, their general size and appearance are greatly changed. Even the High-Tor loses all its grandeur and sublimity. But this effect is compensated for in some measure by the enlarged and multiplied views of the valley with which you are furnished. Nor is there any other situation, from which so complete an idea can be formed of all its parts at the same time.

In pursuing the course of the other rivers, which run thro' the Peak of Derbyshire several romantic dales are to be met with. The banks of the Wye, which has its source near Buxton are in many places very striking and beautiful. They
They are particularly so in Monsal Dale, which is situated near the road leading from Bakewell to Tideswell. I believe, it is seen to the greatest advantage at that particular part, where it approaches the nearest to the above road. That man must be destitute of taste for the beauties of nature, who can travel this way and look into it without being filled with the highest degree of admiration and delight. Standing upon the edge of a high and steep precipice and casting his eye down into the valley, he will behold almost every object, which can contribute to render a small scene beautiful.

He will see the river Wye winding its current thro' a rich and verdant dale and near its bank a small farm-house encompassed and partly concealed with wood: He will find the side of the valley, on which he stands, very steep and nearly perpendicular, in some parts formed of a dark shale, in some adorned with low shrubs, and in other covered with a short green turf, with here and there a large piece of rock starting from its surface. Throwing his eye across the dale, he will perceive the opposite side rising from the bottom with a more gentle and gradual ascent, and softened by a rich covering of wood and herbage. In short, he will observe the whole scene possessed of a great diversity
diversity of beautiful objects, of which an actual view of the place can alone give an adequate and compleat idea.

The chief impression which Monsal-dale makes upon the mind, is that of a quiet and peaceful scene. This is the prevailing character of the place, excepting at the season of harvest, when it puts on a more cheerul and lively appearance. It is then a little in motion, but the objects, when seen from the precipice, which I have already mentioned, seem to be of a small and diminished size. However this change in their appearance has an agreeable effect. Its novelty strikes the mind with pleasure and surprize.

Other parts of Monsal-dale are likewise worth visiting. The views near its head are very pleasing. At this place Litton Frith opens into it, and a high point of land, which runs in between the dales, has been greatly improved by the cultivation of aromatic plants. The whole plantation contains about twenty acres, and Mr. Baker, whose house stands on the south side of it, has covered the rocks in this part with fruit trees. From this high situation there is a view into three beautiful dales, which extend from hence in so many different directions. These are Monsal-dale, Litton Frith, and Miller-dale. By following the
the last up towards Buxton you are presented with several charming and magnificent scenes.

The best are about five miles from it and at a small distance from the village of Wormhill. The dale in this part is very deep. When you are come to the bottom, you are struck with the sight of a prodigious large rock, called Chee-Tor. It is said to be 120 yards in height. In some parts it overhangs considerably, and is beautifully fringed with wood. There is great variety in the face of this rock, nor can it be seen to advantage unless the spectator frequently changes the ground, on which he stands.

The rivulet, which flows at its foot, is likewise very beautiful. It is filled with large stones, and forms many natural cascades.

A little way higher up the dale are also many delightful scenes. And it may be proper to add, that at the distance of a mile from Buxton is a deep and craggy precipice, known by the name of the Lover's Leap. The dale in this part is no more than a narrow and tremendous chasm, and it requires some firmness of mind to be able to look down to the bottom of it, without feeling some degree of terror.

   C   Dove-
Dove-dale, about three miles from Ashbourne, and one from the road leading from thence to Buxton, is justly celebrated for its wild and fantastic appearance. The sides of this valley are in almost every part steep and craggy. However, there is a tolerably good descent into it near a high hill, called Thorpe-cloud. When you come to the bottom, you find yourself enclosed in a very narrow and deep dale. Raising your eye up, you observe, on the right hand, many craggy rocks, one placed above another to a vast height; and on the left, a steep and almost perpendicular ascent finely covered with wood and herbage.

This is the general appearance of the dale at the first entrance into it. But when you have proceeded a few hundred yards, you are struck with rocks of the most singular and extraordinary shape.

In some places they are seen rising up to the perpendicular height of thirty or forty yards in the form of pyramids, or spires of churches, and entirely detached from the side of the vale. In other parts, they lean over the river, and seem to threaten immediate destruction to every one, who passes by them. After having proceeded nearly a mile up the dale, you see a fine natural arch, about 40 feet high and 18 wide, in a chain of rocks which
which extends along the edge of a high precipice, but so entirely detached from it, as to have the appearance of a strong massy wall, formed by human hands. When you have passed through the arch, you observe, at a little distance beyond it; two small caves, one called Reynard's Hall, and the other his kitchen. This situation furnishes a beautiful but confined view of the dale.

The rocks on the opposite side are finely adorned with hanging woods, and at a small distance from hence in the midst of this woody scenery arises a grand solitary pointed rock, which by way of eminence is known by the name of Dove-dale church. Its appearance is peculiarly pleasing and sublime, and cannot fail to strike the eye of every one, who passes by it.

This valley is so very narrow at the bottom that though there is a foot path along the banks of the river it is extremely difficult and dangerous to pass thro' on horseback. The road lies, in many places, over steep and craggy rocks, and in other parts the opposite side of the dale approach so nearly to each other, that you are obliged to ride thro' the middle of the river. Through inadvertency and an ignorance of the place, a

C 2 friend
friend and myself were tempted by curiosity to proceed so far, as to render a retreat with our horses wholly impracticable, and it was not without the utmost difficulty and danger, that we scrambled over the remainder of the rocks, which we had to pass. No person, who has a proper regard for his own safety, should attempt to go beyond the straits of the dale on horseback. But it would be still more imprudent to try to get out by climbing up its sides. A fatal accident, which happened some years ago, should serve as a warning against making so bold and hazardous an attempt.

Formerly it was a custom with a family in the neighbourhood of Ashbourn, occasionally in the summer season, to make an excursion to Dove-dale. They generally left their carriage at the entrance into the dale, and those, who chose to ride from thence to the cave, where a cold collation was prepared, were provided with horses for that purpose. One day, as they were proceeding along the bottom of the dale, the Rev. Mr. Langton, Dean of Clogher in Ireland, proposed on horseback to ascend a very steep precipice near Reynard's Hall, which is apparently between three and four hundred feet high: and Miss La Roche a young
young lady of the party with greater spirit than prudence begged, that she might get up behind him, and accompany him in his bold adventure. Her request was immediately complied with, and the head of the horse directed up the precipice. When they had climbed the steep ascent to a considerable height, either thro' accident or the extreme declivity of the situation the feet of the horse slipt, and they all tumbled down, the clergyman and horse to the bottom of the dale, but the lady not quite so far, being stopt in her descent by a bramble bush, which caught hold of her hair. When the Dean was taken up, he was found to be bruised in a most terrible and shocking manner. However, being still alive, he was conveyed to Ashbourn, where he languished a few days and then expired. When the servants ascended the precipice to disentangle the young lady, they found her in an insensible state. She likewise was immediately taken to Ashbourn, where she remained, till she was so much recovered, as to bear a removal. The horse was more fortunate than either of its riders. Tho' it rolled to the bottom of the precipice, the only injury which it received from the fall, was a few bruises on its sides, occasioned by the stirrups of the saddle.
Dovedale, as Mr. Gilpin observes, is a calm sequestered scene, and yet not wholly the haunt of solitude and contemplation. It is too magnificent and too interesting a piece of scenery to leave the mind wholly disengaged. The same agreeable and ingenious writer also remarks, "On the whole, it is perhaps one of the most pleasing pieces of scenery of the kind we any where meet with. It has something peculiarly characteristic. Its detached perpendicular rocks stamp it with an image entirely its own, and for that reason it affords the greater pleasure. For it is in scenery as in life. We are most struck with the peculiarity of an original character, provided there is nothing offensive in it."

Middleton-Dale, thro' which the road leading from Tideswell to Chesterfield passes, is a narrow, winding, and deep chasm. In grandeur and beauty it is inferior to all those valleys and dales, which I have attempted to describe. Yet the rocks in it are of so peculiar a shape, that they never fail to make a striking impression upon the minds of those, who happen to visit the place. On the north side they bear a strong resemblance to the round towers and buttresses of a ruined castle. In some parts
parts there is such an appearance of mouldings, that one can scarcely help thinking, that the chisel has been employed in their formation.

The rocks, more especially on the north side, are entirely perpendicular and rise to the height of three or four hundred feet. But they are everywhere naked and unadorned, excepting at a point near the entrance into Eyam dale. Here Mr. Longsdon has raised a beautiful plantation, and in the midst of it formed a grotto, which he has furnished with some of the most elegant fossils collected in that part of the county.

The views in this dale are also a little diversified by its frequent windings. The road is so very narrow, and the angles so acute, that, when you look forward, you are naturally led to conclude, that the high and sharp projections will totally obstruct your passage, and that you cannot proceed any further in that direction.

From the view which has been given of the general surface of Derbyshire, we see, that it furnishes many scenes of picturesque beauty. But in vain shall we look for them, excepting in the valleys. Nothing can be more dreary and destitute of entertainment, than the country
which generally borders upon them. Tho' the hand of cultivation has made considerable improvements in the southern parts of the Peak, yet in the north large tracts of poor and waste land are seen almost every where. In many situations scarcely a single house or tree appears to divert the mind of the traveller, and the eye grows weary with beholding scenes so totally destitute of beauty and variety.

However, tho' the moors of Derbyshire are in themselves so unpleasing and even disgusting to the imagination, yet they serve by way of contrast to heighten the beauty of the dales and vallies, by which they are intersected. The sudden and great change in the appearance of the country which these occasion, fills the mind with surprize and delight. The lengthened shadows, which on the sun's decline are produced by the vast height of the mountains, also afford a pleasing contrast to the warm and vivid rays of the sun, glittering on the opposite side.

But, without the aid of contrast, the vales of Derbyshire are possessed of much picturesque beauty, and afford the highest gratification to the creative powers of the painter. For they comprize within a small compass those powerful and necessary articles in the composition of fine
Scenes of picturesque beauty.

fine scenery, wood, rock, and water, varying their effect according to the different times of the day. Accordingly they have drawn the attention of the most eminent painters. There is one scene in Matlock-dale in particular, which has excited general admiration. It is situated at the termination of the range of rocks, which begins near Cromford, and is known by the name of the Rock at the Boat-house. The best station for viewing it is about half way betwixt the boat house and the turnpike gate. The painters esteem this the most compleat piece of scenery in the whole valley. The composition is reckoned to be exceedingly good. It contains great variety of rock, and a good deal of wood. If it be in any respect defective, it is in the view to the left hand, which is rather tame. Notwithstanding the scene is altogether, in the language of the painter, extremely well built, and has been copied by some very good artists.

Besides this, there are many other fine pieces of scenery in these romantic and delightful dales, which have attracted the notice of the painter. Those, who have had an opportunity of seeing them touched by the sweet and magic pencil of Mr. Wright of Derby, will easily conceive, how deserving they are of
The atmosphere and climate.

The attention, which has been paid them. He has not been satisfied with observing their general effect in the day, but has contemplated them by the pale and silver light of the moon, when every object has reposed itself in peace.

CHAP. II.

The atmosphere and climate of the county.

The atmosphere and climate of Derbyshire are no less various, than the general surface of the country. In the southern part of it, they greatly resemble those of neighbouring counties, which have the same degree of elevation. But in the high Peak and the north-east extremity of the county they are materially different in several respects.

One circumstance, in which the northern part of Derbyshire differs from less mountainous countries, is in the quantity of rain which falls in each respectively. Being raised into the course of the clouds, which pass over more level situations, it receives their contents in the
The atmosphere and climate.

The form of rain, hail, or snow. It is not easy to determine what is the exact proportion when compared with other places. For all calculations made with a weather gauge for the purpose of ascertaining this point must be attended with some degree of uncertainty. Rain, during the winter season frequently falling in the state of snow, fleet and hail, cannot on account of the strong winds, which prevail here, be collected with so much accuracy, as seems to be requisite. However it may be proper to mention, that at Chatsworth in 1764, 1765, 1767, 1768, about 33 inches of rain fell at a medium each year. But I apprehend, that in the north west part of the county, which is still more mountainous, a much larger quantity falls in the same space of time. For it has been observed, that showers, which have been brought by the westerly winds, and descended in great abundance in the neighbourhood of Buxton, have not reached or have been carried over the town of Bakewell and Chatsworth.

Upon comparison we shall find, that so large a proportion of rain falls in scarcely any other parts of England. According to the observation of Mr. Barker, the mean annual quantity, which fell at Lyndon during 10 Years (1771

§ Dr. Percival’s medical and experimental essays, page 66.
The atmosphere and climate.

(1771 to 1780) was rather more than 26 inches. When taken for a larger period, for 45 Years, (36—80) it amounted to only 22, 210.† The average quantity for 3 years‡ (1778, 1779, 1780,) which was collected at the house of the royal society, is still less. It was very little more than 21 inches.

From a comparative view of all these places it therefore appears, that the quantity of rain, which falls at Chatsworth every year, exceeds, nearly one third, that, which has been collected at Lyndon and London during the same space of time.

But the fact of which I am now speaking, does not stand in need of any of the foregoing observations to procure it credit. No person, who is well acquainted with the high Peak of Derbyshire, can be ignorant, that it is particularly distinguished by its frequent rainy seasons.

However, tho' so large a proportion of rain falls in this part of the county, it cannot be with truth inferred from hence, that the general state of the atmosphere is moister here than in lower situations. On the contrary, it has been found, that on the summit of high mountains a degree of dryness prevails unknown on the plains. M. de Luc has by repeated experiments and

† Phil. Trans. Vol. 74.
‡ Phil. Tran.
and observations established this fact beyond all doubt. He has also discovered, that the air on mountains is dryer in the night, than in the day; a circumstance, which had been observed also by M. de Sanquier. I think it proper to take this notice of the dry state of the atmosphere in elevated situations during both day and night, not only as a curious fact, but likewise as tending to throw some light on the general nature of the air, which prevails in the mountainous parts of Derbyshire.

Perhaps it may be imagined, that as a larger quantity of rain falls in the Peak of Derbyshire than in most other places in England, the wet seasons are here of longer continuance. Tho' such a supposition may seem reasonable, it is not strictly agreeable to fact. This difference in the proportion of rain which falls in high and low situations is more owing to the great weight than the frequency or long continuance of the showers. The inhabitants of low and flat countries have no conception of the violence of the storms, which happen sometimes in the Peak of Derbyshire. The rain descends in such torrents from the sky, that great mischief is done at these times in all the dales and vallies. I have often been surprized to see the ravages occasioned on the sides of the hills in different places. I was more especially struck in one of my
my excursions with observing the effects of such heavy showers near Lea Wood at a small distance from Crich. The extent of the ground, on which the rain fell, is about ten acres. But having a general descent towards one particular spot, the water swelling into a large and strong torrent here broke the side of the hill, carried down with it a prodigious quantity of soil and stones, and even tore up a large tree by the roots. I believe, that rain falling upon so small a surface seldom or never produces such violent effects in low and level countries.

Another circumstance observable in regard to the atmosphere of the Peak of Derbyshire, is, that it is subject to very strong winds. Brisk currents of air are often felt on these high grounds, when the inhabitants of low and less irregular countries in the neighbourhood suffer great inconvenience by the extreme closeness of the weather.

It is also deserving of notice, that the air in these elevated situations is remarkably clear and transparent. This is generally the case, when on the plains bordering upon them, it is dusky and loaded with vapours. This observation, I believe, will more especially hold good in fine and serene seasons. A contrary appear-
The atmosphere and climate.

...ance is regarded as an indication of rainy and unsettled weather. It is generally remarked, that, when the hills and high mountains are covered with mists in the morning the day is more frequently wet, than when the fogs appear in the valleys, or hanging upon the edge of the mountains, are dispersed by the rising sun.

To form an accurate opinion of the general temperature of the air in Derbyshire, it is evidently requisite, that a series of observations should be made with a thermometer for a considerable length of time. But the information, which I am able to furnish in this way is not so full and satisfactory, as I could wish. The only remark, which I have to communicate with a view of ascertaining this point is, that during the last 12 years the thermometer has never been known to fall below 5° degrees, or rise above 85. In most summers it is continually varying from 64 to 74 degrees. During the sharp frosts of winter I believe it generally stands at 14. There are very few years, when it passes these two degrees of heat and cold. But it is evident, that from such general observations respecting any particular climate, no just estimate can be made of its mean annual or monthly temperature. However some notion may
may be formed of each by attending to the accounts, which have been given of them in places situated in nearly the same latitude and longitude. Now in this manner we may calculate the mean annual temperature of the air at Derby. It has already been observed, that the town is situated in lat. 52 degrees 57 or 59 minutes, and long. 5 or 6 minutes west; and it appears, that the mean annual temperature of Lyndon in Rutland, situated in latitude 52 degrees 30 minutes, and longitude 3 minutes, according to Mr. Barker, was 48 degrees, 0 3 minutes during 15 years, (1770 to 1785).* We may therefore conclude, that the mean annual temperature of Derby is not materially different. Perhaps the air here may be somewhat warmer on account of its greater affinity to the Atlantic ocean. This supposition is rendered probable by comparing it with the standard, which Mr. Kirwan has formed for determining the temperature of different latitudes. According to his calculation the mean annual temperature for the latitude of Derby should be about 50½ degrees.

We shall see still greater reason for approving this estimate, when we consider, that this is the temperature of the springs in the neighbourhood

* Mr. Kirwan's estimate of the temperature of different latitude
bourhood of the town. For this has been regarded by attentive and accurate observers as nearly the same, with the mean annual temperature of every place.

But supposing that 50° degrees is the mean annual temperature of the town of Derby, it is obvious, that that of the Peak or northern extremity of the county will be considerably different. Its greater elevation above the level of the sea must necessarily render it much colder. As the atmosphere derives considerable heat from the earth, distance from it must be a source of great cold. Accordingly it is found, that the highest mountains under the equator are, throughout the year, covered with snow. It has been supposed, that the line of congelation in latitude 51° degrees is in summer time 5700 feet above the level of the sea. Now as many parts of the Peak in lat. 53° rise to half this height, the air must be very cool even in the middle of summer: This effect of elevation would certainly be more sensibly felt, if the ascent of the country was less gradual, or did not afterward extend considerably every way with nearly an horizontal surface. It is reasonable to suppose, that the air is not so cold in the mountainous parts of Derbyshire, as the atmosphere at the same height over plains.
For by its contact with the earth, it receives some heat from thence.

Another cause of cold is the large quantity of rain, which, as it has been observed, falls in that part of the county, which we are examining. After wet seasons the ground is always found to have lost much of its heat. This effect is produced not only by the rain, which descends from the higher and colder regions of the atmosphere, but likewise by the evaporation, which takes place in consequence of it. When the vapour begins to rise from the ground the mutual attraction of the particles of water is diminished, and the heat, which now has liberty to escape from neighbouring bodies, rises into the higher parts of the atmosphere, and by this means the earth and the air near it are considerably cooled.

The clear and transparent state of the air in the Peak of Derbyshire contributes also to encrease the cold, which is observed to prevail here. For the rays of the sun passing thro' this kind of atmosphere do not warm it, as they are known to communicate heat only in proportion to the quantity of watery vapours which it contains. It may therefore be concluded, that the air on the mountainous parts of Derbyshire, which is clear
clear, transparent and dry, will receive but little heat from the rays of the sun, and consequently must be colder than that in lower situations.

The foregoing observations will receive much confirmation from attending to the large quantity of snow, hail and sleet, which fall in that part of Derbyshire, of which I am speaking, more especially at the beginning of the winter and spring season. At Derby it is not unusual to hear, that the snow lies there several inches, and sometimes a foot thick, when there is not the least appearance of any in the neighbourhood of the town. However, in the middle of winter and in very severe weather, the cold is too intense in the high Peak to suffer the snow to fall, and it has been observed to be more abundant in the south of the county.

Moreover the backward state of vegetation in the north part of Derbyshire is another convincing proof of the coldness of its climate. Some kinds of grain will not grow, at least not ripen here at all, excepting in the deepest vallies and those, which are usually sown, are seldom ready to cut, till the near approach of winter. In the spring the frost continues long in the ground, and the seed cannot be sown, before
before the season is far advanced. It may therefore be expected, that the harvest will be very late. Accordingly it sometimes happens, that in some situations the corn never ripens, and is only cut down and withered in the sun and air.

There seems good ground for presuming, that the atmosphere in this part of the kingdom is more pure and healthful than that in lower situations. It has frequently been imagined, that the healthfulness of countries is in proportion to the degree of their elevation. The lower parts of the atmosphere abound with fixed air, or aerial acid, which is discovered to be of the same nature with the noxious vapour found in certain caverns and subterraneous passages, and seen like a subtle smoak, which in summer rises about a foot from the ground, but in winter not above a few inches. And from its gravity, it may be supposed, that the lower part of the atmosphere must contain a larger quantity of it than the higher. Hence I imagine, says Professor Bergman, the reason is plain, why higher situations are in general more healthful than lower ones. And I have no doubt, but that various disorders, both epidemic

[ Physical and chymical essays, Vol. 1, p. 84. ]
demic and endemic arise from the different quantities of aerial acid in the atmosphere.

Tho' this opinion may be in some measure just, yet it must be understood with some degree of limitation. From the experiments & observations of M. Sauffure it appears, that the healthfulness of any place is not in proportion to its elevation. He found, that the air on four mountains out of five was less pure, than that of the plains lying at their feet, and that only one, in which the air was more healthful than in the plains owed that advantage to a particular situation: He therefore presume[s], that the air at a certain height loses somewhat of its purity...

In support of this opinion he remarks, that inflammable air, which, according to the observations of S. Volta, is constantly produced in immense quantity must, as it is lighter than common air, rise to the more elevated regions of the atmosphere. On this account very high mountains, the tops of which must be covered with this elastic fluid, must be as unfavourable to health as very deep valleys. For, if the atmosphere in low situations be rendered less salubrious by the fixed air, with which it abounds and the gross exhalations, which its density enables it to support; that on mountains raised 1000 or 1200 yards above the level of the sea is vitiated by exhalations, which
do not less diminish its wholesomeness, because they happen to be lighter than common air.

From these circumstances it has been concluded, that there is a certain medium at which ceteris paribus the density of the air is best adapted to the purposes of health and life of man. This height has been fixed by M. Sauvage at between 200 and 300 fathoms above the level of the sea.*

Now if we apply these observations to the northern part of Derbyshire, we shall be inclined to believe, that the air there is in most situations favourable to health. For it seems probable from the observations, which have been made with a view of ascertaining its height, that it is in general raised between 1500 and 2500 feet above the level of the sea; a degree of elevation, which appears to correspond to that, which has been mentioned as best fitted to the purposes of life and health.

Moreover there are some circumstances more peculiar to the Peak of Derbyshire, from which the great purity of its air may be inferred. There are very few sources of putrefaction, no marshes, no stagnant waters, or any of those causes of putrid air, with which low situations abound. Perhaps the strong currents

* Bergman's physical and chemical essays, vol 1, page 85, note (p)
currents of wind which generally prevail in this mountainous country, may contribute in an equal degree to improve the state of the atmosphere. Besides these favourable circumstances another has been mentioned, the influence of which cannot be so easily determined. It has been thought, that the frequent and heavy rains which fall in these parts produce so beneficial an effect by washing off the impurities, which it contains.

How far these observations agree with fact can only be decided by those, who have resided some time in the north part of Derbyshire, and closely attended to the health and diseases of its inhabitants. It has been said, that no endemic or epidemic disorders, no agues or fevers are known to prevail here. But this assertion, if just, must be understood with some degree of limitation. For upon enquiry I have been frequently informed, that in the deep vallies and narrow dales agues and fevers are not uncommon, tho' such as live in higher situations are seldom troubled with these complaints.

There is one disease, to which the inhabitants of Derbyshire are so much subject, that it has taken its name from its great prevalence in this situation. It is not peculiar to the Peak, but is observed as far south as the town
of Derby. It is accordingly called the Bronchocele or Derby Neck. In the year 1769 Mr. Procter published the following description and method of curing this disorder.

"The Bronchocele, or Derby Neck, is a tumor arising on the fore-part of the neck. It generally first appears sometime between the age of eight and twelve years, and continues gradually to increase for three, four, or five years; and often the last half-year of this time, it grows more than it had for a year or two before. It generally occupies the whole front of the neck, as the whole thyroid gland is here generally enlarged, but it does not rise to near so high as the ears, as in the cases Wiseman speaks of; but is rather in a pendulous form, not unlike, as Alhucasis says, the flap or dew-cap of a turkey cock's neck, the bottom being generally the bigger part of the tumor, and going gradually less upwards. It is soft, or rather flabby to the touch, and moveable; but when it has continued some years after the time of its growing, it gets more firm and confined,

"By the situation and nature of the complaint, it occasions a difficult breathing, and very much so upon the patient's taking cold, or attempting to run or walk fast. In some the tumor is so large, and so much affects their breathing
breathing, as to occasion a loud wheezing. It very rarely happens to boys, indeed I have never been able to make out one instance of it, in a man or boy.

It is very common in many counties in England, Derbyshire especially, where from its frequency it has the name of Derby Neck, and some other countries are almost free from it. I have been informed by a gentleman of the faculty, from Duffield in Derbyshire, that there were near fifty poor girls afflicted with it in that small village.

Without inquiring into the nature or cause of this disease, our author next proceeds to the method of cure:

Having given, I think, such a description of the natural or cutable Bronchocele, as will enable anyone to know it from other complaints something like it, I proceed to the cure, which when the disease exactly answers the description I have given of it, and its continuance has not been too long, I think I may say will very rarely fail.

I have known several completely cured at very near the age of twenty-five years, which was more than twelve years after the first appearance of the tumor of the neck; but yet at that age, I believe the cure is uncertain, and beyond it, though but a very few years, more doubtful.

I have
The atmosphere and climate.

I have tried the remedy on several, at the age of seven or eight and twenty, but never with success, though it may, I believe, happen so, if the tumor appears not very firm and confined, but rather flaccid and yielding.

Many no doubt lead miserable lives, under the almost intolerable torments of some tedious perplexing disorders, such as the nervous kind, for want of pursuing long enough, let the remedies applied be ever so proper and likely, for them to receive considerable benefit. It is supposed no one can object against the medicines prepared here for their cure, on account of time, or other observations necessary in their use, when they are informed a month or six weeks at farthest, is the longest time, and no confinement, or hardly any other restraint from the usual way of living, is required.

Let one of the following powders be taken early in the morning an hour or two before breakfast, and at five or six o'clock in the afternoon, every day for a fortnight or three weeks. The powder may be taken in a little sugar and water, or mixed with a little syrup, or any thing, so that none is lost:

Take Cinnabar of Antimony levigated, one scruple;
Woodlice prepar'd and powder'd,
Burnt spunge, of each fifteen grains,
to be made into a powder.
The atmosphere and climate.

After these powders have been taken for the time mentioned, the patient should omit them for about a fortnight, and then begin with them again, and take as many more after the same manner, and also at bed time every night during the second course of the powders, three of the following pills are to be taken:

Half an ounce of Mercurial Pill. (after the new dispensatory) to be divided into four equal parts;

Burnt sponge half dram to be mixed with it.

These medicines generally agree so well, that the patient is neither troubled with sickness nor any inconvenience from their use, nor is any confinement necessary, unless they are taken in severe weather, and then it may be only to the house; nor need the diet be much regarded. Indeed I think it sufficient, that the medicines be taken in a temperate season, or rather warm weather, and the patient lives exactly in the usual way, taking some care against catching cold. And if meat be eaten only every other day, and toast and river water, &c. drank instead of malt-liquor, it will not be the worse; nor can the medicines ever succeed better than I have known them several times, when there was no difference at all made in the way of living. If the pills purge, two only should be taken, and if more than an
The atmosphere and climate.

extraordinary stool a day is occasioned by them, the dose must be reduced to one, and continued till the pills are all taken. In general it will be proper for the patient to be purged twice or thrice with manna and salts, or any gentle cathartic, before the powders are begun with. The medicines are here proportioned for an adult, of a good constitution, therefore if the patient is younger, or of a weakly habit, the doses must be managed accordingly.

The patient is not to expect to find much benefit in a little time: perhaps it will be as long after the medicines are all taken, as the time they are in taking, before much difference will be perceived in the tumor of the neck. It is necessary that the medicines be begun with at a proper time, especially the second course; a few days should always be dispensed with upon that account.

As to external application, I have never made use of any, as I think none can be of much service. Many recommended I should suspect of doing harm, such as fomenting the part with warm vinegar; which by its hardening the gland, though it may somewhat lessen it, would render it more difficult, if not incapable of being quite reduced to its proper state.†

Mr.

† A somewhat different method of curing the bronchocele has been practised with great success at Coventry. There are two receipts by which the medicine has been prepared, they are said to be equally efficacious, and the contents of each are given in the Medical Comment. Vol. 7, page 24.
Mr. Prosser in this account of the Derby Neck has fallen into a mistake in supposing, that boys are not subject to it. If the part, in which the disorder appears, was exposed to view, he would easily see, that they are liable to it, tho' not in an equal degree with girls. I would also observe, that the thickness of the neck in some instances arises from an enlargement of every part, with little or no appearance of a tumour in the front. In other respects his description seems to be accurate and I hope, that a desire of furnishing a remedy for so common a disorder, will be thought a sufficient apology for the length of the quotation.
CHAP. III.

The subterranean geography of the county.

HAVING endeavoured to give an idea of the external appearance of the country in Derbyshire, and of the atmosphere and climate, by which it is distinguished, I shall now descend below its surface and examine its internal structure. But the measures* being different in their nature and order in different places, I shall, before I enter fully upon this branch of my undertaking, mark out a few general divisions of the county, according to the several kinds of stone and other substances which are observed to prevail in different situations. Now the most obvious and convenient distinction, which can be made for this purpose, seems to be that of considering the country under the general heads of limestone, coal, and gritstone land.

I shall begin with describing, as accurately as I am able, the extent of the various beds of limestone land which I have observed in different parts of Derbyshire.

* In this and the following pages the word measures is used instead of strata, being a term better understood by English miners.
The most extensive tract of this kind is situated on the north-west side of the county. Its most northern extremity appears at Castleton. The line, by which it is bounded on the west, runs along the west edge of Peak forest, and stretching forward by the east side of Combs Moss, continues in this direction as far as Buxton. In its course from this place it inclines in a small degree to the north, but soon returning to its former direction it extends along the east side of Ax-Edge to Dovehead. It then follows the boundary line of the county about 12 miles, and afterwards crossing the river Dove extends a few miles into Staffordshire. The most southern part of Derbyshire, in which it is to be seen, is about two miles north from Ashborne. From hence the line, by which it is bounded, running in an eastern direction, passes a little way to the south of Knivetion, Atlow, Hognafton, Hopton, Caldelow, Wirksworth as far as Matlock. At this place its course is again changed. It now points northward, and extends on the east side of Snitterton, Winster, Youlegrave, Bakewell, Stoney-Middleton, Haslebage and Bradwell. After passing the road lying between Castleton and Hope it terminates at a small distance above it in the valley of Edale.

Besides
Subterraneous geography.

Besides this large tract of limestone land, there is another of smaller extent on the east side of the county. It forms that high ridge, which has been mentioned as situated in this part. It begins at Pleasley, and in its course to the north is bounded on the west by Glapwell, and the towns of Bolsover, Barlborough and Killamarsh. It spreads eastward into Nottinghamshire in every part from its very first appearance. But its progress to the north is still more extended. For I am credibly informed, that it reaches with very little interruption as far as Trentham castle in the county of Northumberland.

Moreover there are in some other parts of Derbyshire beds of limestone of still smaller extent. I believe, that they do not in any one instance exceed two miles in either length or breadth. They are situated at Ashover, Crich, Turnditch in the parish of Duffield, Mugginton, Ticknall, and Osmaiston near Ashbourn.

The principal tract of country, where coal is found, begins towards the south at Stanton, Dale, and Morley, and extends northwards as far as Scotland. It is called the great northern rake, and I am informed that, excepting it is intersected, near Ferrybridge in Yorkshire, by a bed of limestone about three miles broad, it may be traced to the northern extremity of this
this kingdom. Eastwards it spreads at first into Nottinghamshire, but begins to be bounded on that side at Pleasley by the ridge of limestone, which has already been noticed as lying in this part of Derbyshire. The line, by which it is limited after leaving Morley, runs on the west side of Horsley and Belper, and appears again at Lea, Alton in the Parish of Ashover, Stubley, Dore, and Totley in the Parish of Dronfield, and continues in this direction till it enters Yorkshire.

At Chinley hills near Chapel le Frith coal has likewise been found. The ground, in which it appears, is about 3 miles in length and 2 in breadth. At Newhall in the Parish of Stapenhill, at Measham in the most southern extremity of the county, at Church Gresely, at Calk, and in Hartington upper quarter near Buxton, there are also tracts of coal of nearly the same extent.

As to that part of Derbyshire, where gritstone is found, tho' it does not comprehend all the country which has not been described under the two foregoing divisions, it is of much greater extent than either of them. The situation, in which it most uniformly prevails, is the north and north-west extremity of the county. It is also met with throughout all that tract, which lies between the two principal
Principal beds of limestone and coal, which have been described. Of this district of gritstone land the east moor forms the most considerable part, tho' with various breadth it extends to the south almost as far as the town of Derby. Some beds of this kind but of small extent are also to be seen at Allestrey, Mackworth, Langley, and Stanton, and a few other places in the county.

Besides the several districts, which have been now marked out under the three divisions of limestone, coal, and gritstone land, there is a very considerable one, in which no beds of stone of any kind are to be met with near the surface. If a straight line be drawn from Ashbourn thro' Derby to the borders of Nottinghamshire, it will comprehend all that part of the county, which lies to the south of such a line, excepting those small tracts of a different nature, which have already been pointed out as appearing in this southern situation.

Having endeavoured to describe in different parts of the county the different nature of the ground near the surface, let us proceed to examine at still greater depths in the earth, the various beds, which have been now marked out.

The observations, which I shall make, will be confined almost entirely to the two largest tracts
Arrangement of the measures.

tracts of limestone and coal land, which have already been mentioned. In describing the internal structure of the earth in these parts, I shall point out the order, and thickness of the various beds which have been examined, and then consider the positions in which they are generally found.

In that extensive tract of limestone country, which has been mentioned as lying in the north-west part of Derbyshire the earth has been penetrated in several places to a considerable depth. Now in these various situations the order of the measures appears to be considerably different. But it is scarcely possible to convey a clear idea of them without a plate representing a section of the ground, where they are found. Mr. Whitehurst, in his ingenious work, has given several clear and distinct ones of the mountainous parts of Derbyshire. But this publication not being in the hands of everyone, I shall endeavour to describe the arrangement and position of the measures in a somewhat different part of the county. This situation is Snitterton, a village lying betwixt Matlock and Winster, and in the parish of Darley.

A is Snitterton. B is a level supposed to be driven into the hill in a southward direction from A at Snitterton.
Arrangement of the measures.

C C is a line representing the surface in a southward direction over the supposed level.

At D is a measure of shale, which is distinguished by a dark shade. Under this are some fine lines, representing, beds of blue marble with thin way-boards of clay or soft shale intervening betwixt them. The beds are from one to two feet thick, and the clays are in some places an inch thick, but in others only just a separation of the beds.

E is a measure of limestone about 50 yards thick, supposing that a perpendicular shaft was sunk through it. The upper part is a clear light coloured stone containing balls of chert. In some places appear beds of chert 3 or 4 inches thick at various distances, from 6 to 24 inches, from each other. The lower part of this limestone is of a dun colour and likewise contains chert. It has been proved 25 yards thick by sinking a shaft at I. In this situation the whole measure from the surface of the ground to that, upon which it lies, is of a dun colour, and is about 24 yards thick. Very little lead ore has been got in this stone, tho' many trials have been made to discover it.

F is a measure of blackstone about 28 yards thick. It has been proved in many places within the distance of one mile from Snitterton. I am informed, that no ore has been got in it, except-
Arrangement of the measures

excepting in a strong vein, called the Side, which crosses the High-Tor at Matlock; and what is found there is of a light poor quality. Under this blackstone is a solid bed of limestone, seven feet thick. Some rake-works carry ore in this measure.

G is a measure of limestone 16 yards thick. Under it are found three very thin beds of clay, in some places about an inch thick, and about 8 or 10 inches distant from each other.

H is another measure of limestone 30 yards thick. The rake-works in it near Snitterton bear the largest quantity of ore, more especially in the upper part near to the three beds of clay. The pipe works are also the best in this measure and often go down to the second blackstone.

I and K are two shafts, which are sunk to the second blackstone in a rake work south from Snitterton.

L is a second measure of blackstone. Mr. Alscops (to whom I am indebted for this description) says, that he has never seen it cut through near Snitterton, but upon enquiry he finds, that at a mine called Porter about two miles south of this village a shaft was sunk through it, and it was discovered to be 80 yards thick. But, he apprehends, that in this situation the measures happened to dip

E 3 uncom-

§ Clerk to Peter Nightingale, of Lea, Esq.
uncommonly. For at a place, about 2 miles south-west from Snitterton, this measure has been cut through and found only 30 yards thick; and in other situations it appears to be not so much.

This measure of blackstone is thrown out at the surface about two miles south-west from Snitterton, and about half a mile further in the same direction at a mine called Hang-Worm is a third measure of the same kind, which has been cut through and found about as thick as the second. It appears at the surface at a place, called Grange Mill.

Mr. Alsop has not been able to ascertain the thickness of the limestone, which lies betwixt the second and third blackstone, and informs me, that he has not found more than three measures of blackstone in any part of the country.

In the section, which is here given of the measures near Snitterton the first, which would occur at the surface if they lay in an horizontal position would be that of shale. But in some situations there is found above this one of gritstone also. This appears to be the case in the sections, which Mr. Whitehurst* has given of the measures at two places in the neighbourhood.

* Appendix to his enquiry into the original state and formation of the earth.
Betwixt Grange-Mill and Darley-Moor, he informs us, that the following is the general arrangement of the measures and the respective thickness of each. 1. Gritstone 120 yards, 2. Shale the same thickness, 3. Limestone 50 yards, 4. Toadstone or blackstone 16 yards, 5. Limestone 50 yards, 6. Toadstone 16 yards, 7. Limestone 60 yards, 8. Toadstone 22 yards, 9. Limestone not cut through. To these he adds six other measures usually called clays or way-boards, and says, that in general they are not more than four, five or six feet thick, and in some instances not more than one foot. He observes that the first measure of clay separates No. 3 and 4, the second No. 4 and 5, the third No. 5 and 6, the fourth No. 6 and 7, the fifth No. 7 and 8, the sixth No. 8 and 9.

From these two sections, and other examples which might be produced it appears that in different situations the arrangement is not always entirely the same. One respect in which they disagree, is in the position of the clays. According to the description given by Mr. Alsop, they are only found under the shale, and the middle of the second measure of limestone. Whereas Mr. Whitehurst informs us, that in the situation which he has pointed out, they are always discovered betwixt every measure of limestone and toadstone. I have also been
been informed by an experienced and intelligent mineral gentleman, that upon the first and second blackstone there is a bed of light coloured clay from one foot six inches to three feet thick. By comparing together these several accounts it is sufficiently manifest, that there is great diversity in the situations of the beds of clay. But in other places besides these, in which the beds of clay appear so variously arranged, one of the measures is entirely wanting. I believe, that the blackstone is not found in the mines at Eyam, Foolow, or Ashover, tho' shafts have been sunk to a very great depth at all these places.

Another circumstance deserving of notice is, that these measures, when they agree in their arrangement, often differ in their degree of thickness, when examined in different parts of the country. This remark more especially holds good when applied to the blackstone. In situations not very distant from each other it has been found to vary not less than fifty yards in thickness. The measures of limestone and shale are also thinner in some situations than other. The former, which at Darley is 120 yards thick, is only 80 at Castleton.

I shall in this place mention a few other particulars respecting these beds, and the substances which they contain, tho' I intend in a sub-
subsequent chapter to enlarge more fully upon their nature and quality. The measures, of which I shall take notice, are those of clay and toadstone.

These beds of clay are generally of a light colour with a blueish or green tinge. They always contain small pieces of pyrites, which is known amongst the miners by the name of yellow brazil. They are also said to have a considerable quantity of calcareous earth mixed with them.

In regard to the blackstone or toadstone, it is found to vary much in its nature at different depths in the earth. The upper part of the measure is of a greyish blue colour, which become darker in proportion as you come nearer to the lower surface. It also encreses in hard-ness exactly in the same manner. In the lower part it fires at the point of the pick. This effect is occasioned by irregular streaks of a reddish colour. In this hard part of the stone are likewise found small cavities, which contain a liquid as red as blood. Another substance, which is sometimes met with in this measure is lead ore. Small pieces about the size of peas are interspersed through it on Tidewell moor. In the middle of it was also found at this place a vein of ore ten inches thick. Solid calcareous spar also sometimes runs
Arrangement of the measures.

runs into it as thick as a man's arm. But it is frequently discovered in small fragments or white dots of the size of large shot. Moreover sulphur also has been known now and then to occur in it. A layer about an inch thick has been observed in the virgin mines at Haslebage, so pure, that it flamed, when touch'd with a candle.

Besides these there is another circumstance deserving of notice in respect to the measure of blackstone in which it differs from those, which are immediately above or below it. It seldom happens, that fissures or clefts are found in it, when they are met with in limestone at the upper and lower surface. If a very strong vein of lead ore goes down to the blackstone, it will sometimes render it rather softer for 3, 4, or 5 feet, but is then for the most part cut off by it. However it is often equally good in the measure of limestone below. This has been found to be the case in several mines on Middleton moor, namely in Hill top mine, Slack rake, and Samuel Engeon. But in the language of the miners these veins are squinted 4 or 5 yards northwardly from their former direction, that is, they have departed so much from their perpendicular range. If we attend to the position of the foregoing measures, we shall find them governed by one uniform law.
Position of the measures.

At least in every instance in which I have had an opportunity of making observations, this has appeared to be the case. I have always remarked, that the declination of the measures has been towards those parts of the country, where gritstone has appeared on the surface. Thro' the whole circumference of the tract of limestone land, of which I am now speaking, they dip in this manner. But the degree of their dipping in all these places is various and irregular. In a mine at Corder-low near Hartington the measures dip about a foot in a yard, but twice as fast, at the distance of a quarter of a mile where the limestone ceases. At Eyam, situated on the north-east side of the tract of country, which we are examining, they do not dip in an equal degree. Nor have they so oblique a position at Matlock bridge. They dip there at the rate of about six inches in a yard.

But tho' the position of the measures seems to be greatly affected by the approach of the limestone towards the gritstone, yet in some parts of the country, it appears to depend upon other causes also. In some particular places it seems to be very much influenced by the vallies, which run thro' the country. It is frequently observable, that tho' on one side of these vallies the measures are nearly horizontal, yet on the
the opposite they have an oblique and in some places almost perpendicular position. This appearance has been attributed to a fracture in the earth, and in support of such opinion it has been asserted, that there is a chasm at the bottom of the valley, which has been filled with stones, broken and thrown into confusion by some extraordinary convulsion. However, tho' this may be the case in some instances, yet according to the observation of attentive and experienced miners the measures, which lie under the bed of the rivers are generally entire and undisturbed. I have been informed that the springs, which flow between them on one side of the river, are also met with in the same situation on the opposite; a circumstance, which could never take place, if the measures were broken. For it is evident, that such a fracture would interrupt the current of the water and cut off all communication of this kind between the opposite sides of the dale.

It may be proper here to observe, that it is by means of this dipping of the measures, that their respective nature and thickness have been discovered. It would be an error to suppose that all those, which have been enumerated, were ever penetrated from the same place at the surface; and did they lie horizontally we could
Position of the measures.

could never have obtained that knowledge of the lower ones, which may now with so much ease and certainty be acquired. It has been already remarked, that the measures everywhere dip towards the gritstone, and that the degree of their declination in some places is greatly influenced by the vallies, which appear in different parts of the county. Now it sometimes happens, that by the influence of these causes their position in the earth is rendered almost perpendicular. And it is manifest, wherever this is the case, that the lower beds will be raised up and appear at the surface. In consequence of this effect a knowledge of the internal structure of the ground has been rendered clear and unquestionable. The lower measures of limestone by their inclined position being thrown up nearly to the day, are often penetrated by the shafts, which are sunk thro' them in search of lead ore; and the business of mining is carried on with greater convenience and success.

Having described the arrangement, thickness, quality, and position of the measures, I would in the next place observe, that these measures are often broken, and that in consequence of this clefts and chasms are met with in the earth. It has been said that these are found
found in all the measures excepting the blackstone, and that they are sometimes filled by this substance. One part of this assertion I have never heard contradicted. I believe it is generally agreed, that the measure of blackstone is found entire and unbroken. But from the enquiries and observations, which I have made, it appears extremely doubtful whether it is ever found in the fissures of the limestone.

These clefs or chasms are not only exceedingly various in their form and size, but also more frequent in some parts of the county, than in other. To give a proper idea of their nature it will be necessary to describe some of the most remarkable, which are found in different situations of the high and low Peak.

When I say that the measures are broken, I wish it not to be understood, that the intervals occasioned by such a fracture, are extended in a right line, or that they are, in every part, of the same width. They generally run in angles or curves, and sometimes swell into large caverns. Some of these lie near the surface, and therefore may be easily inspected by the curious observer. Accordingly they have been frequently explored and described by different persons, who have visited this part of Derbyshire. Some of these accounts have been given with a tolerable degree of accuracy, while
while others have been set off with such exaggerated circumstances of terror and astonishment as cannot fail of raising false notions of these subterraneous situations. Yet it must be acknowledged, that to every one, who has never seen any thing of this kind, they must appear very extraordinary and wonderful. I shall therefore give the best description which I have been able to form from my own observation, and those, which have been made by other persons.

The most striking and remarkable cavern in Derbyshire which has yet been discovered in the clefts of the limestone, is met with at Castleton, and is generally known by the name of PEAK's HOLE. It is situated in a deep and narrow recess of the valley in which the town stands. On each side and near the end of this recess two large faces of rock are seen rising to a vast height. On the summit to the left and close to the edge of the precipice an ancient castle appears as it were perched aloft in the air. And at the foot of the rock on the opposite side the mouth of the cavern opens with grandeur and magnificence. It is about 14 yards high and 40 wide. The arch at the entrance is regularly formed and in a direct line extends nearly three hundred feet. This part is tolerable light and inhabited by a number of poor people
people employed in the manufacture of pack thread. They have built small dwellings and follow their work in this spacious and extended vault without experiencing the burning heats of the summer, or the sharp colds of the winter season. Beyond the first turning a gentle declivity is perceived, and the path is rendered wet and dirty by the drops of water, which are frequently falling from the roof. At the distance of about 130 yards from the mouth of the cavern, all further progress into it was formerly obstructed by a projection of the rock, and a deep gulph at the extremity of it. But a passage is now opened through the rock, and a door is hung and locked to prevent any one from going beyond this place without the assistance of a guide.

The cavern, which has been some time gradually contracting, appears about 20 yards from hence to be entirely closed in every part. However, upon a near approach to the rock a low passage under it, almost full of water, is discovered. This opening is just large enough to admit a small boat, but the passenger in it is obliged to lie almost flat down, whilst it is pushed under the rock. Upon landing he finds himself in a cavern, still more spacious than the former. It is said to be 70 yards wide, and 40 high. But not a ray of light can
can enter it, excepting that, which proceeds from a single candle, which he carries with him, and the faint glimmering of this tends only to render him sensible of the extreme darkness and horror of the place. However, by a proper disposition of candles a tolerably complete idea of its shape and size may be formed. When sufficiently illuminated, a path may be observed on the right hand, which leads up a steep ascent to the top of a high rock, called the chancel. Descending from this elevated situation, and proceeding further in the cavern, you perceive that it becomes again much narrower and lower. But from this part to the end nothing occurs which is particularly deserving of remark.

The whole length of this subterraneous passage is said to be 750 yards, and attempts have been made to extend it further, from an expectation of opening a communication with another cavern. But tho' several yards of the rock have been blasted away, all efforts for this purpose have hitherto proved unsuccessful. However, about six years ago, at a small distance from the end of the old passage, a new one was discovered. Its length is about 164 yards. But it is not equal in either height or width to that which has been described.

F

It
It may be proper to observe, that a stream of water runs thro' the whole length of this celebrated cavern, which must be crossed several times, and in one place, on account of its depth, the assistance of the guide becomes necessary. After heavy rain this little rivulet is generally so much swelled as to render it impossible to visit the more distant and interior parts of the cavern.

**POOLE's HOLE** is another cavern found in the measure of limestone, and situated at a small distance from Buxton. The entrance is as mean and contracted, as that of Peak's hole is lofty & magnificent. The passage at first is so very low and narrow, that it is impossible to go forward without stooping very considerably. After having proceeded between 20 and 30 yards in this posture you enter a spacious and lofty cavern, the roof and sides of which are covered with stalactitical encrustations. Large piles and masses of the same substance appear likewise upon every part of the floor. These bodies are daily increasing from the deposition of calcareous earth, with which the drops of water from the roof are charged in very great abundance; and it is no small amusement as you go along to observe the diversity of curious figures, which they have produced. When you reach what is called
called the flitch of bacon, (which is a large water-icle hanging from the roof) the cavern becomes a little contracted. But beyond this part it grows wide and lofty again, and continues so, till you come to the queen of Scot's pillar; a name given to a large massy column of stalactite on account of its having been visited, according to tradition, by that unfortunate woman during her stay at Buxton. As the pillar cannot be passed without some difficulty and danger, few persons venture beyond it. Nor does this seem desirable. For by proceeding thus far, a pretty complete idea of the cavern may be formed. The path hitherto lies along the side and at some height from the bottom of this subterraneous passage. But, to visit and examine the interior extremity, it becomes necessary to descend a few yards by very slippery and ill formed steps. At first the path at the bottom is tolerably even and level, but at the distance of 20 yards from hence the passage rises with a perpendicular ascent to the height of about 80 yards. As it is difficult to climb up, it seldom happens that such an attempt is made by those, who are led by mere curiosity into the place. However it is customary for the guide to fix a candle at the extremity, which to those, who ascend below, has a singular and beautiful effect.

F 2  The
The way, by which you return, lies along the bottom of the cavern, and you are obliged to pass under the queen of Scot's pillar. By thus changing the path, you are furnished with an opportunity of viewing other accumulations of water-icle, some of which are of prodigious size and extraordinary form. You are likewise better enabled by this means to ascertain the height and width of the cavern in every part. When you return to the narrow passage, by which you entered, two cavities are shewn in the rock, one of which is called Poole's chamber and the other his closet.

The whole length of this subterraneous passage is said to be 560 yards; 460 to the queen of Scot's pillar, and 100 beyond it.

ELDEN HOLE, situated in Peak forest, is also a cleft in the measure of limestone. The entrance into it is not, as in the two preceding instances, horizontal, but perpendicular. It is a deep chasm in the ground extending lengthways in the direction of north-west and south-east. Near the surface it is about 10 yards wide, and 30 long. But from hence it gradually contracts, and at the depth of 90 feet the passage is very much diminished and confined.

In this part there is a projection of the rock, and behind it a small cave, which from the quan-
quantity of light in it seems to have a communication with some place near the surface. I have been informed by a miner, who was let down into it, that when he had descended about 56 yards he came to a heap of stones about 14 yards high. When he alighted at the bottom, he found that he could walk off to the south-west and north-east; in the former direction he could go 30, and in the latter 40 yards. In that part of the cavern, which extends to the north-east, he discovered a chink in the floor, out of which a strong current of air proceeded. But it was filled with stones, which had rolled from the heap above-mentioned, and therefore could not be examined. However it appears, that about 30 years ago a Mr. Loyd descended into it; and as his description of the first part of this chasm agrees with the information I received respecting it, it may be presumed that his account of what he observed below this slit in the rock is accurate. He says that he descended thro' this narrow opening into a little cave about four yards long and two yards high, which was lined throughout with a kind of sparkling stalactite of a fine deep yellow with some stalactitical drops hanging from the roof. He found a noble column above ninety feet high of the same kind of en-

* Phil. Trans. vol. 61, page 250.
crustation facing the first entrance. As he proceeded to the north he came to a large stone, which was covered with the same substance and under it he found a hole two yards deep, that was uniformly lined with it. From the edge of this hole sprung up a rocky ascent sloping like a buttress against the side of the cavern, and consisting of vast solid round masses of the same substance and colour. Up this ascent he climbed to the height of about 60 feet and got some fine pieces of stalactite which hung from the craggy sides of the cavern which joined the projection he had ascended. When he got down, which was not effected without considerable difficulty and danger, he proceeded in the same direction and soon came to another pile of encrustations of a different kind and colour, these being much rougher, and not tinged with yellow, but brown. At the top of this he found a small cavern opening into the side of the vault which he entered. Here he saw vast drops of the stalactite hanging like ice icicles from every part of the roof, some of which were four or five feet long and as thick as a man's body. The greater part of the wall of the large cavern or vault was lined with encrustations of three kinds. The first was the deep yellow stalactite, the second was a thin coating resembling a light sttone coloured
Caverns and subterraneous passages. 71

varnish. This covered the limestone, and reflected the light of the candle with great splendor. The third sort was a rough efflorescence, the shoot of which resembled a kind of rose flower.

A Gentleman, who lived upon the spot, told Mr. Loyd after his return from this subterranean expedition, that there was formerly in the floor of the great cavern somewhere near the large heap of stones the mouth of a second shaft, which had been covered by the miners. It was said to have gone down a vast depth further and to have had water at the bottom. He adds there is some reason to believe this water is a continuation of a subterranean river, which runs out of the mouth of the great cavern at Castleton; for a great quantity of gritstone is observed to grow in the earth near Elden hole, but none near Castleton and yet on high floods the river at Castleton washes great quantity of that gritstone in fragments out of the mouth of the cavern at Castleton. That such a conjecture is not without foundation will more clearly appear, if we proceed to examine the nature of the ground which lies between these two places.

I have been informed by miners in Peak forest, who were well acquainted with the subterraneous geography of this part of Derbyshire, that
that all the high ground lying between Perryfoot and Castleton abounds with clefts and caverns. Now that this opinion is just and well founded has been sufficiently proved by the actual discovery of a long series of each betwixt Elden hole and the celebrated cavern near the above town. Perhaps a description of their form and size, and an account of the order in which they succeed one another may be not only amusing, but also throw some light upon the subject of our present enquiry.

The entrance into the caverns and subterraneous passages, which I shall attempt to describe, is about four or five hundred yards west of Peak's hole. It is by means of a shaft fifty yards deep, which was sunk about 30 years ago with a view of pursuing a vein of lead ore. At the bottom a small passage formed by the hand, and fourteen yards long, leads to a cavern, in height about ten yards, and in diameter fourteen. When the miner first broke into it, it appeared beautiful beyond description. Upon introducing his candle thro' the hole, which he had made, he was struck with astonishment. But when he entered the cavern, it in beauty exceeded his highest expectations. The roof and sides were covered with water-icle, almost as white as snow. But now it is in a great measure stripped of this ornament by
by those, who have passed through it. On the south side a narrow passage opens fourteen yards long. It leads to another cavern, which from the entrance extends south-east, and is about ten yards high and forty wide. In the middle a shaft has been sunk which is about eight yards deep. This brings you into a cavern about 12 yards in height. On one side of it is a small natural passage about fifty yards in length, which leads to a chasm in the rock sixteen yards deep and three yards wide. The descent into it is by means of a chain. About four yards from the bottom of the chasm is another opening in the rock about six yards in depth. Eight yards to the south of the place, where you alight, you descend again about twelve yards, and at the same distance directly forwards come into a cavern nearly round. Its height is twelve yards, and diameter eight. From hence you enter a very narrow and low passage in which you are obliged to proceed upon your hands and knees. It was at first formed by blasting a chink in the rock. It runs in a serpentine manner to the distance of two hundred and fifty yards, though in a straight line it would not measure quite half that length. At the extremity of this passage you drop into a cavern, almost circular, sixteen yards in height, and five in width. In this
this cavern two natural passages open in different directions. That, into which you enter, is an hundred and twenty yards long and two feet high; and at the end you discover another about 150 long, six feet high and two wide. This brings you to a deep gulph in the level, which has been driven from a place, called the Winiards.

In exploring the above subterraneous passages and caverns, a vein of lead ore was discovered in the situation, at which we are now arrived. But the pursuit of it being interrupted by the quantity of water in its neighbourhood, to remedy this inconvenience a level was driven from the foot of the hill at the Winiards, which is now carried to the distance of more than half a mile. When you have proceeded about two thirds of the way you come to the gulph already mentioned, which when first observed was thought to be unfathomable. The surface of the water in it was then about two yards below that in the level, but this being turned into it has raised it to the same height with itself. What is the exact depth of this gulph is not known; but, at the time I received my information, it was not filled up, tho' all the rock had been thrown in which had been blasted for the purpose of extending the level beyond this situation.

Near
Near this place the level is crossed by a strong current of water, which, excepting where the descent is considerable, is two feet deep, and three feet wide. It runs from west to east, and nearly in a straight line from Elden hole to the cavern at Castleton. The course of the stream has been followed about a quarter of a mile in each direction. The persons, who undertook to explore it, were stopped in their progress toward Castleton by the great depth of the water. The obstacle, which they met with in proceeding the contrary way, was a natural flood-gate in the rock. Could they have gone further, it is highly probable, that they would soon have reached Elden hole. Those, who are well acquainted with the relative situation of both places, have computed the distance to be only about 400 or 500 yards. It has been supposed with great appearance of reason, that the current of water, which crosses the level, is the same with that, which disappears at Pety-foot, and rises again at a small distance below the mouth of the cavern at Castleton. If it runs in a direct line between these two places, it must in its course pass very near to or immediately under Elden hole. From this circumstance in conjunction with some other, which have been noticed, it seems reasonable to conclude, that by the re-
Caverns and subterraneous passages.

moval of a few obstacles a general communication might be opened between Elden hole, the cavern at Castleton, the level at Winiards, and the long series of caverns which have been described.

Besides the caverns, and subterraneous passages, which have already been pointed out, there is another in Chelmorton dale, the mouth of which is open to the day. The height and width of the arch at the entrance are about eight yards each. Formerly its whole length was only about eighty yards. But a miner observing a vein of lead ore at the end began to work it, and broke into another cavern, considerably higher than the former, but very nearly of the same length. When first opened it appeared very beautiful on account of the large quantity of water-icle which hung from its roof and sides. The miner informed me also, that he found upon the floor a ring, but could not devise, how it came thither, since no entrance could be discovered besides that, which had been made by himself.

This fact, tho' it may appear extraordinary, is not singular. I was assured by another miner since that time, that when sinking a shaft near the west side of Peak forest he came to a cavern, in which he found all the bones of a human body, lying at full length. He like-
likewise said, that upon the closest examination he could not discover any entrance into the cavern. Besides this I have heard of other instances of human bodies being found by miners at various depths in the earth, particularly in the neighbourhood of Moneyash and Sheldon.

Moreover, there are on the north-west side of Peak forest several openings in the ground called swallows by the country people. They seem to have derived this name from the total disappearance of small streams of water, which fall into them. In regard to form and size, they are exceedingly various. I have seen one, which was nearly circular. It appeared to be about 20 yards in depth and 100 in diameter.

The observations, which I have hitherto made respecting the clefts and caverns, which are found in the measure of limestone, have solely a reference to the high Peak. But there are some also, which are occasionally met with in the southern part of that district, which we are now examining. There is one near Brassington in particular which appears at the surface of the ground. But I believe no other opens to the day in the low Peak. They however frequently occur at various depths in the bed of limestone in this part of the county. I have been informed, that in some places they are
are very large. One in the neighbourhood of Matlock Bath in particular, which was discovered by the miners in pursuance of a vein of lead ore was found at the depth of about twenty-four yards. It is very wide and lofty, and nearly half a mile in length.

Dr. Short mentions some subterraneous passages and caverns near Eyam. But I have not had an opportunity of examining them. I shall therefore select a few particulars from his description, and endeavour to convey an idea of them in this manner.

Charleswork, he says, lies at the foot of a very steep rock 93 yards high, and five above the level of the brook. The entrance into it is six yards high and eight wide. After proceeding 52 yards you come to a deep and impassable water. This cave, however, rises from hence directly thro' the hill and opens into Eyam dale. There is another passage, which extends a mile and half towards Foolow and lies under Eyam church.

About 44 yards from the entrance into Charleswork is another cavern distinguished by the name of Bamforth hole. The entrance is five yards high. To the distance of 40 yards it is very narrow, and descending. But, afterwards rising a steep rock you come into a large cavern, adorned with a great variety of stalac-
Caverns and subterraneous passages. 79

Stalactitious petrefactions. Beyond this, about 25 yards, you enter a magnificent room, nine yards wide and two high. Its roof, floor, and sides shine with a variety of spars and water-icles, and are adorned with several ranks of fine pyramids and other curious figures. In the middle of this cavern is a bason three yards long and two wide. A little beyond this is a fine stone pillar supporting the roof. On the right hand of this cavern are openings into two others at the distance of 10 yards. The Doctor informs us, that he went 360 yards into this cavern with great amusement, and observed others extending in different directions without being able to discover their termination.

In regard to the other tracts of limestone land in Derbyshire, wherever I have had opportunity of making observations or enquiries I have not found them materially different in any respect from that, which we have examined.

At Crich, where the limestone appears at the surface about two miles in length, and one in breadth, it has, at the outward edge, a covering of shale, which is followed by one of gritstone. The measures dip from the church in almost every direction, and uniformly towards the gritstone. The degree of declination is very great. In some places they are nearly perpendicular.
The ridge of limestone, which appears at Ashover, is attended with nearly the same circumstances as that at Crich. After sinking a shaft on the west side thro' a bed of shale 240 yards thick the measure of limestone is found to dip to the west, and consequently towards the gritstone. About half a mile from hence at a mine called Cockwell, the limestone with the same measure of shale upon it dips towards the east. In the former of these situations is the famous Gregory mine, and in it the measures are said to dip about six inches in a yard.

In respect to the small tracts of limestone at Turnditch, Mugginton, Osmaston, and Ticknall, I have not had an opportunity of obtaining very satisfactory information. But, as far as my observations have gone, they seem to bear a great resemblance to those, which have already been noticed.

I have already mentioned a considerable tract of limestone on the east side of the county, but the discoveries, which have been made with respect to the internal structure of the ground in this situation, are so few, as to be scarcely deserving of notice. No good veins of lead ore having yet been found here, the earth has never been penetrated to any great depth. Nor is it intersected by deep vallies in
in the same manner with the limestone in the Peak, which has been examined. Consequently there have not been furnished any opportunities or means of acquiring a knowledge of the arrangement, quality, thickness, and position of the measures in this part of Derbyshire.

Having attempted to give an idea of the internal structure of the earth near its surface, in that extensive tract of limestone, which is situated on the north-west side of Derbyshire, I shall now make some observations on the district of clay-stone land yielding coal, which lies near the north-east part of the county.

The measures are here found to be exceedingly various in their quality, thickness, and order. This will be rendered manifest by comparing them with each other as they are met with in different situations. Let us begin with giving a catalogue of them in the most southern part of the country, which we are examining.

Measures penetrated by sinking a shaft at West-Hallam.

<table>
<thead>
<tr>
<th></th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil and clay</td>
<td>-</td>
<td>7 6</td>
</tr>
<tr>
<td>Bind or hard clay</td>
<td>-</td>
<td>48 0</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>Smut</td>
</tr>
</tbody>
</table>
### Arrangement of the measures.

<table>
<thead>
<tr>
<th>Material</th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smut or soft coal</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Clunche harder than bind, and full of ironstone balls with roots running thro' it</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Clay-stone</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Black shale</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Black shale</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Burning shale</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Hard grey clay with a bed of canker, a substance as hard as flint</td>
<td>54</td>
<td>0</td>
</tr>
<tr>
<td>Soft coal</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Black dun, an earthy coal</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Soft coal</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Clunche and bind</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>Coal</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Broad bind</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>Hard coal</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total:** 222 feet 3 inches

**Yards:** 74 feet 0 inches

---

Measures, which occurred in sinking a shaft at Ilkeston:

<table>
<thead>
<tr>
<th>Material</th>
<th>yards</th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil and yellow clay</td>
<td>.2</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

**Black**
<table>
<thead>
<tr>
<th>Arrangement of the measures</th>
<th>yards</th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black shale</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ironstone</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Clunch</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Grey stone</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blue stone</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Black shale</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Brown ironstone</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Black shale</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Light blue bind</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Burning shale</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Light blue clunch</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Light blue stone</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blue bind</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Black clunch</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Black jay, a sort of cannel coal</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Lightish blue clunch</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Broad bind</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Light coloured stone</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Greyish blue clank</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Very light coloured stone</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Strong broad bind</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Grey stone</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Blue bind</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Soft coal</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Black bind</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Soft coal</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

G 2 Black
Arrangement of the measures.

<table>
<thead>
<tr>
<th>Material</th>
<th>yards</th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black clunch</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Light coloured clunch</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Broad Bind</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Black clunch</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clunch and bind</td>
<td>8</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Hard coal</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Clunch</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Measures, which occurred in sinking an engine pit on Alfreton Common:

<table>
<thead>
<tr>
<th>Material</th>
<th>feet</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil and clay</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Skerry, or shattery stone</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Blueish stone</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>Blackish stone</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Blue stone</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Coal</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Stone bind</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Tender bind</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Soft Coal</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
**Arrangement of the measures.**

<table>
<thead>
<tr>
<th>Material</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bind</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Tender stone</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Bind</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Hard coal</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td><strong>Yards</strong></td>
<td><strong>61</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

Measures bored through at a place called the Stone Pits belonging to John Coap at Pinxton:

<table>
<thead>
<tr>
<th>Material</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth and clay</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Stone</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Blue bind, very kind</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Dark coloured bind</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Strong blue bind</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Grey stone</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Light coloured bind with iron-stone shreds</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Dark coloured stone</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Blue bind, very kind</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Strong black stone</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Hunch</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Stone</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Smut</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Dark coloured bind with strong ironstone</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

G 3 Dark
Arrangement of the measures.

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark coloured shale somewhat resembling smut</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hard stone</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

\[104 \text{ feet} 2 \text{ inches}\]

Measures sunk thro' near Pinxton Church:

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil and clay</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Black shale with coal shreds in it</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Blue bind</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Stone</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Short crumbling stone</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Blue bind</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Black stone shale intermixed with coal</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Clunch containing ironstone balls</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Very kind bind containing stripes of coal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Grey shaley stone with shreds of black striped stone</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Black striped stone</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Yellow gritty stone</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Gritstone of a binding nature</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Cank</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Grey stone with many coal stripes good gets</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Strong bind</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Smut
**Arrangement of the measures.**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smut</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Hard coal</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

77 8

Measures, which occur in the coal pits at Stubley in the parish of Dronfield:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Yards</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gritstone</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blue bind</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Black shale</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Dirt</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

50 0 6

Another bed of coal, which is worked, lies under all these measures. But I have not been informed, what is exactly its thickness. It is also deserving of notice, that the first measure is not to be met with in any of the situations which have been pointed out in the foregoing examples.

From this view of the measures in different situations it appears, that tho’ they bear a general resemblance to each other in their quality, their thickness and arrangement are very much diversified and uncertain. Even in places bordering upon each other no correspondence is to be observed in the order, in which
which they are found. Nor would it be easy to dispose of such various substances in a more diversified manner.

The position of these measures is seldom, if ever, found to be horizontal. They dip in almost every direction. I have taken some pains to ascertain in what manner they are affected by the tract of limestone and gritstone, with which this part of the county is bounded, but I cannot discover, that when they approach either, they are governed in the method of dipping by any uniform and certain law. On the western side, where the gritstone appears, they generally decline from it. This is particularly the case at Horsley castle, the Chevin, and Wingerworth. Yet in the intervals between these places there are some situations, in which the measures of claystone seem to dip under the gritstone. For at Alderwashley, Lea, Alton near Ashover, and in the neighbourhood of Stubley and Hathersage coal has been found under the last kind of stone.

If we pass across the district, which we are examining, to the east side of it, we shall find the dip to be more regular and uniform. I believe, that it is generally, if not always, to the east. It has this position when it joins both the gritstone and limestone. At least I am not acquainted with any one example to contradict this observation.
Position of the measures.

Having examined how the measures dip near the boundaries of the claystone land, of which I am speaking, let us next see what is the position in other situations. Now this is determined by what are called faults amongst the miners. But to form a clear idea of this matter it will be necessary to explain the meaning of this term. With this view it should be observed, that the measures are in some places entirely broken, and that the opening occasioned by such a fracture, is filled up with a compound of clay, spar, lead ore, coal, and almost every other mineral substance. And wherever this happens there is said to be a fault. The depth of these faults tho' certainly great, is not exactly known. But there is no doubt, but that their breadth is various. Tho' it seldom exceeds a few yards, it has been in some situations found to amount to fifty. In regard to their length, I believe, it has not been fully and clearly ascertained. They have been in some instances traced to the distance of two or three miles from the place, where they have been discovered. They do not extend in a right line, but in a manner equally winding and irregular with the vallies in which they are found.

The measures on the opposite side of these faults are never met with in the same position. They
They are always observed to be raised much higher, or sunk down considerably lower in the earth. If they hang at the head, or lean forward, they are certainly gone downwards. But if they decline from the faults, the lower measures are raised higher than they appear on the opposite side.

As these faults are discovered everywhere, and extend in almost every direction, it is evident, that the measures must dip variously in different situations. Perhaps their declination may in some places be owing to other causes. But it is certain, that wherever faults occur, the position of the measures is altered.

It has been already hinted, that the faults often are met with in vallies. However we cannot infer from hence, that they are always to be found in such situations. For the measures are generally entire and undisturbed in the wide vallies, whilst in the narrow ones they are in great disorder and confusion.

At Chesterfield and Heanor the measures have a peculiar position. They dip for a considerable space towards one common center, and by this means form a sort of basin or deep circular figure.

It has been observed by miners, that the measures are thinner at the baslit edge, than in any other part. But at a certain depth they acquire
Position of the measures. acquire a regular thickness, which they preserve, till you come near the faults, where they gradually become thinner again. From these circumstances it seems probable, that the measures have some time had an horizontal position, and by some means been broken so as to lie in an oblique direction.

In the southern part of the county we have already observed, there are two small tracts of clay stone land, which yield coal, one of them situated at Newhall, and the other at Measham.

At Newhall the following measures are found in a shaft known by the name of the old coal pits.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Yards</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue earth</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Black earth</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Tool coal</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Blue bind</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Main hard coal</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Blue bind</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Deep coal rather soft</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

The measures dip here from the north, east, and west, towards one common point. But the main declination is to the south. The coal baffits to the west at Newhall park, to the north about 500 yards from Brillinestonehall, and to the east near Swadlincote, at a finali
small distance from the turnpike road lying betwixt Burton and Ashby.

The extent of the ground is about half a mile from the most northern bafdit of the coal to the most southern dip; and the western and eastern bafdit are about a mile from each other.

At Measham the measures dip from the south, east, and west toward one common point. The bafdit edge of the coal appears to the west just beyond the village of Oakerthorpe, to the east near to Willsley, and to the south about half a mile short of Swibstone.

The measures at Chinley hills near Chapel-le-frith, where coal is also found, dip on opposite sides of the hill in different directions. In that part, which contains coal, they decline to the west, and on the contrary side they also follow the descent of the hill.

In regard to the nature and state of the measures in that part of the county bearing coal, which lies south-west of Buxton, I have had no opportunities of gaining certain information. But I apprehend that they dip to the west, and believe the coal is found at no great depth in the earth.

In that part of Derbyshire, which has been distinguished by the name of gritstone land, the nature of the measures is but little known. Throughout the parishes of Chapel-le-frith,
Position of the measures.

Glossop and Hathersage, and the whole extent of the east moor the gritstone appears in two different states. It is seen everywhere scattered in loose and detached pieces upon the surface of the ground. In some places it is also found in one vast solid mass, and seems to form entire ridges and large eminences.

At Coxbench, Breadfall, Stanton, Mackworth, Allestrey, Duffield, Stanton, and Melbourne, where the gritstone does not appear much at the surface, it extends very deep in the earth. In some of these places it is known to lie in an entire bed fifteen or twenty yards thick.

It has been already observed, that there is a large tract of land in Derbyshire, where neither lime, coal, or gritstone is found. In this part of the county the ground consists of measures of red clay of different shades, and degrees of hardness. Others of a greenish colour may likewise be sometimes observed interposed betwixt them. These beds differ in quality as well as colour and hardness. Some of them are calcareous, and are therefore called marl.

In some situations thick beds of gravel also are met with. But the substance most deserving of notice in the tract of country, which we are now examining, is Gypsum, or Plasterstone.
Position of the measures.

It is found in a nearly straight line across the midland part of the kingdom, and appears in several places in Derbyshire. It has been got in the largest quantity at Chellaston, Aston, and Elvaston, three parishes bordering upon each other, and about five miles south-east of Derby.

The depth at which this substance lies in the ground, is generally about eight yards from the surface. It is not found in regular layers, but in large lumps or blocks indented together, which may be easily separated from each other.

The thickness of the beds of plaster-stone is from two to four yards; and at the distance of a foot above it is regularly spread a thin layer of roche plaster.
HAVING endeavoured to give some idea of the general surface of Derbyshire, and of the various measures of which the ground is found to consist in different situations, I shall now examine and describe the chief mineral substances, which accompany these measures throughout the county.

Now productions of this kind are not only met with in great variety, and abundance, but are in their nature highly valuable. They constitute a considerable part of the natural riches of Derbyshire. I mean therefore to pay a very minute attention to the state in which they are usually found, and the various methods, which are pursued to prepare them for the different purposes to which they are commonly applied. I shall begin with making some observations, upon the antient and present state of the lead mines in the county.
How long the ore of lead has been discovered and attended to in this county it is not possible with precision to determine. But it is certain, that the working of its mines is a business of very remote antiquity. There is not the least room to doubt, but that they engaged the attention of the Romans at the time, when they were in possession of this country. Cambden thinks, that Derbyshire was alluded to by Pliny, when he says, "In Britain lead is found near the surface of the earth in such abundance, that a law is made to limit the quantity, which shall be gotten." It must be acknowledged, that this is only conjecture. But the proof of the point under consideration does not depend upon such uncertain evidence. In the year 1777 a pig of lead with the following inscription upon it was found on Cromford moor, and is now in the possession of Peter Nightingale, of Lea, Esq. IMP.CAES.HADRIANI.AUG.MEI.LVI.

It has been thus interpreted by the Rev. Mr. Pegge.* The sixth legion inscribes this in memory of the Emperor Hadrian. He supposes the pig to have been cast about the year of our Lord 130.

Since the discovery of this block of lead two others have been found in this part of the county.

county. The first in the year 1783 was met with in Matlock bank. But it is very difficult to ascertain the meaning of the inscription. The words upon it are not only very much abbreviated, but likewise consist of compounded letters, so that great room is given to the indulgence of conjecture. The Rev. Mr. Pegge, who is distinguished by his extensive and accurate knowledge of antiquities, thinks, that the inscription will admit of this construction, Lucius Aruconius Verecundus Mercator Lundinensis. The property of Lucius Aruconius Verecundus lead merchant of London. The letters are in very sharp relief, and as perfect, as if they were newly formed. The length of the block on the upper surface is 19 inches, the breadth 3½. The length on the lower is 22 inches and the breadth 4½, and the weight is 84 lb.

Another block of lead has been found at Matlock at a still later time. It has inscribed upon it the following letters: TI. CL. TR. LVT. BR. EXARG. which according to the learned and ingenious conjecture of the Rev. Mr. Gifford, stand for these words. Tiberii, Claudiani, Triumviri Lutudari Britannorum Ex Argentaria. The weight of this pig is 12 stones, and 5 pounds.
Lead mines.

If we admit of the constructions, which have been put upon these two blocks of lead, we must allow, that they were very probably cast at the time, when the Romans were in possession of this part of Britain. But without having recourse to them, the great antiquity of the lead mines in Derbyshire has been sufficiently proved by the pig, which was found on Cromford moor. This affords undoubted evidence, that they were worked by the Romans. And if this point wanted confirmation, the inscriptions upon the other blocks of lead might not improperly be employed for such a purpose.

That the lead mines of Derbyshire have been worked ever since the æra, of which I am speaking, is a matter, which may be proved with nearly the same clearness, and satisfaction. The Saxons and Danes, who immediately succeeded the Romans in the conquest and dominion of Britain, appear not to have been ignorant of the value of the metal, which we are considering. At Castleton there is a mine, which has received its name from one of their deities. It is called Odin, and, we may presume, was opened, before the christian religion was introduced, at least before it was generally professed in this kingdom.
From a grant, which an abbes of Repton made of Wirksworth, when it belonged to the religious house at that place, it is evident, that there were in the year 835 lead mines in the Wapentake. For Kenewara, who was then governess, granted to Humbert the alderman her estate at Wirclesworth on condition, that he annually gave as rent to archbishop Ceolnoth lead to the value of 300 shillings for the use of Christ church in Canterbury. Mr. Pegge thinks, that there were lead mines at Wirksworth even before 714. In support of this opinion it may be observed, that Eadburga, Abbess of Repton, sent St. Guthlac, patron saint of Croyland abbey, who died in that year, a leaden coffin, and a winding sheet or shroud, in which he was buried.†

It appears from a survey of the castle of the Peak, which was made in the time of Queen Elizabeth, and is kept in the Duchy court of Lancaster, that it was then covered with lead. And it seems not unreasonable to suppose, that the metal used in this instance was procured from the neighbouring country. Now if this was really the case, the mines must have been attended to soon after the period, of which I am speaking. For I shall have occasion to shew, in a subsequent part of this work, that

the castle was built some time before or at least as early as the reign of William the conqueror.

At the time of the Norman survey the business of the lead mines undoubtedly was carried on to a considerable extent. In domestical book mention is made of three at Wirksworth, and one at each of the following places, Crich, Ashford, Bakewell and Metesford, a manor which is described as situated in the neighbourhood of Matlock. And it is particularly observed, that the three manors of Bakewell, Ashford and Hope paid in the time of Edward the confessor 36l. and five cart loads of 50 sheets, but that in the time of the conqueror it paid only 12l. 6s.

If we come down to a still later period, we shall find, that the inhabitants of Derbyshire have never lost sight of the object, to which we are now attending. In the 16th year of Edward 1st two persons were appointed by the crown before the sheriff of the county to make enquiry at Ashbourn into the rights and customs of the miners.†

In the twenty-second year of the same reign a silver mine was discovered at Comb Martin in Devonshire, and 337 Derbyshire miners were taken from the Peak to work there.*

† Fodinece regales by Sir John Pettus, p. —

* This observation, I believe, is taken from Dugdale's Baron. p. 393. But not having that work now in my hands, I will not answer for the accuracy of this reference.
The brazen dish, by which the measures of the ore in the low peak are regulated, appears from the following inscription upon it to have been cast in the reign of Henry 8.

"This dish was made the 11th day of October the 3rd year of the Reigne of Kyng Henry the viij before George Erle of Shrowesbrye Steward of the Kyng most Honourable household and also Steward of all the honour of Tutberye by the assent and consent as wele of all the Mynours as of all the Brenners within and adjoyning the Lordshyp of Wyrkysworth Percell of the said honour This Dish to Remayne In the Moote hall at Wyrkysworth hanging by a Cheyne so as the Mchanntes or Mynours may have resorte to the same att all tymes to make the trw Mesure at the same."

The books of the barmasters which were formerly kept at the castle in the Peak, and are now deposited at Chatsworth, bear testimony to what has been done in modern times.

To what extent precisely the business of the lead mines has been carried on in this county at the different periods, which have now been mentioned, cannot with certainty be determined. But it is an undoubted fact, that the produce of them during the last century has been very considerable. At present lead ore is found in various parts of the county. It is
Lead mines.

met with throughout the Wapentake of Wirksworth, and in the high Peak as far northward as Castleton. Indeed it has been discovered in different quantity in all that extensive tract of limestone land, which has been described as situated on the north west side of Derbyshire. Lead ore has been found also in the large bed of limestone on the eastern borders of the county, particularly in the neighbourhood of Bolsover, Barlborough, and Whitwell. It has likewise been gotten at Ashover, Crich, Turnditch, Mugginton, and Calke. In short, I have not heard of any bed of limestone in Derbyshire, in which it has not been in some measure discovered. However, tho' lead ore appears thro' so large an extent of country, it is met with in the greatest abundance about ten miles to the north and south of the river Wye. The observations, which I shall now make, therefore will chiefly relate to this part of the county.

Veins of lead ore on account of their various positions in the earth are distinguished from each other by three different names. They are divided into pipe, rake, and flat works.

The vein called a pipe work lies between two rocks, or measures of limestone, which regularly extend above and below. It consists of several lines or branches, which run nearly paral-
Llead mines.

parallel to each other, and tho' some of them may in particular situations depart from such a direction, yet they seldom fail afterwards to return to it. These branches have a general communication or connection with each other by means of fine slender threads or leadings, as they are called by the miners. The rock, which runs along each side of the vein and serves to bound it in those parts, is sometimes pierced through by such transverse threads. When this is the case it is generally thought right to follow them, as it frequently happens, that beyond this apparent boundary a fresh range is discovered. Should no ore be found after passing the rock, the entire breadth of the work will be ascertained. But its length is more variable and indeterminate. It depends very much upon the dipping of the measures, betwixt which it is extended. If this be great, it begins to decline, or cannot be pursued any further on account of the quantity of water, which is found at so great a depth in the earth.

The vein, called a rake, is different in almost every respect from the pipe. It is found in the chasms and clefts of the limestone. Consequently instead of extending uniformly between the same measures, it breaks through them, and sinks into the earth. It sometimes penetrates an hundred and fifty or two hundred yards.
yards. It generally runs in a slanting direction, and has been followed to the distance of four miles from the place where it was first discovered. I believe that this is the case with the side rake at Matlock.

The Flat work bears a great resemblance to the Pipe. There are however a few particular circumstances, in which they disagree. The Pipe has a perpendicular leader or stem, which is accompanied with many branches but the flat has none. The latter spreads wider, but never continues long; it seldom extends more than an hundred yards. It is also found near the surface and in the solid rock, and is very weak and poor. It is seldom thicker than a man’s finger.

Excepting the flat works these veins are scarcely ever discovered in the solid bed of limestone. They are generally enclosed in a yellow, red or black soil and are strongly combined with caulk, and spar, or some other mineral substance.

The direction, in which veins of lead ore are discovered, cannot with strict propriety be considered as regular and uniform. As the pipes never penetrate through the measures, between which they extend, they are found to dip with the country where they appear. The range of the rake is still more various and uncertain. In the high Peak they generally run east.
east and west, and in the Wapentake of Wirksworth north and south. I have, however, seen sometimes two veins cut each other nearly at right angles.

Another fact of a similar nature with that, which I have now mentioned, is, that the rake and pipe veins sometimes unite, and run together a short way in the same direction. In this case they grow stronger and richer, tho' they sometimes become totally extinct.

It is not easy, if possible, to determine which kind of vein is the most prevalent in Derbyshire. Those miners, whom I have consulted, are divided in their opinion respecting this point.

There is no less difficulty in deciding, which sort of vein is the most productive of ore; both pipe and rake works in different places have yielded it in great abundance. But I believe that the former are more generally good.

Various are the ways, in which veins of lead ore are discovered. Sometimes they are found by attention to the nature of the ground, and sometimes by mere accident. As all veins are accompanied with certain substances, the experienced miner is greatly assisted in his researches by a knowledge of this fact. Whenever he observes such indications of ore, he either throws up a trench or digs a round hole
in the earth. And, as veins generally send forth small branches out of the rock into the soil towards the surface of the ground, he frequently by this means meets with the object of his search.

But important discoveries are often made without trouble or design. The furrow of a plough, the treading of a horse, the working of a mole, and various other incidents will sometimes expose to sight the branch of a vein, and lead to the disclosure of such treasure, as the greatest skill and industry could never have made.

It has been already observed, that all veins have some branch, which rises nearly to the surface; and it is found, that the richness or poverty of veins greatly depends upon the strength and number of the branches, by which they are attended. Whenever these weaken and diminish, the vein generally begins to decline. I have heard of only one exception to this rule. It happened in a valuable mine at Wirksworth. In this instance several branches pointed towards each other, and it was expected, that a large vein would have been formed by their union. But it was soon found that such hopes were deceitful and groundless.

Another
Another circumstance, which likewise indicates the declension of a vein, is, when it runs in such a direction, as to receive upon it a greater number of measures at the surface. This is the case at Ratchwood, Orchard, and Raventor mines in the liberty of Wirksworth, at a mine near Crich, and at Dimple mine in the parish of Matlock. In all these places the veins become poorer, as they receive greater covering.

I have been informed, that many mistakes and inconveniences have arisen from an inattention to this circumstance. However it should be remarked on the other hand, that this observation does not hold good in all situations. In support of this assertion it is found that the vein in the famous Gregory mine at Ashover has grown richer and more valuable in proportion to its depth in the earth.

The method of working lead mines is in general so well known, that it is scarcely necessary to make any observations upon this business as practised in Derbyshire. There are however two impediments which occur in the prosecution of it, of which it may be proper to take some notice. These are water and bad air.
Lead mines.

To relieve the mines from water many expedients are daily employed. The most common and effectual one, is driving a sough or level from the bottom of some neighbouring valley as far as the works. But it sometimes happens, that the vein lies so deep in the earth, that the water cannot be drawn off in this way. It then becomes necessary to have recourse to pumps, which are worked sometimes by a wheel turned by a neighbouring stream of water, and sometimes by a fire engine placed at the mouth or in the inside of the shaft.

The usual way of relieving mines from bad air is by the introduction of a pipe or tube down the shaft to the place where the work is carried on. As the pipe turns near the bottom of the shaft, and is extended along the roof of the gallery, a circulation of the air immediately takes place, and the inconvenience arising from the want of this effect is entirely removed.

To give a regular account of the several branches of the business of the lead mines, it will be requisite in the next place to take notice of some of the customs and regulations, by which it is in its different stages governed and conducted. But before I do this, I shall offer
a few thoughts concerning their origin and establishment.

We have already seen, that the lead mines of Derbyshire were worked at a very early period, certainly when the Romans were in possession of this country, and perhaps in still more ancient times. But whenever this business was first begun, it is reasonable to suppose, that laws would be formed for the management and direction of it. The original inhabitants of this county, who happened to be engaged in the prosecution of mineral concerns, would soon perceive the expediency and necessity of being governed by some kind of regulations. But admitted this to have been the case, there is great reason to believe that their laws and customs were superseded by others introduced and established by the Romans. Suetonius says, plurimis etiam civitatibus, et privatis vetteris immunitates, et jus metallorum ac vestigaliam adempta.

However it appears from Heineccius, that private adventurers were afterwards permitted to work the mines. Restituerant deinde uidelem hoc beneficiuin sequentes principes, sed ea lege, ut certum inde canonem metallicum solverent. We are also informed what this carion metallicus was. Cuncti, qui per privatorum
Lead mines,

vatorum loca saxorum venam laboriosis effos-
sionibus persequuntur, decimas fisco, decimas etiam domino repraesentent. The adventurers were to pay a tenth to the crown and a tenth to the owners of the land. In the law imme-
diately following that which I have above quoted mention is made of the procuratores metallorum, officers, that exactly answer to the berg-masters or as the word is now pro-
nounced Bar-masters of the present time. For berg signifies a mine, as appears from the word Rabbit burrough still in use.§

Since the time of the Romans the mineral laws of Derbyshire have undergone several changes and regulations. It has been already observed, that Edward the first directed the sheriff of the county to call a meeting at Ashbourn of such persons as were best acquainted with the rights and customs of the mines. And it appears, that on this occasion the miners petitioned, that these rights and customs should be confirmed to them under the great seal by way of charity in consideration of the danger to which they were exposed. In the reigns of king Edward the sixth and queen Mary also the mineral laws received some additions and improvements. Nay even within the space of a few

§ For this derivation of the mineral customs and laws of Derbyshire from those established by the Romans I am indebted to the Rev. Mr. Gifford of Duffield.
a few years past new regulations have been proposed, approved, and passed into laws at the
great Barmote courts of the high Peak and Wapentake of Wirksworth.

It is not my design to enter into a minute detail of these customs and regulations. I mean
to take notice of such only, as may tend to convey a general idea of the manner, in which the
mining business is conducted. But to give a clear illustration of this matter it will be neces-
sary first to remark that the principal part of the county, where lead ore is found in con-
derable quantity is known by the name of the king's field. Nearly the whole Wapentake of
Wirksworth comes under this denomination. This does not appear always to have been the
case, for in the time of the Saxons it belonged to the Abbey at Repton. But Mr. Pegge
imagines that in the year 874, when this religious house was destroyed by the Danes, it
was escheated to the crown, since it appears to have been in its possession, when Domesday
book was compiled. As to that part of the king's field, which is situated in the high Peak, I apprehend, that at least ever since the Norman conquest it has been the property of the
crown, and in the same custady with the castle.

Now all that part of the county which comes under the denomination of the king's field
field has been from time immemorial let upon a lease. The present farmer of the mineral duties in the high peak is the duke of Devonshire, and in the Wapentake of Wirksworth the widow of the late —— Rolles, Esquire. They have each a steward and barmasters in the different districts, which they hold under the crown. The steward presides as judge in their Barmote courts and with twenty-four jurymen chosen every half year determines all disputes, which arise respecting the working of the mines. For this purpose they meet twice in the year, and if requisite may upon proper notice be summoned still oftener. In the high Peak the courts are held at Moneyash, and in the wapentake at the town of Wirksworth.

The office of the bar-master consists of various branches. But the most material are putting miners into possession of veins, which they have discovered, and collecting that proportion of ore, to which the Leeslee of the crown, or lord of the manor has a claim.

When a miner has found a new vein of ore in the king's field, provided it be not in an orchard, garden, or high road, he may acquire an exclusive title to it by a proper application to the bar-master of the liberty. His first business is to acquaint him with his discovery and intentions, and to desire that he will
will give him possession. The method of doing this, is in the presence of two jurymen, marking out in a pipe or rake work two meares of ground each containing twenty-nine yards, and in a flat work fourteen yards square. In recompence for his trouble the barmaster is entitled to the first dish of ore, which is gotten.

However if a miner neglects to avail himself of his discovery beyond a certain limited time, he is liable to be deprived of the vein, of which he has received possession. The barmaster may then dispose of it to any person, who may wish to try his fortune in it.

The other part of the barmaster's duty, which consists in superintending the measurement of the ore, and taking that proportion, to which the lessee of the crown, or lord of the manor is entitled, is attended with some trouble and difficulty. For these claims are exceedingly various in different parts of the high and low Peak.

But to give a clear idea of them, the several kinds and sizes of ore should be first specified and distinguished from each other. The largest sort is called Bing, and is always very good. The next in size and of almost equally good quality is known by the name of Pefey. A third kind, which passes thro' the sieve when
when it is washed, is termed Smitham. Besides these, there is a still finer sort, which is caught by a very slow stream of water, and the particles of which are as small as flour. It is stilled Belland and is inferior in value to every other species of ore, on account of the foreign matters, which are mixed with it.

All these sorts of ore are now subject to a toll or duty, tho' the two last were once considered as exempt. In the year 1761 the duke of Devonshire asserted and established the claim of the crown in the high Peak; and the success of his Grace induced Mr. Rolles, a very short time after, to contest the point with the miners in the Wapentake. Accordingly for this purpose he threw the cause into chancery, and obtained a verdict in his favour. So that now all sorts of ore are subject to a toll throughout the Peak of Derbyshire.

However the proportion of ore, which is due, and that which is really taken, are in very few places the same. The farmers of the mineral duties seldom insist upon the full extent of their claims. The dish or hoppet, as it is sometimes called, by which the ore is measured, contains, in the low Peak fourteen, and in the high, sixteen pints. And to state with precision the several deductions, which are made from the earnings of the common miner,
miner, it will be requisite to mention what number of these measures may be demanded, and what number is actually taken in each of these districts.

That part of the king's field, which is situated in the Wapentake of Wirksworth is divided into eight liberties. Now these, tho' under the same jurisdiction, leased by the same person, and subject to the same duties, pay in very different proportions. In Bonsal and Brasington every thirteenth dish is due, but a twenty-fifth only is taken. Neither of them is subject to a tithe. Cromford pays every thirteenth dish. The tithe, Smitham & Belland excepted, is every fortieth. In Elton the twenty-fifth is taken and every tenth dish is due as tithe to the duke of Rutland. At the capital mines he takes every nineteenth, but at the smaller ones at discretion. One half of the liberty of Matlock pays a thirteenth, and the other a twenty-fifth, but neither of them any tithe. In Wirksworth, which produces a larger quantity of ore, than any other liberty, a twenty-fifth is taken in some places, and a thirteenth in others. A fortieth is due to the Vicar as tithe. The reason, why a larger proportion of ore is taken in some places, than in others, is, that the former resisted the...
claims of the lessee of the crown, when he asserted his right to every thirteenth dish of all kinds of ore.

These observations have solely a reference to the king's field. But in the low Peak there are mines also in grounds, which are private property. In this case agreements are made between the owner of the land, and the labouring miners; and it concerns each party to engage on terms the most advantageous to themselves.

The customs and regulations concerning the mines in the high Peak are not materially different from those, which prevail in the Wapentake of Wirksworth. A meare in the king's field is here somewhat larger. It measures thirty-two yards. Two meares are given to every miner, who discovers a new vein. The next is claimed for the king, and afterwards the miner has a power of disposing of the vein, in what manner he pleases.

In the king's field every thirteenth dish of ore is due to the crown, but a twenty-fifth is commonly taken. The tithe is every tenth, of which a third is paid to Philip Gell of Hop- ton, Esq. The duke of Devonshire as lessee to the crown generally takes every fifteenth dish for his share of lot and tithe. Mr. Gell is enti-
Lead mines.

titled to the above proportion of tithe in the liberties of Bakewell, Hope, Tideswell, and Ashford.

Castleton is a royal manor. It pays every twenty-fifth to the crown, and every tenth dish as tithe to the Vicar. Besides this manor, and the different liberties contained in the king’s field, there are several private lordships in the high Peak.

In Ashford which belongs to the duke of Devonshire, the tolls are the same, as in the king’s field. Eyam and Stoney Middleton are also private property, and belong to the families of Devonshire, Bruce, and Thanet. The lot is every thirteenth dish, which is taken. The tithe, which is due to the Rector of Eyam, is a penny for every dish. Tideswell is a private lordship and belongs to Mr. Archer. The lot or toll is every thirteenth; the twentieth is taken. Litton belongs to Lord Scarsdale; every twentieth dish is taken, but it is not subject to a tithe. Peak forest is the sole property of the duke of Devonshire, and is under the same regulations with Litton. There are a few other liberties, in which lead ore is gotten, but the laws and customs, by which they are governed, bear so great a resemblance to those, which have been mentioned, that it is needless particularly to recite them.

Besides
Besides the claims, which have been mentioned, there is another called cope. In the Wapentake it is four-pence, and in the high Peak five-pence per load, and is paid by the buyer of the ore to the farmer of the mineral duties, or the lord of the manor.

The demands of the crown and clergy being satisfied, the next business of the miner is to dispose of his ore to some of the merchants and smelters, who reside in the neighbourhood. In the sale of this article the price is in a great measure determined by its particular species and quality. Tho' the several kinds of ore are always sold together, yet it is evident, that that, which contains the greatest quantity of Smitham and Belland, is, on account of their mixture with other substances, the least valuable.

Before the lead ore is disposed of, it is beaten or knocked into small pieces, washed, and sifted. This part of the business is performed by women, who are hired by the miners, and earn about six-pence a day.

When the ore is properly cleansed and dressed, it is carried to some furnace in the neighbourhood to be smelted. Now these furnaces are of two kinds, the hearth and the cupola. But it appears, that there was another method of obtaining lead from its ore, before either of them came into use. About two hundred years ago, the
the business of smelting was carried on by means of wood fires upon some of the highest hills in the neighbourhood of Wirksworth and Crich. The western side was always chosen for that purpose, since the winds were found to be the most constant and lasting from that quarter. Such an irregular and uncertain method of smelting was followed and somewhat improved by the invention of the hearth furnace. This is however of but rude and simple construction. It consists of large rough stones placed in such a manner as to form an oblong cavity about two feet wide, fourteen long, and two deep into which fuel and ore are thrown in alternate layers. The heat required is produced by a pair of large bellows worked by a water wheel, and applied about five or six inches from the bottom of the cavity. The fuel consists of wood and coal, and when the heat becomes strong enough to smelt the ore, the lead trickeres down and at an opening in the front of the furnace runs out thro' a small channel made for the purpose. It then falls into a trough placed before the hearth, from whence it is laded into moulds, and cast into blocks called half pigs. The lead procured in this way is very soft, pure and ductile; but a considerable quantity is always found to remain in the flags. On this account it becomes ne-

I 4

ecessary,
cessary, that they should pass a second time thro' the fire. They are accordingly put into another furnace, called a flag furnace. The heat required for smelting them is produced by a fire made with coaks, and is more intense than in the former instance. But the metal extracted by this means is inferior in quality and value to that, which was obtained by the first process, and is distinguished by the name of flag lead.

At present a very small proportion of lead ore is smelted in this way. I believe there are only two hearth furnaces in Derbyshire, one situated at Rowsley near Bakewell, and the other on the west side of the east moor at a small distance from Hathersage. Nor shall we think, that they have without sufficient reason given place to the cupola furnace, if we attend to the advantages, which arise from the construction and use of the latter.

The cupola furnace is said to have been invented by a physician named Wright. It was introduced into Derbyshire about fifty years ago, but has received some improvement since that time. It is of an oblong form, somewhat resembling a long, but not very deep chest, the top and bottom of which are a little concave. It will hold a ton of ore, but its usual charge is only eighteen hundred weight. At one end the
the fire is placed upon iron bars under an arched roof, and at the height of three or four feet from the floor of the building. At the other extremity a perpendicular chimney is built. When the fire is kindled and every part, excepting the two ends, is closed, the flame is necessarily drawn through the whole length of the furnace, and by its reverberation from the roof the ore is smelted without ever coming into immediate contact with the fuel.

The time, which is required for this process, is various and indeterminate. Some ores may be worked in six, whilst others take nine hours. This difference of time is owing partly to their respective nature, and partly to the minerals, which are attached to them. The ore, which is united with spar, is the most easy of fusion. For this reason, when the business goes on but slowly, it is customary to collect and throw a small quantity of this substance into the furnace. But this is not always necessary. In general the different minerals, which are combined with the ore, assisted by a little coal slack, are sufficient to smelt it.

When the ore is put into the furnace great care is taken to begin with a slow heat. Without such a precaution a considerable quantity of lead would be lost. Every kind of ore contains a proportion of sulphur, and were this expel-
expelled and dissipated by a strong heat, the lead would be drawn up the chimney along with it. Whereas a small fire gradually sets it at liberty and the current of air occasioned by it is not strong enough to bear away the lead, which is heavier than the sulphur. When the ore at the surface is sufficiently smelted, that, which lies beneath, is turned up, and a fresh fire is made. In this state it remains some hours. The fire is then raised a third time, and the ore continues undisturbed, till it is entirely smelted.

When the ore is thus brought into a fluid state, preparation is made for drawing it off. For this purpose there are two orifices formed at different heights on the same side of the furnace. Through the higher the flag, which swims like water upon the surface, is let off. To separate what remains entirely from the lead it is usual to throw into the furnace a small quantity of quick lime, by which it is absorbed and dried up. The lead being purified by this means is drawn off thro' the lower orifice into an iron vessel which is placed beneath to receive it.

However some flag is generally left at the bottom of the furnace. This is worked over again with a strong heat, and, when it is sufficiently smelted, quick lime is thrown in, as before,
before, to separate the metal from it, and the lead is drawn off as in the preceding part of the process. Yet, after all, a small quantity of scoriae will remain at the bottom of the furnace, which is taken from thence with iron tongs.

From the vessel, into which the lead is drawn, it is taken with ladles and poured into moulds of various sizes. For it is necessary, that the pieces or blocks cast in them should be of different weights according to the market for which they are intended. Two of them make a pig, which sold at the works is 220\( \frac{1}{2} \) of 112, at Hull 190\( \frac{3}{4} \) of 120, at Bawtry 210\( \frac{1}{2} \) of 112, and at London 190\( \frac{1}{4} \) of 112. Eight of these make a fodder or ton.

Lead is not always disposed of in this state and form. Sometimes it is first rolled into sheets at works erected for that purpose in the neighbourhood of the furnaces.

A considerable quantity of this metal is also converted into red lead by the merchants and smelters, who reside in different parts of the county. This process is performed by calcination in a kind of oven, the floor of which is divided into three parts. The ore is placed within the middle division, and the fire on each side in the other two spaces. The flame is reverberated from the roof and falling upon the ore reduces it into a powder. The
The success of this business greatly depends upon a nice adjustment of the heat. If it be very intense, the calx of the lead becomes a dirty white or grey colour. On the contrary, should the fire be small and slow, it is of a yellow or orange colour. It is therefore a matter of great consequence, that a proper medium should be observed between these two extremes. At the commencement of the process a thin pellicle or skin spreads upon the surface of the lead, which is taken off as fast as it is formed. Nor does this appearance cease, till the greatest part of the lead is reduced to a powder. However it seldom happens, that the metallic principle is entirely destroyed by this operation. It therefore becomes necessary to separate the uncalcined part from it. For this purpose it is ground very fine in a mill, and washed. The calx or powder being then again exposed to the heat of the furnace, and continually stirred, become uniformly of the same red colour and is rendered fit for use.

In making red lead a certain proportion of the flag lead is always employed. In calcining a ton about eighteen hundred weight is generally used. This quantity, when mixed with the ore lead, is thought to quicken its reduction into a powder.
It is a well known, but at the first sight extraordinary fact, that tho' during calcination much of the substance of the lead is dispersed into the air, yet it receives a considerable increase in its weight from this process. Dr. Watson* says, that three tons when entirely reduced, do not weigh more than fifty-two hundred. But he observes, that notwithstanding so great a loss a ton or twenty hundred weight generally give twenty-two hundred of red lead. This fact has been clearly accounted for by discovering that it imbibes a large quantity of air during the process, which is the occasion of the increase in its weight.

Some years ago attempts were made to extract silver from the lead. But there is not now any work of this kind in Derbyshire.

Another mineral substance contained in lead ore is sulphur. When the ore is melting, as it has already been observed, it rises upon the surface, and is carried up the chimney. By means of a pipe or long vault connected with the chimney a considerable quantity has been collected at a furnace in Middleton dale. Dr. Watson says, that Derbyshire lead ore contains between an eighth and a ninth part of its weight of sulphur. And yet no attempts have been made to save it excepting at the above-mentioned place and at Hathersage.
It is not easy, if possible, to ascertain the exact annual produce of the lead mines in Derbyshire. At almost every period of time since we have any account of their having been worked, it appears to have been exceedingly fluctuating and variable. In the year 1782 the mines in the Wapentake of Wirksworth yielded 1306 sodders, or tons of lead, and those in the liberty of Crich about 200. At Alhöver during the last six years preceding the above time the mines had produced annually upon an average 2011 tons. What quantity of lead ore arises from those in the high Peak every year, I have not been able to learn. But if it be estimated at 2000 tons, I apprehend the calculation will not be very distant from the truth. So that the present annual produce of the lead mines in Derbyshire may be computed on an average at between five and six thousand tons.

That branch of the mineral business in this county, of which I am now speaking, has been generally thought for some years past to be in a declining state. Whether the strongest veins of lead ore in the hills be exhausted, or not yet discovered, perhaps cannot with certainty be determined. But it is almost universally admitted that the produce of the mines is not so large now, as it was twenty years
years ago. However to remedy and supply this deficiency every possible expedient, which can be thought of, is daily tried. At some furnaces the flags are working over a second time, which were formerly thrown aside as useless, and undeserving of further notice. In various parts of the high and low peak, many persons are constantly employed in washing heaps of rubbish, which have been formed time immemorial by the working of the mines. It must be acknowledged that this practice, which is called buddling for ore, was introduced above fifty years ago into the county by some Welch and Cornish miners. But it has been lately followed with more than usual assiduity, and while lead is so scarce and valuable an article, the employment will afford a tolerable subsistence to those, who are engaged in the prosecution of it. Yet, these are but small exertions, when compared with others, which are making in Derbyshire for the revival and support of the mineral business. At Wirksworth, Youlegrave, and Castleton very large soughs or levels are driving, and nearly completed, which it is expected, will free many valuable mines from the great body of water, with which they are at present troubled. 20,266l. 12s. 1d. exclusive of interest, have been already expended upon the Hilcar sough alone,
alone, which is driving from Darley Dale towards Youlegrave. Its whole length, when finished, will be about two miles.

Fire engines have also been lately employed for the purpose of relieving the mines from water. One in particular invented by Mr. Bolton near Birmingham has been employed with great success in the Gregory mine at Ashover.

If we consider the produce of this valuable mine we shall be inclined to believe, that the richest veins of lead ore in Derbyshire are not entirely exhausted, tho' the working of them may in some instances be attended with much labour and expense. That a proper idea may be formed of the vast wealth, which has been derived from this single undertaking, I would observe, that from the year 1758 to 1783 it yielded lead to the value of 105,986l. os. 3½d. and that during this period it produced 1511 tons annually upon an average.

It cannot be reasonably supposed, that there are many such veins in the county. But I am informed by persons well acquainted with the mineral part of Derbyshire, that besides those which are now working, there are several valuable ones, which cannot be pursued on account of the great strength of water in their neighbourhood.

Whether
Whether the proprietors of the lead mines in Derbyshire, when considered as a collective body, really derive benefit from their pursuits, may be justly regarded as a very questionable point. However it is a matter, which will not admit of dispute, that this branch of business is of considerable national advantage. If those, engaged in mineral concerns, are not upon the whole gainers, they certainly furnish employment and support to a numerous class of labouring people, and supply the kingdom with an article, which must be drawn from some other part of the globe. It must be confessed, that there is scarcely any business which has so much of the appearance of adventure. But considering it even in the light of a lottery, it certainly is not productive of those pernicious consequences, with which such engines of fortune are usually attended. Entire blanks are seldom drawn. Some quantity of ore is generally met with; tho' in undertakings of this kind the profits are not always adequate to the expence of pursuing them. When a vein is discovered, it is not possible for some time to ascertain its value. It may be worked some years, before this is fully known. In different parts of the ground it appears with different degrees of strength. Some veins will occasionally yield a prodigious quantity of ore in a very
very short space of time. I have been informed, that the Portaway mine near Winsted lately produced ore to the value of 4000l. in seven weeks. Such favourable changes support the spirits of the miners; and whilst they continue to take place, the working of the lead mines in Derbyshire will never become totally disregarded and neglected.

SECTION I.

Iron ore and works.

FROM the account, which has been given of the lead mines of Derbyshire, it appears, that the ore of this metal is found in very considerable quantity in the county. But ironstone, or the ore of iron is met with in still greater abundance. It occurs throughout all that large tract of land, where coal has been discovered, excepting at Chinley hills near Chapel le frith.

The depth at which it lies in the earth is exceedingly various. This is evident from a bare inspection of the catalogue of the measures
fures in that part of the country, where iron-
stone is found. It appears even in the same
shaft at various distances from the surface of
the ground. Nor is it less manifest, that from
the great dipping of the measures in some
places the iron-stone will frequently basfit to
the day. When this is the case, it is seen at
the surface, and is taken out of the ground to
the depth of eighteen or twenty yards. For
this purpose a hole is made about the same size
with the shaft of a coal pit. This is gradually
enlarged every way, as they go deeper into the
earth, and at length the opening assumes the
shape of a bell. It is usual not to descend
lower than eighteen yards. Fresh ground is
then broken and another hole of the same form
and depth is begun and sunk in the earth.
By this means the soil near the surface is inter-
mixed with the lower beds and rendered en-
tirely useless. On this account land generally
receives greater injury from the working mines
of iron-stone, than those of coal. And unless
the beds are very valuable, it is reckoned bad
policy to disturb the ground for the sake of the
ore which it contains.

The thickness of the beds of iron-stone is
various. This may likewise be seen from ex-
amining the catalogue, to which I have just
now
now referred. They are found from two to twelve inches thick.

The most valuable beds of iron-stone, which have yet been discovered, are situated in Morley park near Heage, at Wingerworth, Chesterfield, and Stavely. Accordingly in each of these places furnaces have been built for the purpose of converting it into metal. The foundations of one have also been laid very lately between Dale and Stanton. But the execution of the undertaking is at present suspended, if not entirely given up. The iron-stone at Wingerworth in particular is found in so great abundance, and of so good a quality, that the land, in which it lies, is valued at 100l. an acre.

The method of smelting iron-stone as practised in Derbyshire is nearly the same at all the works, which I have visited. The furnaces employed for this purpose are not materially different from each other in either their size or construction. By giving a description of any one in particular, I may therefore hope to convey a general idea of the manner, in which iron is obtained from its ore. With this view I have procured an elevation of the furnace erected by Walter Mather, Esq; at Stavely.

By describing its various parts, and their uses, I ex-
I expect that I shall be enabled to explain this business in a clear and intelligible manner. Plate, figure 2.

Formerly the furnaces employed for smelting iron-stone were built square. But now they are generally erected in a circular form; and that at Stavely in particular bears a great resemblance to a glass-house. A A is the outside wall. B B is a lining of stone and sand, designed to render the wall so close and compact, as to exclude all air. C C is the inside of the furnace. D D are the boshings; their use is to support the materials, and prevent the metal from descending too suddenly, and congealing at the bottom of the furnace, before it can be drawn off. E is the hearth, in the front of which is a dam-stone. This is five feet, ten inches from the back-stone of the hearth. One side of the dam-stone is formed with sand and is broken down, when the metal is drawn off. F is the timp, which is about twenty-four inches above the bottom of the hearth. G is the mouth of the furnace, thro' which all the materials are thrown in. At H the blast is applied to encrease and quicken the heat of the fire. I I is the gang way or path, along which the materials are carried in wheel-barrows to the mouth of the furnace. K 3

K is
Iron ore and works.

K is a small dwelling for a workman. L L L L are arches, which support the gang way; and M is a room, in which the materials are laid ready for use.

When the furnace is built, some time is required to prepare it for use. A small fire is first made under the timp and fuel is continually added, till it is raised as high as the mouth of the furnace. The blast is not employed, before the furnace is filled to about half its height, left a too sudden and strong heat should injure the walls.

As soon as the furnace is properly seasoned, the process of smelting the iron-stone begins. Fuel, ore and flux are continually put in, both day and night, in regular succession; nor is the fire suffered to go out, till the furnace wants to be repaired, or some other circumstance renders it necessary to extinguish it. The fuel is generally coak, tho' charcoal has been sometimes used. But limestone is the constant and universal flux.

However before these different substances are mixed, it is necessary, that the ironstone should undergo some degree of preparation. When it is taken out of the ground, and carried to the place, where the furnace is erected, it is interlaid, with coak first and then with coal.
coal slack, in beds, and burnt in the open air. The action of the fire upon it having separated many foreign matters, which adhered to it, it is then screened, broken into small pieces, and carried to the furnace.

When they charge the furnace, they begin with coak, upon which they lay a bed of iron-stone and then one of limestone. These different substances they continue in this order to put in, to the amount of the quantity, which is required. The smelting of the ore is urged by the application of a blast produced by a pair of cylinders, which are worked by a fire engine or water wheel. When the fusion of the iron-stone commences, the smelted matter passes thro' the layers of coak and limestone; and these likewise being vitrified greatly facilitate and at length compleat the reduction of the ore. The metal, which during this time has been collecting at the bottom of the furnace, is let out by opening one side of the dam-stone with iron-crows. It then runs into a bed of sand, where pigs are formed, 3½ feet in length and 100 lb. in weight.

The length of time, which is required for the fusion of iron-stone, is various, and in a great measure depends upon the size of the furnace, and the quantity of ore, with which it is charged. At some works it is usual to tap
tap once in eighteen, and at others twice in twenty-four hours.

By mixing the ore, flux, and fuel in different proportions different kinds of metal are produced. When that, from which shot and ballast are made, is wanted, it is customary to every nine baskets of ore to add four of coak and two of limestone. But with this quantity of fuel and flux it is not necessary to mix more than seven baskets of iron-stone to produce forge metal. When the other fort, which is called soft metal, and from which cast goods are made, is required, it is usual to put in four of coak and one and a half of limestone.

These are the general proportions made use of for the smelting of iron-stone: However there are particular circumstances, which sometimes cause a trifling variation. As the metal is not obtained with equal ease from every kind of ore, it is requisite occasionally to diminish or encrease the proportion of limestone and fuel. This is more especially the case in regard to the latter. Charcoal, which produces a greater degree of heat than coak, is never used in so large a quantity for obtaining any particular kind of metal. But wood being a scarce article in Derbyshire cannot be procured with so much ease, and at so moderate an expense as coal. For this reason charcoal is not at
at present employed for smelting iron-stone in any part of the county, with which I am acquainted.

When the metal is obtained from its ore, it is brittle, and wants the malleability of iron. To give it this property it is therefore carried to the forge, where it is wrought into bars. Metalurgists are not agreed in regard to the cause of that brittleness, which all unwrought iron is known to possess. Some think it is owing to the presence of a portion of vitreous matter. Others ascribe it to the imperfect reduction of the iron and to its containing a quantity of calx. It has also been supposed, that arsenic or zinc render the metal brittle. But the most prevalent opinion is, that this property is owing to its imperfect reduction, and the portion of metallic calx interposed between its parts.

The quantity of iron which is annually produced in this county has lately been very considerable. At present it amounts to about 5600 tons. This estimate was made by taking an average account of the metal, which was extracted every week at the several furnaces in the county.
SECTION II.

Calamine mines and works.

Lapis calaminaris, or calamine has so little of the appearance of an ore, that only those, who are well acquainted with its nature, could know it to be one. The most common sort has so great a resemblance to some kinds of limestone, that it can scarcely be distinguished from them. There is however an inferior species of calamine, generally called black jack, which has some degree of metallic splendor, and may be easily mistaken for lead ore. The great resemblance of these two mineral substances to each other has given room for the practice of great fraud in the sale of the latter. Some years ago a large quantity of black jack was bought for lead ore. This instance of imposition has rendered the merchants more cautious. So that deceits of this kind, I believe, are now very seldom, if ever, attempted.

From these observations it may be presumed, that calamine has not been long known and attended to in Derbyshire. A century ago the miners
Calamine mines and works.

Miners were entirely ignorant of its properties and value. It is not twenty years since its use in the composition of brass was made a secret in this county. But this being publicly known has excited the general attention of miners to this substance in various parts of the high and low Peak. The chief places, where it has been discovered, are Castleton, Cromford, Bonfial, and Wirksworth.

Calamine occurs at various depths in the earth. It is generally found near a vein of lead ore. Sometimes these two mineral substances are discovered mixed together, or run a considerable way along the side of each other. But it more frequently happens, that one immediately ceases, when the other begins to appear. It is a common observation of the miners, that a good vein of both is never found in the same place.

This ore of zinc generally lies in a bed of yellow, or reddish brown clay. These beds bear a great resemblance to pipe works, and consist of distinct lumps of various sizes, and irregular shape. The direction in which they are found, is the same with the dip of the measures in that part of the country, where they appear.

From the mines calamine is carried to the furnace, which is built near a rivulet or small stream.
stream of water. Here it is first washed in the current, and cleansed from the soil or clay, which adheres to and is mixed with it. It is then, in a vessel filled with water, washed again in sieves, and the foreign matters are picked out. These are chiefly caulk, spar, and lead ore, and all excepting the last are thrown away.

When by repeated washing and picking the ore appears to be sufficiently purified, it is calcined in a reverberatory furnace of nearly the same form and construction with the cupola, which is used for smelting lead ore. The chief respect, in which they differ from each other, is, that the furnace, of which I am speaking, has not a concave, but flat roof and bottom. The time required for calcining the calamine is about four or five hours; and during the process the ore is frequently stirred up with iron rakes. When it is taken out of the furnace, it is picked again, and being ground into a fine powder, and washed once more, becomes fit for use.

Dr. Watson* says, that the calamine annually raised in Derbyshire amounts to about 1500 tons, tho' 60 years ago they did not raise 40 tons in a year. I do not know at what time this estimate was made; but from the best information I can obtain there does not appear

appear to be more than 500 tons at present annually collected from the several places, where this article is found.

Derbyshire calamine in its native and crude state is sold from 35 to 40 shillings a ton, but when prepared for use, it is valued at 5 or 6 guineas. It appears, that it does not bear so good a price as that, which is gotten about Mendip in Somersetshire. For Dr. Watson informs us, that at this latter place a ton in an undressed state is sold for 65 or 70 shillings, and after calcination for 8 pounds.

A ton of crude calamine, as dug from the mine is reduced by the various processes it undergoes, before it becomes saleable, to about 12 hundred weight and hence it has lost 8 parts in 20. Of 8 hundred weight thus lost in a ton 6½ may be esteemed fixed air. The remaining part amounting to 1½ consists of some impurities, which have been picked out or washed away, and of some portion of the metallic parts of the calamine, which is inflamed and driven off during calcination.‡

Blende or black jack, loses different proportions during calcination. Some kinds lose a fourth and others a sixteenth of their weight.†

S E C T.

‡ Chemical essays, vol. 4. page 16. † page 19.
SECTION III.

Copper ore.

COPPER ore has yet been found only in very small quantity in Derbyshire. Pieces about twelve inches in circumference, and detached from any vein are frequently met with at Matlock. Others of a much larger size have also been found at Bonsal and converted into Copper. They were discovered, some lying on the surface of the ground, and the rest in a neighbouring walled fence. Some years ago a slender vein of copper ore was found and worked at Great rock Dale betwixt Tideswell and Buxton. And lately another has been met with at Ruslip Edge near Chapel le'frith. No advantage has at present been derived from this discovery. However from an expectation of meeting with ore in some quantity three mineral gentlemen in the neighbourhood took a lease of the land where it is found. But I have not heard, whether they will prosecute their intentions of working the vein.
SECTION IV.

Coal mines.

The use and value of coal have long been known in Derbyshire. Pits were dug for getting this mineral in the liberties of Norton and Alfreton as early as the reign of Edward II. At this time Thomas de Chaworth,† lord of Alfreton, gave to the monks of Beauchief licence and authority to supply themselves with coal from either of these places in what quantity they chose.

At present coal is found in very great abundance in Derbyshire. One almost uninterrupted bed extends thro' that large tract of claystone land, of which such frequent mention has been made, as lying on the eastern border of the county. It is found also, as it has been already observed, at Newhall, Measham, Chinley, Hartington upper quarter near Buxton, and at Calke.

† Charter of Edward II. Dugdale Mon. Angl. vol. 2. page 609.
Coal is met with at various depths in the earth. In some situations several beds are passed thro' by the same shaft. But the upper ones are both thin and soft, and the coal is seldom got of which they consist. The hard coal also in different places is found at different distances from the surface. This change is always observed to happen in the neighbourhood of the faults. On passing over them coal will be sometimes found lifted up or thrown down. 120 yards from the situation, in which it was left on the contrary side.

At the first sight the intervention of these walls of clay seems to be a great impediment to the prosecution of this branch of mineral business. And it must be acknowledged, that whenever they occur, there is always some difficulty in discovering again the exact situation of the bed of coal on the contrary side. But this inconvenience is in a great measure counterbalanced by an advantage, with which they are sometimes attended. They serve to guard the mines from strong currents of water, with which they would be troubled, if these natural barriers were removed. For it is found, that when they are broken through, the water rushes forward with great violence and abundantly shews the imprudence of such a step.

Thus
Coal mines.

Thus by these walls of clay has the wise author of nature provided for the security and convenience of those, who are engaged in the prosecution of this useful and hazardous business.

In working mines of coal, water and foul air are often found to be very troublesome. To relieve them from the latter they have recourse to the same means, which are employed in lead works. But to free the pits from inflammable and mephitic air, with one or both of which they are often troubled, a method somewhat different is pursued. At most works there is, besides the large shaft, by which the coals are drawn up, a smaller one at the distance of a few yards. This is about 4 feet wide and 15 or 16 feet deep, and from the bottom of it a pipe is carried into and down the larger shaft to that part of the mine, where the men are at work. A vessel of burning coal holding about four pecks is then suspended in the smaller shaft. By this contrivance the air is immediately rarefied, and a fresh column rushing upwards to supply its place a circulation is produced and maintained in every part of the mine.

It is scarcely possible to ascertain the exact quantity of coal, which is got in Derbyshire every year. But it certainly is very large. For besides what is consumed in the neig...
bouring country, a considerable quantity is conveyed by the Erewash canal into Leicestershire.

Tho' the ground, where coal is discovered in Derbyshire, be for the most part private property, yet the coal and ironstone in waste lands in the parish of Alfreton belong to the crown, but are now leased by Tho. Thoroton, Esq; of Screveton in Nottinghamshire. I am also told, that by purchase he has a right to both these minerals in the enclosures, and can search for them in most farms in the parish. In several other liberties the land and coal are the property of different persons. In this case, the owner of the coal has a right to sink a shaft wherever he pleases, and to form a road for the convenience of carrying away this article, when it is raised at the pits.

SECTION V.

Origin and uses of Plasterstone.

Some remarks have already been made upon the situation of plasterstone in the earth. It is likewise deserving of notice in this place, that upon clearing away the soil from the outside
side it presents every appearance of crystallization. The internal state of the beds also tends to render such a supposition very probable. It is not possible to say, at what time these crystallizations were produced. I think it sufficient to offer this conjecture in respect to the power or law, by which such beds were formed; and shall now mention a few of the most remarkable properties and uses of the substance, which we are examining.

The most valuable plasterstone, which has ever been got in this county, is met with at Elvaston. But the pits, which were some years opened here for getting it, are now closed. That which is found at Chellaston is neither of so beautiful a colour, or so fine a texture. However it is equally adapted to answer the common purposes, to which plasterstone is applied. The principal demand for this article is from the potteries in Staffordshire. It is there used for the formation of moulds, and is excellently calculated for such a purpose. For when calcined, it is found to possess a remarkably absorbent quality. The instant the composition is poured into the mould, it imbibes the moisture, and a solid figure is produced.

A considerable quantity of plasterstone is also used for laying of floors in buildings. To prepare it for this purpose it is necessary, it
should be first burnt about eight hours in the open air. When this is done, it is customary to kindle a fire in the middle of the day. For the darkness greatly assist those, who are engaged in the work, in judging, when it is sufficiently burnt. When the fire is put out and it is properly cooled, it is beaten fine with flails and made into mortar. It is then spread about two inches thick upon reeds, or laths covered with straw. Being afterwards left to dry a floor will be formed in the space of a few days almost as solid and durable as stone. The expence of laying this kind of floor is in the neighbourhood about one shilling and tenpence a yard. But it is evident it will encrease in proportion to the distance of the place, to which the plasterstone is carried.

The substance, which we are considering, is used also for ornamental purposes both in its native and a calcined state. In its native state it is called alabaster by those, who manufacture it. As it takes a very high polish, it assumes a very beautiful appearance, when wrought into large columns, chimney pieces, vases and small obelisks. In a calcined state it is applied to all the purposes of Plaster of Paris. It is also mixed sometimes with quick lime for the purpose of making the mortar set more strongly, and
and is in this view found very useful for the formation of cornices and mouldings, and such like ornamental purposes in building.

The quantity of plasterstone annually raised at Chellafton pits is about eight hundred tons, five of which are sent by the canal into Staffordshire. The price of it is determined by its particular quality. The best is sold at three half crowns and the inferior sort at five shillings a ton.

---

**CHAP. V.**

**Fossils.**

HAVING described the internal structure of the earth in Derbyshire, and enumerated the most valuable ores and mineral substances, with which it abounds, I shall now give a more particular and minute detail of the various productions of this kind, which have hitherto been met with in this county. The Fossils of Derbyshire are highly esteemed for their beauty as well as intrinsic value, and have
have been thence introduced into the most elegant collections in Europe. By furnishing a catalogue of them, I flatter myself, I shall therefore render an acceptable service to those who have a taste for mineralogical pursuits.

Writers on this subject have distributed mineral substances into classes, either according to their external characters, or the principles, of which they are composed. Nor am I ignorant of the advantages, which attend such arrangements. Mineralogy cannot be conveniently taught as a science without being reduced to a system. But I have no such object in view in the present undertaking. My design is chiefly to give a catalogue of the various fossil productions of Derbyshire. I shall therefore do little more than mention, and describe them under the two general heads of native and extraneous. These are simple and obvious distinctions, and perhaps the only ones, which should be admitted into a work of this kind. Those, who may wish to see a more accurate and particular arrangement may consult the excellent works of Cramer, Kenckel, Werner, Wallerius, Linnaeus, Romé de l'Isle, Daubenton, or the no less valuable writings of Cronstedt, Bergman, Kirwan, M. de Chevalier de Born, M. Monet, M. de Fourcroy, and Da Costa.

However, to give a clear and distinct idea of
of the various fossils, which I shall now enumerate, it seems necessary to mention some of both their external characters, and constituent parts. I shall therefore take notice of the most striking of each, which have come to my knowledge, and arrange them accordingly.

SECTION I.

Native Fossils.

In giving an account of the native fossils of Derbyshire I shall begin with those of the calcareous kind.

Limestone, as I have already observed, is found thro' a great extent and in various parts of the county. But in different situations both its colour and quality are different. At Buxton, Peak forest and Stoney Middleton it is of a light grey colour and in the state of lime is much used for agriculture. For this purpose a considerable quantity is not only disposed of in the northern part of the county, but likewise carried into Cheshire and Lancashire.

At Crich there are several kilns employed in burning limestone. When calcined it is remarkably white, and is very much valued for washing cielings and other ornamental purposes. It is generally allowed, that limestone of this

light
light colour is the most free from metallic particles, and that, of which I am now speaking, is found to be particularly well adapted to cold clay land. It has been observed to be not only a more efficacious manure, but also to bring the crops of corn a fortnight earlier than limestone of a darker cast.

At Ticknal and Kniveton the limestone is of a very dark colour, and sets very strongly. At Kniveton it more especially possesses this latter property, and in a degree very little inferior to that at Barrow in Leicestershire. This property of the dark coloured limes of growing hard in water is laid by late writers to be owing to a mixture of manganese. Might not these be imitated or excelled by mixing a small quantity of the black wad with other limes?

At Hopton there is another variety of limestone of a light colour, hard, but which does not bear a polish. It abounds with small fragments of entrochi, and is much used for hearths, chimney pieces, floors, and staircases. For the two latter purposes it perhaps has no equal, as may be seen by examining the staircases at Kedleston Hall.

I am informed, that on Braffington moor a stone of a similar but superior nature has been discovered
Native Fossils.

discovered. It is said, that it is more free from flaws, and in particular, that it has not that porous appearance, which is so observably in the Hopton stone.

Marble.

This species of calcareous substance is found in various parts of the high and low peak. It is of two kinds, black, and mottled grey.

Black marble abounds chiefly at Ashford. There is a small quantity also occasionally worked at Matlock. But I have not seen any pieces in a polished state, and therefore cannot form an accurate opinion concerning its particular quality. The quarry, from which the black marble at Ashford is procured, is situated on the west side of the village. It may be had in very large blocks. However, the measures in which it is found in their quality differ a little from one another. In general it is very black, and of a close and solid texture. I have seen some very fine specimens of it. They had received so high a polish, that they reflected objects as strongly as a mirror.—This marble greatly resembles that, which is brought from Namur in the Netherlands.

The mottled grey marble is found in a great variety of places. But the largest quantity is got in the neighbourhood of Moneyash. Tho' it
It be remarkable for the diversity of shade in its ground, it may be distinguished into two kinds. The ground of one sort is lightish grey, and that of the other has a slight blueish cast. The former is rendered extremely beautiful by the number of purple veins which spread upon its polished surface in elegant and irregular branches.

But the chief ornament of the mottled grey marble is the number of entrochi, with which it abounds. The longitudinal and transverse sections of them produce an almost incredible variety in its figure. And it is deserving of notice, that, in general, the more superficial the situation of the beds is, the lighter coloured the marble, and the more abundant the entrochi.

The purple veined marble is got at Ricklow dale near Moneyash. That with the blueish ground at the village itself. There is another variety at a small distance from hence at a place called High low. It is known by the name of bird eye marble.

The black and grey marble agree in several properties. They are both calcareous, effervescence with the mineral, and are corroded by the vegetable acids of the fermented and unfermented kind. I am informed, the specific gravity of the black when compared with the grey is as
12 to 13, twelve cubical feet of the former, and thirteen of the latter weighing a ton.

Mr. Kirwan says, that black marble receives its colour from a slight mixture of iron. According to M. Bayen the grey contains a still smaller proportion of this metal. Mr. Rinman observes, that the blue colour in marble, is owing to a mixture of shock.

*Calcareaous Concretions.*

These are found in very great abundance in almost every part of the Peak. There is scarcely a single cavern, which is not lined with encrustations of this kind. The water being very much loaded with lime deposits it upon all bodies and in all places, where it flows. These concretions appear under all possible forms. The water-icles or stalactites are more especially deserving of notice. They mostly contain a slight mixture of clay and iron, and from hence derive the variety of colour by which they are distinguished.

Bright yellow stalactite—Matlock.

Dark brown stalactite of a close texture, and receiving a high polish, from Winster.

Stalactite of the same colour from Wirksworth.

Round scaly stalactite (Pfolithus) from the Cumberland mine, Matlock.
Stellated stalactite—Caftleton.
White striated stalactite—Ashover.
Green stalactite, very elegant, from a mine at Matlock.

Large pipes of stalactite from Poole’s hole, Buxton.

A pipe of stalactite formed in a water pipe in a mine near Cromford. The wood was decayed and the water for a considerable time had passed thro’ its self-made calcareous trunk.

Stalactite of a light milky blue cast, almost transparent, receiving a very high polish and rendered very beautiful by veins of a very dark brown colour spreading thro’ it. This substance seems to be stalactite of a pure kind, and is found buried in the earth. When polished its surface appears fat and oily. It seems to be the same calcareous concretion, which by M. de Fourcroy is called Alabaster. From Bonsal.

Tophus.

This substance is formed in small streams of water by a slow and gradual deposition of earth principally of the calcareous kind. It is also found in banks, which abound with gentle springs. At first it is very soft, but by being exposed to the air, is rendered very hard and tho’ porous becomes durable.
Native Fossils.

Tophus at Alport near Youlegrave formed in the course of a small brook. It is sometimes taken from thence and used in building. The chimneys at the top of many houses in the neighbourhood are formed of this substance.

The entire bank next the river from the turnpike gate at Matlock to beyond the old bath is composed of Tophus, with which the new bath is built.

Tophus extremely beautiful resembling honey comb within—Matlock.

Tophus stained with green & blue—Matlock. These colours are found to be owing to a slight mixture of vitriol with iron and copper.

Calcaceous encrustations, and petrifactions of vegetable, animal, and testaceous substances are found in various parts of the county. But these I shall more particularly mention, when I come to enumerate the extraneous fossils.

Transparent calcareous spars.

Professour Bergman found the composition of calcareous spar to be such, that 100 parts contain about 34 of fixed air, 11 of water and 55 of pure calcareous earth. These spars seem to present an astonishing variety to the eye, but when examined I believe there is only one kind in Derbyshire, the Rhombic, which by various combinations assumes extraordinary and beauti-
beautiful forms. Mr. Bergman observes, that they consist of a tessera or oblique parallelopiped; all the planes of which are Rhombs of such a kind, that the obtuse angles are equal to 101° and the acute to 78°. By a proper accumulation of such similar parallelograms crystals of the most opposite form may be produced.

Spar of an amber colour with 24 sides from Eyam.

Brilliant transparent spar with 24 sides from Eyam.

Doubly refracting spar (spathum islandicum) from Ashover, and Brassington.

Rhomboidal spar—Matlock.

Pyramidal or dog tooth spar—Matlock and Brassington.

Diaphonous spar with 16 sides from Eyam.

Hexagonal spar—Matlock.

Hexagonal prismatic spar pointed with two pyramids—Calk.

**Fluor spars, Blue sfohn.**

The fluor spars have for many years drawn the attention of the curious on account of the many singular properties, which they possess. The most useful of these is promoting the fusion of ore. They contain an acid, the most penetrating we know of. It corrodes and perforates glass. The fluor principally consists of lime satu-
saturated with this acid. Mr. Bergman says, that there is sometimes present a little clay or flint. He sometimes found also a small portion of marine acid. From some specimens collected in Derbyshire the most elegant jointed siliceous tubes have been extracted. It melts of itself in a strong heat, and the fumes which it emits are extremely noxious. When moderately heated it becomes phosphorescent. The blue is said to derive its colour mostly from iron, but sometimes from cobalt. The manufacturers of this article in Derbyshire find, that they can change the blue into a red or reddish purple colour by exposing it to a certain degree of heat. Fluor spar is composed of a great number of concentric lines or pyramids one applied above another. I shall now proceed to enumerate the fluors of Derbyshire.

Purple with white veins, from Castleton.

Dark purple, from Castleton.

Nodules of purple and white fluor with concentric lines, from Castleton.

Purple fluor with concentric lines—Castleton.

Purple fluor with a layer of bright amber coloured fluor over it—Castleton. This is an elegant fossil.

Fluor with a yellow cast from a pit called Tanner's venture near Castleton.
Light purple and white fluor very beautiful called the Deakin stone at Castleton.

Pellucid fluor with a silver coloured pyritical vein running thro’ it and following the angles of crystallization from Ashover.

Yellow fluor—Crich and Ashover.
Pellucid fluor—Crich.
Purple and yellow fluor—Crich
Purple fluor from Ball’s eye mine near Cromford.

Fluor of an amethystine colour from Bonfal.
Brilliant transparent cubes of fluor upon lead ore from Wirksworth.

Gypsum selenite or plaster stone.

According to Mr. Kirwan 100 grains of gypsum contain about 30 of vitriolic acid, 32 of mere earth, (chiefly calcareous) and 38 of water of which it parts with about 20 by calcination. Mr. Morveau says its red colour is owing to iron. The greenish veins, with which it also abounds are found to contain sulphur.

Pure and almost transparent gypsum at Chellaston.

Gypsum nearly resembling statuary marble from Chellaston.

White gypsum, and also with red and green veins spreading through it—Elvaston. This
Native Fossils.

is much harder and receives a higher polish than that, which is found at Chellafton.

A piece of white gypsum without any degree of transparence found in sinking a well at Darley turnpike, near Derby. Others of the same kind have been met with near Braffington.

Fine columns of selenite found in a cavity of a piece of gypsum—Chellafton.

The hair fossil is a capillary gypsum. Specimens of it with the fibres above eight inches long have been found in the Cumberland mine near Matlock.

The snow fossil, one of the most beautiful productions of nature, is a ramose gypsum. It also is found in the Cumberland mine.

Selenitical needles nearly two inches long found in the clay in Cumberland mine.

Small prisms of selenite cemented in one mass with lead ore and other mineral substances, from a mine at Castleton.

Selenite consisting of Rhomboidal laminae, from Castleton.

Fibrous gypsum commonly called Roche Plaster, from Chellafton. The stratum is from one to two inches thick, and lies in the clay a little above the solid bed of plasterstone.

Mr. Kirwan mentions having seen from Derbyshire yellowish stone compounded of cal-

M careous
careous and barytical earth, consisting of lumps of chalk interspersed with nodules of barole-
lenite.

ARGILLACEOUS SUBSTANCES.

Porcelain clay of a most delicate white colour, and a very fine texture from a lead mine near Brassington. Some years ago a small quantity was used at the porcelain works in Derby. What is gotten at present is sent to the potteries in Staffordshire.

Pipe clay—Bolsover. It is not quite so good as that, which is procured from Pool in Dorsetshire and the Isle of Wight. However it may be manufactured very well with it. At Bolsover pipes are made with it in its native and unmixed state.

Pipe clay near Newhaven. At the same place a very good potter’s clay may be had.

A very good potter’s clay from Crich.

Potter’s clay at Brampton and Stanwich near Chesterfield, Morley moor, Heage, Smalley and Horley. They are chiefly of a yellowish or grey colour.

Potter’s clay red and grey—Ticknall. The latter, as it corrodes the lead, is never used for the glazed ware.

Potter’s clay—Griely green.
Indurated clay called bind, found in most of the coal pits. It is used for the improvement of land, the soil of which is light and sandy.

Clay-stone is, as I have already observed, found in a great extent of country on the east side of Derbyshire. It runs easily into a flag, and this property has suggested an use of it, which has been pretty generally adopted in that part of the county, in which it appears. As proper materials for mending roads in such situations are scarce, and coal is plentiful, flags which are easily procured from this kind of clay stone by burning it are often applied to this purpose. This method of procuring materials for repairing roads, on account of the smallness of the expense, perhaps might be adopted in other similar places with advantage.

Terra tripolitana commonly known by the name of rotten stone is found near Bakewell. It is much used by the lapidaries in Derby for polishing.

Marl which is a compound of clay and calcareous earth may be observed in almost every part of Morleston Hundred. But these two sorts of earth are found mixed in exceedingly various proportions. Marl is also remarkable for its great diversity of shade and hardness. It is of a grey, red, and light flesh colour. But the second is the most common. It is of two sorts.
sorts. One, which has the appearance of a thin shattery stone, contains but little calcareous earth, and when exposed to the weather does not readily break and fall into pieces. However it is thought to be very useful when laid upon light or boggy land. But the other kind of red marl is much more valued. It is found to be a very efficacious and durable manure, especially when it is mixed with a suitable proportion of dung.

Schistus tegularis roof slate—Chinley Hills near Chapel le frith, and Hayfield. It is of a grey colour and lamellar texture, shines with mica; and does not give fire with steel. It has been much used for covering of houses in the neighbourhood. Some, which is of a more hard and compact texture, I am informed, has been carried to Buxton and employed for flooring in the Crescent.

Brick clay in a variety of situations in the eastern and southern parts of the county. The best, which I have seen, are met with in the neighbourhood of Derby, and the parish of Stapenhill.

**SILICEOUS SUBSTANCES.**

Those substances, which come under this denomination, are found to strike fire with steel, but do not effervesce with acids. However
ever that which is obtained from fluor spar, as it has already been observed, acts upon, and corrodes it.

Siliceous like other primitive earths, is seldom found pure. According to Mr. Bergman its specific gravity, when free from foreign matter is 1.975. Mr. Kirwan observes, that the particles when first precipitated, occupy in water at least twelve times the space, which they do when dried. So that when sufficiently fine, they may remain suspended therein, nay when vehemently heated in a close vessel they may be dissolved. Fixed alkalies unite with siliceous earth in the liquid way. But in the dry way they seize it with great violence, and convert twice their weight of it into a permanent transparent glass. When pure it is refractory in the fire.

Quartz.

These are the basis of crystal. Besides siliceous they contain sometimes a very small quantity of calcareous and argillaceous earth. They are more opake and less pure than crystals.

Solid smooth quartz from a mine opposite the high Tor, Matlock. I have heard of only one specimen.
Native Fossils.

Small brilliant quartz crystal upon brown chert—Matlock.

Pale amethystine crystals found on the toadstone—Matlock.

Pellucid crystals on the toadstone—Matlock. Hexagonal crystals terminated by two pyramids of the same form, found in a yellowish red earth near Buxton. They have a slight reddish tinge, which they most probably derive from a small mixture of iron. These crystals are commonly called Buxton diamonds.

Crystals of the same form, nearly an inch long, found in clay in a field between Mam-tor and Castleton.

Small crystals of the same kind in an iron earth on Brassington moor. Iron earth is the only bed, in which I have found perfect crystals.

Opaque quartz or pebbles.

Quartz pebbles of good colour are sometimes found in the neighbourhood of Derby. They take a fine polish, but are seldom free from flaws. For this reason they are neglected by the Lapidaries.

White quartozo pebbles found near Derby. When they are rubbed together, they emit strong flashes of fire. In the furnace they run easily into a black glass.

Flint.
Flint.

Small pieces found in the gravel pits in the neighbourhood of Derby.

Large lumps in the gravel pits at Stenson in the parish of Barrow. They are tolerably pure and almost transparent.

Petroflex chert.

This substance is less hard and more opaque than flint. According to Mr. Kirwan its specific gravity is from 2.59 to 2.7. It is composed of siliceous united to argillaceous, and a small quantity of calcareous earth. In fire it crackles and grows white like flint but is generally more fusible, as it commonly melts of itself.

Chert is found in strata, and may be seen in this form running thro' the rocks in various parts of the Peak. A large quantity of this substance is annually carried from the neighbourhood of Bakewell into Staffordshire and Yorkshire in which counties it is used for the manufacture of earthenware. It is found in a thick stratum, but is not so hard as that, which is met with in many other places.
Chert of a hard rough and porous nature is found at Bonsall. It is called fiery dragon, and is made into millstones.

White chert in the hill between Matlock and Bonsall.

Green chert—Matlock. It is found on the toadstone.

Chert of the colour of a Cornelian stone found on the toadstone near Matlock.

Brown chert—Middleton Dale.

Black chert—Matlock.

Dark green chert from a mine near the high tor, Matlock. It would be difficult to distinguish this from jasper without breaking it. When broken it does not look quite so dull as jasper.

White chert striped with brown, found near Matlock. It takes a high polish and looks beautiful.

Angular pieces of chert cemented together by calcareous spar are found in Nether-Hay mine near Matlock. These pieces of chert seem to have been left from some antient working of the mine, and to have been conglutinated together by the spar. It takes a fine polish, and is an elegant fossil.

Breccia Silicia puddingstones are found in the gravel pits near Derby, and are used for paving the streets. In general they are of too dark colour to be beautiful.
Moorstone composed of quartz and small pebbles, or of quartz, felt-spat, and mica found in the north-west extremity of the county and on the east moor. Millstones are made of this stone on Kinder scout in the parish of Glossop, and at Grindlesford Bridge in the parish of Eyam.

Sandstone or freestone is found at Bakewell Edge, Duffield, Matlock, Horseley, Melbourn. The most elegant and magnificent houses in Derbyshire have been built with stone procured from some of the above places. At Melbourn and Horseley scythe stones are manufactured from it.

Stone of this kind is found in laminæ at Dronfield, and in the parish of Glossop. It is a good deal used for covering of houses in those parts of the county.

A stone with a thin superficial covering of a substance resembling pumice stone found near Matlock.

Terra ponderosa, Heavy Earth.

The substances, which come under this name seem not yet to be thoroughly understood, tho' they have been examined with considerable attention by several eminent chemists. They are found by analysis as well as external appearance to differ somewhat from one another. The basis of them all is the same, but this is disco-
discovered in union with various other principles: and according to these combinations, the heavy earth has been distinguished by different names. Professor Bergman, in his outlines of mineralogy has taken notice of two kinds, terra ponderosa aerata, and terra ponderosa vitriolata. A specimen of the latter, which he examined, he found to contain in 100 parts 84 of heavy earth, 13 of the most concentrated vitriolic acid, and 3 of water.

But the substances, in which heavy earth is discovered, are not only composed of various constituent parts, but are also different in the external form and appearance. Mr. Fourcroy says, that heavy spar has been confounded with fluor spar by many naturalists, and that indeed it has the same fracture and does not effervesce with acids. But its form, its small degree of transparency, and above all its extreme weight are sufficient to distinguish it. By one single chemical character it may always be known. By pouring vitriol upon it no smell or vapour is produced. It is either crystalized, or in shapeless lumps, but always in beds more or less thick, and of different degree of extent. It is of considerable hardness, altho' it does not strike fire with steel.

I proceed to give an account of the different substances containing heavy earth found in Derbyshire. Cauk,
Cauk, marmor metallicum of Cronstedt, is found in large quantity in the lead mines throughout the county. Some specimens of a white and of a reddish colour have been analyzed by Dr. Whitering. He says, they were crystallized in rhomboidal laminae, but these very much inmixed and confused. Cauk of this kind loses very little or nothing of its weight by being made red hot. Its specific gravity is 4, 330. It appears from the experiments he made upon it, that 100 parts of Derbyshire cauk contains 95, 5 of marmor metallicum, and 5 of calciform iron. Dr. Whitering thinks it probable, that the red pieces contain a little more iron.

The following varieties have been met with in this county:

Flesh coloured cauk on the surface of the yellow fluor—Crich.

Dark brown cauk, which takes an exceedingly high polish from Ashford on the water.

White cauk in sprigs like heath on a brown ground (the fluor ericæformis of Da Costa) from Bonfall Ley.

Ramose white cauk from Eyam.

Plated Cauk—Stoney Middleton.

Threaded cauk—Ashford and Calke. This exactly resembles balls of thread.

Stellated white cauk from Wirksworth.

White
White cauk in spiculæ from Bogrod mine, Wirksworth. Dr. Whittering has made some experiments and observations on a piece of terra ponderosa vitriolata from Shropshire apparently similar to this specimen. He says that it loses little or nothing of its weight by being made red hot, that its specific gravity is 4,000, but that after soaking one night in the water it was 4,200, or more. By analysis 100 parts of it appeared to contain marmor metallicum 97, 7 calciform iron 2, 3.

The cauks of Derbyshire have long been supposed by the miners of this county to be of a metallic nature. The same opinion was also entertained by Professor Bergman. For he supposed the terra ponderosa to be a metallic earth, though it had not been made into regulus. Dr. Whitering observes, that it seems to claim a place betwixt the earths and metallic calces. Like the former it cannot be made to assume a metallic form; but, like the latter, it may be precipitated from an acid by means of phlogisticated alkali. In many of its properties it much resembles the calx of lead and in others the common calcareous earth, but still seems sufficiently different to constitute a new genus, as will appear from a little attention to the following circumstances.

Terra
<table>
<thead>
<tr>
<th><strong>Terra ponderosa</strong></th>
<th><strong>Terra calcarea</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>When dissolved in water it precipitates upon the addition of the smallest portion of vitriolic acid.</td>
<td>Dissolved in water does not precipitate upon the addition of vitriolic acid.</td>
</tr>
<tr>
<td>Its gypsum therefore is insoluble.</td>
<td>Its gypsum therefore is insoluble.</td>
</tr>
</tbody>
</table>

With nitrous & marine acids forms salts so deliquescent, that they cannot be kept in crystallized form. Its gypsum does not decompose vitriolic salts via lumida.

**Inflammable Substances.**

Inflammable air or fire damp comes with propriety under this class. Mr. Kirwan says, that this kind of air will flame, when it is mixed with two or three times its bulk of common atmospheric air. When pure, it explodes.
plodes all at once, but when mixed or combined with fixed air it burns with a blue lambent flame.

Inflammable air is met with in most of the coal and some of the lead mines in Derbyshire. In driving soughs likewise for relieving the mines from water, the workmen are generally troubled with it, more especially when they pass through beds of shale. Some years ago several persons were killed by an explosion of it in the famous Hilcar sough near Youlegrave. Nor would it have been possible to have proceeded in the work without sinking shafts from the surface at proper distances from each other, and by this means procuring a circulation of air thro' the subterraneous passage.

Sulphur.

Sulphur in a layer four inches thick found in the virgin mines Haslebage near Bradwell. Sulphur in a layer one inch thick in the toadstone—Tideswell moor. In both these instances it was found so pure, that it would flame with a candle.

Sulphur of nearly equal purity in Odin mine Castleton. It is also met with in shale in various parts of the county.

Pyrites.
Native Fossils.

Pyrites.

Pyrites is a combination of sulphur with iron, arsenic, and vitriol. Their colour is owing to the mixture of some or all of these substances in different proportions. Iron mineralized by sulphur gives a brassy or golden colour. Iron mineralized by arsenic singly is of a bright white resembling a mixture of silver and tin. The pyrites of Derbyshire are in general exceedingly hard, and strike fire with steel.

Pyrites without any determined figure, (pyrites sulphureus rudis) from the Gregory mine, Ashover.

Arsenical pyrites of a fine silver colour.—Eyam.

Pyrites which breaks like steel, (pyrites texturae chalybeae) Ashover.

Pyrites in a bright silver-coloured vein running thro’ pellucid fluor—Ashover. The pyrites follows the angles of the crystallization of the fluor and is exceedingly beautiful. Pyrites of a golden colour sprinkled over the surface of fluor. Ashover.

Pyrites in exact cubes. Ashover.

Pyrites glittering like gold on the surface of the Heanor coal.

Pyrites
Pyrites in the form of small wedges on lead ore. Ashover.

Pyrites in large brassly wedges found in the cavities of Swanwick coal.

Pyrites jagged like the comb of a cock as bright as silver on ore of zinc. Eyam.

Greenish vitriolic pyrites found with the toadstone one mile from Matlock by the side of the river Derwent.

Pyrites of a golden and a brassly colour formed upon oval pieces of limestone. These are found in a variety of lead mines and are commonly called Mundix in Derbyshire.

Pyrites formed in a mass resembling a number of leaves lying upon one another. Ticknall.

It is impossible to enumerate all the pyrites of Derbyshire. A great variety of them is found in almost every part of the county. They lie in a great measure neglected, though a large quantity of sulphur might be extracted from them. The only use which is made of them, is obtaining copperas* from some, which are collected at Dore and Totley near Dronfield.

* This Substance is found amongst coal, and is generally known by the name of drofs. When it is brought to the work, it is laid in beds between two and three feet thick, and covering a space of ground about sixty yards square. The pavement, upon which the pyrites lies, has a small declination towards the middle where there is a channel formed to receive the liquor, and convey it into a large reservoir which is placed at the end. When the drofs has been exposed a while to the weather a strong acid, which has a whitish appearance, is seen on the outside. This is washed off by rain and heavy dews, and runs down into the channel, and from thence into the cif-
Native Fossils.

It is to be hoped, that those engaged in mineral concerns in Derbyshire will grow more provident and attend to a matter, from which advantage may be derived to themselves and their country.

Bitumen.

I place the Bitumens among the native fossils, as most authors have done so, though they are thought by some to derive their origin from the animal and vegetable kingdoms.

Rock oil, (Petroleum) in veins of the black marble at Ashford. It gently exudes, when the sun shines upon the stone.

Hardened rock oil, (Pix montana or asphal-tum) found in Odin mine, Castleton.

Bitumen exceedingly elastic in a mine near Castleton. It takes fire on being touched with a candle and burns slowly with a very disa-

tern. The liquor is then pumped into a copper and the watery part is evaporated by boiling. This part of the process generally requires five or six days. Before the evaporation is begun it is necessary to throw into the boiler a certain proportion of iron. Old nails or any scraps of this metal are found to serve the purpose. The dust and small pieces arising from the boring of cannon have hitherto been most used, because they are easy of solution. In order to discover when the liquor is sufficiently evaporated, it is customary to dip a small stick in it and to drop it upon a piece of lead. If it crystallizes, it is time to stop the boiling. The liquor is then drawn off into a leaden cooler, from whence it is taken and put into casks for sale. Hamburg was the market, where it was formerly dispensed, but now it is chiefly sent to Hull and London. It is sold at about five pounds ten shillings a ton. The quantity of copperas, which is made every year, is not great. It seldom exceeds a ton a week.
greetable sulphureous smell. It is of a dark brown colour. I have not heard, that this kind is found in any other country.

Bitumen hard like asphaltum found in the center of an anomaly at Castleton.

Very hard solid Bitumen with a shining surface on transparent fluor. Ashover.

Bitumen of this kind, at Darley bridge.

Liquid Petrol in a mass of lead ore: Ashover.

Stones containing a considerable quantity of rock oil were formerly met with near Stoney-Middleton. They were so common, that the miners used to burn the oil in lamps. There is not at present any work carried on at the place.

Small cavities in the black stone above the shale, containing a thick black oil, are found in various parts of the county.

Earth coal.

Mr. Kirwan says, that by distillation coal yields first fixed air, then an acid liquor, inflammable air, and a light oil of the nature of Petrol, then a volatile alkali, and lastly dense pitchy oil. The residuum is nearly of the whole, which is mostly argillaceous earth. Mr. de Fourcroy says, that by the same pro-
cess he obtained alkalin phlegm, concrete volatile alkali, an oil of a deep colour which becomes more heavy as the distillation advances. He observes that at the same time there passes a great quantity of elastic and inflammable fluid, which is thought an oil in vapour, but may be an inflammable gaz of a particular kind, and that there remains in the retort a scorified coaly matter which is yet susceptible of burning. This he adds is the coak of the English.

Coal, as I already have had occasion to observe, is found in great abundance in Derbyshire. Tho' various in its nature and properties, it may all be comprehended under the two general divisions of soft and hard.

The soft coal, which lies much nearer to the surface, is found in most of those shafts, in which the other sort is met with. It is generally shattery, and often sulphureous. It is much used for burning limestone, and the manufacture of iron goods. A large quantity is also converted into coak.

The hard coal, which is more useful and valuable, is more various in its nature and properties. I shall endeavour to distinguish it according to its different quality at the several places, in which it is found.

At Smalley, West Hallam, and Ilkeston the coal is of a shining and lamellar texture. It is

N 2

not
not very heavy and solid. At first it blazes and burns very briskly, but soon buries itself in a white ash.

At Heanor and Shipley the hard coal is of a dull, scaly, compact, and solid texture. It takes fire with difficulty, and burns very slowly. But when once lighted, it diffuses a lively and durable heat, and burns a long time before it is entirely consumed. It is sometimes attended with a strong sulphureous smell and yields a reddish brown ash.

At Denby, Ripley, Swanwick and Alfreton, the hard coal partakes of the qualities of the two sorts, which have been described. It is of a scaly, moderately compact, and rather bright texture. It burns with a strong and regular heat, and lasts a considerable length of time. It is pretty free from sulphur, and mostly gives a white or grey coloured ash.

At Normanton and Blackwell the hard coal agrees in most its properties with that, which is last mentioned. The chief circumstance in which it differs, is, that it is harder and more refractory and therefore more apt to sparkle and fly in the fire.

At Chesterfield and Eckington the hard coal is but little sulphureous and yields a large quantity of ashes. That which is found at New-
Native Fossils.

hall and Measham is very nearly of the same kind.

The coal near Buxton is shattery, and exceedingly sulphureous.

Peat.

This substance according to Mr. Kirwan yields from distillation water, acid, oil, and volatile alkali, and its ashes contain a small proportion of fixed alkali. These are either white or red according to the quantity of ochre or pyrites which they contain.

Peat is found throughout the north-west extremity of the Peak, and in most parts of the East Moor. When first dug up, its texture is soft, smooth and oily, but being cut into oblong pieces resembling bricks, and exposed to the influence of the sun and air during the summer season, it becomes brittle and inflammable and is in many places used for fuel.

Turf.

This substance generally covers the peat, tho' in some situations it is found alone. It consists of a yellowish or brownish bituminous earth interwoven with the roots of moss, heath and other plants.
Native Fossils.

Both the above substances are possessed of a remarkably antiseptic quality. Animal bodies may be preserved in them for almost any length of time, tho' when taken out and exposed to the air they soon perish.

METALLIC SUBSTANCES.

From the account, which has been given of the ores and mines of Derbyshire it will be easy to see, that the substances, which come under this class, must be various and abundant. But this will be rendered still more evident by enumerating and describing the natural and chemical characters, by which every individual substance of each particular species is distinguished.

Lead ores.

A greater variety of lead ores has been found in Derbyshire than perhaps in any other part of Europe in the same extent of country. The following list will give a tolerable idea of them.

Dr. Watson observes, that lead ore is not always of the same goodness in the same mine nor even in the same part of the mine, and (what is more remarkable) the different parts of the same lump of ore have in equal bulks different weight. The weight of a cubic foot of the lightest,
lightest, which he had met with, was 7051 ounces and the weight of a cubic foot of the heaviest was 7786 ounces. This difference of weight, he thinks, is most probably owing to a diversity in the size and configuration of the pores. Another observation made by Dr. Watson upon lead ore, is that it contains lead and sulphur, a liquid, and air. He says he has separated inflammable air from it by dissolving it in the acid of sea salt.

Galena is found in many parts of Derbyshire. Its figure, texture, and colour are various.

Solid massy lead ore—Ashover.

Large cubes of lead ore (galena tessulis majoribus micans) from Gregory mine, Ashover. Some of these measure nearly two inches.

Large cubes of lead ore from the Bogrod mine near Wirksworth.

Small cubes of lead ore (Galena tessulis minoribus micans) from the same mine.

Cubic lead ore from a mine on the top of Maffon hill, Matlock.

Lead ore in the black marble—Ashford, and lead ore about the size of peas interspersed throughout the toadstone on Tideswell moor.

Ramose lead ore from Dimple mine near Matlock Bridge. This ore shoots out into large branches, from which smaller ones proceed. It is rare and extremely beautiful.

N 4

Lead
Lead ore in large pyramids of the most lively colours, from Eyam. The beautiful tinge, with which this ore is covered, is ascribed by some to a superabundant quantity of phlogiston. Others have thought that it is occasioned by the vapour of the liver of sulphur.

Lead ore in triangles from Eyam. This also is found coloured in the same manner with the last.

Steel grained lead ore, from Matlock, Youlegrave, and Eyam. Dr. Watson observes, that the mean weight of a cubic foot of 6 pieces was 7342 ounces, and that this kind of ore is much richer than the ordinary diced ore of Derbyshire.

Antimoniated lead ore—Eyam and Ashover. This kind of ore appears massy on the outside, but its fracture shews needles flat and shining like those of antimony.

A large mass of lead ore partly solid, and partly antimoniated with several veins of Petroleum running thro' it was found in the Gregory mine Ashover. Part of this rare and valuable fossil is in the collection of Sir Walter Synnot of the kingdom of Ireland. The remainder is in the possession of Philip Ralphleigh, Esq.; in Cornwall.

A large lump of lead ore mixed with coal found at the works at Denby.
Brown sandy lead ore in the gravel pits at Normanton near Ashborne. It melts of itself with a gentle heat.

Brown lead ore. Matlock.

Potter's lead ore. Eyam.

Semi transparent white lead ore, the spatum plumbi of Cronstedt; Hubbadale mine near Bakewell. According to M. de Fourcroy white sparry ore is the calx of lead deposited slowly by water and crystalized. He says its crystals are usually in mutilated hexagonal prisms, or in striated cylindrical columns. M. Laborie has assured us, that white lead is nothing but a pure white earth of lead united to fixed air, and crystalized by water. In confirmation of this opinion M. Romé de l'Isle has remarked, that it is not uncommon to find galena, which is beginning to pass into the state of white lead.

Sparry lead ore, Winster and Eyam. Mr. Longdon of Eyam has a noble specimen of this curious and valuable kind of lead ore.

Friable white lead ochre, native cerussé, from Raven-tor mine near Wirksworth. Friable brown lead ochre from the same mine.

Indurated calciform lead ore of a pure white colour from Middleton near Wirksworth. Indurated calciform brown lead ore from the same place.

Masses
Masses of lead have been found in the earth, detached from any vein, near Wirksworth. These pieces are of very extraordinary form. By some it is imagined, that they have been torn by great violence from their native beds. But it appears more probable, that they were produced and left by the working of some ancient mine, when it was customary to procure the lead from the ore by setting fire to the veins, in which it was found.

Copper ore.

The copper ores of Derbyshire are not remarkable for their number or variety.

Liver-coloured copper ore of a solid texture, from a mine at the end of Lovers walk, Matlock.

Very dark brown copper ore, Rufflow edge near Chapel le frith.

Green fattin copper ore from a mine on the edge of the river Derwent, Matlock. This colour is said to be occasioned by the marine acid.

Lumps of copper ore have been found in various other parts of the county. But hitherto they may be considered rather as an object of curiosity than value.
Iron ore, or stone.

The texture and colour of the iron ores of Derbyshire are various. The most common are those of an argillaceous kind. There are however a few others of a different sort, of which it may be proper to take some notice.

Red ironstone. Heage and Holmesfield.
Light grey ironstone. Chesterfield and Wingerworth.

Dark brown ironstone—Wingerworth and Chesterfield. At the latter place it has sometimes veins of pure white clay running thro' it.

Ironstone at Chesterfield, which being exposed to the air falls to pieces and discovers something white like spar. Mr. Bergman found, that white ore of iron contains 38 parts of calcined iron, 14 of manganese, and 38 of aerated lime.

Striated iron ore, minera ferri grisea striata, is found near Bonsal. This texture seems to be produced by antimony.

Stellated iron ore. Bonsal and Swanwick.

Cavernous ironstone is found over most of the lead mines at Wirksworth. It is called toft by the miners, and lies totally neglected.

The toadstone found at Matlock is exceedingly rich in iron. Much poorer matters are worked for that metal.
Native Fossils.

Ponderous nodules of dark red ironstone are found between Higham and Shirland. They are vulgarly called loadstones.

Sandstone is found near Belper with spots larger than a pea all through it of a rich iron sand. These particles seem to have been brought together by attraction, as there is no appearance of iron in any other part of the stone.

Ferruginous Geodes are found in the banks, about Littleover.

Ironstone, boulders are found in the bind, over the coal pits, at Swanwick and Ilkeston. But of these I shall take more particular notice under the head of extraneous fossils.

A stratum of a substance called cank is found in sinking shafts for coal at Alfreton, Ilkeston, and Newhall. It is said to contain iron, but I believe, is never smelted with a view of obtaining this metal from it. It is so very hard, that in boring for coal they cannot pass thro' it without extreme difficulty.

Bloodstones or Hæmatites are found at Derby, Spondon, Sandiacre, and Hartington. I believe, they may be also met with in all those parts of the county, in which red clay and marl appear on the surface of the ground. Some valuable ones have been picked up and disposed
disposed of at Birmingham, where they are used for burnishing goods plated with gold. The best are said to be found in a bed of sandy red clay.

Ochres.

Martial ochres (ferri terra precepitata non mineralisata) are more abundant in nature, than any other kind of iron ore. They are supposed to result from the decomposition of ores of iron, which is produced by water, but more especially by fixed air. The acid of this air, with which the moisture, that circulates thro' the earth, is impregnated, gradually takes away the phlogiston from the iron, and reduces it into the state of calx.—Martial ochre is owing to the ore of sulphureous iron, and is found in most parts of Derbyshire. The best, of which I have any knowledge, is of a rich yellow colour and is met with in a cavern called the Water hull near Castleton.

Pale yellow ochre, from a mine near Winster. This kind of ochre may be observed in many foughs, belonging to the coal pits, and is the most abundant, when the coal contains much sulphur.

Dark brown ochre from the lead mine under the high Tor, Matlock.

Yellow
Yellow ochre from most of the chalybeate springs.

Balls of yellow ochre, found in the shale at Hassop.

These colours deserve the attention of our most eminent painters, as they are said to be the most durable pigments in nature.

In Derbyshire the earth is in many places very rich in iron. Some on Bragginton moor has been worked with a view of obtaining this metal from it.

In the neighbourhood of Buxton and Chelmorton there is an earth lying near the surface of the colour of a fox, and known in that part of the country by the name of fox earth. Tho' it has not been particularly examined, I suspect it contains a considerable quantity of iron. In this earth the Buxton diamonds are found, and it is in its nature so exceedingly barren, that it is scarcely improveable with manure. On this account the farmers with all possible care avoid turning up and mixing it with the common soil.

Near the coal pits at Denby, Smalley, and Heanor, is found a clay sometimes coloured superficially by a dilute blue, and sometimes when newly dug up it is observed to acquire this colour upon exposure to the air. Ac-
cording to some experiments made by Dr. Whitering upon a clay apparently similar, the basis of this colour is an irony matter full of phlogiston; for by ignition upon a charcoal fire it flames, turns red, and becomes magnetic.

SEMI-METALS.

Calamine, minera zinci terrea:

Professor Bergman found, that there are, in 100 parts of Hungarian lapis calaminarisis, 84 of calcined zinc, 3 of calcined iron, about 1 of pure clay, and 12 of silicious earth. It cannot be expected, that this proportion should hold good in common specimens. However Mr. Kirwan observes, that a good ore should yield at least 30 per cent. and its specific gravity be about 4,400 or 5,000.

Native zinc in greyish, thin, flat, pliant, and inflammable needles found in the cavity of a piece of brown lapis calaminarisis at Bonsal. This specimen is in the possession of Mr. Bourn of Eastwood in Nottinghamshire.

Zinc crystalized, on the outside, in several wedges like crystals, from a mine near the high Tor, Matlock.

Crystals of zinc, transparent, of a garnet colour, from a mine near Ashover.

Plain
Plain solid calamine. Bonfall.

Bone calamine, extremely cavernous, from Maston hill near Matlock. This species of ore is furrowed, and cellular, and appears, as if it was worm-eaten.

Calamine in the form of dog tooth spar. Matlock. In this case, and in all regular forms the calamine seems to have been deposited on a spar, which it has destroyed, and assumed the figure of. For I believe, that calamine has never been known to crystalize.

Rhombic calamine found near Winster. This has taken its form from rhombic spar.

Waxen calamine found at Matlock. It is very cavernous, and exactly of the colour of bees wax.

Waxen calamine, from a mine near Matlock, formed upon a perfect spar, pointed at both ends.

Nodules of white calamine, from a mine near Bonfal.

Stalactitical calamine, very ponderous, found near Bonfal.

Stalactitical calamine found near Matlock.

Calamine, coated over points of spar, which it had half destroyed, from Eyam.

Zinc mineralized by sulphur and iron, pseudogalena of Cronstedt, is known in Derbyshire by the name of mock ore, and has so great a resem-
resemblance to lead ore, as to be frequently mistaken for it. These ores of Zinc are of various colour, and extremely refractory in the fire. At present they are not at all used for converting copper into brass. As they are found in abundance, it is a pity, they should be so entirely neglected. The Germans know very well how to smelt ores of this species, and draw very considerable profits from them.

Black pseudogalena, called by the Derbyshire miners black jack, from a mine near Wirksworth. Professor Bergman says, that upon a just calculation this variety contains in 100 parts 29 of sulphur, 1 of regulus of arsenic, 6 of water, 6 of lead, 9 of iron, 45 of zinc, and 4 of siliceous earth.

Brown pseudogalena, Eyam. According to P. Bergman, ore of this colour contains in 100 parts, about 17 of sulphur, 5 of water, 44 of zinc, 5 of iron, 5 of clay, and 24 of quartz. He thinks it is probable, that the zinc is more dephlogisticated in this than in the other instances.

Pseudogalena possessing a metallic splendor, at Cromford. From Dr. Bergman's analysis of this kind of ore it appears, that 100 parts contain 52 of zinc, 8 of iron, 4 of copper, 26 of sulphur and 4 of water, together with 6 of a siliceous and martial matter.

0

Black
Black wad.

Mr. Wedgewood found by analysis, that 22 parts of this mineral contain nearly 2 of indissoluble earth, chiefly micaceous, 1 of lead, about 9½ of iron, and the same quantity of manganese. It is of a dark brown or blackish colour, and is met with in different states. It is sometimes found in the form of a powder but its most usual appearance is that of a brittle hardened clay. The late Mr. Roe, painter of Derby, above thirty years ago discovered, that by mixing it with linseed oil, first a heat and afterwards a flame would be produced.

Black-wad has been found to be very useful as an oil colour in house, and ship painting. It is chiefly employed for the latter purpose, and the principal demand has been for the royal navy. This use of black-wad, I believe, was first found out by Mr. Dawson of Winster. He made it known to Lord Sandwich, when first lord of the admiralty, and has derived considerable advantage from his discovery.

Black-wad is chiefly found at Elton near Winster. It is generally calcined, before it is used. There is a work for this purpose at Wensley,
Wensley, a village a few miles distant from the place, where it is found.

I have been informed, that some years ago black-wad was met with at Parwich.

I am not sufficiently acquainted with the nature of the following mineral substances, to be able to arrange them properly under any of the foregoing classes. I shall therefore subjoin a separate account of them in this place.

Slickensides.

Slickensides with one polished surface, from Lady-wash mine near Eyam, and from Gregory mine at Ashover.

Slickenside with a smooth surface on each side, from Haycliff mine Eyam, and Ashover.

The crackling and explosions caused by scraping these slickensides with a pick-ax are well known, but hitherto not satisfactorily accounted for. They are said to lose the above property very soon after they are taken out of the mine. In regard to their external appearance, their smooth side greatly resembles black lead very thinly spread over the surface of any smooth body. But the rough side looks very much like to common limestone.

Zeolites in the form of wedges have been lately found in a vein on Hopton Moor. These
have not been sufficiently examined, and the above specimen I have not had an opportunity of seeing.

Carpolithi of a white ground spotted with green of a lively colour. The basis is caulk, the green part is an indurated pyritical earth. They were found at ———-.

SECTION II.

Extraneous Fossils.

HAVING thus given a general idea of the native fossils of Derbyshire, which have either fallen under my inspection, or come to my knowledge, I now proceed to describe the extraneous ones. These are extremely worthy of notice on account of both their amazing number and variety. They occur in almost every part of the county. The mountains of limestone, which extend thro' the high and low Peak, seem to be composed of marine productions. Entrochi, a species of star fish, are found almost everywhere. I have seen continued beds of them, above twenty miles in length. The number of Anomiae is prodigious.
gious. Had Ovid visited here the ruins of a destroyed world, he might have justly said,

Vidi factas ex æquore terras et procul a pelago conchæ jacuere marinae.

Corraloids.

The cone in cone corraloid is found, in a bed ten inches deep, on the surface of the shell marble at Tupton near Wingerworth. The cones are exceedingly distinct. No finer or more perfect fossil of this kind has been found anywhere.

A fine specimen of cone within cone corraloid, found at Blackwell.

Another of the same kind, found in sinking a shaft for a fire engine at Aldercar in the parish of Heanor. It was met with at the depth of 47 feet.

Corraloids, with small tubes, from Eyam. The recent coral of this kind is found in the red sea. It is known by the name of tubularea purpurea. This fossil perfectly agrees with it in every particular.

Pori fungitæ from Stoney Middleton. The specimens very perfect.

Madreporæ, coral, branched, with stars at the extremity of each branch. A specimen with angular branches from Matlock.
Madrepores with round branches from Eyam. These are Madreporae ramosae ramis rotundis of Imperatus.

Millepores, coral, branched, with the surface and extremity punctured, as if pierced with the point of a needle, from Middletondale and Bonsal.

Tubipores, a congeries of coralline tubes parallel, or variously curved, from Middleton dale.

Fungitae, from Hopton moor.

Conic fungitae, from Ashover.

Astroites, coral, of tubular texture, with small stars on the surface, and honeycomb-work within side, from Ashford.

Porpites, from Eyam.

Retepores, from Castleton.

The sea fan (Corraulina reticulata) from Castleton.

Plates of Echini very curiously formed, the plates pentagonal with a small point rising in the middle, from Castleton.

Spines of Echini from Castleton.

Entrochus, cylindrical, sometimes three inches, generally about one inch long, composed of several flat round joints with radii on each dish and perforated thro' the middle, from Castleton, Moneyash Moor, Matlock, Dove-dale and Wirksworth.

Trochites
Extraneous Fossils.

Trochites from Bonsal Lay.
Oval Trochites from the same place.
Screw stones, very elegant, from Ashover.
These are parts of star fish.
Screw stones in chert. Matlock.
Ammonites, Cornu Ammonis or Nautilus, serpent stone, flat, spiral, representing a worm or small serpent coiled up, ridged and studded, in the black marble. Ashford.

Belemnites, cylindrical, but conical at one and sometimes at both ends, generally about the length and thickness of a finger, with a conical cavity at the base. Castleton.

Jointed belemnites in the black marble. Ashford.

Anomiae, bivalve, one valve gibbous, and often perforated at the base, the other plane, and less, the hinge without tooth, from Castleton, Dovedale, and Matlock.

Large anomiae from Crich.

Large bamped anomiae from Matlock.

Gryphites, bivalve, oblong, somewhat resembling a boat, but narrow and remarkably curved upwards at one end, the valve plane, found in the red clay over the Gypsum. Chelaston.

Terrebratula, from Castleton.
Ostreopectines, from Castleton.
Buccinites, from Castleton.
Tellinae, from Ashover and Hartington.
Siliceous petrified wood is found in the gravel pits near Derby. A fine piece was a few years ago taken out of the pavement of the town of Derby.
Petrified rushes found near Matlock.
Yew in the same state. Matlock.
A petrified substance greatly resembling a cauliflower. Matlock.
Muscle shells in ironstone, in the marble at Tupton, near Wingerworth.
Muscle shells in the ironstone. Chesterfield.
A regular stratum of muscle shells found eleven yards deep at Swanwick.
Muscle shells in ironstone 84 yards deep at Cotmenhay in the parish of Ilkeston.

Animals and insects.

A small alligator in the black marble at Ashford.
The tail and back of a crocodile are said to have been found at Ashford, and to be preserved in a cabinet at Brussels.
Groups of flies in the black marble, Ashford.
A beetle in ironstone, Swanwick.
A butterfly, from Swanwick.
Vegetable impressions.

An entire sunflower, with all the seeds perfectly marked, found in an ironstone over the bed of coal at Swanwick. This rare fossil is in the possession of Mr. Tatlow of Swanwick.

A resemblance of a bamboo from Swanwick.

A flower of chrysanthenum very perfect from Swanwick.

A flower of coltsfoot from Swanwick.

Several kinds of fern very perfect in ironstone from Swanwick.

Equisetum or horsetail very perfect. Swanwick.

A plant of maiden hair from Swanwick.

Several plants of fern in bind from Swanwick.

A small branched moss in ironstone. Swanwick.

The cone of a pine tree, in ironstone. Swanwick.

The branch of a box tree, in ironstone. Swanwick.

A resemblance of the flower of a cactus. Holmesfield.

Most of these fossils are in the collection of Mr. Tatlow. Besides those I have now enumerated, he has several other with vegetable
impressions upon them. But as the plants are supposed not to be British, it is only a skilful botanist, who can give them their proper names. The ironstone and bind at Chesterfield and Newhall likewise abound with vegetable impressions, many of which are the same with those, which have been mentioned. Indeed there are very few beds of ironstone in Derbyshire, in which they do not in some measure appear.

I mean not to offer the above as a complete catalogue of the Derbyshire fossils. It is impossible it should be so in a country, in which new mines are opened every day. The principal merit, which it has to recommend it to the curious enquirer, is, that it is an authenticated list, not copied from the works of other writers. Many of the specimens mentioned have come under my own inspection, chiefly in the collection of a gentleman, who resided four years in this county for the purpose of examining its mines and fossil productions.

If what I have written in this chapter is of use to the curious fossilist, the principal end for which I have designed it, will be answered. My satisfaction will however be much increased, if it tends in any measure to promote the study of this branch of science. What more elegant
elegant amusement can offer itself to the man of leisure and of fortune? What that can raise the mind more to the admiration of the great creator? What that can be more beneficial to the arts and manufactures of our country? Surely those, who are blessed with affluence, cannot consider these as useless and ignoble pursuits.

The character of a mere collector of fossils has been with some justice derided. But even persons of this description are not entirely useless to science. In their museums the skilful mineralogist often meets with bodies, by which he extends his knowledge. The matters amassed by them at length fall into the possession of the experienced chemist and philosopher, who knows in what manner to benefit society by them. None but the ignorant and illiberal can condemn those, who devote their time to useful discoveries. It will admit of a doubt whether any class of men be more serviceable to their country, excepting those, who improve its agriculture and manufactures.

Perhaps it may be expected, that I should have entered more deeply into the subterranean geography of Derbyshire, or at least have more particularly applied the observations, which have been made, to the illustration of this part of
of natural history. But too few lights have yet been thrown upon the subject to enable me to do it in the satisfactory manner I could wish. Men are apt to make inductions from a certain number of remarks formed in some particular districts; a method of proceeding which must be extremely prejudicial to real knowledge. As this is frequently the case, it is much to be wished, that those, who reside in mineral countries would keep accurate lists of the strata, veins, their particular directions, and dippings, &c. &c. From a collection of such remarks, judiciously formed, greater advantage would be derived, than from all the theories, which have been suggested by the imaginations of fanciful men. The earth has undergone such various changes since its formation, the original beds have suffered so great alteration both from water and fire, that we can scarcely hope, that any perfect system should ever be established. If man, with all his reason and study, cannot thoroughly understand the laws of attraction, by which a single crystallization is formed, how can he expect to comprehend those, by which the almighty thought fit to create and govern the world? His works far surpass our feeble ideas, and we may with propriety say with that excellent naturalist Bertrand,
Bertrand, "Reconnaissons qu'il faut toujours remonter et souvent s'arrêter à la systématique de l'univers façement formé par le créateur infiniment puissant. C'est la première cause et la dernière raison de tout."

---

**CHAP. VI.**

**Medicinal waters and baths.**

The analysis of mineral and medicinal waters is a business, which for some years past has engaged the attention of the most eminent chemists in Europe. Professor Bergman at Upsal in Saxony, M. Monet, M. Duchanoy, and M. de Fourcroy in France, and Drs. Faulconer, Percival, and Pearson in our own country, have each distinguished themselves by the discoveries and improvements, which they have made in this branch of knowledge. However, tho' considerable light has been thrown upon the subject by their ingenious labours, the analysis of mineral waters is not yet arrived at that degree of precision, to which it may perhaps be some day carried. Many
Many circumstances and qualifications are requisite for a successful prosecution of such an undertaking. Whoever attempts this difficult part of chemistry should have a correct knowledge of the ingredients usually contained in these waters, be perfectly acquainted with all chemical phænomena, and exercise peculiar address, in order to perform the operation with sufficient accuracy. He should also attend to the situation of the spring, and nature of the soil. The natural as well as chemical properties of the water should likewise be examined; its taste, smell, colour, weight, transparence, and temperature. When I consider the indispensible necessity of all these qualifications and circumstances, I should not attempt to give an account of the mineral, medicinal waters of Derbyshire, had I not received considerable assistance in the execution of such a design. I have not only availed myself of the experiments and observations, which have already been made, on the most renowned springs in the county, but have been favoured with other no less valuable communications respecting them, which I am furnished with an opportunity of laying before the public.

The discovery, which has lately been made of the ingredients contained in mineral waters, has raised in the minds of some persons a doubt concern-
concerning their real efficacy and usefulness. Perhaps in some instances they may have been extolled above their just desert. But it is an unquestionable fact, that they daily give relief in many cases, and in others entirely remove the disorders, for which they are recommended. Besides, the cause would not appear so inadequate to the effect produced, if a proper degree of attention was paid to the several substances, with which mineral waters are impregnated. The fixed air, which they generally contain, is known, when administered alone, in many cases to have a very powerful and salutary influence. Nor are the saline matters, which are found in them, less efficacious and useful. M. de Fourcroy observes, that the strong taste and extreme dissolubility of calcareous marine salt, and marine salt of magnesia chew, that they ought to have a great deal of power on the solids and fluids of the human body. He adds, it is owing to this mixture, that common salt has an irritating action, is sharp and purgative, and has greater energy than refined salt.

The great utility of mineral waters will be still more easily conceived and admitted, if it be considered, that they require much time to produce their full effect. In some cases a large quantity of the fluid must be drank, before any
any benefit can be received from them. It is well known, that success often attends the simplest remedies, when they are employed with patience and perseverance. And mineral waters may be justly ranked among these remedies of slow operation. Considering them in this light Professor Bergman observes, they effect surprizing cures every day and such as could not be expected from any other mode of cure hitherto discovered. We are not to attribute these effects to simple water considered by itself, for according to this supposition they would be produced in every place alike, but to the substances mixed with it and dissolved in it, by which it is sharpened, and as it were armed with such efficacy.

I hope, that by means of the observations, which are made in the following pages, on the mineral waters of Derbyshire, their nature will be better understood. They may also tend to throw light upon those, which are found in other situations, and which upon examination appear to contain the same substances. For the effects produced by one may be expected to arise from a use of the other. Or on the contrary should it be discovered, that by analysis they resemble any other mineral waters in their ingredients, it may be known from an atten-
attention to the disorders, for which these are recommended, in what cases those of Derbyshire may be used with advantage.

In a country abounding with fossils the waters naturally must contain in solution earthy, saline, and metallic substances. It may therefore be expected, that in Derbyshire mineral waters will be met with in great number and variety. I profess not to enumerate and examine them all. To do this, would be almost an endless task. On this account I mean to confine the observations, I shall make, to a few of the most remarkable.

In treating on medicinal waters most writers have formed them into classes. But the diversity, which appears in their arrangements, plainly shews, that such distinctions are in a great measure arbitrary, tho' perhaps not entirely useless. I shall not therefore be solicitous about the accuracy and precision of the order, in which I shall place the mineral, medicinal waters of Derbyshire. My leading aim will be to dispose of them in such a manner, as shall appear calculated to give the most clear and distinct idea of their impregnation and uses.

It may be deserving of notice, that all the mineral waters of Derbyshire of a chalybeate and sulphureous nature, where I have had an oppor-
opportunity of examining their situation, arise in beds of shale. And from this circumstance it seems probable, that they derive their impregnation from this substance. Such a conjecture is strengthened by observing, that, in dry seasons, several of the springs become weaker. This is remarkably the case in regard to the martial vitriol water at Heage. The degree of its strength is entirely determined by the state of the weather. I am credibly informed, that, when there has been no rain during some months, the vitriolic taste by which it is distinguished, has been scarcely perceptible. As there is no moisture in the ground to dissolve the substance, from which the water derives its impregnation, the well is supplied with that only, which distills from other parts of the earth in its neighbourhood.

In respect to the warm springs, it is also observable, that they appear at the surface near these beds of shale. Though they break out in the stratum of limestone, yet they are found only in those parts of the county near which it ceases to appear. Buxton, Matlock and Stoney Middleton all lie upon the borders of that extensive tract of limestone, which appears on the north-west side of Derbyshire. I mean not to infer from this situation of the warm springs
springs, that they receive their impregnation from shale. I have only taken notice of it, as this circumstance may possibly lead to discoveries respecting the origin of these warm waters.

**Medicinal springs and baths at Buxton.**

These are entitled to a very particular and distinguished notice on account of both their very antient reputation and great usefulness. It will scarcely admit of a doubt, that Buxton on account of its warm springs was frequented by the Romans at the time, when they were in possession of this country. In Camden's Britannia notice is taken of a Roman wall cemented with red Roman plaister close by St. Anne's well, near which were the ruins of an antient bath. And in the year 1781, when the foundations of the Crescent were dug, the shape and dimensions of this bath might be very clearly discerned. Its form appeared to be an oblong square, or parallelogram. It measured from east to west thirty feet, and fifteen in the contrary direction. The spring was situated at the west end, and at the east might be plainly perceived a flood gate, by means of which the water was let out. The wall was built with limestone and appeared to be
not built till nearly the middle of the present century. Besides the hall there are in the village several other houses designed for the same purpose. But none of them are equal to it in size or convenience of situation. However there has been lately erected and is now finishing a range of building, which in beauty and magnificence rivals, if not exceeds, any other in this part of the kingdom. It is constructed in the form of a crescent with a colonnade extending the whole length of the front. The span of the building is 257 feet. The colonnade within the pillars is 7 feet wide, and 11 feet high.—The crescent consists of 7 dwelling houses and an hotel. The dwelling houses contain 11 rooms each, and the hotel 20. Besides these there are 93 in the attic story of the whole building. The assembly room, which is on the east side of it, is 75 feet 6 inches long, 36 feet 2 inches wide, and 30 feet high. An elegant stone balustrade extends the whole length of the front, and the arms of the Cavendish family neatly carved in stone are fixed in the center. The whole number of windows in this magnificent building is 378.

It is not possible to ascertain with exactness the number of the company, who resort to Buxton every season. It is computed, that the public buildings and private lodgings will accom-
accommodate 500 persons, besides the regular inhabitants of the place. And it is well known, that, for some years past, several persons have occasionally been obliged to seek lodgings in the neighbouring villages.

From this sketch of the history of the warm medicinal water at Buxton, it appears, that it is possessed of a very antient and distinguished reputation. But, whether it has a just, and well founded claim to it, can only be determined by a regular detail of the cures, which it has effected, or by an examination of the different substances, with which it is impregnated. In regard to the former method of investigation, very little or nothing has been done. But to discover its chemical properties some pains and ingenuity have been employed. With this view several analyses have been made. However there appears some disagreement of opinion both concerning the ingredients, which the water contains, and the proportion in which they exist.

Dr. Percival,* who first analysed Buxton water with any degree of accuracy, says, that it contains calcareous earth, ossifil alkali, and sea salt, but in very small proportion. For a gallon of the water, when evaporated, yields

P 4

23

* Medical and experimental essays, page 63.
23 or 24 grains of sediment. It strikes a slight green colour with syrup of violets, suffers no change from an infusion of galls, from fixed vegetable alkali, or from the mineral acids; becomes milky with the volatil alkali, and with saccharum saturni, and lets fall a precipitate upon the addition of a few drops of the solution of silver in the nitrous acid. The specific gravity of this water is precisely equal to that of rain water, when their temperatures are the same, but it weighs 4 grains in a pint lighter, when first taken from the spring. The temperature of the bath is about 82 degrees of Farenheit's thermometer, that of St. Anne's well, as it is a smaller body of water and exposed to the open air, is somewhat less. The water is transparent, sparkling, and highly grateful to the palate. He adds, this celebrated spring abounds with a mineral spirit or mephitic air, in which its stimulus, and indeed its efficacy consists, and which is quickly dissipated by exposure to the air.

According to the account given by Dr. Higgins, Buxton water afforded, in a Winchester gallon, 17 grains and 16-20ths of sediment, of which 11½ grains were calcareous earth combined with acidulous gas, 1½ grain of selenite, 3½ grains of sea salt, 1½ grain of marine salt of magnesia, and 1-20th grain was iron.
iron combined with acidulous gas, exclusive of the quantity contained in calcareous earth in the heat of boiling water.

Dr. Pearson, whose analysis is the last, I have seen or heard of, asserts, that the tepid springs at Buxton afford, upon evaporation, 16 grains of solid matter in a gallon of water. Of this quantity he found $\frac{1}{4}$ of sea salt, $\frac{2}{5}$ of vitriolic selenite, and $\frac{11}{14}$ of calcareous earth. He informs us also, that a pint of this water is from 6 to 8 grains heavier than distilled water, and that its temperature in the gentleman's bath is from 81½ to 82, and in new St. Anne's well from 81 to 81¼.

In respect to the mineral spirit, contained in Buxton water, Dr. Pearson has departed from the general opinion of those, who had gone before him. He says, it is not fixed air, because it does not resemble it either in taste, or the appearance of its bubles. And, as it is without smell, he concludes it is not hepatic vapour, or phlogiston. He stiles it a permanent vapour compounded of air and phlogiston and considers it as the same with the choke or fire damp found in coal pits. He also discovered by a series of experiments, that it was unfit for the respiration of quadrupeds, birds, fish, and amphibious creatures. But he observes, that it may be taken into the stomach without
without injury, that light and flame are extinguished by it, and that it is not at all changed by being a long time in contact with common or lime water.

However, tho' Dr. Pearson denies the mineral spirit of Buxton water to be fixed air, he allows, that it contains a small portion of that fluid. He says, that this is half the quantity of that, which is found in common spring water.

It is imagined, that the springs at Buxton have one common origin. If this be the case, the water, as it rises towards the surface, must divide into several streams. For it has many different discharges. It is said, that it springs up not only in all the baths, but likewise in various parts of the earth between the hall and the crescent.

The baths, which are three in number, have been formed at different periods. The gentlemen's has been built time immemorial, that of the ladies is of more modern date, and the other, which is appropriated to the use of the poor, has been, only a few years, finished. They are all adjoining to one another, but in distinct apartments. In the gentlemen's bath the water rises on the south-east side in a stratum of limestone, and in the other two it issues thro' several seams in the floor. It has been calcu-
calculated, that all the springs throw out water at the rate of 60 gallons in a minute. Dr. Pearson found, the gentleman's bath was filled to the height of five feet in 50 minutes, and that two hours and fifty minutes were required to fill all the three baths.

I am informed, that, about three quarters of a mile westward from the baths, other springs have been discovered, and that during the last summer a scheme was in agitation for erecting buildings near them for the accommodation of company. There is very small room to doubt, that there are warm springs in this part of the valley. It has long been observed, that snow melts sooner here than in the neighbouring country: and it does not seem reasonable to ascribe this effect to any other cause than the existence of warm waters in this situation.

The medicinal virtues and uses of Buxton water may be in some measure learnt from an attention to the substances, with which it is impregnated. By a proper knowledge of the effects, which these have upon the human constitution, some opinion may be formed concerning the cases, in which it may be recommended with safety and advantage. However a well authenticated detail of the various cures, which it has performed, would throw equal, if
if not still clearer, light upon the subject. But no such register has hitherto been kept. All therefore, which can be at present done with a view of ascertaining the medicinal virtues of Buxton water is to mention a few disorders, in which its beneficial efficacy has been most evident and decisive. Now it may be asserted with the most unquestionable authority, that it has been repeatedly used with distinguished success for the gout, rheumatism, nephritic and bilious disorders, and for most complaints in the stomach and bowels. It has been also recommended in other cases. But as in them its salutary effects have not been so manifest and undoubted, it seems scarcely worth while to mention them.

There are a few circumstances attending the use of Buxton water, of which it may not be improper to take notice. When drank in considerable quantity, it is found to possess a binding and heating quality, and is productive of many feverish symptoms. With a view of preventing such disagreeable effects, it is usual to recommend a gentle purgative to keep the body open. However it sometimes happens, that Buxton water, when it is first drank, is followed by a directly opposite consequence. This I believe may generally be considered as a favourable
able sign. At least I have known instances, in which its salutary influence has been experienced, when it has operated in this manner.

There is an inconvenience attending the gentlemen's bath, which it is more easy to point out than to remedy. Those who make use of it, are obliged to dress and undress in the bath room itself and all the time are exposed to the warm and moist air with which it is filled. Perhaps in some complaints no bad effects may arise from this circumstance; but in other disorders it has been thought to counteract, rather than promote the good efficacy of the water. This may be reasonably supposed to be the case with persons of a relaxed habit, who make use of the bath as a cold one, with a view of bracing and strengthening the system.

Tho' the ladies bath is not subject to the inconvenience I have now mentioned, yet it will admit of improvement. If the dressing room opened directly into the bath room, such an alteration would render it more safe, and commodious.

The expences at the several houses, which are open for the reception of company are not materially different. But the company from the Hall, and the Eagle and Child (both the property of the Duke of Devonshire) have the privi-
privileged of bathing at an earlier hour than those, who come from any other lodging house.

The poor at their bath are not only exempted from all charge, but also meet with great assistance and support from the charitable contribution of the company, who resort to Buxton. It is customary for every new comer, if he stays more than one day, to give a shilling for their use, which is collected and taken care of by the steward of the house in which he happens to lodge. And the sum raised in this way during the course of the season has some years past been very considerable. The common weekly allowance to the poor is six shillings; and should any of them be more weak and necessitous than ordinary, it is usual to add four shillings to such a charity.

Buxton is a place of resort for pleasure as well as health. The common amusements are, in the morning, taking the air, and sometimes hunting, and, in the evening, plays or dancing. To the former purposes the neighbouring country is excellently adapted. Being high and open it forms a pleasing contrast to those, who are accustomed to low or flat situations. When a dance is intended at any of the houses, it is usual to send cards of invitation to the company, who
Medicinal waters and baths.

who lodge in other parts of the village, and those, who wish to join in the amusement, assemble immediately after supper.

Matlock water and bath.

The warm springs at Matlock have not been so long discovered, nor are they possessed of so high a reputation as those situated at Buxton. They were first noticed about the year 1698, when the bath was paved and built by the Rev. Mr. Fern of Matlock and Mr. Heyward of Cromford. It was afterwards put into the hands of George Wragg, who to confirm his claim and title took a lease of it from the several lords of the manor for 99 years, paying them a fine of 150 pounds and the yearly rent of six-pence each. He then built a few small rooms adjoining to the bath, which, it is said, were but a poor convenience for strangers. The lease and property of Wragg were afterwards purchased by Messrs. Smith and Penel of Nottingham for nearly 1000l. These gentlemen erected two large commodious buildings with stables and other conveniences, and made a coach road to Matlock Bridge. In a short time afterwards this road was carried down the valley towards Cromford, and a passage blasted thr"
tho' the rock near that place, by means of which a communication was opened with the southern part of the county.

Some years after another spring was discovered at the distance of about a quarter of a mile from the old one. In this situation likewise a bath was formed, a lodging house built, and other conveniences provided for the accommodation of the company, who might resort thither.

At a still later period a third spring was met with three or four hundred yards east of that, which was first noticed, but being of a colder temperature than either of the other, was neglected. It being however imagined, that the water flowing from it was mixed with another spring, several attempts were then made to separate them from each other; and in the summer of 1786 the means employed for this purpose were attended with the desired success. By driving a level into the hill, they have gone beyond the point, where the two sorts of water mix, and conveyed the warmer by a proper channel into a bath, which has been built near a lodging house, lately opened for the reception of company.

The water at Matlock, like that at Buxton, has gradually risen to the degree of reputation, which it now possesses. Some idea may be formed
formed of the esteem, in which it is held from the company, which frequent the place every season. It is calculated, that the bath houses, in conjunction with the private lodgings in their neighbourhood, will accommodate about 150 persons; and it is well known that, during the height of the last seasons, they were not large enough to receive all the company, which visited the place,

According to Dr. Percival, Matlock water is grateful to the palate and of an agreeable warmth, but exhibits no marks of any mineral spirit either by its taste, sparkling appearance in the glass, or with syrup of violets. It is very slightly impregnated with selenite or other earthy salts, and of this its comparative levity affords also a further proof. It weighs only 4 grains in a pint heavier than distilled water. The precipitation of a grey powder, by adding a solution of silver in aqua fortis to the water, renders it probable that a small portion of sea salt is contained in it.

Dr. Pearson says, it has been reported to contain in a gallon of water 40 grains of sediment, which is called nitre, alkaline earth, and sea salt. He observes himself, that it is impregnated with rather more fixed air, than Buxton water, and that a pint weighs eight grains heavier than distilled water.
I found, that with syrup of violets the water at the spring upon the hill was turned greenish and therefore conclude, that it contains a small quantity of fossil alkali. Upon the addition of galls and Prussian lixivium no change whatever was produced. That it contains calcareous earth will not admit of a doubt. This is manifest from the copious precipitate, which takes place upon adding the fixed vegetable alkali, but more especially from the large quantity of this substance, which is deposited in the kettles, and other vessels, in which it is usually boiled. On pouring vitriolic acid on a small portion of sediment, collected in this manner, a very strong effervescence ensued.

In respect to the temperature of Matlock water it is found, that Farenheit's thermometer rises in it to 66 degrees at the spring, and 68 in the bath. But the water at the spring upon the hill has about one degree less of heat. The spring, which was last discovered, was at first reported to be 6 or 7 degrees warmer than either of the other two, but is now said to be of nearly the same temperature.

Perhaps it may throw still additional light upon the nature of Matlock water to observe, that the following plants generally grow and flourish in it, water cressles, horse mint, brook lime, garlic, scurvy grafs. For I am informed these
these contain volatil alkali, both fluid and concrete, and empyreumatic oil, substances which are found in all animal bodies. From analogy it seems therefore not unreasonable to conclude, that the ingredients, which it contains, are friendly to the constitution of man.

Dr. Percival§ observes, that Bristol and Matlock waters appear to resemble each other both in their chemical and medicinal qualities. In Hectic cases, hæmoptoe, the diabetes, and other disorders, in which the circulation of the blood is quick and irregular, he apprehends Matlock water on some accounts claims the preference to that of Bristol. For as it is not sensibly impregnated with a mineral spirit, it should seem less disposed to quicken the pulse, and may therefore be drank in larger quantity. But it must be acknowledged, that the climate of Bristol is superior to that of Matlock; a circumstance of the highest importance to consumptive patients. Situated in a deep tho' delightful valley and surrounded by very high mountains, the sun disappears at Matlock earlier in the evening, the fogs are longer in dispersing, and, it may be presumed, rain falls here more frequently and copiously than in other places. For, at Chatsworth, which is encompassed also with hills and is

§ Medical and experimental essays, page 60.
about 10 miles distant, in 1764, 1765, 1767, 1768, about 33 inches of rain fell at a medium each year.

Since Dr. Percival made his observations on the impregnation and uses of Matlock water, Dr. Francis Armstrong, Physician at Uppingham in the county of Rutland, has addressed the public on the same subject. He says, I have taken great pains to examine particularly into the properties of Matlock springs and may with truth assert, that they are of the same nature with the Bristol water, equal in some cases, and preferable in many. Nor do I think that the air of Matlock is in the least unfavourable to consumptive patients, where the lungs are not injured in such a manner, as to render a recovery very doubtful, either from the use of medicine or water, nor have I, in my whole practice, had the least complaint of this inconvenience from any of my patients.

I ordered a most amiable lady last year to drink the Matlock waters in a confirmed phthisis pulmonalis, and in such a situation, that I must own, I never expected to see her return. Being greatly interested in her preservation, I gave her full directions how to proceed. With much difficulty she reached the place. The company, in a very uncandid manner, cries out,

† Medical Commentaries, vol. 7, page 379
out, "What a cruel physician, to send the lady so far from home to die!" I saw the lady but three days before she left home, otherwise she would have visited Matlock much sooner. She strictly persevered in the rules laid down, and in a fortnight was able to dine in public; in six weeks was perfectly recovered, having got rid of her cough and being greatly increased in muscular habit. I visited her on her return, and had I not been perfectly acquainted with her before, I should not have known her. She has continued well ever since, and I hope will for many years, as a blessing to her young family and a comfort to the best of husbands.

I hope I shall be excused reciting this case, it being one, amongst many, in which I have experienced the good effects of this water; and indeed patients, whom I have sent to Bristol, and who have returned, benefited in some measure, have afterwards been restored to a perfect and lasting state of health, from the use of Matlock water.

I have, in the course of seven years, sent a great number of patients to Matlock, and in cases where medicine had not the least prospect of being serviceable; all of whom have had perfect and lasting cures; and I may with truth declare, I have not failed in one instance. However contrary to the opinion of some my practice,
practice may be, I have, after repeated trials, found, that in many cases much advantage has been gained by the administration of medicines in conjunction with the course of water-drinking; being well-timed, so as to act in an uniform manner, they had excellent effects, the water being greatly assisted in its operation.

As for the bath (if I may be allowed the expression) it is the coldest hot bath of any I know in Europe; and from its temperature, it may with propriety be used either as a cold or hot bath.

I perfectly agree with Dr. Percival that a larger quantity of Matlock water may be drunk at a time, than of any other mineral water I am acquainted with, owing to the entire absence of any mineral spirit; yet it is always advisable to begin with small quantities. From the want of mineral spirit it is less apt to throw the circulation of the blood into irregularities, or quicken the pulse; and therefore it must have the preference to Bristol water in phthisis pulmonalis, haemoptoe, diabetes, fluor albus, &c. In all these, I have experienced the most happy effects from it, as well as in hectic and low fevers, in hysterie and hypochondriac affections, in a profluvium or deficiency of the catamenia, in bilious disorders, in constitu-
constitutions debilitated by long and severe vernal and autumnal intermittents, in disorders arising from long residence in hot climates, in broken constitutions brought on by hard and habitual drinking, and in weak or depraved appetites.

The value of this communication would have been much increased, if Dr. Armstrong had favoured the public with his general treatment of the patients, who have been fortunately under his care. He appears to lay considerable stress upon the use of medicines in conjunction with the course of water drinking. But it is obvious, that without a knowledge of those in particular, which he administered, Matlock springs may fail of having the effect, which he has found them to produce. However tho' the public at large cannot avail themselves of the information, which he has given, in the degree, which they may wish, yet perhaps the hint, which he has suggested, may be sufficient for the use of gentlemen of his own profession.

The expences, customs, and amusements at Matlock are nearly the same as those at Buxton. But in the last respect it is generally thought to be much superior. On this account it is more resorted to for pleasure than Buxton.
Water and bath at Stoney Middleton.

Dr. Bullock informed me, that the warm water at Stoney Middleton in its chemical properties, and medicinal virtues very much resembles that at Matlock. He also said, that in the bath the thermometer stands at 63 degrees, but in two other springs at a small distance from it it rises only to 60. Dr. Pearson says, that a pint of this water weighs 6 grains heavier than distilled, and 2 than Matlock water.

Stoney Middleton has hitherto been little visited or frequented on account of its warm springs. Perhaps if the bath, which is only enclosed by a high wall and exposed to the open air, was covered in and a convenient room built adjoining to it, such an improvement might induce a greater number of persons to try, of what efficacy the water is possessed. But supposing its medicinal virtues equal to those of Matlock, it cannot be reasonably expected, that Stoney Middleton will ever become a place of so general resort, as it is greatly wanting in that charming scenery, by which Matlock is so eminently distinguished.

Formerly there were at Middleton near Wirksworth a warm spring and bath. But
the water, by which they were supplied, is now entirely lost. It was taken away by a fough, which was driven some years ago with a view of laying some lead mines dry in the neighbourhood.

Besides the warm springs, which have now been enumerated there are a few other in the vicinity of Matlock. I have been informed, that there is one in particular in a mine betwixt the old and new baths, but on the opposite side of the river Derwent.

SULPHUREOUS WATERS.

Very different opinions have been and still are entertained concerning the actual presence of sulphur in those waters, which come under this denomination. On the one hand it is asserted, that they do not contain it substantially dissolved in them, but are impregnated with phlogiston and an acid the principles of sulphur. It is said, that these being in a volatile state are sublimed, meet on the surface of the water, and there unite into a true and perfect sulphur, which did not naturally exist in the water. On the other hand persons no less eminent for their chemical knowledge have maintained, that sulphur does actually exist in mineral waters and that to account for their impreg-
impregnation it is entirely unnecessary to have recourse to any such hypothesis.

A still different account has been given by later chemists of the mineralizing principle of these waters. Professor Bergman thought, that a genuine liver of sulphur is rarely present in mineral waters, although it is fallaciously indicated by an hepatic vapour, consisting of sulphur resolved into the form of vapour by means of phlogiston and the matter of heat. He supposed, that this vapour is decomposed in the atmosphere by means of pure air, which attracts phlogiston so greedily that it is able to separate it from nitrous acid itself. The connecting medium being separated above the surface of the water, the whole compound is dissolved, and the disengaged particles of sulphur adhere to the surrounding bodies.

Dr. Faulconer in his treatise upon Bath water endeavours to shew, that sulphur may be held in water by lime, and thus become a liver of sulphur; and Dr. Walker imagines that sulphureous waters of the volatile kind receive their impregnation from the decomposition of the liver of sulphur by means of the superabundant acid contained in aluminous slate. This opinion, he thinks, is supported by an attention to the nature of the ground in the neighbourhood of the wells at Harrogate.
M. de Fourcroy imagines, that some waters contain the liver of sulphur, and that others are mineralized by hepatic gaz. He accordingly divides sulphureous waters into hepatic, and hepatized.

From these different opinions it is manifest, that waters of this class contain sulphur in some form. It is also probable, that it does not exist in all in the same state. Having given this view of the sentiments of different writers on the impregnation of sulphureous waters, I shall now enumerate those, with which I am acquainted in Derbyshire. But before I do this, it may be proper to add, that these waters contain also either the fossil alkali, sea salt, a purging salt, iron, an earth or other matters, and commonly several of these in different proportions.

**Sulphureous spring and bath at Kedleston.**

The most renowned sulphureous water in Derbyshire is situated at Kedleston, in the park belonging to Lord Scarfsdale. That this water is impregnated with sulphur in some state or form appears not only from its strong taste and smell, but likewise from its changing silver to a dark copper colour. In the well it is of a blackish-blue colour tinged with purple and gives
gives the same appearance to all substances thrown into it. But in a glass it looks very clear and transparent. However when it has stood some time a dustiness comes on, which is soon followed by a total loss of scent and taste. In its passage from the well it deposits a whitish sediment, which has the appearance of sulphur.

Dr. Short a long time ago observed, that the black sediment and white scum attending waters of this class gave clear indications, on a hot iron, of their containing sulphur. From his examination of that at Kedleston in particular it appears, that it is impregnated with other substances also. He says, that eight pints of it evaporated left two scruples of sediments, 21 grains of which were a dark brownish earth and the rest salt.

Dr. Watson, who has examined Harrogate water remarks, that those, who have analysed it, have met with a brown substance, which they knew not what to make of, and has himself attempted to explain its nature. He attributes the colour of the sediment to an empyreumatic oil, with which he supposes, that sulphureous waters are impregnated. Perhaps this may account for the dark appearance of the earth, which Dr. Short found in the water at Kedleston.
Kedleston. I am informed, that when mixed with the chalybeate water at Quarndon it immediately becomes black.

The temperature of the spring is about 47 degrees.

Kedleston water is principally valued for the antiscorbutic quality, of which it is possessed. When taken inwardly it is diuretic, and has given relief to persons afflicted with the gravel. It has also been found useful from external application. In this way it is said to have been employed with advantage in most diseases of the skin, but more especially in ulcerous complaints.

This water, when drank in quantity, I am informed has a binding property, and persons of a coltive bodily habit cannot conveniently make use of it without a gentle opening medicine. But upon others its effects are said to be directly the reverse.

Besides the water, which is drank at the spring, a considerable quantity is carried every day to the town of Derby, and is there used by the inhabitants at their meals, as a substitute for malt liquor. It is sold at a penny per quart bottle, and the carriage of it affords subsistence to a few poor people in the neighbourhood.

Between 20 and 30 years ago Lord Scarsdale enclosed the spring with a handsome building. In the part fronting his house is a portico supported
ported by a colonnade and on each side of the well is a bath with suitable conveniences.

For the accommodation of those, who wish to try the efficacy of this water, his Lordship has built a good house in its neighbourhood. But some seasons it has been found scarcely large enough to receive all the company, who have resorted to the place.

**Spring and bath at Cawley near Dronfield.**

I have not seen or examined the sulphureous water at this place. Dr. Short says, that with tincture of galls it first turns muddy and afterwards green throughout. He also observes, that three pints and a half exhaled left of a white pungent saline sediment 17 grains, 4 of which were earth, and the remainder nitre. He adds, that it is gently purgative and is recommended in chronic obstruction, in cases of worms, and foulness of the blood.

At Cawley there is a bath as well as spring. But being exposed to the open air, it is not much used.

**Sulphureous spring and bath at Shuttlewood near Bollöver.**

The water at this place is so slightly impregnated with sulphur, that it can scarcely be perceived either by its taste or scent. According to
to Dr. Short the quantity of sea salt, which it contains, is also very inconsiderable.

The bath is not covered in or even inclosed with a wall, and the situation being exceedingly inconvenient, it is seldom used even by those who reside in the neighbourhood.

*Agnes and Mudge meadow wells.*

About three miles from Ashbourn and half of one on the left side of the road, leading from thence to Wirksworth, are two sulphureous springs, which are known in the neighbourhood by the names of Agnes and Mudge meadow wells. They are situated at the distance of about a quarter of a mile from each other. I have not seen them myself, nor have I heard, that the water has been ever analysed. But from the information I have been able to obtain, it appears very much to resemble that at Kedleston. There is no bath at either of the springs.

*Shottle spring.*

In the higher part of Shottle, a hamlet situated in the parish of Duffield, there is a sulphureous spring. From the scent and taste the impregnation appears to be but small. By evaporating a pint of the water a whitish resi-

duum
duum looking like sulphur was obtained. It had a sharp and acid taste, and when swallowed occasioned a dryness and irritation in the throat and stomach.

This water has not hitherto been much drank. Its medicinal virtues are therefore little known or understood.—It may be deserving of notice, that at the distance of a few yards from it there is also a chalybeate spring.

*Wirksworth Spring.*

At a small distance from the town, and near the road leading to Ashborne is a spring, which contains both sulphur and iron. But the quantity of each is very inconsiderable. It is said to be also impregnated with a purging salt and to operate by stools.

**Chalybeate Waters.**

It has been discovered by M. de Morveau and is now generally allowed by the best chemists, that waters of this class contain iron dissolved, and suspended by fixed air, or vitriolic acid. Perhaps in some instances both these agents may be employed. It is found, that those waters, in which fixed air is the menstruum, upon being boiled immediately lose this
this principle, and the iron is precipitated in the form of a brown powder. Whereas, if this metal is held in the water by vitriolic acid, the most intense heat cannot separate them from each other. They will continue united, till the water is entirely evaporated, and, if mixed in a just proportion, a true crystal of copperas will be produced. The reason, why I apprehend, that in some waters the iron is dissolved by both fixed air and vitriolic acid, is that the mineralizing principle is not in every instance expelled with the same degree of ease. Sometimes a very gentle heat, applied for a short time, will be sufficient to produce this effect. I have also found it necessary sometimes to continue the water a considerable time upon a very hot fire, before galls lost their power of changing its colour.

Besides iron these waters are said usually to contain sea salt, the fossil alkali, a purging salt and sometimes other mineral substances.

Chalybeate waters are said to be the most useful, and beneficial to health of any of the mineral waters. But this assertion must be understood in a restrained sense. It cannot with propriety be extended to those waters, which contain iron held in solution by vitriolic acid. For their usefulness and innocence must be greatly affected, if not entirely destroyed by

R such
such an ingredient. Accordingly those waters are justly esteemed the most valuable, which part with their menstruum in the most quick and easy manner.

Waters of this class are said to encrease the tone of the fibres, quicken the circulation, and restore a proper consistence to the blood, when in a too thin and watery state; and on these accounts they must strengthen and invigorate the whole frame. That they will produce these salutary effects may be inferred from the tonic and stimulating powers of the two principal ingredients, with which the water is impregnated. It may therefore be expected, that they will be found useful in most disorders arising from weakness, and in spasmodic affections owing to too great irritability and relaxation of the nervous system. They are also recommended in hysterical and hypochondriacal disorders, in loss of appetite and digestion, and in a variety of other complaints.

In using chalybeate waters some degree of caution is necessary to secure their beneficial influence. Costiveness should be avoided and gentle exercise used. Acids, tea, and all astringent substances, which decompose these waters, should not be taken immediately before or after drinking them. It is also advisable,
to begin with a small quantity or to dilute the water with milk. If it be too cold for the stomach, a little warm water may be added.

There is no kind of mineral water in Derbyshire found in so great number, as those of a chalybeate nature. Nor will it appear difficult to account for this fact, when it is recollected thro' what a large extent of country iron ore and shale are met with. Being thus numerous, I shall take notice of a few only, which are in the greatest repute.

Chalybeate water at Quarndon.

The most celebrated chalybeate water in this county, with which I am acquainted, is situated at Quarndon about two miles distant from Derby. Dr. Short says, that a pint contains a grain of fixed salt, and that two gallons, when evaporated, left half a dram of a light coloured sediment, half of which was nitrous earth.

I found, that with gall shavings Quarndon water was turned to a very deep purple, approaching nearly to a black, and that, upon adding a few drops of the Prussian lixivium, about $\frac{1}{4}$ of the mixture in the higher part of the glas became a fine light blue, and the remainder at the bottom was changed to a deep green.
Medicinal waters and baths:

green colour. The fixed air, by which the iron is held in solution, may, in a few minutes, be set at liberty with a moderate degree of heat.

The temperature of the water is about 49½ degrees.

This water, when taken in sufficient quantity, is found by some to be purgative. However, if it be drank by others without using exercise, it does not pass the stomach with ease.

Persons of a weak and relaxed habit have been much benefited by the use of this water. After drinking it a few days they have found their spirits and strength return in a surprising manner, and in the space of a month a cure has been entirely effected.

The chalybeate spring at Quarndon is a good deal frequented every summer. It is drank not only by those, who take lodgings in the village for that purpose, but sometimes also by the company, who resort to Kedleston, which is only about half a mile distant from hence.

Chalybeate spring at Buxton.

At the distance of about 150 yards from the warm spring at Buxton, there is a chalybeate water, which bears a great resemblance to that at Quarndon. The chief circumstance, in which it differs from it, is, that when heated
it retains its fixed air rather longer, and when drank, has a more rough and irony taste. Dr. Pearson says, that it contains iron dissolved in vitriolic acid, but does not mention by what means he discovered this to be the menstruum. I am apprehensive, that there is reason to suspect his accuracy in this instance. For, after boiling a small quantity of this water with an intense heat about five minutes, I found, that gall shavings were incapable of producing any change in its colour. I mean not however to deny the presence of a very small quantity of vitriol. If it did not contain a certain proportion of this acid, I imagine a more gentle heat would be sufficient to precipitate the iron, than I found necessary for this purpose. The water was exposed to a hot and clear sunshine for 8 or 10 hours, and yet at the end of that time gall shavings turned it to a very deep purple. From this circumstance it seems also probable, that it contains some mineralizing principle besides fixed air.

Dr. Pearson says, that the heat of this water is from 52 to 55 degrees.

Chalybeate springs at Morley and Whittington.

In an enclosure, near the house of the Rev. Robert Wilmot, is a chalybeate water, which, from
Medicinal waters and baths.

from the tests I employed in the two foregoing instances, appears to contain about the same quantity of iron as those, situated at Quarndon and Buxton. The respect, in which it most materially differs from them is, that it parts more freely with the fixed air, with which it is impregnated. M. de Fourcroy observes that in some chalybeate waters the iron, and in some the fixed air exceeds the other. From the brisk acidulous taste of that at Morley in particular, I should apprehend, that it contains the latter proportion.

There is a chalybeate water at Whittington also, in a farm occupied by Mr. Lalouell, which appears to be possessed of nearly the same degree of strength with that situated at Morley.

Chalybeate spring at Chesterfield.

The chalybeate spring at Chesterfield is much weaker than any of those, which I have mentioned. This may be inferred from the faintness of the colour, which it strikes with galls. Upon adding a few drops of Prussian lixivium to a glass of this water, one half of the quantity was changed to a fine blue, and the other to a deep green colour.

I have been informed, that, when drank in sufficient quantity, it is purgative, and that it has been found useful in disorders, arising from weakness and relaxation.
Tibshelf Spring.

The chalybeate water at Tibshelf does not appear to be materially different from that, which was last mentioned. About a century ago it was much valued, and drank throughout the summer season. But it does not appear to be now in any repute.

Duffield and Bradley Springs.

About a quarter of a mile from Duffield, and in an enclosure near the turnpike road leading to Derby, there is another spring apparently of the same impregnation and quality with the two preceding.

At Bradley, near the house of Hugo Meynell, Esq. there is also a chalybeate water, which bears so great resemblance to the three last, which I have mentioned, that by the tests I have employed to ascertain the substances, which they contain, it would be difficult to discern any difference among them.

Besides the chalybeate springs, which I have now pointed out, I am sensible, there are many more situated in various other parts of Derbyshire. But all those, which are in much public repute, I believe, may be found in the account, which has now been given.
Martial vitriolic spring at Heage.

I have heard of only one spring of this kind in Derbyshire. It is situated in the liberty of Heage, near the road lying betwixt Crich and Belper, and at about a middle distance from both places. The water affords very strong and decisive evidence of being impregnated with both iron and vitriol. It has a sour, austere taste. With galls it becomes almost as black as ink. Prussian lixivium changes it into a deep blue; syrup of violets turns it to an olive green, and upon adding the fixed vegetable alkali a rusty precipitate appears at the bottom of the glass. By evaporating a few pints of this water a residuum of the same reddish brown colour, and of an acid taste was obtained. But no crystals of copperas could be perceived to form during the evaporation. Perhaps this effect might be prevented by the fixed air, which it most probably contains. For this fluid being expelled by the heat, the iron, which is dissolved and suspended by it, would be precipitated, and occasion that rusty appearance, which was observable in the residuum, and conceal the crystals, if any were formed. That this water does contain fixed air
Air may be inferred from the number of air bubbles, which may be seen in it, when it is first poured into a glass at the spring.

Another circumstance, which tends to confirm this opinion, is, that when tightly enclosed in a bottle or cask, it will with a slight degree of agitation break it, an effect which is most probably owing to the effort of this fluid to make its escape.

The mineral water at Heage is situated in a black-boggy soil. It was discovered about 20 years ago by a labouring man, who was employed in forming a sough, with a view of draining the ground in its neighbourhood. He had been a long time troubled with an ulcerous disorder in one of his legs, but found, during the prosecution of his undertaking, it gradually disappeared, and that, by the time it was finished, a cure was entirely effected. This circumstance led him to suspect, that the water was possessed of some medicinal virtues, and upon examination he perceived the vitriolic taste, by which it is distinguished.

The beneficial efficacy of Heage water has likewise been experienced in a few other cases. It has been found useful in stopping inward bleeding, and when applied outwardly, I am informed, it has this effect as soon and completely, as extract of Saturn. It is good for
Medicinal waters and baths.

softening the teeth, and for healing sore and inflamed eyes. But its salutary virtues are said to be most conspicuous, and certain in ulcerous disorders. However it is said that in all external applications it should be used with great caution. For in a case of this kind a paralytic stroke in the diseased part has been supposed to be the consequence of too suddenly drying up the humour.

Salt spring at Edintree near Hope.

M. de Fourcroy says, that saline waters contain besides common salt, sometimes two or three different sorts. He thinks, that salt with the base of magnesium is a more common ingredient in them, than is at present imagined.

I have heard of only one salt spring in Derbyshire. It is situated in the high Peak, betwixt the villages of Hope and Bradwell, and near a rock called Edintree. I have not seen it myself, though I took some pains to discover it, but am credibly informed, that the impregnation is considerably strong. It is said to be useful in ulcerous, and scorbatic complaints.

Intermitting springs.

Besides medicinal, there are a few other springs in Derbyshire, which, on account of
some singular and extraordinary circumstances, with which they are attended, seem entitled to some degree of notice.

One of these springs is situated on the west side of Peak forest and about half a mile distant from Sparrow Pits. It is called Barmour ebbing and flowing well. The motion of the water, from which it has received its name is not regular, but entirely depends upon the quantity of rain, which falls at various seasons of the year. In long and continued dry weather, it has sometimes ceased to flow during the space of three weeks or a month: I was informed at the farm house near the spring, that in the course of the last thirty years two instances of this kind had occurred. At the time I saw it, which was in a wet season, the interval betwixt ebbing and flowing was about five minutes.

The well is situated at the foot of a steep hill which rises to the height of 80 or 100 feet. In this a small gurgling noise is heard at a distance a few moments before the water makes its appearance. It then flows out at several different places, and forms a stream nearly large enough to turn the overshot wheel of a corn mill.

The hill, from which the water proceeds, is composed of limestone, and perhaps this circumstance may have some influence upon its temperature, which is said to be warmer than
than that of common springs. It is found, that in the severest weather it is never frozen, and that a steam always rises from it at such seasons.

There seems to be only one satisfactory way of accounting for the irregular flowing of this spring. If we consider it as a natural syphon in the earth, we shall be able to explain most of the phænomena, with which it is attended. Those, who understand the principles upon which this instrument acts, and consider the internal structure of the earth in this part of the county, will find no difficulty in accounting for the various motions observable in respect to the flowing of this water. Nor would it be easy to add any thing to render such a matter more clear and intelligible.

There was formerly a spring of this kind at Tideswell likewise. But it has now entirely ceased to flow, and the place, where the well was situated, is scarcely known. It appears from the philosophical transactions that in the year 1729 it was visited by Mr. J. Martyn, who observes, that the ebbing and flowing well was at that time far from being regular. He adds, that it was seldom seen by the neighbours themselves, and that for his own part he waited a good while at it to no purpose. Upon enquiry I found, that it is now very imperfectly remem-bered
Medicinal waters and baths.

bered by any person; but I was informed, that the well, which is now closed up, might be easily restored to its ancient state.

At Chelmorton, a village situated about three miles south east of Buxton, there is a spring, attended with a different circumstance, which has been considered by some as very singular. The water which rises out of the ground at the head of the village, appears at first in a very considerable stream, but, as it proceeds, gradually diminishes, till at length it is entirely sunk into the earth. Formerly it ran the whole length of the street, and in its course supplied the wants of all the inhabitants. But since the very severe frost in the year 1740 it has reached only about half that distance from its source, tho' I believe, the body of water, when it rises out of the earth, is the same now as it was, before that event took place.

Whoever pays a proper degree of attention to the ground, over which this water flows will find no great difficulty in accounting for the fact, which has now been related. The soil appears to be a light calcareous earth, thro' which moisture will easily pass: and, as this part of the country abounds with chasms or fissures, it is not improbable, that the course of the stream may lie over one of these openings, which
which will readily receive the water, after it has passed thro' the soil, with which it is covered.

To the foregoing account of the mineral and other remarkable springs in Derbyshire I shall subjoin a few observations on the more common ones, which are found in a pretty large district in the county.

Ingenious theories have been formed with a view of accounting for the origin of springs in general. But I have not met with any, which have appeared to me quite satisfactory. If speculations on this subject seem only plausible, perhaps this is all, which can be reasonably expected. However, tho' we may be unable to investigate the primary cause of springs of water, yet the secondary is not so much hidden from our view. At least in some particular situations, it may, I think, be discovered with clearness and certainty.

When I described the strata, of which the earth is composed in that part of the country, where coal is found, I observed, that they were frequently intersected by thick walls of clay. Now, whenever these occur, it is manifest, that the currents of water, which pass between the strata, will be stopp'd in their course, and be forced up thro' the fissures to the surface of
of the ground. Accordingly it is found, that when the faults are pierced thro' near a spring, it immediately disappears, and is totally lost.

The fact, which I have now mentioned as serving to explain the secondary cause of springs of water in some particular situations, may perhaps throw some degree of light upon them in other places also. It seems not improbable, that obstructions of a different kind may have the same effect upon the subterraneous streams, which are met with in almost every part of the globe, and that one chief reason why springs are more abundant in some situations, than in other, is, that these obstructions are here more numerous.

Having finished the observations, which I have been able to make and collect, in respect to the medicinal, and other springs in Derbyshire, I shall now subjoin a letter on the same subject with which Dr. Darwin has been so obliging, as to favour me. The respectable name of the writer, I am persuaded, will be sufficient to excite the curiosity and attention of the public, and from the novelty and ingenuity, which appear in some of the remarks, it may be presumed, that they will not be disappointed in their expectations.

Derby,
Derby, Feb. 5, 1788.

Dear Sir,

In compliance with your request I send you on paper, what has occur'd to me about the natural history of the Buxton and Matlock waters.

Several philosophers have supposed, that the warm springs of this country acquire their heat from the chemical decomposition of pyrites; and it was affirmed by the late Mr. Tiffington, which has been lately cited in an ingenious work of Mr. Kirwan on mineralogy, that the warm water about Matlock ow'd its heat to the blue marle, which is mixed with pyrites, and is found in thin strata above and below the beds of lava or toadstone; for an account of which see Mr. Whitehurst's valuable book on the theory of the earth. But it has since been observed, that tho' warm water was found sometimes in these beds of Pyrites and marle; yet that no smell or taste then attended it; which must have occur'd, if the pyrites had been in a state of decomposition. And secondly that cold water was found in these beds oftener than warm.

The arguments in favor of another opinion appear to me to be much more conclusive, viz. that the water of these springs is raised in vapour
poured by subterraneous fires deep in the earth; and
that this vapour is condensed under the surface
of the mountains in the vicinity of the springs.

1. The heat of these springs has been in-
variable perhaps for many centuries, certainly
as long as we have had good thermometers;
which shews that the water, which they arise
from, is in a boiling state in some part of the
earth. For as boiling water acquires a certain
degree of heat, viz. 212, the steam which
arises from it, (where it is not confined,) must
always be of that degree of heat. Now the
internal parts of the earth, a few feet be-
low the surface, being always both in winter
and summer of 48 degrees of heat; it fol-
lows, that if the steam of water, after it is
condensed, flows through a given distance of
the cold earth; it will become cool'd from
212 to some degree of heat above 48, propor-
tional to the distance between the mountain,
in which it is condensed, and the place of its
exit. And thus may for many ages preserve an
uniformity of the degree of heat; which could
not happen if it was produced by chemical com-
binations of materials near the surface of the earth.

2. In the very dry summer of 1780, when
all the cold springs in this part of the country
either totally ceased, or were much diminished;
I was well inform'd on the spot both at Mat-
lock
lock and Buxton, that the warm springs had suffer'd no observable decrease of their water. Whence I conclude, that the sources of these warm springs were at a much greater depth beneath the surface of the earth than the cold ones: and that on that account the water must first have been raised in the form of steam from those greater depths.

Another circumstance shews, that the source of many of these waters is situated beneath the origin of the cold springs; even after the steam, which produces them, is condensed into water; which is that their heat continues always the same both in winter and summer, in wet seasons and in dry, which evinces, that no cold water from the dews, or springs in consequence of them, is mix'd with these sources of warm water.

Indeed one of the springs at Matlock had much common cold water mix'd with it, lower down in its course towards the Derwent, which occasioned it to be neglected; till a miner, Mr. Mather, proposed last year to Mr. Simpson, the proprietor, an ingenious devise to separate them; which was by fixing pipes into the mouth of the spring to raise the hot water, before its exit, above the place, where the cold springs enter into it; and thus to push back the cold water into an old mine-sough, where it
it was said formerly to discharge itself; and thus by loosing a part of the warm water, to preserve the remainder unmixed; which I believe has so far succeeded.

3. The rocks of limestone in all this part of the country abound with perpendicular clefifs, in which are found the ores of zinc, lead, and copper. And it is hence probable, that not only the steam of water at present, (which produces these warm springs,) but that those metals themselves, and the fluor or baro-selenite, which attends them, have in former ages been raised into those perpendicular clefifs by the great subterraneous fires, which raised the continents and islands from the primeval ocean.

4. The existence of central fires in the earth in the early ages of the world is demonstrated by the elevation of the solid parts of the globe above the ocean; and the shatter'd condition of its strata; with the immense masses of lava then produced; which go under the names of toad-stone, basaltes, moor-stone, porhpory, and granite, as are so well explain'd in Mr. Whitehurst's, and in Dr. Hutton's theories of the earth. The present existence of central fires seems probable from the many volcanoes, which are spiracula, or chimneys, belonging to those great fires; and it is probable, that by
the escape of elastic vapours from these is owing
the small extent of modern earthquakes, com-
pared with those of remote antiquity, of which
the vestiges remain all over the globe. Another
argument for the present existence of immense
subterraneous fires, is that the great earthquake
at Lisbon produced undulations on the lakes of
Scotland; and was felt in the mines of Derby-
shire: (Philos. Transact.) which could not
easily happen, but by a percussion on one side
of a confined fluid lava; which would be pro-
pagated to the other, as striking the gentlest
blow on one side of a bladder distended with
water is felt by the hand placed on the other
side. To which may be added, that in some
mines, the deeper you descend the warmer you
perceive them. Morinus in a tract de locis
subterraneis, p. 131. says, that in some mines
of Hungary, which are 500 cubits deep, the
heat becomes troublesome, when the miners
get below 480 feet of depth. And Mons. De
Luc, on going 1359 feet perpendicular into the
mines of Hartz on July 5, 1778, on a very fine
day, found the air at the bottom a little warmer
than at the top of the shaft. (Phil. Trans.)

5. Because there are springs of hot water in
all countries, where open volcanoes evidently
exist: whence from analogy we may conclude
the hot springs in countries where open volca-
does have existed, but are now not open, are owing to the same cause acting in a less powerful manner.

6. Add to this, that if those waters had been heated by the chemical decomposition of pyrites, some of them at least would probably have retain'd a strong chalybeate taste, or sulphureous smell: or that they would all of them have been impregnated with some similar material; which on the chemical analyses of these waters of Buxton, and Matlock does not appear to be the fact.

7. I come now to another circumstance, which very much corroborates the above theory of the production of these springs from the steam raised from deep subterraneous fires, and not from the decomposition of pyrites. The strata of the earth in this part of Derbyshire consist of beds of limestone and of lava (or toadstone) which lie reciprocally one upon the other; in many parts of the country, there are three beds of each, which are many yards thick. See Whitehurst's theory of the earth. Now if we suppose the steam rising from subterraneous fires to be owing partly to water slowly subsiding upon those fires, and to limestone gradually calcined by them; it must happen, that the steam rising through the perpendicular clefts in the supercumbent rocks must
be replete with calcareous gas, (or fix'd air;) with some phlogisticated air.

Dr. Priestly from 5 ounces of lime-
stone obtain'd 1160 ounce-measures of air, nine tenths of which was fix'd air, and the other tenth phlogisticated air. From 4 ounces of white spar he obtain'd 830 ounce-measures of air, the first portion of which had but one fourth of fix'd air; which however varied in the course of the experiment, being once three fourths, then one half, then one third of fix'd air. Vol. 6. p. 226.

If this steam so impregnated be condensed in limestone strata, the fix'd air in this hot steam will super-saturate itself again with calcareous earth. Now this is what precisely happens to the waters at Matlock, which are replete with calcareous particles; as appears by the copious deposition of tupha, or calcareous incrustations, along the channels in which they flow. For in general it happens, that springs of water wear themselves valleys from their sources, as is done by the water at Buxton; but those springs at Matlock have produced rocks and mountains of a sponge-like calcareous stone between their fountains and the Derwent, with which all the houses at Matlock are constructed, and many of the stone fences.
Medicinal waters.

It may seem extraordinary, that fix'd air, or calcareous gas, which is known to precipitate lime from water, should render limestone more soluble in water. This however is evinced by the experiments of Mr. Cavendish, who added to lime-water, which had been render'd turbid by means of calcareous gas, more of the same gas: which enabled the water to redivide the precipitated limestone. Which however is consequentaneous to other chemical phenomena, as one portion of alcali added to a solution of iron in an acid precipitates the iron; which is redivided by the addition of a greater portion of alcali. Water by a large quantity of calcareous gas will thus in close vessels super-saturate itself with lime; which will gradually precipitate in the form of limestone, when exposed to the air, by the evaporation of the superfluous gas.

In the beginning of October 1780, I was present with my friend Mr. Edgeworth at the opening of two of the springs of Matlock about 200 yards above their usual places of appearance. We found them both at these new openings about one degree of heat, or somewhat more warmer than at the places of their usual exit. The upper one, which could be best seen, issued from some cracks or fissures in the upper surface of a bed of toadstone, and between
it and the blue marle, which lies over it; under which marle it seems to have been condensed; and thence to have super-saturated itself with calcareous particles. I examined this marle by means of acids; and found it to be calcareous; except some shining bits of whitish pyrites, which had no appearance of being in a state of decomposition.

On the contrary the steam, which produces the water of Buxton, is probably condensed in the substance of the toadstone or lava; and not in a stratum of marle or limestone, like the Matlock water; and hence the great difference of their contents. As one edge of these strata of limestone and lava, wherever there are springs, is always elevated higher than the other; it would be easy by attending to the inclination of these strata to discover, on which side of the bath is situated the mountain, in which the steam is condensed; which probably may not be more than a mile or two from the eruption of the springs; because in opening the springs at Matlock at a place about 200 yards above the wells, the water, (tho' already collected into a kind of vein) was cool'd more than a degree; and this cooling must proceed much faster, where the water is diffusely and thinly spread between two contiguous strata. And further as the progress of this water must warm
warm in some degree the surface of the earth, beneath which it passes after its condensation; and particularly at the place of its condensation; it is not improbable, but its course might be detected by observations made in rime mornings, or when snow has lain long on the ground, by the melting or disappearance of it first in that part; or perhaps by the earlier vegetation of the grass or trees on those parts of the surface. A Mr. Taylor, who once kept this bath, produced early vegetables by conveying a stream of the warm water under a border of his garden. If this source should ever be discovered by mining, I suppose the water by being received nearer the place of its evaporation, would be found of a greater degree of heat from 82, its present heat, up to 212, or the heat of boiling water.

I cannot conclude this part of the subject without observing the analogy between the production of cold and of hot springs; they are both produced from vapour; that, which produces cold springs, is brought to the summits of mountains by the atmosphere; and being there evaporated slides down between the strata, which compose the hill; and bursts out through some of these strata below. That, which forms hot springs, is condensed under the same strata of the mountains, over which slides
flides the cold water devaporated from the atmosphere; in these respects exactly imitating, if large things may be compared with small, an old-fashion'd alembic, and its superincumbent refrigeratory. Without the existence of mountains, or elevations of ground, neither hot nor cold springs could have existed; nor indeed without their having been shattered in their elevation; for some of the strata of the earth being deficient at the summits of mountains gives access to the dews to slide between the first and second; or between the second and third strata; and thus form cold springs below. And the perpendicular clefts or cracks in these mountains give access to the steams raised from below for the production of warm springs.

The contents of the waters of Buxton and Matlock much countenance the theory above deliver'd, for if steam be raised from subterraneous furnaces, where limestone is probably in a state of calcination, much calcareous gas (or fix'd air,) and some phlogisticated air, would arise with the aqueous steam; these are found in the Buxton water in the loose state of bubbles, according to the analysis of Doctor Pearson, and in this the Buxton water resembles the waters at Bath; which are said by Dr. Priestly to possess similar kinds of air. Exp. v. 2. p. 223. And as these airs seem to be the principal ingredients
gredients of both these waters, there is reason to believe, both from this circumstance, and from their success in relieving similar diseases, that their medicinal powers are very similar. At the same time, as the waters at Bath are said to contain a very minute quantity of iron, those of Buxton may be better adapted to some inflammatory habits; and as there is a chalybeate spring at Buxton near the other, it would be easy occasionally to render these waters still more similar to those of Bath by adding a small portion of the chalybeate water to that of Saint Ann's well at the time of drinking it; and thus doing that by art at Buxton which at Bath is done by nature.

In the Buxton water the fix'd air is found in loose bubbles, because it does not meet with any calcareous earth, or limestone to combine itself with: in the Matlock water the contrary occurs; it has no loose air-bubbles, because the fixable air is combined with lime; and thus this water is replete with calcareous earth in subtile solution; and in this respect, I suppose, resembles the Bristol water.

The incrustations, which are deposited from these calcareous or hard waters, were once supposed to contribute to produce the gravel or stone in the kidneys and bladder; this opinion particularly prevail'd about half a century ago in
in Paris; where it was said, that a certain dis-
strict of that city, supplied with water which
incrusted the pipes, through which it pass’d,
was much afflicted with the stone in the blad-
der. Mons. Condamine, an ingenious and
active philosopher, on a minute inquiry found
the assertion to be totally devoid of truth.
Since that time the waters of Carlsbad, which
incrust whatever is thrown into them like those
of Matlock, have been much frequented by
patients with gravel and stone, and it is said
with advantage. (Philos. Transact.) Since the
great light thrown on this subject by the che-
"mical accuracy of Bergman and Scheele (whose
premature deaths are a loss to mankind,) the
use of these waters may be better understood.
By their experiments it appears, that the stony
concretions in animal bodies consist of saccha-
rine acid and air, and that this acid has a greater
affinity than any other to calcareous earth. Now
as the saccharine acid is perpetually generated
in the stomach during the digestion of our
aliment; it is probable, the salutary effects of
these calcareous waters, such as Matlock and
Bristol, may be owing to their saturating the
superabundancy of this saccharine acid; and
that thus they may prevent the tendency which
some of our fluid secretions possess, of producing
calculus, and perhaps gouty and bilious con-
cretions;
cretions; and prevent the increase in size of those already form'd. On the same principle they may tend to render purulent matter less acrimonious; as they are supposed to be of advantage in pulmonary and scrophulous ulcers. Certain I am, that the cold springs also, which are replete with calcareous matter, as St. Alkmund's and other wells about Derby, are salubrious to the drinkers of them; as the daily experience of the inhabitants who use them, evinces. And I am acquainted with one person, who has drank of a cold spring very much loaded with this kind of earth for his only potion for the last five years, using about two pints a day of it; and enjoy'd a perfect state of health.

There is another disease in which the waters of Matlock, and of Bristol are celebrated, the diabætes. In this so great a quantity of sugar is generated by the powers of digestion, that the urine becomes loaded with sugar. A patient of this kind in the infirmary at Stafford, who eat and drank about thrice the quantity allow'd to other patients, made about 16 and sometimes 18 pints of water a day; and by my desire some of this was evaporated by Mr. Hughes of that place, and produced about an ounce of very coarse sugar from every pint of the water. An account of this case; and a theory of
of diabetes is published in a pamphlet "on the inverted motions of the lymphatic system and a criterion between Pus and Mucus." Cadel, London. In this disease therefore it is probable the use of these calcareous waters is to be ascribed to their affinity to the saccharine acid, which in those cases would seem to be in great abundance.

So far have I perform'd my promise to you in writing down, what has occur'd to me concerning the natural history of the waters of Buxton and Matlock: to enter minutely into the medical history of these, and of Kedleston water, and other mineral waters of this county would require a volume, and take up much more of my time and attention than I could at present contrive to bestow upon it. But I cannot leave this account of calcareous or hard waters without adding; that I suppose, from the great affinity between calcareous earth and saccharine acid, may be explain'd a circumstance, the theory of which has never been understood, and therefore the fact has generally been doubted; and that is, that hard waters make stronger beer than soft ones. I appeal to the Brewers of Burton for the fact, who have the soft water of the Trent running on one side of their Brewhouses; and yet prefer universally the hard or calcareous water supplied
Medicinal waters.

plied by their pumps. I suppose there may be some saccharine acid in the malt, (which is not all of it equally perfectly made into sugar by the vegetable-digestive power of the germinating barley,) which by its attracting the calcareous earth of hard waters may produce a kind of mineral sugar; which like the true sugar may be convertible into spirit: for a similar purpose, I suppose, lime is used by the sugar-bakers in refining their sugars, tho' the theory of its effects is unknown to them.

There are other sources of water in Derbyshire, which should be mention'd. The waters of the Hamps and Manifold sink into the earth near Wetton mill, and rise again in Ilam gardens. The subterraneous cavities, in which these streams pass, seem to have been made in the early ages of the world, (as well as all the other caverns of this county, as Peak-hole, Elden-hole, Pool's hole, and Thor's house near Wetton mill,) by long regions of earth rising to let out the confined vapours from conceal'd volcanoes; and opening, as it were, their jaws; which, when the sides subsided again, did not exactly fit each other; and thus left long subterraneous cavities.

The sulphur waters of Kedleston are celebrated for curing the same diseases as those of Harrogate, but are considerably weaker; and may
may therefore be better adapted to feeble constitutions. These sulphur-wells abound with marine salt, and contain some epsom salt; to which they all of them owe their purgative qualities. I am well inform'd, that the salt springs in Cheshire, if they are left to rest a few weeks without being pump'd, acquire a similar sulphureous smell; and suspect, that these sulphur wells may be class'd with other salt springs, of greater or less degree of saturation; but that some of their ingredients are in a state of decomposition.

The Bishop of Llandaff; (to whom the public is so much obliged for making chemistry both useful and agreeable) mentions in his ingenious observations on Harrogate waters, that one of the springs arises in a bed of shale; some parts of which are softer than other parts, as if in a state of decomposition; about a mile eastward of the Kedleston bath is a stratum of shale, which is seen on the sides of the hollow way in Quarndon town; and, where it is there exposed to the air, seems of a soft kind. Whence there is reason to suspect, that the water being previously impregnated with vitriolic acid from shale may be necessary to the production of these sulphureous waters. The Kedleston water is weaker than that of Harrogate in respect to the quantity of marine salt it con-
Medicinal waters.

tains; I suppose about two ounces of Bay salt added to a gallon of this water renders it in every respect as efficacious as the Harrogate water, in those diseases commonly term'd scorbutive, and in worm-cases, particularly ascarides.

At Heage there is a water, I am inform'd, with a very austere taste, which is worth inquiry; as it is probably either a chalybeate dissolved in vitriolic acid, like that at Somersham near Cambridge; or an aluminous water, like that of Nevil-Holt in Leicestershire. These springs, which abound with vitriolic acid, sometimes produce morasses, which have a remarkable property of preserving flesh-meat; I have been told there are such morasses in the wilds of the Peak; in which dead game, and even large pieces of mutton have been buried one year, and found nearly unchanged the next. In countries abounding with coals there are generally chalybeate springs; of these those, which sooner loose their iron when exposed to the air, are generally prefer'd for medical purposes; of this kind is that of Quarndon near Kedleston; in these waters the iron is dissolved by means of calcareous gas, or fix'd air as shewn by Mr. Lane; which is a volatile acid, and when exposed to the air soon escapes; and the iron is then deposited in a calciform state like
like ochre. A dark-colour'd shale, of similar appearance to that seen on the sides of the hollow road near the chalybeate spring at Quarndon, covers the collieries at Bedworth near Coventry. There is a similar shale also appears on the sides of the turnpike road at Hulland near Ashburn; it is probable there are coals under-both these parts of the country, which from their situations would be valuable acquisitions; and boring for coals, if properly managed, is not very expensive; as the superincumbent strata are generally of soft materials.

I shall conclude this long letter by mentioning an artificial spring of water, which I produced by boring near the Derwent in Full-street in Derby.—As the copious spring, call'd St. Alkmund's well, rises about half a mile from this part of Full-street, and about six feet higher in respect to level; I supposed the same stratum of marle might be continued to this place, tho' cover'd with houses, and some feet of rubbish. On clearing an old well, which was about four yards deep, and contain'd very bad water, the upper surface of the marle appear'd. The old well was then wall'd round with bricks, and water-clay, so that the bottom was kept perfectly dry. A hole about two inches diameter was then bored about 15 yards deeper: and then some sand was brought up
up mix'd with the marle; and a spring gradually arose; and by driving a wooden pipe into the hole, and afterwards putting a leaden pipe through this, the water arose about two feet above the surface, tho' not up to the level of St. Alkmund's well, as I had expected; it has now for five years continued to flow; and I think rather increases in quantity, and perhaps in purity. A more particular account of this well is related in the Philosophical Transactions.

I mention it in this letter, because I suppose there are many situations in which water might be thus procured by boring a perpendicular hole near the edges of valleys, or a horizontal one into the sides of mountains, for the convenience of watering cattle or for flooding grounds, and for the purposes of agriculture. And I suppose the springs in marly countries are preferable to river-water, as they are always loaded with calcareous earth.

If you think any part of this long letter worthy a place in your expected history of Derbyshire, I desire you will do with it whatever is agreeable to you.

I am, dear sir,

With great respect, &c.

E. DARWIN

T 2 SECT.
S E C T. I.

Rivers.

As rivers are formed by the confluence of springs and small streams of water, it will be proper to take notice of those of Derbyshire in this place. Now the largest of these are the Trent, the Derwent, the Dove, the Wye, the Errewash, and the Rother.

The source of the Trent is not in this county, but in the park at Trentham, the seat of the Marquis of Stafford. It enters into Derbyshire at the south-west extremity, and winding its course across interfects it into two unequal parts. Flowing through a flat and level country it passes along with a deep and gentle stream. Milton, in one of his occasional poems, thus describes this river.

Trent, who like some earth-born giant spreads
His thirty arms along the indented meads,
Or sullen mole, that runneth underneath.

About sixty years ago, the Trent was rendered navigable as high as the town of Burton. In consequence of this improvement considerable business began to be done upon it. And it
it was calculated, that the goods carried down it every year amounted to about fourteen thousand tons. But at a later period this quantity was rendered much larger by the communication, which was opened between the eastern and western coasts of this kingdom by means of a navigable canal.

There are three bridges thrown over the Trent in its course thro' the county. They have all been built since the Norman conquest. For in Domesday book no mention is made of any tollage over it, excepting at Weston.

Burton Bridge, which is the first, erected over the Trent, after it enters Derbyshire, was built in the time, when Bernard was Abbot of Burton, which was sometime in the interval between the years 1157 and 1175.

Swarkestone bridge, I apprehend, was built at a much later period. I have not been able to ascertain the particular time. There is a tradition in the neighbouring country, that this undertaking was executed at the expense of two maiden ladies. But such an account appears scarcely credible, when the great length of the bridge is duly considered. It is said to consist of 29 arches at various distances from each other, and appears to extend above three quarters of a mile.
Cavendish bridge was built about 30 years ago, at the expense of the family, whose name it bears. Formerly there was a ferry at this place, and the charge for passing the bridge is continued the same, as for crossing the water in the old way.

There is a ferry both at Willington and Twiford. At the latter village the river is fordable in two different places.

The river Derwent rises in the northern extremity of the county, and taking a southern course falls into the Trent a few miles below the town of Derby. The whole length of its course is about 46 miles. Running thro' a hilly country, its current is swift and rapid. Whether this circumstance has any effect upon the temperature of its water, it seems not easy to determine. But it is an undoubted fact, that this is much warmer than the generality of rivers. I have been informed, that in the summer season the thermometer frequently stands at 66 degrees. It was likewise observed, in the year 1740 the Derwent was not so soon frozen over as the Trent, and that after the commencement of the thaw it became navigable nearly a month earlier than that river. Nor will it appear difficult to account for this fact without ascribing it to the rapid motion of its water. Flowing thro' a country, abounding with warm springs, it
it must receive a considerable body of water from them in its course.

The Dove likewise has its source in the high peak. Running in a south-east direction it divides this county from Staffordshire, and falls into the Trent, at a small distance below Burton.

The river Wye rises a little way above Buxton, and, running in a south-east direction, falls into the Derwent at Rowsley, a few miles below Bakewell.

The Errewash rising in the hundred of Scarisford, and, separating the two counties of Derby and Nottingham from each other, falls into the Trent at a small distance below Sawley.

The river Rother has its source near Chesterfield, and, taking a north-east direction, falls into Yorkshire near the village of Beighton.

S E C T. II.

Navigable canals.

I Mention the navigable canals in this connection, though they can scarcely with strict propriety be regarded as forming a part of the natural history of Derbyshire.
Several years ago an act of parliament was obtained with a view of opening a communication between the eastern and western coasts of this kingdom by means of a navigable canal. This design has been some time completed, and one extremity of the canal has been brought into Derbyshire. It enters into the county at a place called Monk's bridge, where it is carried over the river Dove in an aqueduct of twenty-three arches, and the ground is raised one mile and two furlongs in length, and to a considerable height. The canal is 31 feet wide at the top, 18 at the bottom, and five and a half deep. Its whole length in Derbyshire is about 14 miles, and in its course thro' the county it has 6 locks upon it. The boats employed upon it carry about 25 tons, and are drawn by horses. The tonnage is three-halfpence, and the freight one penny per mile. It is now about 18 years since the extremity, which lies in Derbyshire was completed, and during this time the shares have varied considerably in their value. At present they sell at their original price.

A second canal has been formed in the north-east part of the county. It begins at Chesterfield, and extending eastward thro' part of Yorkshire and Nottinghamshire, falls into the Humber at Stockwith in the latter county. The part which lies in Derbyshire was finished in
in the year 1777, and on the fourth of June a
vessel was brought to the town of Chesterfield.
It extends from hence 11 1/2 miles in this county,
and enters into Nottinghamshire at a place
called Gander-lane.

When the act of parliament was obtained for
making this canal a large sum was subscribed,
but found inadequate to the execution of this
design. The original subscribers were there-
fore obliged to take up money for this purpose;
and since that time have had the mortification
to find, that the profits, arising from the busi-
ness done upon the canal, have been merely suf-
ficient to pay interest for their loan.

A third canal, called the Errewash canal, ex-
tends along the eastern borders of the county.
It begins near Langley mill, in the parish of
Heanor, and running nearly parallel with the
river Errewash, falls into the Derwent a little
below Sawley. Its whole length is about 11
miles. There are 14 locks, and 25 bridges
upon it; and at the head it is 108 feet higher,
than at the place, where it falls into the river.

In April 1777, the bill for making this ca-
nal received the royal assent; in about four
months afterwards it was begun; in Novem-
ber 1778 it was completed as far as the first
colliery at Ilkeston, and on the 10th of De-
cember 1779 it was wholly finished. This
day
day the first boat came up, the whole length of the canal, from the river Trent to Langley-mill. It was filled with proprietors agents and workmen, and attended with a band of music; and, as it passed each bridge, and coal wharf, it saluted with small cannon and musquetry. The concourse of people on the occasion was very numerous.

The expense, incurred by the execution of this undertaking, was about 25,000l. From May 1784 to May 1785 the tonnage amounted to above 4000l. and, when all necessary deductions were made, above 3000l. remained to proprietors for interest. The shares are now risen to three times their original value.

There has lately been in agitation a scheme for extending this canal northwards as far as Pinxton-mill. But I have not heard what is the ultimate determination of the proprietors and landholders in the neighbourhood.
C H A P. VII.

Soil, agriculture, and produce.

T may be justly questioned, whether there be any art of so much importance to the welfare of mankind, as that of agriculture. Upon the cultivation of it the comfort, if not the existence of society manifestly depends. For this reason an attention has been paid to it in every period of the world. There is scarcely an age or nation, in which its great moment has not been in some measure perceived and acknowledged. Yet it appears from history, that the improvements, which have been made in this business have not born a due proportion to its importance. I pretend not fully to account for this fact. But it is evident that there are some points in the study of agriculture, which have not yet met with a proper degree of attention. The nature of soils and manures has not been examined with that care and accuracy, which seems necessary for the improvement of this useful branch of knowledge. However from the great ardour and success, with which the study of chemistry has been lately
lately pursued, it may be hoped, that the period is not very distant, when the constituent parts of both these substances will be more clearly ascertained, the fertilizing principle be better understood, and the business of agriculture be established upon a more certain foundation, than has hitherto been the case. According to the present management no very great advantages are to be expected from the prosecution of it, unless a person has paid a long and close attention to the external characters of soils, and to the effects of those manures, with which they are usually improved. Whereas by a proper analysis they may be adapted with greater certainty to each other, and young disciples in the art will proceed upon more clear and settled principles, and therefore sooner acquire a clear knowledge of this fundamental part of agriculture.

In describing the soil of Derbyshire I wish it was in my power to give an accurate account of the various kinds, which are found in different parts of the county. To do this many and repeated experiments are evidently necessary. But as these require much time and considerable skill and practice in chemical analysis, the information I have been able to obtain in this way is very slight and superficial. In the account, which I shall now give, I shall there-
therefore do very little more than describe the different kinds of soil by their external characters and appearance.

The most common soil in Derbyshire is a reddish clay or marl. I have already mentioned * a very large district in the county, in which very little or no stone of any kind is discovered below the surface of the ground. Now wherever this is the case, I believe, the soil is of the nature, which I have now described. A reddish clay or marl appears also throughout the southern and middle part of that extensive tract of limestone, which has been observed to lie on the north-west side of the county.

In respect to the quality of this soil I would remark, that it is exceedingly various in different situations. In some places it contains so much calcareous earth, that with a few drops of vitriol a strong effervescence will be produced. Whereas in others this acid seems not to have the least effect upon it. Such a difference is frequently observable in different layers even in the same situation.

In regard to the colouring principle of this soil, there is little or no doubt, that it is iron. This, I believe, is the general opinion of chemists, and in support of it I have found, that water, when it has passed through it, has been

* Page 50.
So much impregnated with this metal, as to strike a faint purple with gall shavings.

An excellent compost is often formed by the Derbyshire farmers of lime, dung, and the soil of which I am speaking. The last is also used alone as a manure. It is the most useful, when it is of a calcareous nature. However I have been informed, that light and boggy land has been improved sometimes by the argillaceous kind.

A very different species of soil prevails throughout that large tract of country, in which coal is found. It is a clay of various colours. It is in different places, black, grey, brown, and yellow, but principally the last. I have not learnt, that it any where contains so much calcareous earth, as to effervesce upon the addition of vitriolic acid. However in some places a considerable quantity of sand seems to be mixed with it.

This kind of soil is also found in some parts of Derbyshire, where gritstone is met with. But in such a situation the land is more frequently of a black colour and bituminous quality. On the east moor, and in the northern extremity of the county, there are large tracts of land, which consist of this sort of soil.

In regard to the soil, with which the limestone on the north-east side of the county is covered,
covered, I believe, it is generally of a brown colour, but of different shades. As far as my observations have extended, it appears to be of a looser texture, and to produce a finer grass than the soil, under which coal or gritstone is found.

In the short account I have now given of the different kinds of soil, which are met with in various parts of Derbyshire, I wish it not to be understood, that any of them uniformly prevail thro' the several districts, which have been described. In some situations tracts of land of a considerable extent may be observed of a quality, very different from that, which is seen throughout the neighbouring country. This diversity seems in some instances to be owing to adventitious causes. In that part of the county, in which coal is found, this more especially is the case. Where the faults occur, I am told there is generally a change in the appearance of the ground at the surface.

It is also observable, that in those parts of the country, in which the reddish clay and marl are found, land of the extent of 50 or 200 acres, and of a blackish colour and loose texture is sometimes met with. It is generally seen in moist situations, and perhaps may be thus accounted for. It is not improbable, that it was originally of the same nature with the
the soil in the neighbourhood, but that the iron, which it contains, being moistened by the liquid, flowing from astringent plants, with which wet places abound, it would be changed to the black colour, by which it is distinguished.

Small tracts of gravel and sandy soil are also interspersed throughout the district, of which I am speaking. But I confess myself incapable of assigning any reason for their appearance in such a situation.

Nor am I more able to account for the origin of those peat bogs, which are found in the north part of the county. Many theories have been formed for this purpose. But I have met with none, which appear to me entirely satisfactory. It has been supposed, that they have been occasioned by trees falling down and perishing; that these have stopped the currents of water, and by them have been converted into a bog. But this does not seem to have been the case in Derbyshire. For in the bogs, formed upon the highest mountains, trees have been found nearly perfect. In one, which is situated upon Hatherage moor, near Stanwich Pole, I am informed, that at the depth of two yards oak, birch, and firs have been discovered in leaf. From the various substances, of which the earth of these bogs is found by analysis to con-
broken up. This is more especially the case with those which lie near the banks of the Trent. These are constantly kept for pasture; because it is thought, that better cheese is produced by the natural than the cultivated grasses.

About 14 years ago the double furrowed plough was introduced into the southern part of Derbyshire. It is now almost universally adopted; and the long experience and approbation of the best farmers may be justly considered as bearing a strong testimony to the excellence and great utility of this implement of husbandry. The wheel plough is also used in a few instances.

At Greasley and Repton great attention has been paid to the cultivation of barley. These parishes lying in the neighbourhood of Burton, the farmers have been much encouraged in the growth of this sort of grain by the great consumption of malt at the breweries of that town.

The land near the banks of the river Dove is not so much in tillage, as that in the more southern part of the county. At Egginton and Scrapton the dairies are in general very large; upon some of the farms forty or fifty milking cows are kept. Besides wheat barley and oats, a small quantity of rye is grown. But in these and all the other parishes, which extend
extend along the banks of the Dove, the farmers raise their rents chiefly from an attention to their dairies.

The land, which lies betwixt this part of the county, and the town of Derby is more equally divided betwixt tillage and pasture. The soil being strong is thought to be better adapted to the growth of wheat, oats, and beans, than barley. When the ground is laid down to pasture, it is usually sown with clover and rye grass, to which a little trefoil is sometimes added. At Sutton on the Hill, and Church Broughton, the wheel and double furrowed ploughs are both in use, but the former is going out of repute. The land is said to be too strong for it.

At Brailsford, where the soil is rather lighter, barley is sown almost equally with wheat and oats. Of these two crops are generally taken from a fallow, and afterwards one of turnips also. It is esteemed the best management not to suffer the land to remain long either in tillage, or pasture without a change.

In the neighbourhood of Ashbourn the business of the dairy is principally attended to. Very little grain besides oats is grown here.

The land about Derby, which is employed for the growth of most sorts of grain, is more especially valued for the excellent wheat, which it
it produces. No finer crops are gathered in any part of the county, than at Chaddesden and Chelafton. In the fields at both these places, which are open and extensive, the following course of tillage and crops is invariably pursued. Fallow, wheat, barley, beans or pease. This management, I believe, is also common in other places where land in tillage has not been yet enclosed.

At Weston upon Trent three crops are generally taken from a fallow, when the land is constantly in tillage. The usual course is barley, clover, and wheat. The ground is mostly prepared with a wheel plough drawn by two horses, going abreast to each other.

At Mugginton, on the opposite side of Derby, the land in tillage is managed somewhat differently. But, in this and the neighbouring parishes, the growth of corn is only a secondary object of attention. The principal stress is laid upon the produce of the dairy. Accordingly the best land is chiefly in pasture.

In all that tract of country on the north side of Trent, which I have now described, the farms are in general of a very eligible extent. Upon an average they are let at about a hundred pounds a year. Tho' the rent of a few may amount to the double of this sum, yet, I believe, the generality are rather below it.
Proceeding northward on the east side of the county we may observe a great change in the state and method of agriculture and the nature of the produce. We see the land in pasture continually diminishing, and a larger proportion assigned to tillage than in any other part of the county.

At Heanor the usual course of crops after a fallow are

- Turnips, Wheat,
- Barley; Oats, and
- Oats, or Grass feed.
- Clover, Wheat.

The grass feeds which are sown here, are Dutch clover, rye grass, trefoil and rib grass.

A large proportion of the land at Ripley is in pasture. The tenants are usually restrained in their leases from ploughing more than a third of the land in their occupation. In regard to that, which is in tillage, the two courses of crops, which are most common after a fallow, are,

**Upon stiff land**
- Wheat,
- Oats,
- Oats,
- Fallow again, or sow clover and rye grass.

**Upon light land**
- Turnips,
- Barley and clover,
- Wheat,
- Oats.

In
In the second course it is usual to manure the clover leys with dung or lime. If this is omitted, a good crop of oats is not to be expected.

When the farmers intend that the land should rest some time, they sow it with clover and rye grass and take a crop of hay. After this they suffer it to lie some years for pasture. When they break the ground up again, they frequently pare and burn it. They seldom sow Dutch clover, because they say, it will not continue long in the ground.

At Pentridge, in the neighbourhood of Ripley, rib grass is sometimes sown.

At Alfreton, the following method of managing land in tillage is the most common upon a fallow prepared

<table>
<thead>
<tr>
<th>With lime</th>
<th>With lime and dung</th>
<th>Winter fallow with lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat, Oats, Oats;</td>
<td>Turnips, Barley, Clover, Wheat;</td>
<td>Wheat, Oats, Wheat; sometimes.</td>
</tr>
</tbody>
</table>

It is thought, that a crop of peas, by killing the weeds, tend very much to prepare and improve the land for succeeding crops of other grain.
Soil, agriculture, and produce.

Tartarian Oats have lately been introduced into this part of Derbyshire, and are likely to prove useful and profitable. Seven or eight quarters generally arise from an acre of poor land.

Bind has been laid here upon light land, and given it such firmness and strength, as to qualify it for producing a good crop of wheat.

At Bolsover the land is much in tillage. The number and course of crops are various.

Wheat, Barley,
Oats, Clover,
Clover, or Wheat,
Wheat, Oats,
Oats.

Agriculture at Barlborough seems to be faulty in almost every respect. The farms are too small for a country, in which there is no manufacture, and from the great number of crops taken from a fallow, are in general in a very impoverished state. The following is the order, in which they commonly succeed one another; wheat, oats, clover, wheat. But they often run the fallows much longer.

The land at Norton and Dronfield is very much in tillage. The most common methods of taking crops after a fallow are

Turnips,
Turnips, Barley and Clover, Wheat, Clover or peas Wheat, Oats, Oats, Oats, or Wheat, Wheat, Oats, Oats, Oats, When the land is good in nature or condition. When in bad condition.

The fallows are often worked with the spiky or porcupine roller. When the soil is a stiff clay, and has not much grass upon it, it is a very useful implement. After the ground is a little broken down by it, it is customary to go over it a few times, first with a great; and then with a small harrow.

The following experiment made with a view of trying the effect of urine seems to be deserving of attention. The Rev. Mr. Halliday of Norton, manured three equal parcels of land in the following manner. One he covered with dung, and another with ashes, but the third he watered with urine. The result was, that the last produced an equal quantity of hay with the other two.

Mr. Shore, who pays great attention to improvements in husbandry, is very careful to preserve the urine from his cattle. He collects it in a reservoir sunk in the ground at a small distance from his stables. When this is filled, the
the urine is pumped into a hogshead, fixed upon a pair of wheels in the same manner with the watering carts in London. It is then carried into the fields, and sprinkled upon the ground by means of a small trough full of holes, which is fastened behind the vessel, and receives the urine when it is let out by a plug drawn for that purpose.

Returning southward to the Midland part of the county, we may observe considerable improvements begun and carrying on at the south extremity of the east moor. These are two very extensive enclosures in the parishes of Matlock and Ashover, including several thousand acres. The fences are made with stone, in some places collected from the surface of the ground, and in other taken out of pits opened for that purpose. When I was in this part of the county, the enclosure was only lately begun. No just opinion could therefore be formed concerning the value of the land, or the crops, which they were likely to produce. I remarked, that the method of preparing the land for tillage, was paring and burning it and manuring it afterwards with lime.

At Brackensfield and Higham the land is a good deal in tillage. The grain chiefly grown is wheat and oats.

At
At Higham the following courses of crops are the most common after a fallow.

<table>
<thead>
<tr>
<th>Poor land</th>
<th>Good strong land</th>
<th>Very good land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clover &amp; oats.</td>
<td>Clover and barley;</td>
<td>Turnips, Barley and clover,</td>
</tr>
<tr>
<td>Wheat upon clover leys.</td>
<td>Wheat on clover leys.</td>
<td>Wheat upon clover leys.</td>
</tr>
</tbody>
</table>

As the soil lies thin upon the rock, it is not usual to take more than two crops from a fallow. Amongst the grass seed sown at Higham, cinquefoile has been tried with success. It yields not only a very good crop, but is also found very durable in the ground. The method of tilling land, which I have mentioned as practised at Weston upon Trent, has been adopted in this part of the county likewise.

If we pass from hence into the wapentake of Wirksworth, we shall find, that grazing and the business of the dairy are leading objects of attention throughout all this district.

At Bradbourn and Hartington a very small quantity of corn is grown. In the latter parish there is a very extensive common, which apparently is susceptible of very great improvement. The soil in most places seems to be good, and is covered with a fine turf. The greatest
greatest hindrances to improvement are the coldness of the climate and a scarcity of suitable manure. The quantity of dung is but small, which can be spared from the land, already enclosed and cultivated. However there is not the least doubt, but that with the assistance of the lime, and other kinds of manure, which the country affords very important advantages might be derived from the enclosure of a common, the natural soil of which appears to be so good.

In the high Peak the farmers raise their rent chiefly by grazing and breeding of cattle. At Chelmorton and Stoney Middleton a considerable number is every year fattened, and disposed of at Manchester and Sheffield Markets. Peak forest, and some other parts of the neighbouring country are employed in taking young cattle to ley. Large herds are brought from Cheshire and Yorkshire in the spring, and fetched back about the end of October.

In the parish of Glossop the land is chiefly in pasture. The farms are in general but small and well adapted to this manufacturing part of the county. In many instances the produce is only sufficient to supply the wants of the family of the person, by whom they are occupied. On some of the larger farms the breeding of cattle for sale is an object of considerable importance.
portance. But in this and most other parts of the high Peak a very small quantity of corn, besides black oats, is grown. Perhaps the parishes of Hope, Edensor, and Darley may be in some degree regarded as exceptions to this remark. In these three places I believe a larger proportion of wheat and barley is cultivated than in any other part of the neighbouring country.

From the short and general sketch, which has been given of the agriculture and produce of Derbyshire it is manifest, that a larger proportion of land is applied to the purposes of the dairy and grazing, than to the growth of corn. This is much more the case now, than it has formerly been. Several hundred acres in different parts of the county are laid down for pasture, which were some years ago in tillage. Accordingly it is found, that the quantity of cheese, which the county produces, is more than sufficient to supply the wants of its inhabitants. It is calculated, that nearly two thousand tons are every year carried to London, and several sea-port towns on the east coast. The cheese of Derbyshire is generally mild, and in taste, tho' not always in colour greatly resembles that, which is made in Gloucestershire.

In regard to the corn, which is grown in Derbyshire, it is generally supposed by dealers
in this article, that of some kinds a larger, and of other a smaller quantity is produced than what is sufficient to supply the inhabitants. It is certain, that there is no sort of grain so much cultivated as barley. The produce is so large, that about half of it, which is calculated to be about 5000 quarters annually, is carried into, and consumed in the counties of Stafford, Chester, and Lancaster. In the two last it is disposed of in the state of malt. But besides this, a considerable quantity of barley is sold in the markets of Burton and Uttoxeter. It is calculated, that upon an average about 500 or 600 quarters are brought annually from Nottinghamshire and Leicestershire into the town of Derby in particular, and that about two-thirds of the barley, which is here converted into malt, is disposed of in the neighbouring western counties.

There is reason to believe, that the produce of wheat in the county is scarcely equal to the consumption. When the crops have failed, it has been found necessary to procure a supply from Nottinghamshire and Lincolnshire. Sometimes a small quantity has also been brought in from Norfolk.

In respect to the articles of beans and oats it is supposed, that in Derbyshire there is cultivated about a sufficient quantity for the use of the inhabitants. From
From the survey, which has been taken of the agriculture and produce of the county, it appears, that some parts of it do not yield corn in sufficient quantity for their consumption. The inhabitants of the Peak are obliged to have recourse to the markets of Chesterfield and Alfreton for a supply. It has been computed by those, who are competent judges of the matter, that these high and mountainous situations do not produce more than a fourth part of the grain, which is consumed there.

I doubt not, but that those, who are properly acquainted with the state of agriculture and the nature of the produce of many other counties in this kingdom will easily perceive, that several modern improvements have not yet been introduced into Derbyshire. Perhaps it may not be unacceptable to some of those, into whose hands this work may fall, to be informed of a few particulars, in which the Derbyshire husbandry seems to be defective, when compared with that practised in Norfolk and Suffolk, and other counties, distinguished by their judicious management of land in tillage.

In Derbyshire the feed of turnips is universally sown broad-cast, and in many places the use of the hoe is either unknown or entirely neglected. If we attend to the management universally prevalent in Norfolk and Suffolk,
we shall easily see, that this branch of business will admit of great improvement. In these counties they sow with an engine, which from its construction appears to be possessed of several advantages. It is generally 12 feet long, and has four sides, which in width are not quite equal to one another. The bottom is an inch and half wide, the two sides an inch and three quarters, and the top, which is a slide, about the eighth of an inch wider than the sides. The inside consists of eighteen equal divisions or boxes, and in the bottom of each is a small orifice inlaid with tin, thro' which a hole is bored, just large enough to allow a few seeds to pass at one time.—With this engine turnip seed may be sown more even, and with greater expedition, than in the broadcast way. The person, by whom it is carried and used, regulates the motion of it by the pace, with which he walks. If he takes large steps, he swings it twice across his path every time he moves his foot; but if his steps are short, he gives only a single motion of his arm to each.

When the plants appear, the farmers are very careful to lessen their number, first by drawing a light harrow over them, and afterwards by using the hoe two and occasionally three times. Nor is there any room to doubt, that
that such a practice would be productive of very good effects, if it was universally adopted into the husbandry of Derbyshire. Indeed the experience of some, who make use of the hoe, with themselves puts the matter out of dispute. They are ready to acknowledge, that by this means they not only obtain a larger crop of turnips, but also bring the land into a more improved and fertile state for producing succeeding crops.

The necessity of hoeing turnips has been clearly shown by Mr. Young.§ in his address to the farmers in the west of England. He says, that in Suffolk, without hoeing they would get a produce on their best lands of, perhaps, two, three, or at most four tons an acre, and that chiefly leaf. With hoeing, they get from twenty to thirty-five tons of root only; and if leaf were an object, much more than is ever gained without. He observes also, that hoeing destroys all weeds, which may have risen in the field from the last ploughing. Another argument, which he brings in support of the culture of turnips, is, that it covers the land, in the hottest season of the year, from the action of the sun, which, he imagines, volatilizes and exhales those finer particles on which depend, or with which is connected,

§ Papers of the Bath society, vol. 3. page 314.
the food of plants. He adds, that many weeds may rather be propagated than killed by the turnip husbandry without hoeing. He is inclined to think, that if the ploughings be given in a quick succession, the roots and seeds will be tumbled about too fast for vegetation, but when the land is sown and left to repose, they will grow very fast.

Another implement of husbandry used in Norfolk and Suffolk and a few other counties in England, but which I have never seen or heard of in Derbyshire is the dibble or frame dab. To introduce the farmers of this county to a knowledge of it, I shall therefore attempt to give a description of its form and use. It is of three different constructions and applied to the same number of purposes. The dibble, which is made use of for planting peas, is three feet long, and has ten teeth, the two outside ones of which are square. The length of the stem or handle, which is inserted in the middle of the frame is about the same with that of the frame itself. Another kind, which is used for setting beans, a good deal resembles that, which I have now described, excepting in the number of teeth, which is only six. A third sort of dibble, which is used for planting wheat, is not materially different in size or form from either
either of the foregoing: The only suspect in which it differs is, that it contains twelve teeth.

The number of hands required to follow the dibble depends upon the sort of grain which is sown. That used for planting wheat, which contains the most teeth, I am informed, will require eight children at the least to follow it; this account I received when I was in Suffolk a few years ago. But I am informed that the same now in use in some part of the county has only seven tines or teeth. The practice of setting wheat is now become very extensive in Norfolk and Suffolk, and has been in some degree adopted by other counties. And when it is considered how many advantages arise from such a custom, it will not appear difficult to account for the approbation, which it has already met with. Six shillings are given for setting an acre, and so expert are the labourers in the business, that they will earn nearly five shillings a day. Sometimes women as well as men, with the help of children perform this work; and the poor derive so much advantage from this employment, that they can discharge their rents and maintain their families without having recourse to the parish.
Nor does the farmer receive less benefit from setting off wheat. The produce is two shillings per acre more than from that, which is sown. Having much less small corn intermixed with it, the sample is better, and always fetches a higher price, to the amount generally of two shillings per quarter. Add to this, that the value of the seed, which is saved, is sufficient to defray the expense of planting.

From these observations it also follows, that the public must be greatly benefited by such a practice. Many thousands are supported by the corn, which would have perished in the earth, if it had never been invented and applied to the purposes of agriculture.

Several of the considerations, which have been brought to shew the great utility of setting wheat, might be employed to recommend the use of the dibble for planting beans and peas. But this is a point too obvious to stand in need of any enlargement. I therefore proceed to make a few remarks upon the ploughs, employed by the farmers in Derbyshire.

It appears from the observations, which have been made, that the wheel and double furrowed ploughs have been some time introduced into some parts of the county. But strong prejudices are still entertained against them in other situations. It is objected against the
the Norfolk plough, that it is not adapted to the stiff lands of Derbyshire, and that, when drawn by two horses going abreast, the ridges are apt to be trodden down and injured in ground, either naturally moist, or rendered so by wet seasons. In regard to the double furrowed plough it is alleged, that in fields, which have been long in tillage, the lands or ridges are very much twisted, and where this is the case, it cannot be used without difficulty and inconvenience. However it is acknowledged, that, where the ridges lie in a direct line, with the addition of one horse as much work may be done in a day, as with two single furrowed ploughs in the same space of time.

Perhaps the following course of crops, as they are much practised in Norfolk and Suffolk, may not be unworthy of the attention of farmers in those parts of Derbyshire, in which the land is chiefly in tillage.

Upon a good clay soil. Without ever fallowing.

Fallow, ing.
Barley, Turnips.
Clover, or Barley.
Wheat, Clover.
Beans, Wheat.
Barley, Upon

† Perhaps it might with stricter propriety be styled the Saxon plough; for it appears to have been used in England before the Norman conquest. Mr. Strutt, in his chronicle of those times has given a drawing of a wheel plough, which was then in use.
Soil, agriculture, and produce.

Upon a lighter land,

Fallow or turnips,  Fallow,
Barley,            Wheat,
Clover,            or Clover,
Wheat.            Wheat.

In many parts of Suffolk so great stress is laid upon the third of these courses, that it frequently forms an article in leases.

In regard to the management of land employed for pasture, it is observable, that some of the artificial grasses and plants, cultivated with great success in other counties, have never been introduced into Derbyshire. I have not heard, that sainfoin, cole-feed, lucern or the turnip-rooted cabbage have been tried in a single instance. If from the repeated experiments of farmers in different parts of the kingdom an opinion may be formed of the advantages, arising from the cultivation of the last of these plants, it seems to be highly deserving of attention. It is very likely, that this vegetable production will prove more valuable than any other, with which we are acquainted. Its chief excellency arises from being a green and most nourishing food at a season of the year, when it is most wanted. It will live throughout most winters, without receiving any injury. It is also produced in larger quantity than
than the common turnip, and is very acceptable food for horses as well as cows and sheep. It is cultivated and treated in the same way, with the common turnip.

Besides the turnip-rooted cabbage, there are several other kinds of food for cattle either not known or not attended to by the farmers in Derbyshire, but at the same time highly worthy of cultivation. But I forbear to enumerate and enlarge upon them, lest I should digress too much from the main object of this work.

SECTION.

Animals.

In the account, which has been given of the state of agriculture in Derbyshire, I have omitted to take notice of the different sorts of cattle, which are commonly bred and kept in the county, reserving this branch of husbandry, till I came to enumerate the various kinds of quadrupeds, which are found in this part of the kingdom.

Horses.

There is scarcely any characteristic, by which this animal can be distinguished in Derbyshire. The horses, which are employed in agriculture, and for hard labour, are considerably different in the southern and northern parts of the county. Those kept in the south are in general of a strong and heavy kind. Whereas in the northern part of Derbyshire the horses are smaller, and more light and slender, and on account of their make are better adapted to the business of a mountainous country. As a large quantity of limestone is burnt in the Peak, they are much employed in carrying this article to distant places thro' roads, some of which are scarcely passable with wheel carriages. It is surprizing to observe, with what agility and ease they will ride and descend the steepest hills, with very large burdens upon their backs.

Nor is the like extraordinary effect of custom and habit less conspicuous in the horses, which are used for the saddle. In pursuing the diversion of hunting they will run full speed along the side of, or directly down the steepest declivities. It is said, that those, which have been long used to the country, will ascend any precipice, which can be climbed by man.

Horned
Horned cattle.

The cows of Derbyshire are almost universally horned, rather large and handsome. Their horns are well shaped, near the head falling outward, but at the extremity turning towards the nose. Their size is various. They weigh from nine to fourteen stones a quarter. The most common weight is ten or eleven.

Several gentlemen have lately taken considerable pains to improve the breed of cattle in this county. And it may be justly questioned, whether any other district in England of the same extent can furnish so large a number of cows, equally distinguished by their beautiful shape. In proof of their great value and excellence some have been sold at so high a price as 100l. each.

However it seems, that they are not formed merely to please the eye. It is said, that they may be made fat in a much shorter time, than those, which are brought from other counties. But it does not appear, that they are better calculated for the support of the dairy. Tho' they give from two to four gallons at a time; yet, I am informed, that they do not often exceed ten quarts.

Tho' a large number of cattle be annually bred in this county, yet it is supposed, that they
they are not sufficient for the use of the inhabitants. Many are brought every year from Yorkshire and Lancashire, and sold to the graziers who reside in different parts of Derbyshire.

Sheep.

Sheep in the northern and southern part of Derbyshire are in weight and size considerably different from each other. Those, which are bred upon the borders of Leicestershire weigh from 20 to 30 pounds a quarter, and the farmers are constantly endeavouring to increase their size. In the middle part of the county they are somewhat smaller. But in the high Peak their weight is still more diminished. The sheep, which are kept here in great number, weigh from 14 to 17 pounds a quarter, those upon gritstone being 3 pounds lighter, than those upon limestone land. But the difference in the quantity and quality of the wool is still more remarkable. The fleeces, which grow upon the gritstone sheep are much lighter and thinner than those, which are taken from the other kind. Whether this difference be owing to the quality of the food or to the particular breed of the animal, I am not myself able to determine. Perhaps both causes may have some degree of influence.

Goats.
Goats.

There are now very few, if any, goats kept in Derbyshire, though they were once nearly as much attended to as any of the species of animals, which have now been mentioned. Among the endowments of Beauchief Abbey recited in a charter of Henry 4th we meet with a grant of pasture land for 40 cows and 2 bulls, 10 mares, 80 sheep, 30 swine, and 40 goats. From so large a proportion of goats it may be presumed, that they were at that time very numerous and common in this part of the kingdom.

Swine.

It appears, that in the reign of king John there were swine living wild in Derbyshire. For at that time a grant was made to the monastery at Lenton of tithe of the game taken in the counties of Nottingham and Derby, namely of stags and hinds, of bucks and does, and of boars and sows.‡

At present there are three different sorts of swine in this county. Some are very large, weighing between 40 and 50 stones. Their heads are very long, and their ears hanging over their eyes, and extending almost to their nose,

‡ Mon. Angl. vol. 1. page 648.
nose, give them a very ugly and disagreeable appearance. There is also a smaller sort with short ears pointing directly upwards. But the most common swine are a mixture of these two breeds, and weigh about 25 stones each. They are usually fattened with either potatoes, pease or oaks. But the last are thought to have the most speedy effect. It is customary to begin with boiled potatoes, and to finish with oatmeal or pease.

Deer.

Though in nature there be a considerable variety of these animals, yet, I believe, the fallow deer are the only species now to be met with in Derbyshire. They may be seen in very great number in the parks at Chatsworth and Kedleston.

However we have seen, that stags were once common in this county.† The horns of this animal, which are yet remaining in the halls of the most ancient houses afford also undoubted evidence of the fact: and as an additional confirmation of it I would observe, that they have been found in the cliffs of rocks in the Peak. I have seen a stag's head in the possession of the Rev. Mr. Barker of Youlegrave, which was found in the tophus at Alport. One of the horns is perfect.

† Note, page 315.
perfect, and the future of the skull may be clearly discerned. At what particular period this species of deer was exterminated in Derbyshire I have not been able to ascertain. But it may be presumed, that as there are very few flags to be met with in Great Britain, the distance of time, at which they became extinct, is considerable.

In regard to the wild and useless animals I believe they are the same in Derbyshire as those, which are found in other parts of England. There is one species now become extinct, which seem to have been once common in the northern extremity of the county. For it appears, that the high Peak was formerly much infested by wolves. John le Wolseley, who died 2 Edw. II., held one messuage and 15 acres of land by the service of taking wolves in the forest of the king in the Peak of Derbyshire.

Foxes are met with in every part of the county, but in the greatest number at Bradley and Shirley park in the neighbourhood of Ashbourne. It is said, that cats are sometimes seen in woods in a wild state and that they are larger and more fierce than the tame ones. I have been favoured with a few particulars respecting the otter, which are curious, and deserving of notice; as they throw some de-


gree of new light upon the capacity and disposition of this animal. A few years ago one
was brought up tame at Eckington. Upon enquiry the Rev. Mr. Pegge informed me,
that he saw it twice, or three times; once in the water, where it caught a good large eel,
and swam about some time with the fish in its mouth. He also said that it was as tame and
as harmless as a lap dog, and would come when called.

It is scarcely necessary to add, that polecats, martins, weasels, badgers and stoats, hares,
rabbits, squirrels and dormice are all inhabitants of Derbyshire. Of rats there are very few of
the black species. But the brown and water rats are common, especially the former.
House and field mice are likewise often met with. Moreover the fetid and water shrew,
the mole, the urchin and the great and the long eared bat are all common in Derbyshire.
CHAP. VIII.

A catalogue of some plants growing spontaneously in Derbyshire.

In the last chapter an account was given of the soil, agriculture, and produce of Derbyshire. In this survey notice was taken of some of the most useful plants, which are cultivated in different parts of the county. But very few of those, which grow spontaneously, were enumerated. I therefore propose now to give as complete a catalogue, as I have been able to form, of the plants which come under this denomination.

Perhaps such an attempt may be thought superfluous and unnecessary. It may be alleged, that several works have already been undertaken expressly for the purpose of ascertaining the native plants of Britain. But such a business is not the sole or chief object, which I have in view. Indeed I have no expectation of adding to the number of plants, which have already been observed in this kingdom. My prin-
principal intention is to point out the situation, in which any individual one may be found in Derbyshire.

The execution of such a design, I doubt not, will be thought useful by those, who have a taste for botanical pursuits, and reside in the county. But such persons may possibly object to a catalogue of the more common plants. They may think it sufficient to take notice of those, which are scarce in this part of the kingdom. But on the other hand let it be remarked, that so confined a plan would have rendered this branch of natural history very defective. Another reason for attempting a general catalogue is the great difficulty of distinguishing what are really scarce plants. For some, which are seldom met with in one situation, grow very plentifully in another.

I shall not attempt a description of any of those plants, which I propose to enumerate. This business more properly belongs to the botanist than the natural historian. Besides, to give an account of the generic and specific characters of plants would swell this work to an inconvenient size. It will be more conducive to the end, which I have in view, and perhaps equally amusing and instructive to mention their medical virtues, their uses in
confist, it seems not improbable, that it has an animal or vegetable origin. Perhaps it may have both.

The soil in the vallies, near the banks of the larger rivers, is, every where, of a different nature from that in the neighbouring country. It is easy to see, that its original state must be much altered by the various kinds of earth, with which it is mixed, whenever it is overflowed by the swelling of the water. Such inundations serve in some degree, though not entirely to account for the diversity of soil, which is observable in the situations of which I am now speaking. Whether the great fertility of the land in such places can be justly ascribed to the same cause, I leave to be determined by those, who have better opportunities of enquiry and observation.

Having given an account of the general nature of the soil in Derbyshire, I proceed to describe as well as I am able, in what kind of occupation and state of improvement the land is throughout the county.

In the southern part of Derbyshire the land is nearly equally divided betwixt pasture and tillage. Formerly in the neighbourhood of Appleby it was employed chiefly in the latter way. But, about 20 years ago, the open fields were
were enclosed, and since that time the business of the dairy has been more attended to.

At Walton upon Trent the land is occupied in the same manner; but the farms are larger. It is not uncommon in this part of the county for one person to have five hundred acres in his hands and cultivation. As the dairy is equally an object of attention with the growth of corn, the same land is never suffered to continue long in tillage. The following course of husbandry is most common.

After breaking up the grass land, it is customary to sow

<table>
<thead>
<tr>
<th>Oats,</th>
<th>Oats,</th>
<th>Oats,</th>
<th>Oats,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat,</td>
<td>Wheat,</td>
<td>Wheat,</td>
<td>Wheat,</td>
</tr>
<tr>
<td>Barley,</td>
<td>Fallow,</td>
<td>Fallow,</td>
<td>Beans,</td>
</tr>
<tr>
<td>or</td>
<td>Turnips,</td>
<td>Wheat,</td>
<td>Fallow,</td>
</tr>
<tr>
<td></td>
<td>Barley,</td>
<td>Barley,</td>
<td>Barley.</td>
</tr>
</tbody>
</table>

Sometimes after oats and wheat they fallow in the winter, and then have a crop of barley or beans. But, I believe, it is an universal practice, when the last crop is taken, to sow grass seeds, which are either clover or rye grass or both. It is usual, after having completed the above courses, to suffer the land to lie two or three years for pasture.

However this kind of management is not extended to all their lands. Some are never broken
the arts, and as food, and any other striking or peculiar properties, of which they may be possessed. In executing this part of my plan I have derived considerable assistance from the botanical arrangement of British plants by Dr. Withering. He has collected from other authors, and observed himself whatever is useful and amusing on the several subjects, which have now been mentioned. He has also been so kind as to offer me, thro' the obliging medium of Mr. Whately, any extracts, which I might think worthy of my attention. And it will be seen, that I have not neglected to avail myself of his polite offer.

In respect to the arrangement of the plants, which appear in the following catalogue, I have adopted those of Mr. Hudson and Dr. Withering, so far as they were consistent with the execution of the plan, which I had formed.

The catalogue, which I now present to the public, is not so large as I could wish. Many plants are omitted, which, I doubt not, are frequently observed in several parts of the county. But as they have not been examined by myself, or those gentlemen, who have been so obliging as to give their assistance, I have thought proper not to mention them.

W

The
The particular places of growth of what I apprehend to be the rarer plants are pointed out. The name of the person, by whom they have been observed, is also frequently added: and considerable pains have been taken to render this part of the work as accurate as possible.

I have given both the Linnaean and English names of plants for the convenience of the unlearned as well as scientific botanists; and, after the example of Dr. Withering, the former has been placed the first.

Whenever the time of flowering and the length of a plant's duration in the ground are known, they are both noticed. The letter A. signifies annual, or one year. B. biennial, or two years. P. perennial, or many years. It may be proper also to observe, that with a view of distinguishing the shrubs, and trees from other plants, they are marked with the letters T. and S.
Native plants.

Class I.

MONANDRIA DIGYNIA.
I. CHIVE. II. POINTALS.


A. March—August.

Class II.

DIANDRIA MONOGYNIA.
II. CHIVES. I. POINTAL.


The berries are filled with a dry, spongy, violet pulp, from which a rose-coloured pigment may be prepared. Scopoli.

With the addition of allum, the berries dye wool and filk of a good and durable green; for this purpose they must be gathered as soon as they are ripe—the leaves are bitter and slightly astringent.—Oxen, goats, and sheep eat it, horses refuse it.
Native plants.


The leaves have a slight degree of astringency and bitterness. An infusion of them is recommended by Hoffman, as a substitute for tea; but it is more astringent and less grateful.

It is said to be useful in purifying the blood and humours.

It is eaten by cows, sheep, goats, and horses, but refused by swine.

**Veronica serpyllifolia.** Pauls betony. Smooth speedwell. Derby; Pinxton; in meadows and pastures. P. May.


The leaves are mild and succulent, and are eaten in ballads early in the spring.

This is sometimes used as an ingredient in spring juices.—Cows, goats, and horses eat it; swine refuse it.

Native plants.


The leaves are a better substitute for tea than those of the common speedwell, being more grateful and less astringent. Cows and goats eat it; sheep, horses, and swine refuse it.


Cows, goats, sheep, and horses eat it.


Veronica arvensis. Wall Speedwell. Old walls, and amongst rubbish; Derby. A. May.

Horses eat it.


On moist and boggy ground, near Mr. Eames's, Mackworth. P. May.

It is said, that new milk poured upon the fresh leaves in a strainer and set by a day or two, becomes
becomes stiff and tenacious; that it does not yield any whey, and soon is converted into a very pleasant and wholesome food. It has been also observed, that a small quantity of the milk in this consistent state will have upon fresh milk the same effect, which is produced by the leaves of the plant. However, the truth of these assertions has lately been questioned. Upon trial it is not always found to be possessed of the property, which has now been mentioned.—The oily and glutinous juice, which silancule contains, is used by farmers to cure cracks or chops in the udders of cows.—It has been supposed by some, that it is the cause of the disease, called the rot, among sheep, when by extreme hunger they have been constrained to eat it. But Dr. Withering questions, whether this complaint is owing so much to the vegetables in marshy grounds, as to a flat insect called a fluke, (fasciola hepatica) which is found in these wet situations adhering to the stones and plants, and likewise in the livers and biliary ducts of sheep, which are affected by the rot.

From experiments made on purpose, and conducted with accuracy, it appears, that neither sheep, cows, horses, goats, or swine, will feed upon this plant.
Native plants.


**Salvia pratensis.** Meadow Clary. Crich. Mr. Hallows. P. June.

**Circæa lutetiana.** Common Inchanters Nightshade. Newton wood; Sutton spring; Quarndon well; in the woods at Matlock. P. May. Aug.

It is eaten by sheep.

**Order II.**

**Diginia.** II. Pointals.

**Anthoxanthum odoratum.** Spring grass. Meadows and pastures common. P. May. This is one of the earliest of our grasses and is said by Linnaeus to occasion the smell of new-mown hay. Mr. Curtis says that the leaves, rubbed between the fingers, impart a grateful odour. Boccone says a distilled water is prepared from it as the vehicle of some perfumes. Dr. Withering observes, if it be gathered whilst in blossom, lapped in paper and carried in the pocket, it retains the smell of new-mown hay for a long time.
Native plants.

Class III.

TRIANDRIA MONOGYNIA.

III. CHIVES. I. POINTAL.

Valeriana officinalis. Great wild valerian. Matlock; Duffield; Dovedale.

Cats are much affected by the roots. P. June.

There is a variety of this plant, with narrower leaves, growing in high situations. It is this, which is so much valued in medicine. The root has a strong and not an agreeable smell; its taste is warm, bitterish, and sub-acrid; it communicates its properties to wine, water, or spirit; but it is best in substance and may be taken from half a dram to two drams for a dose. There is no doubt of its possessing antispasmodic virtues in an eminent degree. It is often prescribed with advantage in hysterical cases; and instances are not wanting when it appears to have removed some obstinate epilepsies. In habitual costiveness it is an excellent medicine and frequently loosens the bowels when other stronger purgatives have been tried in vain.

Valeriana dioica. Small marsh valerian.


Val-
Native plants.

Valeriana locusta. Lamb's lettuce.

Corn fallad.
Frequent in corn-fields. April.—July.
The young leaves in spring and autumn are eaten as fallad, and are said to be very little inferior to young lettuce.—Cows, sheep, and lambs eat it.—A horse eat it. Dr. Stokes.

Crocus officinalis. Autumnal saffron crocus.
Holmes and Siddals near Derby; Breadfall and Duffield near the banks of the river Derwent.
The leaves of this plant, which grows in large patches in a common pasture near Derby, are preferred by the cattle to all other grasses.
The summits of the pointal carefully collected, and moderately dried, are the saffron of the shops. That collected in England is preferred to all other. It affords a beautiful colour to water, wine, or spirit, and gives out the whole of its virtues to them. It has been holden in high repute as a cordial and exhilarant, and to be particularly serviceable in disorders of the breast and in hysterick depressions; but Dr. Withering says, that modern practice pays no great attention to it, since it has been found to produce no sensible effect, even when given in doses much larger than those generally prescribed.

Iris
Native plants.


. Swarkestone bridge; Packfaddle bridge near Markeaton; Tibshelf; Pinxton; and other marshy and wet situations. P. July.

. The juice of the fresh root is very acrid and has been found to produce plentiful evacuations from the bowels, when other powerful means had failed. [Edin. med. eff. Vol. 5. art. 8.] It may be given for this purpose in doses of 80 drops, every hour or two; but physicians find the degree of its acrimony is so uncertain, that it can scarcely ever come into general use. In some cases it proves diuretic. Dr. Withering says, the fresh roots have been mixed with the food of swine bitten by a mad dog, and they escaped the disease, when others bitten by the same dog died raving mad. The root loses most of its acrimony by being dried.

. Goats eat the leaves when fresh; but cows, horses, and swine refuse them: cows will eat them when dried. The roots are used in the island of Jura to die black. Pennant's tour, 1772, p. 214.


Erioph-
Native plants.


Poor people sometimes stuff their pillows with the down, and make wicks of candles with it, but it becomes brittle when quite dry.


This grass is stiff and hard to the touch, but being generally short, it eludes the stroke of the scythe, and takes off its edge, which makes it disliked by mowers.

Goats and horses eat it. Cows and sheep are not very fond of it. Crows stock it up, for the sake of the larva of insects which they find at the root.

**Order II.**

_Digynia._ II. POINTALS.

_Alopecurus pratensis._ Foxtail grass.


This is the best grass to sow in low meadow grounds, or in boggy places which have been drained. Sheep, horses, and goats eat it. Cows and swine are not fond of it. Linn. But Dr. Pultney says, that this is the most grateful of all grasses to cattle.
quality, and grateful flavour. When ground to meal, they make bread very little inferior to that in common use from wheat. The bran separated in preparing the meal, is given to horses, which have the worms; but they must be kept from water for some hours afterwards. Geese are very fond of the seeds, and well know, where to look for them. Dr. With.

**Festuca ovina.** Sheep's fescue. P. July.
In high situations. Duffield bank.

It flourishes best in a dry sandy soil: cows, horses, and goats will eat it, but it is the favourite food of sheep: they prefer it before all other grasses, and are said soonest to grow fat upon it; for tho' small, it is succulent. The Tartars who lead a wandering life, tending their flocks and herds, always choose those spots where this grass abounds. Is not the superiority of the Spanish and English wool owing to the abundance of this grass in the hilly pastures where the sheep are kept? Dr. Withering.

**Festuca sylvatica.** Wood fescue.
Common in woods. P. July

**Aira praecox.** Early hair grass.
Near walls; not uncommon. A. May. June.
Native plants.

Aira flexuosa. Heath hair-grass.
Horses, cows, and sheep eat it.

Cynosurus cristatus. Crested dog's-tail grass.

Bromus giganteus. Tall brome-grass.
Cows, horses, goats, and sheep eat it.

Bromus sterilis. Barren brome-grass.

Bromus hirsutus. Hairy brome-grass.

Bromus erectus. Upright brome-grass.
Not very common, but found in a wood near Little-Eaton. Dr. Johnson. P. June.

Cows, sheep, and goats eat it.

Avena pubescens. Rough oat-grass.
Common. P. June.

Arundo
Native plants.

Arundo arenaria. Common. Dr. Johnson.


It makes an excellent hay upon a dry chalky or sandy soils. It is cultivated with advantage along with clover, and springs earlier than the other grasses; by this means cattle are supplied with food at a season of the year, when it is most difficult to be obtained.

Cows, horses, and sheep eat it. Goats are not fond of it.

Elymus europaeus. Wood lime-grass.
Rocks opposite to Matlock—Baths. Mr. Woodward. P. June.

Hordeum pratense. Meadow barley.
In the fields about Coxbench. P. June.

Common. A. April.—Aug.
Sheep and horses eat it.

Triticum repens. Squitch-grass, Dogs-grass, Couch-grass, Quitch-grass.
P. June.—Aug. It
Native plants.

It is a very troublesome weed in most places. At Naples the roots are collected in large quantities, and sold in the market to feed horses. They have a sweet taste. When dried and ground to meal they have been made into bread in years of scarcity. The juice of them drank liberally is recommended by Boerhaave in obstructions of the viscera; particularly in cases of schirrhous liver and jaundices. Dogs eat the leaves to excite vomiting.—Horses eat them when young, but leave them, when fully grown.—Cows, sheep, and goats eat them.

Order III.

TRIGYNIA. III. POINTALS.

MONTIA fontana. Small water chickweed or purslane. A. May.
Pinxton, Wirksworth, and Buxton.
Native plants

Class IV.

TETRANDRIA MONOGYNIA.

IV. CHIVES. I. POINTAL.

Hedges and ditches; very frequent for several miles round the town of Derby.

In some parts of England this plant is cultivated for the use of the clothiers, who employ the heads with crooked awns to raise the knaps upon woollen cloths. For this purpose they are fixed upon the circumference of a large broad wheel, and the cloth is held against them, when it is turned round.—The flowers blossom in June, and the heads are gathered in August.

Dipsacus pilosus, Small wild teasel, Shepherd's rod. Shepherd's staff.

Derby; betwixt Derby and Spondon. Dr. Johnson.

Scabiosa succisa. Devil's-bit or scabious.
Frequent in fields. P. June.—Aug.

Linnæus says, that the leaves are used to dye wool yellow or green.—Dr. Withering observes, that a strong decoction of it, continued a good while together, was an empirical secret for gonorrhæas. Scabiosa
Native plants.

Scabiosa arvensis. Field or corn scabious. Pastures and corn fields. P. July. Aug. Sheep and goats eat it. Horses and cows are not fond of it.—This plant is slightly astringent, bitter, and saponaceous.


Dr. Withering says, that the common people apply the green leaves to cuts.


Plantago lanceolata. Rib-grass. Common, in fields and meadows. P. June. Linnaeus says it is eaten by horses, sheep, and goats, and that cows refuse it; but Haller attributes the richness of the milk, in the famous Alpine dairies, to this plant and to the Alchemilla vulgaris. Dr. Withering.—The total
total absence of this plant in marshy lands, is a certain criterion of the wretched quality thereof. In proportion as such soils are meliorated by draining, this plant will flourish and abound. It is often sown and cultivated for pasturage, but does not answer the purpose without a mixture of clover or other grasses. Twelve acres of land being sown with this plant; a plentiful crop was the consequence, but no animal would eat it. Mr. Dickenson.—When it grows detached from other plants, as it frequently does by the sides of foot-paths, I have never seen cattle touch it. Dr. With.

Sanguisorba officinalis. Wild or great Burnet.
Common, in moist pastures.
The whole plant is astringent. The green leaves are sometimes put into wine to give it a grateful flavour, and the very young shoots are said to be agreeable in salads. Linnaeus says, that cows, horses, sheep and goats eat it.—But Mr. Woodward observes, that horses do not seem fond of it.

Sherardia arvensis. Little field Madder.
Common.
A. May.—Sept.
Goats are very fond of it; horses eat it; sheep are indifferent to it.
Native plants.

Asperula odorata. Sweet Woodroof.
Sutton wood; Dovedale; in a wood near Mr. Eames's, Mackworth. P. May.
Linnaeus observes, the scent of this plant is said to drive away ticks and other insects. Formerly it was much in repute for attenuating viscid humours, and strengthening the tone of the bowels, but it is rejected by modern practice. Dr. Withering observes, that it gives a grateful flavour to wine.
Cows, horses, sheep, and goats eat it.

Asperula cynanchica. Squinancy-wort.
Normanton; Pinxton. P. July.

Galium palustre. White Ladies bed straw.
Common in marshes about Coxbench. P. July
Cows, sheep, and horses eat it. Goats and swine refuse it.

Sides of fields and roads, frequent.
The flowers will coagulate boiling milk; and Dr. Withering says, the best Cheshire cheese is prepared with them. The French prescribe them in hysterical and epileptic cases. Boiled in alum-water they tinge wool yellow. Mr. Pennant says, that the roots dye a very fine red, not inferior to madder, and are used for this purpose in the island of Jura.
Native plants.

Galium uliginosum. Marsh Goosegrass.

P. July.

Pleasly park; in marshes about Coxbench. Horses, cows, sheep, goats, and swine eat it.

Galium aparine. Catchweed, Goosegrass.
Cleavers. Clivers.

A. May. June.

Common, in hedges.

The plant is eaten by horses, cows, sheep, and goats. Swine refuse it. Young geese are very fond of the branches.—The expressed juice of the stems and leaves, taken to the amount of four ounces, night and morning, is very efficacious in removing many of those cutaneous eruptions which are called, though improperly, scorbutic. It must be continued for several weeks.


Middleton dale. Mr. Coke. P. July.

Galium pusillum. Least Goosegrass.

Middleton dale, Mr. Coke, P. May.


Frequent in hedges. Derby; Kedleston; Glapwell; Pinxton.
Native plants.

The wood is very hard and smooth, fit for the purposes of the turner. The berries are bitter and styptic: they dye purple.

Horses, sheep, and goats eat it. Swine and cows refuse it.

Frequent in meadows and pastures.
The whole plant is weakly astringent. Dr. Withering says, in the province of Smolandia in Gothland, they make a tincture of the leaves and give it in spasmodic or convulsive disorders.

Horses, sheep, and goats eat it. Swine refuse it. Cows are not fond of it.

Order II.

Digynia. II. Pointals.


Order III.

Tetraxygium. IV. Pointals.

Ilex aquifolium. Common Holly.
Frequent. T. April—June.

X 4 Birds
Native plants.

Birds eat the berries. The bark fermented, bruised, and afterwards washed from the woody fibres makes the common bird-lime. It makes an impenetrable fence and bears cropping. Neither its verdure or the beauty of its scarlet berries is observed to be affected by the severest weather. The wood is used in fineering, and is sometimes stained black to imitate ebony. Handles for knives, and cogs for mill-wheels are made of it.

Moist ground adjoining to Radbourn common.

Class V.

Pentandra Monozygia: V. Chives. I. Pointal.

Dry situations; frequent.
When it grows in the water, and its taste and smell are by that means rendered less perceptible, sheep will sometimes eat it; but it is generally fatal to them. Dr. Withering.—Cows, horses, swine, and goats refuse it.
Native plants.

**Myosotis arvensis.** A. \[3\] Common.

--- **palustris.** P. \[3\]

**Lithospermum officinale.** Common

*Gromwell.* P. June.

Matlock. Mr. Hallows.

Sheep and goats eat it. Cows and horses refuse it.

**Lithospermum arvense.** *Lesser Gromwell.* *Bastard Alkanet.* *Painting Root.*


The bark of the root tinges wax and oil of a beautiful red, similar to that, which is obtained from the foreign alkanet that is kept in the shops.—Sheep and goats eat it. Cows are not fond of it. Horses and swine refuse it.

**Cynoglossum. Houndstongue.**

Ashover, in a hedge. Matlock, but not very common. P. June.

The root and leaves have been suspected by some to possess narcotic properties, but others will not admit the fact. It is discarded from the present practice; but Mr. Ray says that Dr. Hulse used a decoction of the roots inwardly, and applied cataplasms of them outwardly in strumous and scrophulous cases.—The scent of this plant is said to be very disagreeable
agreeable and very much to resemble that of mice.—Goats eat it. Cows, horses, sheep, and swine refuse it.

**Symphytum. Comfrey.** P. May.—July.
Wingerworth; Derby; Mackworth. A variety with purple blossoms in several places near Derby, and in a ditch near Duffield bridge.

Dr. Withering says, that the leaves give a grateful flavour to cakes and pанада. The young stems and leaves are frequently eaten when boiled. The roots are glutinous and mucilaginous, and a decoction of them is used by the dyers to extract the colouring matter of gum lac.

Cows and sheep eat it. Horses, goats, and swine refuse it. Dr. Stokes observes, that a horse eat it.

**Lycopsis arvensis. Small Bugloss.**
Not uncommon. A. June.
Cows, horses, sheep, and goats eat it. Swine refuse it.

When cultivated in gardens, it grows very large, and makes a beautiful showy appearance.

Cows,
Native plants:

Cows and sheep are not fond of it. Horses and goats refuse it. Bees are fond of the flowers, but their wings are sometimes injured by the strong hairs.


The blossoms are used for making wine.—Silk-worms are fond of the leaves and flowers.


Gerard says, that a dram and half of the driest roots, taken up in autumn, operates as a strong but safe emetic.—Sheep and goats eat it. Cows are not fond of it, and swine refuse it. Silk-worms may be fed with the leaves.


Ponds and pits, not unfrequent. S. Normanton. In a pit by the foot road betwixt Mackworth and Kedleston. P. June: July.

The leaves have a penetrating bitter taste. An infusion of them is frequently prescribed in
in rheumatisms, and sometimes in dropfies. It is also given to destroy worms. It has had great reputation in scorbutic and scrofulous disorders. A dram of the leaves in powder purges and vomits. Dr. Withering says, that in a scarcity of hops this plant is used in the north of Europe to bitter the ale; two ounces supply the place of a pound of hops. Some people say that sheep will eat it, and that it cures them of the rot; but from the Upsal experiments it appears, that tho' goats eat, sheep sometimes will, and sometimes will not. Cows, horses, and swine refuse it.

Ditches in the meadows below Derby. Mr. Whately.

Between Derby and Coxbench. Dr. Johnson. Meadows about Derby. Mr. Whately.
Native plants.

The plant is a little acrid, and somewhat astringent.—Cows and sheep eat it. Goats are not fond of it. Horses refuse it.

**Lysimachia teeniela. Purple Moneywort or Loosestrife.**

In moist situations. Pleasley, Pinxton, and Normanton.

**Anagallis arvensis. Male Pimpernel.**

A. May.—Aug.

Common. The blossom is scarlet.

Mr. Dickenson observes, it is remarkable with what a sparing hand nature has dealt out her richest and most glorious colour, for except this and the poppies, I do not recollect any indigenous plant of a scarlet colour.

This plant was much used by the antient physicians in maniacal and melancholic cases, but is very little regarded in modern practice.

Cows and goats eat it. Sheep refuse it.—Small birds are very fond of the seeds.

**Convolvulus arvensis. Small Bindweed.**

June.—Aug.

Frequent in corn fields and road sides.

Cows, horses, goats, and sheep eat it. Swine refuse it.—The blossoms give a deep yellow or orange tincture to water, which is heightened by alum and alkalies.

**Convol—**
Native plants.

**Convolvulus sepium. Great Bindweed.**
The inspissated juice of the plant, in doses of 20 and 30 grains, is a powerful drastic purge. Dr. Withering says, that scammony is the inspissated juice of a species of convolvulus so much resembling this, that they are with difficulty distinguished. Can it then be worth while to import scammony from Aleppo at a considerable annual expence, when a medicine with the very same properties grows spontaneously in many of our hedges? Tho' an acrid purge to the human race, it is eaten by hogs in large quantities without any detriment.
Sheep, goats, and horses eat it. Cows refuse it.

**Polemonium caeruleum. Greek Valerian. Jacob's Ladder. Ladder to Heaven.** P. June.
Matlock, Alfreton brook. Mr. Coke.—Lover's Leap, near Buxton. Mr. Wood.—By the side of the turnpike road, in Bakewell meadows. Mr. Whately.

On account of its beauty it has been introduced into the English gardens.—Cows, goats, and sheep eat it. Horses are not fond of it.

Chee Tor.

The
Native plants.

The juice of the petals stains blue, but with the addition of alum, green. A green pigment is obtained from them.

Linnaeus says, that cows, horses, sheep, and goats will eat it. But Dr. Stokes found, that a horse refused it.

**Campanula patula. Spreading Bellflower.**

Betwixt Ashbourn and Dovedale. Dr. Johnson.—Little Chester, near Derby. Betwixt Rowsley and Darley, Matlock. Pilkington.

It is very deserving of a place in our flower borders. The whole plant abounds with a milky liquor.—Horses, sheep, and goats eat it.

**Campanula trachelium. Nettle-leaved Bellflower, Great Throatwort, or Canterbury Bells.**
P. July.—Sept.

Hedges. Pinxton. Mr. Coke.—Betwixt Duffield bridge and Makeney. Pilkington.
Cows eat it. Horses and goats refuse it.

B. July.—Sept.

Middleton dale. Mr. Coke.—Matlock, on the heights of Abraham, and Makeney, near Duffield. Pilkington.

Exter-
Externally used this plant is emollient. Dr. Home advises a decoction of it, two ounces to a quart, in diarrhoeas of an old standing; he gave a quart every day. Clin. Exp. p. 439. It eases the pains of the intestines; is used as an injection with advantage; and is often applied externally to the piles. *ib.*—It is said to intoxicate fish, so that they may be taken with the hand.—In Norway they give it to cows, which are consumptive.—The down serves for tinder.

It is not known, that any of the brutal creation will eat it.

**Verbascum nigrum. Black Mullein.**

Stanton. Mr. Coke. P. July.—Sept.

The flowers are grateful to bees. Swine will eat it. Sheep are not fond of it. Cows, horses, and goats refuse it.

**Datura stramonium. Thorn-apple.**

Derby and Pinxton. A. July.

An ointment prepared from the leaves gives ease in external inflammations and haemorrhoids. The Edinburgh college direct an extract to be prepared by evaporating the expressed juice of the leaves. This has been given with advantage in convulsive affections and epilepsies. Out of 14 epileptic patients 8 were entirely cured by it, at Stockholm. The dose from 2 to 16 grains a day. *Med. Com.* i. 368. iii. 22. See
Native plants.

See also Lond. Med. Journ. ii. 295. The seed or leaves taken internally bring on delirium, tremors, swelling, itching, eruption and inflammation on the skin; these effects were produced by a dose of a dram and a half in a girl 9 years old. See Dr. Fowler's account, Med. Comm. vol. v. p. 164.

It is refused by every animal.

**Hyoscyamus niger. Common Henbane.**

B. June.

Nun's green, Derby; Chelafton; Pinxton. Every part of the plant is poisonous. Madness, convulsions and death are the general consequence of taking it internally. Yet in a certain quantity it has been used in medicine. The expressed juice is evaporated to an extract. The dose is from half a scruple to half a dram. Dr. Withering thinks, that it may be advantageously joined with opium, where the effects of that medicine are desirable, and costiveness is to be avoided. Dr. A. Fothergill has given two cases of madness, in which he experienced the good efficacy of the extract from this plant. One was a deep melancholy, and was entirely removed. The other was a puerperal mania, and the medicine in this instance was attended with equal success. Memoirs of med. soc. of Y London,
London, art. 23. It appears, that great caution is necessary in the use of this plant.

It is said, that sheep sometimes eat it when it is young.


Pinxton; Derby. Not very common.

From one to three grains of the leaves infused in boiling water, and taken at bed-time occasions a copious perspiration, en creases the secretions of the kidneys and generally purges more or less the following day. These properties, judiciously applied, render it capable of doing essential service in several diseases, as may be seen in Mr. Gataker's treatise on the Solanum. But Dr. Withering observes, that its effects on the nervous system are so uncertain and sometimes so considerable, that it must ever be administered with the greatest caution. The leaves used externally abate inflammations and assuage pain. The flowers smell like musk. It is not eaten by any animal.


Moist hedges and ditches, frequent.

Boerhaave says it is a medicine far superior to China and Sarsaparilla as a sweetner and restorative.
florative. Linnaeus thought an infusion of the young twigs an admirable medicine in acute rheumatisms, inflammations, fevers, and suppression of the lochia. Dr. Hill says he has found it very efficacious in the asthma. Dr. Hallenberg advices it in ischiatic and rheumatic pains, jaundice, scurvy, and lues venerea. He directs a pint of boiling water to be poured upon 2 drams of the stalks sliced and dried; after standing half an hour, it must be boiled 15 minutes. The dose 2 tea-cups full or more, morning and evening. The stalks may be gathered early in the spring, or at the end of autumn. *Med. Com. vol. 3. p. 15.* Mr. Beddoes says, the root has the smell of the potatoe.—Sheep and goats eat it. Horses, cows, and swine refuse it.

The stalk has at first a bitter taste, which is followed by a pleasant sweetness. On this account it is frequently eaten by children, without their receiving any injury from it. Pilkington.

**Atropa belladonna.** Deadly or Sleepy Nightshade. Dewberries. P. June.—Aug.
Fruit ripe from August to October.

Near a pond at Hardwicke. Mr. Hallows.—Horsely castle. Dr. Johnson.—It may be considered as one of the scarce plants of Derbyshire.
The whole plant is poisonous. Those who eat the berries, are seized with stupor or delirium and become variously convulsed. Death is the unavoidable consequence, if a strong emetic be not immediately employed, to discharge the poison from the stomach. For this purpose has been recommended a large glassful of warm vinegar, or repeated draughts of a tea spoonful of spirits of harts horn, taken in a large glass of brandy and water, as these narcotics frequently diminish the irritability of the stomach, so far as to render it insensible to the operation of vomits.—Tumours of the breasts even of the cancerous kind are said to have been resolved by a topical application of the fresh leaves. Dr. Graham in the Med. Communications, vol. i. p. 419. says, he found great benefit from a poultice made of the roots boiled in milk and applied to hard ill-conditioned tumours and ulcers; and relates a deplorable case, in which this poultice effected a perfect cure. The powdered root has been given in doses of ten or more grains every other night as a preventative after the bite of a mad dog. Lond. Med. Journ. vol. iii. page 109. Dr. Withering has no doubt but the external application of this plant may be productive of good effects in several cases, but he thinks it dangerous, when the skin is broken.
Native plants.

An infusion of the dried leaves has been used for a cancer in the breast with success. *Phil. Trans.* vol. 50. p. 77.
The juice of the ripe berries stains paper of a beautiful and durable purple.

Frequent in hedges.—Cows, goats, and sheep eat it. Horses refuse it.

*Rhamnus catharticus.* Purging *Buckthorn.* Apr. May.
Not uncommon in hedges and woods.
The juice of the berries is a nauseous purgative, and made into a syrup is used in medicine. About an ounce of it is a moderate dose; but it generally occasions so much sickness and griping that it is falling into disuse. The juice of the unripe berries is of the colour of saffron, and is used for staining maps or paper. These are sold under the name of French berries.—The juice of the ripe berries is the sap green of the painters; but if they are gathered late in the autumn the juice is purple.—The bark affords a beautiful yellow dye.—Goats, sheep, and horses eat it. Cows refuse it.

Glapwell. Mr. Hallows.

From a quarter to half an ounce of the inner bark, boiled in small beer, is a sharp purge. In dropcies, or constipations of the bowels of cattle, it is a very certain purgative. The berries gathered before they are ripe, dye wool green. The bark dyes yellow, and with preparations of iron, black.

Charcoal prepared from the wood is preferred by the makers of gunpowder. The flowers are particularly grateful to bees. Goats devour the leaves with greediness, and sheep will eat them.

Evonymus europaeus. Spindle tree, Prick wood, Prick timber tree, Gatteridge tree, Louse berry.

Matlock. S. April. May.

The berries vomit and purge violently, and are fatal to sheep. Powdered and sprinkled upon the hair, they destroy lice. If the wood is cut when the plant is in blossom, it is tough and not easily broken; and in that state is used by watch-makers, and to make skewers and tooth picks.—Cows, goats, and sheep eat it, Horses refuse it.

Ribes
Pinxton. On the banks of the Derwent betwixt Duffield and Derby; and in several places by the side of a brook betwixt Mackworth and Markeaton.

The ripe fruit is universally acceptable, and the juice is very agreeable both in punch and when converted by the addition of sugar into a jelly.—Cows, goats, and sheep eat the leaves.

Pleasly park. Mr. Coke.—In hedges on the west side of the Derwent betwixt Duffield and Makeney; and on the hill, where Codnor castle formerly stood.

Common upon old buildings, to which it is sometimes a very beautiful ornament.

Dr. Withering says, that the berries have a little acidity; and that they purge and vomit. Horses and sheep eat it. Goats and cows refuse it.

Vinca minor. Lesser Periwinkle.
In a hedge within the Roman station at Little Chester near Derby. P. May. Sept.

Vinca major. Greater Periwinkle.
Pleasly park. Mr. Coke. P. June.
Dr. Withering says it is bitter and slightly astringent. Y 4. Order
Order II.

DIGYNIA. II. POINTALS.

HERNIARIA hissuta. Hairy Rupturewort.
Duffield, Mr. Hadley. A. July.

Frequent among rubbish, on road sides and walls.

The young shoots peeled and boiled are eaten as asparagus, but with some persons they have a griping effect.—The roots are given to sheep which have a cough.

Goats and sheep are not fond of it. Cows, horses and swine refuse it.

CHENOPODIUM urbicum. Upright Goosefoot.
A. Aug. Sept.
Frequent on dunghills and among rubbish.
Goats and sheep eat it. Horses and cows refuse it.

CHENOPODIUM polyspermum. Upright Blite. All-seed.
A. August.
Not uncommon.—Cows and sheep eat it.
Goats and horses refuse it.

CHENOPODIUM viride. Green Goosefoot.
Common in kitchen gardens.—Goats, sheep, and swine eat it.
Native plants.

Chenopodium album. Common wild Orache. A. August.

Common on dunghills. Cows, goats, and sheep eat it. Horses refuse it. Swine are extremely fond of it. Linnaeus. But Dr. Stokes says, that horses sometimes eat it, and even appear fond of it.


Betwixt Derby and Duffield. Cows eat it; but it is said to be poisonous to swine.


Dethick. Mr. Hallows.

The scent is rank and fetid. Dr. Withering says, that it has got the reputation of being an anti-hysterical. — Cows, horses, goats, and sheep eat it. But swine refuse it.


Hedges, but not very common.

The wood, being hard and tough, is capable of being converted to many useful purposes. The leaves are not only eaten by horses, cows, sheep, goats, and swine, but from some late experiments have been found very acceptable to silk-worms. By its height and shape this tree is a beautiful ornament to the country, where
where it grows. It loves an open situation and bears to be transplanted. Dr. Withering says, that a decoction of the inner bark has been known to carry off the water in dropsies. The bark dried and ground to powder, has been mixed with meal in Norway to make bread, in times of scarcity.

**Ulmus montana. Broad-leaved Elm.**

Not unfrequent in the southern part of the county.

S. March,

**Hydrocotyle vulgaris. Marsh Pennywort. White Rot.**

P. May. June.

S. Normanton. Quarndon common.

Farmers suppose it occasions the rot in sheep.

**Gentiana centaurium. Century Gentian.**

S. Normanton, Matlock, and wind-mill near Derby.

A. June.—Aug.

It is very bitter. Dr. Withering says it is the basis of the famous Portland powder which prevents fits of the gout, when taken in a large quantity, and a long time together; but brings on hardness of the liver, palsy, and apoplexy. A tincture of the leaves and upper part of the roots is a good medicine in weak stomachs, and cachectic habits. A decoction of the whole plants destroys lice, and cures the itch.—Cows are not fond of it, and in sheep pasture it is frequently left untouched.
Native plants.

Gentiana pneumonanthe. Marsh Gentian, or Calatbian Violet. August.

Egginton heath.


Pinxton. Mr. Coke.

Sanicula europaea. Common Sanicle.

In hedges, at S. Normanton, Mackworth, and Rough Heanor. P. July.

The leaves are slightly bitter, aromatic, and astringent.—Sheep eat it. Goats are not fond of it. Horses refuse it.


Dovedale. Dr. Johnson.


Frequent in meadows and pastures.

The seeds have been sometimes used as diuretics and carminatives; and are highly recommended in calculous complaints. Dr. Withering.—An infusion of them has been found to afford relief in sharp fits of the gravel. Mr. Woodward.—It proved very beneficial in the case of a lady who passed calculi of considerable size. Dr. Stokes.

2. This
2. This in its cultivated state is the well known garden carrot, whose roots are eaten either boiled or raw. When raw, they are given to children troubled with worms. They seem to pass thro' most people but little changed. Dr. Withering.—On which account I have employed them as a means of ascertaining the time which food takes to pass through the tract of the alimentary canal. Dr. Stokes.—They are a grateful and nutritious food to all kinds of cattle, and well worthy of a more general cultivation for the purpose of the farmer. Crickets are very fond of them, and are easily destroyed by making a paste of powdered arsenic, wheat meal, and scraped carrots, which must be placed near their habitations. A poultice made of the roots has been found to mitigate the pain, and abate the stench of foul and cancerous ulcers.

**Bunium flexuosum. Earth-nut. Pig-nut.**

P. June. May.

Frequent in meadows and pastures.

The roots either raw, boiled or roasted have a pleasant taste, and are frequently eaten by children. Dr. Withering thinks, that they are very little inferior to chestnuts, and would be an agreeable addition to our winter deserts.
**Conium maculatum. Common Hemlock.**

*Kex.*


Common in hedges, road sides, and orchards. The whole plant is poisonous, yet a few years ago it was much used in medicine. At present it has lost some measure of its reputation. Dr. Withering has assigned several reasons for the change, which has taken place in the public opinion in regard to its value. He says, that wild Cicely or Cow-Weed has been often gathered instead of this plant; that the season of its highest perfection has never been yet sufficiently ascertained, that its properties are often impaired by the fermentation occasioned by want of care in gathering it, and in obtaining the extract it has lost part of its virtue by the application of too great heat. He then directs in what manner the extract should be prepared. He says, let several people be employed to gather the plant, and as fast as it is cut, let others carry it in hand baskets to the press; but it must lie light and loosely in the baskets. Let it be bruised and the juice immediately squeezed out; and as fast as it runs from the press, it must be put over the fire, and boiled till three parts out of four of the whole liquor is wasted. Then it must be put into a water bath, and evaporated to the consistence of honey. If it be now taken and spread thin upon
upon a board or marble slab, and exposed to the
sun and to the air, it will soon be of a proper
consistence to be formed into pills. From 5
to 10 grains of this extract is a proper dose;
few constitutions will bear more without ex-
periencing disagreeable effects.—He has never
given it in cancers without a mitigation of the
pain and an amendment of the discharges. He
thinks it preferable to opium on some accounts,
and observes, that if it should prove at last that
it is only a narcotic, surely there are many
cases, in which a narcotic, that does not occa-
sion constiveness is preferable to one, which does.

In the second edition of his valuable work
Dr. Withering makes some remarks in addition
to those, which were contained in the first.
He observes, that such is the uncertainty of
the preparation owing to the difficulty of making
the extract, that he has now for some years laid
aside the use of it and prescribed only the pow-
der of the dried leaves. He says, let the leaves
be gathered about the end of June, when the
plant is in flower. Pick off the little leaves
and throw away the leaf-stalks. Dry these
selected leaves in a hot sun or on a tin dripping-
pan or pewter dish before a fire. Preserve
them in bags made of strong brown paper or
powder them and keep the powder in glass
vials, in a drawer or something, which will
exclude
exclude the light, for the light soon dissipates the beautiful green colour, and with its colour the medicine loses its efficacy. From 15 to 25 grains of this powder may be taken twice or thrice a day. He has found it particularly useful in chronic rheumatisms, and also in many of those diseases which are usually supposed to arise from acrimony. He concludes with saying, I can assure the medical practitioner that this is well worth his attention.

Frequent in hedges, meadows and pastures. In Poland and Lithuania, the poor people prepare a liquor from the leaves and seeds, which undergoes a fermentation and is drank instead of ale. The stalks when peeled are eaten by the Kamischatkians.—The Russians distil an ardent spirit from this plant.—The leaves are a favourite food of rabbits; and hogs, cows, goats and sheep eat them, but horses are not fond of them.

**Heracleum angustifolium.** Jagged Cow Parsnep.
This plant is a variety of the *Her. sphon.* and was found by Dr. Stokes betwixt Ashbourn and Okeover.
Native plants.

**Angelica sylvestris. Wild Angelica.**
It is warm, acrid, bitter and aromatic.
The roots possess these properties in the greatest degree. The stalks are said to make an agreeable sweetmeat. The plant is much improved by cultivation.

Cows, goats and swine eat it. Horses refuse it. Linn.—Dr. Stokes says, a horse eat the flowering stem.

**Sium nodiflorum. Creeping Water Parsnip.**
Dr. Withering says, that a young lady six years old was cured of an obstinate cutaneous disease by taking three large spoonfuls of the juice twice a day, and that he has repeatedly given to adults three or four ounces every morning in similar complaints, with the greatest advantage. It is not nauseous, and children take it readily with milk. He adds, that in the doses he has given it, it neither affects the head, the stomach, nor the bowels.

**Sison ammonum. Bastard Stone Parsley.**
Moist woods and hedges. P. July.
The Seeds are a mild warm aromatic. They impart their virtues to rectified spirit and tinge it green.
Native plants.

Oenanthe fistulosa. Water Dropwort.

P. July.

Not uncommon in ponds and ditches; Pinxton.

Cows and horses refuse it, though from experiments made on purpose it does not appear to be in the least degree noxious to the former.

Æthusa cynapium. Fool's Parsley. Lesser Hemlock.

A. July.

S. Normanton, and in gardens at Derby.

This plant, from its resemblance to common parsley, has sometimes been mistaken for it, and when eaten it occasions sickness. Dr. Withering observes, that if the curled-leaved parsley only was cultivated in our gardens, no such mistakes would happen.

Cows, horses, sheep, goats, and swine eat it. It is noxious to geese.


Banks of the Derwent above Chatsworth. Mr. Whately.

Mr. Woodward says, that the seeds are used in the north of England for polishing and perfuming oak floors and furniture.
**Scandix pecten.** Shepherd's Needle.  
Cраке Needle. Venus's Comb. A. July.  
In corn fields; Pinxton.

**Cærophylllum sibuestre.** Wild Cicely.  
Common about Derby.  
The roots eaten as parsnips have been found poisonous. The leaves and stems afford a beautiful green dye. Cows and rabbits are fond of it. Mr. Curtis says, that in some parts of the kingdom, in times of scarcity, it is used as a pot herb.

**Ægopodium podagraria.** Herb Gerârd.  
P. May, June.  
Pinxton; about Coxbench wood.  
Cows, sheep and goats eat it. Horses are not fond of it.—It is said, that the leaves may be eaten early in the spring with other pot-herbs.

**Seseli carnifolia.** Meadow Saxifrage.  
S. Normanton. Mr. Coke.

**Apium graveolens.** Smallage Parsley. July.  
Pinxton. Mr. Coke.
Native plants.

The root in its wild state (when it grows near water,) is said to be fetid, acrid, and noxious; but that when cultivated (in dry ground) it loses these properties, and the root and lower part of the leaf-stalks and stem blanched by covering them up with earth, are eaten raw, boiled in soups, or stewed. In this state they are called Celery. They are said to be hurtful to people subject to nervous complaints. They are certainly good antiscorbutics. The seeds yield an essential oil.

Sheep and goats eat it. Cows not fond of it. Horses refuse it.

Order III.

TRIGYNIA. III. POINTALS.

Viburnum lantana. Pliant Mealy-tree.
way-faring-tree. S. May.

Glapwell; Langwith. Mr. Hallows.

The bark of the root is used to make bird-lime. The berries are drying and astringent.


Berries ripe in Sept.

Woods and wet hedges. The Guelder rose is a variety of this plant.—Cows, goats and sheep eat it. Horses are not fond of it.

Z 2

SAM-
Native plants.


S. Normanton; Bakewell; Dethick; Wirksworth; Buxton; Alport near Youlegrave; and Boulton.

It has the same medical properties with the common elder, but is in some respects more violent, and therefore less manageable. A dram and a half of the root is a strong purge.—The berries give out a violet colour.—The green leaves drive away mice from granaries, and the Silesians strew them, where their pigs lie, under a persuasion, that they prevent some of the diseaseth, to which they are liable.

It is not eaten by any animal.


The berries are ripe in Sept.

Common in woods and moist hedges.

The whole plant has a faint unpleasant, narcotic smell. It is said not to be safe to sleep under its shade.—The inner green bark is purgative, and may be used with advantage, where acrid purgatives are requisite. The expressed juice is given from a dram to half an ounce; and Sydenham observes, that if it does not vomit or purge at all, or but gently, it does no service. In smaller doses it is diuretic, and has done eminent service in obstinate glandular obstructions, and in dropsies. Dr. Withering says,
Native plants.

says, that if sheep, which have the rot, are in a situation where they can get at the bark and the young shoots, they will soon cure themselves. It is an ingredient in the black dye.—The leaves are purgative like the bark, but more nauseous. They are celebrated externally against burns and inflammations, and are an ingredient in several cooling ointments. If turnips, cabbages, fruit trees, or corn, (which are subject to blight from a variety of insects) be whipped with the green leaves and branches of elder, the insects will not attack them. Phil. Trans. vol. 62. p. 348. A decoction of the flowers, taken internally, is said to promote expectoration in pleurisy. If the flowers are fresh gathered they loosen the belly. Externally they are used in fomentations to ease pain, and remove sunburn. They are fatal to turkeys. A rob prepared from the berries is a gentle opener, and promotes perspiration. The juice of the berries with raisins or sugar is frequently made into wine, and produces the same effect with the rob. The berries are said to be poisonous to poultry.—The pith being exceedingly light, is cut into balls, used in electrical experiments.

A variety of the elder with light green berries grows at Mackworth. The wine made from them is generally preferred to that made with the juice, which is extracted from the other sort.
Native plants.

**ALSINE media.** Common Chickweed.

Frequent in gardens and cultivated ground.


This species is a notable instance of what is called the Sleep of Plants; for every night the leaves approach in pairs, so as to include within their upper surfaces the tender rudiments of the new shoots; and the uppermost pair but one at the end of the stalk, are furnished with longer leaf-stalks than the others, so that they can close upon the terminating pair and protect the end of the branch. Linn.

Dr. Withering says, that the young shoots and leaves, when boiled, can hardly be distinguished from spring spinach, and are equally wholesome.

Swine are extremely fond of it. Cows and horses eat it. Sheep are indifferent to it. And goats refuse it. It is a grateful food to most small birds, and to young chickens.

**Order IV.**

**TETRAGYNIA. IV. POINTALS,**


Matlock; Normanton; Pinxton; and on boggy ground near Mr. Eames's, Mackworth. Horses and goats eat it. Sheep are not fond of it. Cows and swine refuse it.

**Order**
Order V.

PENTAGYNIA. V. POINTALS.

Linum usitatissimum. Common Flax.

Pinxton. Mr. Coke. A. July.

It is observed, that the seeds yield, by expression only, a large proportion of oil, which is an excellent pectoral, as is likewise the mucilaginous infusion. They also make an easy and useful poultice in cases of external inflammation. After the oil is extracted, the remaining part of the seed is made into cakes, which are given to cattle to fatten them. The oil itself differs in several respects from other expressed oils; it does not congeal in winter, nor does it form a solid soap with fixed alkaline salts; and it acts more powerfully as a menstruum upon sulphureous bodies. When heat is applied during the expression it gets a yellowish colour, and a peculiar smell. In this state it is used by the painters and the varnishers. The stem is used in the manufacture of linen, which, after it is worn into rags, is converted into paper.

Linum catharticum. Purging Flax.

A. May.—July.

Pinxton; betwixt Derby and Radbourn.

Linnaeus recommends an infusion of two drams of the dried leaves as a mild laxative.—

Z 4 Dr.
Native plants.

1772, p. 175. It has been observed, that other plants do not flourish in it's neighbourhood.

**Allium vineale. Crow Garlick.** P. June. Matlock; Duffield; and Breadfall Meadow.

The young shoots are eaten in sallads, or boiled as a pot-herb.

**Ornithogalum luteum. Yellow Star of Bethlehem.** P. April.

Park Hall woods, Rev. Mr. Pashley: in a meadow adjoining to the Copper-mills, Derby, Mr. Whately.

Dr. Withering says, the bulbous roots are nutritious and wholesome, and have been employed for food in a scarcity of provisions.—Horses, goats and sheep eat it. Swine are not fond of it. Cows refuse it.

**Narthecium ossifragum. Lancashire or Bastard Ashbodel.** P. July.

Dethick. Mr. Hallows.

Cows and horses eat it. Sheep and swine refuse it.

**Convallaria majalis. Lily of the Valley. May Lily.**

Matlock; Mr. Hallows. Dovedale.

The
Native plants.

The flowers are highly fragrant, but when dried have a narcotic scent. Reduced to a powder they excite sneezing. An extract prepared from the flowers, or from the roots, partakes of the bitterness as well as of the purgative properties of aloes. The dose is from 20 to 30 grains. A beautiful and durable green colour may be prepared from the leaves by the assistance of lime. Dr. Withering.

Sheep and goats eat it. Horses, cows and swine refuse it.

Convallaria multiflora. Solomon's seal.
Pleasy-Park. Mr. Hallows. May.
The young shoots are eaten by the Turks as asparagus, and the roots have been made into bread. Linnaeus.
Cows, goats and sheep eat it.

Hyacinthus non-scriptus. Harebell.
English Hyacinth. P. May.
Frequent in hedges and woods.
The roots are said to be poisonous. They may be converted into starch.

Cutthorpe near Chesterfield. Mr. Hallows.
The root powdered might supply the place of our foreign spices. It is our only native true aro-
aromatic plant. Linn. The powder of the root has cured agues, when the Peruvian bark has failed. The roots have a strong aromatic smell, and a warm, pungent, bitterish taste. The flavour is greatly improved by drying. They are commonly imported from the Levant, but those of our own growth are equally good, if not superior. The root, candied, is used by the Turks as a preservative against contagion. It is refused by all animals.

**Juncus conglomeratus.** Round headed Rush.  
**effusus.** Soft Rush.  
P. June.  
**articulatus.** Jointed Rush.  
P. July.  
**campestris.** Field Rush.  
P. May.  
**compressus.** Flat stalked Rush.  
Frequent in moist places.

**Juncus bulbosus.** Bulbous Rush.  
June.  
Little Chester, near Derby.

**Berberis vulgaris.** Barberry.  
*Piperrydge-bush.*  
S. May.  
In hedges at Mackworth.  
The flowers at a proper distance have an agreeable scent. The berries, when boiled with sugar, are very pleasant to the taste of most persons.—An infusion of the bark in white wine is gently purgative.—The roots boiled in lye, dye wool yellow. In Poland they dye leather of
Native plants.

of a most beautiful-yellow with the bark of the root. With the assistance of alum, the inner bark of the stems dye linen of a fine yellow.—Dr. Withering observes, that this shrub should never be permitted to grow in corn lands, for the ears of wheat, which grow near it, never fill, and its influence in this respect has been known to extend as far as 300 or 400 yards across a field.

Cows, sheep and goats eat it. Horses and swine refuse it.

Order II.

TRIGYNA. III. POINTALS.

Dethick. Mr. Hallows. B. July.
Near Swarkestone bridge. Ray. Mr. Coke.
RUMEX obtusifolius. Broad-leaved Dock.
Meadows and pastures.

The leaves are eaten in sauces and in ballads. The Laplanders use them to turn their milk sour. In France they are cultivated for the use of the table, being introduced in soups, ragouts, and fricases. In some parts of Ireland they eat them plentifully with milk, alternately biting and supping. The Irish also eat them with
Native plants.

with fish, and other acaulescent food. The dried root gives out a beautiful red colour when boiled.

*Rumex acetosella*... *Sheeps Sorrel.*

P. May... June.

Common in dry situations.

*Colchicum autumnale*... *Meadow Saffron.*

P. Sept.

Meadows at Marston Montgomery; in the pastures betwixt Duffield and Burley; very abundantly in Breadfal long-meadow; and near Derby.

This is one of those plants, whose violent effects on the bodies of animal engage the attention of Dr. Storeck of Vienna. Tho' the root had been considered as a strong poison, he rendered it a safe and useful medicine. Boiled in vinegar, and the strained vinegar sweetened with honey or sugar is found to be a good pectoral or diuretic. Dr. Withering thinks, that in its virtues, it very much resembles squil, but is less nauseous and acrimonious, tho' more sedative.

In pastures it is left untouched by cattle.
Native plants.

Order V.
POLYGYNIA. MANY POINTALS.

Alisma plantago. Great Water Plantain.
In watery places. Pinxton; and Derby.
Alisma ranunculoides. Lesser Water Plantain.
Betwixt Derby and Burton. Mr. Whately.

Class VIII.

OCTANDRIA MONOGYNIA.

VIII. CHIVES. I. POINTAL.

Order I.

Matlock; Darley. Mr. Coke.
Goats are extremely fond of it. Cows and sheep eat it. Swine and horses refuse it.—An infusion of the plant has an intoxicating property, and the Kamtschatadales brew a sort of ale from the pith, and from the ale make vinegar. The down of the seeds also mixed with cot-
cotton or fur has been manufactured into stockings and other articles of cloathing.

**Epiobium hirsutum.** *Hairy Willow-herb.*

P. July.

*— ramosum. Codling and Cream.*

P. July.

*— montanum. Mountain Willow-herb.*

B. July.

*— tetragonum. Square Stalked Willow-herb.*

P. July.

*— palustre. Marsh Willow-herb.*

P. July.

Not uncommon in moist situations.

Mr. Coke found a variety of the Epiobium hirsutum on Tidewell moor.

**Chlora persoliata.** *Perforated Yellow-Wort.*

A. June. July.

Pleasly park. Mr. Coke. Whitewell.


Frequent on the moors and heaths.

Children are fond of the berries either alone, with milk, or in tarts. The moor game and crows feed upon them. The juice stains paper or linen purple.—Goats eat it. Sheep are not fond of it. Horses and cows refuse it.

**Vac-**
Native plants:


Frequent on the moors and mountains.

The berries, tho' not pleasant, are often made into tarts. A considerable quantity is bought every year for this purpose by the inhabitants of Derby. They are sometimes sold to ignorant people for cranberries.—Goats eat it. Cows, sheep and horses refuse it.

Vaccinium oxyccocos. Cranberries.


The berries by some are very much valued, and made into tarts. The sound fruit may be kept many years closely corked up in bottles, either with or without water.

Erica vulgaris. Common Heath.

On the moors. S. June.—Sept.

In the island of Ilay, ale is frequently made by brewing one part malt and two parts of the young tops of heath. Sometimes they add hops. Boethius relates, that this liquor was much used by the Picts. Pennant's tour, 1772, p. 209.—Woollen cloth boiled in alum water, and afterwards in a strong decoction of the tops of heath, receives a fine orange colour. The stalks and tops will tan leather. Befoms are made of it, and faggots to heat ovens with, or to fill drains, which are to be covered over. —Bees extract honey from it, but the taste

A a of
Native plants.

of it is not so pleasant as when it is collected from other plants.—Mr. Pennant says, that cattle not accustomed to browse on heath will give bloody milk, but are cured by drinking plentifully of water.

**Erica tetralix.** Closely-leaved Heath.
On Ashover and Wirksworth moors, and Egginton heath: July.

**Erica cinerea.** Fine-leaved Heath.
Frequent on the moors. Aug.

**Erica multiflora.** Many-flowered Heath.
Ashover. July.

**Daphne mezereum.** Mezereum. Spurge

S. Feb. March.

Matlock, Chee Tor. Mr. Coke.

An ointment prepared from the bark or the berries has been successfully applied to ill-conditioned ulcers. The whole of the plant is very corrosive; 6 of the berries will kill a wolf. A woman gave 12 grains of the berries to her daughter, who had a quartan ague; she vomited blood and died immediately. A decoction made of two drams of the cortical part of the root, boiled in three pints of water, till one pint is wasted; and this quantity drank daily is found very efficacious in resolving venereal nodes and other indurations of the periosteum.
Native plants.

riotheum. See Dr. Ruffel's paper in the med. obs. iii. p. 189.—Dr. Withering says, the considerable and long continued heat and irritation, which it produces in the throat, when chewed, made me first think of giving it in a case of difficulty in swallowing, seemingly occasioned by a paralytic affection. The patient was directed to chew a thin slice of the root, as often as she could bear to do it, and, in about two months, she recovered her power of swallowing. This woman bore the disagreeable irritation and the ulcerations its acrimony occasioned in her mouth with great resolution; but she was reduced to skin and bone and for three years before had suffered extremely from hunger without being able to satisfy her appetite; for she swallowed liquids very imperfectly, and solid not at all. The complaint came on after lying-in.

It is eaten by sheep and goats. Cows and horses refuse it.


Very happy effects have been experienced from this plant in rheumatic fevers. It operates as a brisk and rather severe purgative. It is an efficacious medicine in worm cases; and upon many accounts deserves to be better known to physicians; but, in less skilful hands,
it would be dangerous, as it is possessed of considerable acrimony. The whole plant has the same qualities, but the bark of the root is the strongest. Dr. Alston fixes the outside dose at 10 grains. Dr. Withering.

**Order II.**

**DIGYNIA. II. POINTALS.**

*Chrysosplenium alternifolium.* *Alternate-leaved golden Saxifrage.* P. April.
Dethick. Mr. Hallows.—Chee Tor. Mr. Coke.

*Chrysosplenium oppositifolium.* *Opposite-leaved golden Saxifrage.* P. April.
Pinxton. Nursery near Mr. Eames's, Mackworth.

**Order III.**

**TRIGYNYA. III. POINTALS.**

S. Normanton. Crich. In a meadow by Mr. Bennett's, Mackworth.

The root is one of the strongest vegetable astringents. The young shoots are eaten in herb
Native plants.

herb puddings in the north of England. Dr. Stokes.—The young leaves boiled and fried with bacon, are eaten by the common people in Derbyshire. Pilk.


Pinxton. Burdock pool, Derby.


The whole plant has an acrid, burning taste. It cures little aphthous ulcers in the mouth. It dyes wool yellow. The ashes of this plant, mixed with soft soap, is a nostrum, in a few hands, for dissolving the stone in the bladder; but it may be reasonably questioned whether it has any advantage over other semi-caustic preparations of the vegetable Alcali. Dr. Withering says, its acrimony rises in distillation, and the distilled water, drank to the amount of 2 or 3 pints daily, has been found very effectual in some nephritic cases.

Horses, goats, sheep, and swine refuse it.

Polygonum persicaria. Dead or spotted Arsmart. July.

Common in wet places.
Native plants.

Its taste is slightly acid and astringent. With the assistance of a solution of alum this plant is said to give a yellow colour to woollen cloth. Goats, sheep, and horses eat it. Cows and swine refuse it.

**Polygonum aviculare.** Common Knot-grass.
April—Sept.

**Polygonum sagopyrum.** Buck Wheat.
Branks.
A. July, Aug.
Chesterfield.

In some parts of England the whole plant, when fully grown, is ploughed into the ground and used as manure to the land.

Mr. Bartley of Bristol says, *(Bath letters, and papers on agriculture, &c. v. iii. p. 311.)* buckwheat is become with me a favourite object of cultivation, being clearly of opinion, that it ought in numerous cases to supersede the use of summer fallowing; for the crop produced seems not only so much clear gain in respect to such practice, but also affords a considerable quantity of straw for fodder and manuring. Besides I think a summer fallowing is not so advantageous a preparation for a succeeding crop.—From its quick and luxuriant growth it is an admirable destroyer of weeds, and suits with a dry mellow soil, but flourishes most in a light sand. It is impatient of wet and of cold. Horses, poultry, and hogs are fond
fond of it.—Dr. Withering says, cows, goats, and sheep eat, but the last are said to become unhealthy by living upon it.—There is reason to suppose that it may become an object of distillation.—The seeds are warm and nourishing, but the flesh of poultry, which eat them, is said to acquire a rank taste.

**Polygonum convolvulus.** Climbing black Bindweed.

A. June.—Sept.

Not uncommon; in corn fields and hedges.

Dr. Withering says, that the seeds are quite as good for use as those of the preceding species, are produced in greater quantity, and that the plant bears cold better.

Cows and goats eat it. Sheep and swine refuse it. Horses are not fond of it.

**Order IV.**

**Tetragnia. IV. Poinetails.**

**Adoxa moschatellina.** Tuberous Moschatel.

Woods and shady places.—Dethick. Mr. Hallow.—Love lane, Derby. Mr. Whately.—Nursery by Mr. Eames's, Mackworth. P. Apr.

Goats eat it. Cows refuse it.

**Paris quadrifolia.** Herb Paris. Truelove.

**One-berry.**

S. P. April. May.

A a 4 Pinxton.
Native plants:

Pinxton. Newton wood. Mr. Coke.—Love lane, near Derby. Mr. Whately.—In Longford long lane, in a pit near Dalbury Lees.

Dr. Withering observes, the leaves and berries are said to partake of the properties of opium. The juice of the berries is useful in inflammations of the eyes. Linnaeus says the root will vomit as well as ipecacuanha, but it must be given in a double quantity. Dr. Stokes remarks, the berries give out, on infusion in water, a purplish red, which an acid turns to a bright florid red, and an alkali to a bluish green.—Goats and sheep eat it. Cows, horses, and swine refuse it.

Class X.

Decandria digynia.

X. Chives. II. Pointals.

Saxifraga caespitosa. Matted Saxifrage.
Castleton hill. Mr. Coke. P. June.

Saxifraga tridaettylitae. Rue-leaved Saxifrage. Rue Whitlow-grafs.
Buxton. A. April.

It was formerly infused in beer, and drank for a long time was said to cure the king's evil.
Native plants.

**Saxifraga granulata.** White Saxifrage.
Caulston. Edensor. Mr. Coke.—Near Swarkeston bridge. P. June.

**Saxifraga hypnoides.** Trifid or Moss Saxifrage. Ladies Cushion. P. July.
Caulston. Mr. Coke.—Middleton dale. Mr. Whately.—Dovedale. Mr. Woodward.

It is cultivated in our garden as an edging for borders.

**Dianthus arenarius.** Common Pink.
Near Edensor. Mr. Coke. P. July.

**Dianthus deltoides.** Maiden Pink.
Hills between Bakewell and Chatsworth. Mr. Whately.

**Saponaria officinalis.** Soapwort. Bruisewort.
Elmeton. Mr. Hallows.—Duffield.

The whole plant is bitter. Bruised and agitated with water it raises a lather like soap, which washes greasy spots out of cloaths. Dr. Withering says, that a decoction of it applied externally cures the itch; and that the Germans use it instead of farfaramilla in venereal complaints. M. Andry of Paris, cures virulent gonorrhoeas, by giving half an ounce of the inspissated juice daily.

Order
394  Native plants.

Order III.

TRIGYnia. III. Pointals.


The leaves boiled have something of the flavour of peas, and proved of great use to the inhabitants of the island of Minorca, in the year 1685, when a swarm of locusts had destroyed the harvest. The Gothlanders apply the leaves to erysipalous eruptions.

Cows, sheep, and goats eat it. Horses are not fond of it.

Silene nutans. Nottingham Catchfly.


Sheep, horses, goats, and swine eat it. Cows refuse it.

Stellaria holostea. Greater Stichwort.

Frequent in hedges, at Pinxton, Derby, Duffield, and Mackworth. P. May.

Stellaria graminea. Lesser Stichwort.

Not uncommon at Pinxton and Derby. July.

Horses, cows, goats, sheep, and swine eat it.

Arenas—
Native plants.

**Arenaria trinervia.** Plantain-leaved Sandwort. A. May.—July.
S. Normanton. Mr. Coke.

**Arenaria serpyllifolia.** Thyme-leaved Sandwort. A. May.—July.
S. Normanton. Mr. Coke.

**Arenaria saxatilis.** Mountain Sandwort.

**Arenaria verna.** Mountain Sandwort.

**Arenaria laricifolia.** Larch-leaved Sandwort. P. June.
Middleton dale. Crich. Mr. Coke.

Order V.

**Pentagynia.** V. Pointals.

Dethick, Mr. Hallows.—Dovedale. Mr. Whately.

Cows, goats, sheep, and swine eat it. Horses refuse it. Linn.—A decoction of the leaves in milk is a forcible diuretic. It has been given with success to cure the piles. Dr. Withering.

**Sedum dasypilum.** Thick or round-leaved Stone-crop. P. August.
Pinxton. Mr. Coke.

Sedum...
Native plants.

Frequent on roofs of houses at Derby, Make-
ney, and S. Normanton. P. June and July.
This plant continues to grow, when hung
up by the root, which is a proof that it receives
its nourishment principally from the air, as is
the case with most of the succulent plants. It
is very acrid. Applied externally it blisters.
Taken inwardly it excites vomiting. In scor-
butic cases and quartan agues it is an excel-
 lent medicine under proper management. Dr.
Withering.—Goats eat it. Cows, horses,
sheep, and swine refuse it.

Sedum reflexum. Yellow Stone-crop.
Walls, roofs, and rocks. Derby, Horsley
castle, and Alfreton. July.

Oxalis acetosella. Wood Sorrel. Cuckow-
meat.
P. April.
Frequent in shady places.
The leaves and flowers contain a pleasant
acid. The London college directs a conserve
to be made of the leaves, beaten with thrice
their weight of fine sugar. The expressed juice
depurated, properly evaporated, and set in a
cool place, affords a crystalline acid salt, in
considerable quantity, which may be used,
whenever vegetable acids are wanted. It is em-
ployed to take iron moulds out of linen, and is
fold
fold under the name of essental salt of lemons.
Dr. Withering.—An infusion of the leaves is
an agreeable liquor in ardent fevers, and boiled
with milk they make a pleasant whey. Lewis:
Sheep, goats, and swine eat it. Cows are
not fond of it. Horses refuse it.

**Agrostemma githago. Cockle. A. June.**
In corn fields, but not very frequent.
Horses, goats, and sheep eat it.

Frequent in meadows and pastures. P. June.
Horses, sheep, and goats eat it.
**Lychnis dioica. Red and White Campion.**
The red frequent in dry and moist places,
but the white not very common. P. May. June.

**Cerastium vulgatum. Common mouse-eared Chickweed.** P. June.
Ashover moors. Derby.
**Cerastium semidecandrum. Least mouse-eared Chickweed.** A. April.—Aug.
Pinxton. Mr. Coke.
**Cerastium tomentosum. Woolly Mouse-ear.** Kedleston. Mr. Hadley. July.
**Cerastium aquaticum. Marsh Mouse-ear.** Siddals, near Derby. P. July.
Sper-
Native plants.

Spergula arvensis. Corn Spurrey.
S. Normanton. A. July.
Poultry are fond of the seeds; and the inhabitants of Finland and Norway make bread of them, when their crops of corn fail. Dr. Withering says, experience shews it to be very nutritious to the cattle, that eat it.—Horses, sheep, goats, and swine eat it. Cows refuse it.

Clafs XI.

Dodecanadia monogynia.

XII. Chives. I. Pointal.


Order II.

Digynia II. Pointals.

Very common in hedges and road sides.
It is a mild corroberant, and is employed against habitual diarrhoeas. Dr. Withering observes,
Native plants.

observes, the Canadians are said to use an infusion of the root in burning fevers and with great success. An infusion of 6 ounces of the crown of the root, in a quart of boiling water, sweetened with honey, and half a pint of it drank three times a day, Dr. Hill says, is an effectual cure for the jaundice. He advises to begin with a vomit, afterward to keep the bowels soluble, and to continue the medicine as long as any symptoms of the disease remain.—Sheep and goats eat it. Cows and swine refuse it. Horses are not fond of it.

Order III.

TRIGYNA. III. POINTALS.


Pinxton, Chesterfield, Matlock, Duffield, Allestrey, and Derby.

This plant affords a most beautiful yellow dye for cotton, woollen, mohair, silk and linen, and on account of the excellence of its colour is commonly used by the dyers. A decoction of it turns blue cloths green. The yellow colour of the paint, called Dutch pink, is obtained from this plant. Dr. Withering says, the tinging quality resides in the stems and
and roots, and it is cultivated in sandy soils, rich soil making the stalk hollow and not so good. It is generally supposed to be the plant, with which the Picts, the antient inhabitants of Britain, painted their bodies.—Cattle will not eat it, but sheep sometimes browse it a little.

**Euphorbia exigua. Dwarf spurge.**
Corn fields. Pinxton. A. July.

**Euphorbia peplus. Petty spurge.**
Derby. Mr. Hadley. A. June.

**Euphorbia Amygdaloides. Wood spurge.**
Chaddesden common. Mr. Hadley. July.

**Euphorbia helioscopia. Sun spurge.**
Wartwort, or Churn-staff. A. July.
Derby. Pinxton.

If sheep eat it, they are purged by it, and their flesh gets a bad taste; but this is not the case with cows.

Order VII.

**Dodecagynia. XII. Pointals.**

**Sempervivum tectorum. Common Leek.**
Frequent on roofs and old walls.
The juice either applied by itself or mixed with cream gives present relief in burns and other
Native plants. 401

other external inflammations. Mixed with honey it is an useful application in aphtous cases. Dr. Withering.

Clafs XII.

Scarcely any of the plants of this class are poisonous. The fruits are mostly pulpy and esculent.

ICOSANDRIA MONOGYNIA.

XX. CHIVES. I. POINTAL.

Prunus insititia. Black Bullace-tree.
Hedges, but not very common. Pinxtton.

T. April.
The bark of the roots and branches is considerably stiptic. Dr. Withering says an infusion of the flowers, sweetened with sugar, is a mild purgative, not improper for children. The fruit is sour, but, when it is mellowed by frosts, is not unpleasant.

Prunus cerasus. Common Wild Cherry-tree.

Glapwell. Mr. Coke.—Mackworth.
The gum, which exsudes from this tree, is equally valuable with gum arabic. Hasselquist relates, that more than 100 men, during a
Native plants.

sége, were kept alive for near two months without any other sustenance than a little of this gum taken into the mouth sometimes, and suffered gradually to dissolve.—The fruit is frequently infused in brandy for the sake of its flavour.—The wood is hard and tough. It is used by the turner, and is formed into chairs and stained to imitate mahogany. This tree is the original stock from which many of the cultivated kinds are derived. Linnaeus.


Pinxton. Derby.

It grows best unmixed with other trees. It bears cropping, and suffers the grass to grow under it.


Chee Tor. Matlock. Mr. Coke.

The fruit is nauseous, but bruised and infused in wine or brandy, it is thought to give it an agreeable flavour. A strong decoction of the bark is used by the Finlanders to cure venereal complaints; and a decoction of the berries is sometimes given with success in the dysentery. The wood being smooth and tough is made into handles for knives and whips.

Sheep, goats, and swine eat it. Cows are not fond of it. Horses refuse it.

Prunus
**Native plants.**


Frequent in hedges. S. March. Apr.

When it is planted in hedges, it is apt to spread and encroach upon the neighbouring ground.—The wood is hard and tough, and is formed into teeth for rakes, and walking sticks. The thorns are said to have something of a poisonous nature in the autumn. The tender leaves have been used and recommended as a substitute for tea. An infusion of a handful of the flowers is a safe and easy purge. The bark powdered, in doses of two drams, will cure some agues. Letters written upon linen or woollen, with the juice of the fruit, will not wash out.

Sheep, goats, and horses eat it.

---

**Order II.**

**D I G Y N I A. II. P O I N T A L S.**

*Crataegus aria.* White Haw or Beam-tree. T. May.

Matlock. Mr. Coke.—Mountainous parts of Derbyshire, from the fissures of the precipices, without any appearance of soil. Mr. Woodward.—He also observes that it is here called the wild pear-tree.

Bb 2 It
It loves an open and high situation, bears lopping, and permits the grass to grow.—The wood being hard, tough, and smooth, is used for axle-trees, wheels, walking-sticks, carpenters, and other tools.—The fruit is eatable, when mellowed by the autumnal frosts, and an ardent spirit may be distilled from it. It seldom bears a good crop of fruit two years together.—Sheep and goats eat it.

**Crataegus monogyna. White-thorn.**

_Haw-thorn._

T. May.

It is preferred on a variety of accounts to every other English plant for making hedges. In Derbyshire it is also suffered to grow single in parks, and pleasure grounds, to which it is a beautiful ornament, more especially when it is in blossom. It does not flourish in a high situation or barren soil. It is therefore not much used, in the mountainous parts of Derbyshire, for making hedges.

**Order III.**

**Trigynia. III. Pointals.**

_Sorbus aucuparia. Mountain Service._

_Ash or Quicken-tree._

T. May.

Not uncommon in woods and hedges.
Native plants.

It will not bear lopping, and does not hinder the growth of other plants.—The wood, which is soft, tough, and solid, is converted into tables, spokes for wheels, shafts, chairs, &c. The roots are formed into handles for knives, and wooden spoons.—The berries dried and reduced to powder, make wholesome bread; and an ardent spirit may be distilled from them, which has a fine flavour; but it is small in quantity. The berries infused in water make also an acid liquor, somewhat like perry, which is drank by the poorer people in Wales. Dr. Withering.

Sorbus domestica. True Service or Sorb-tree.

Crich woods, Matlock. Mr. Coke.

The fruit is mealy and austere, not much unlike the medlar.—The wood is said to be valuable for making mathematical rulers, and excisemens gauging sticks.

Order IV.

Pentagynia. V. Pointals.

Pyrus communis. Common Pear Tree.

Matlock. Mr. Coke.—Morley lime, between Morley and Stanley. T. May.

B b 3 It
Native plants.

It stands the severest winters and does not destroy the grass. The wood is light, smooth, and compact. It is used by turners, and to make joiners tools; and for picture frames, to be stained black. The leaves afford a yellow dye, and may be used to give a green to blued cloaths.—The fruit is auster; but, when cultivated, highly grateful, as is proved by the great variety of excellent pears, which the industry of mankind has raised; for they all originate from this.—Horses, cows, sheep, and goats eat the leaves.


Frequent in woods and hedges. T. May.

Grass, and even corn, will grow beneath it. It is much used as a stock, on which to engraft the better kinds of apples; because its roots are neither killed by frost, nor eaten by field-mice.—The bark affords a yellow dye. The wood is tolerably hard; it turns very clean, and, when made into cogs for wheels, obtains a polish, and wears a long time. The juice of the fruit, which is very acid and auster, is called verjuice, and is much used in recent sprains, and in other cases as an astringent or repellent. In Derbyshire it is frequently used with sugar and melted butter, as a sauce to puddings, and is known by the name of dip. Dr. Withering thinks, that with a proper addition
addition of sugar, it is probable, that a very grateful liquor might be made with the juice, but little inferior to old hock.

Horses, cows, sheep, and goats eat it. Swine are very fond of the fruit. Linn.

A decoction of the inner bark is said to be a good substitute for Peruvian bark.


Frequent in moist places. Pinxton. Duffield. Siddals, near Derby.

The flowers infused in boiling water give it a fine flavour, which rises in distillation. Sheep and swine eat it; goats are extremely fond of it; horses and cows are indifferent to it. It is said, that the latter eat it, when they have the yellows.

Order V.

POLYGYNIA. MANY POINTALS.

Rosa rubiginosa. Sweet-briar.

Rosa arvensis. White-flowered Dogs Rose.
Common in hedges. S. July.

B b 4 Rosa
Native plants.


S. June.

A perfumed water may be distilled from the blossoms. The pulp of the berries, beat up with sugar, makes the conserve of the heps of the London dispensatory. Mixed with wine it is an acceptable treat in the north of Europe. The leaves of every species of rose, but especially of this, are recommended in the Eph. nat. curiosor. as a substitute for tea, giving out a fine colour, a sub-astringent taste, and a grateful smell, when dried, and infused in boiling water.—Cows, sheep, goats, and swine eat it. Horses are not fond of it.


S. June.

Hedges and pastures at Rough Heanor, Pilk. The ripe fruit is eaten by children; it has a grateful sub-acid taste. The juice of it, diluted with water, dyes silk and muslin of a peach colour; and with the addition of alum a deep violet; but it has very little effect on woollen or linen.—Cows, sheep, goats, and swine eat it. Horses refuse it.


In several hedges about Hathersage. Mr. J. Martin.*—In pastures at Rough Heanor. Pilk.

An infusion of the full blown blossoms of all the roses, especially the paler kinds, is purgative; but the petals of the red, gathered before they expand and dried, are astringent.

**Rubus idæus. Raspberry Bramble.** May, Pleasly, Darley, Chapel le frith, and in most other parts of the Peak.

The fruit is agreeable and cooling. It is said to dissolve the tartarous concretions of the teeth. Sheep, goats, and swine eat the leaves. Cows are not fond of them. Horses seem indifferent to them.


Children eat the berries. In Lancashire wine is sometimes made from the juice of them with a certain proportion of sugar.


Dr. Leigh, in his natural history, p. 94, places it amongst the scarce plants of Derbyshire. I believe, that it grows at the head of the valley of Edale, and near the foot of the mountain called Kinder scout. At least I have had a plant described to me and found in this situation, which seems to be the cloud-berry.

Dr. Leigh says, it is a fruit of a pleasant taste, and a good antiscorbutic. Dr. Withering
Native plants.

ing informs us, that the Norwegians pack them up in wooden vessels and send them to Stockholm, where they are served up in deserts, or made into tarts. The Laplanders bury them under the snow, and thus preserve them fresh from one year to another. They bruise and eat them with the milk of the reindeer. In the highlands of Scotland also they are sometimes brought to table with the desert.

Cows, sheep, and goats eat it.


Hills opposite Matlock Bath. Mr. Woodward.

The berries are not very good, but children eat them.—Cows, goats, sheep, and swine eat it. Horses refuse it.

Fragaria vesca. Wood Straw-berry.

Frequent in the Peak. P. May.

The fruit is universally pleasant. It promotes perspiration, and dissolves the tartarous encrustations on the teeth. Dr. Withering observes, that people afflicted with the gout or stone have found great relief by using them largely; and Hoffman says, he has known consumptive people cured by them. The bark of the root is astringent.

Sheep and goats eat it. Cows are not fond of it. Horses and swine refuse it.
Native plants:

**Fragaria sterilis. Barren Straw-berry.**
Not uncommon in barren places. P. April.

**Potentilla anserina. Silver-weed.**
*Wild Tansey.* P. June.

Sifiin moor, Derby, Hartington Common.
The leaves are mildly astringent. Dried and powdered they are given with success in agues. The usual dose is a meat spoonful of the powder every three hours between the fits. The roots, in the winter-time, in taste resemble parsnips. Swine are fond of them. Dr. Withering.—Cows, horses, goats, and swine eat it. Sheep refuse it.


The red cortical part of the root is mildly astringent and antiseptic. Dr. Withering says, a decoction of it is a good gurgle for loose teeth and spongy gums.—Horses, cows, goats, and sheep eat it.


Pinxton, Normanton, Buxton, Radbourn Common.

The roots may be ranked with the strongest vegetable astringents, and as such have a place in the modern practice of physic. Farmers find
find them very efficacious in the dysenteries of
cattle. They are used in several countries to
tan leather. They dye red. Dr. Withering.
Cows, goats, sheep, and swine eat it. Horses
refuse it.

**Geum urbanum. Common Avens. Herb**

**Bennet. June.**

Frequent in woods and hedges, and on road
sides.

The roots, gathered in the spring, before
the stems grow up, and put into ale, give it
a pleasant flavour, and prevent its growing
 sour. Infused in wine it is a good stomachic.
Its taste is mildly astringent and aromatic, espe-
cially when it grows in warm dry situations;
but in shady moist places it has little virtue.—
Cows, goats, sheep, and swine eat it. Horses
are not fond of it.

**Geum rivale. Water Avens. P. June.**

Chee Tor. Hassop. Pinxton. Mr. Coke.

The powdered root will cure tertian agues,
and is daily used for that purpose by the Ca-
nadians. Dr. Withering.—It is made use of
to cure ropy malt liquor. Dr. Stokes.

Sheep and goats eat it. Cows, horses, and
swine are not fond of it.
Native plants.

Class XIII.

The plants of this class are in general poisonous.

Polyandria Monogynia. Many Chives. I. Pointal.


The juice of every part of this Plant is very acrimonious. It cures warts, tetters, and ringworms. Diluted with milk it consumes white opaque spots upon the eyes; but it must be made very weak, before it can be applied with safety to so tender an organ. It is seldom given internally. Dr. Withering says, there is no doubt, but a medicine of such activity will one day be converted to more important purposes.


An infusion of the blossoms made into a syrup is kept in the shops. It partakes in a small degree of the properties of opium, and stands recommended in catarrhs, coughs, spitting of blood, and other disorders. Sheep and goats eat it. Horses refuse it.
It flourishes best on the sides of hills, but it
will live very well in meadow ground. It is
easily transplanted, and grass grows beneath it.
It is useful to form shady walks, and clipped
hedges. The wood is soft, light, and smooth;
close-grained and not subject to worms. It
makes good charcoal for gunpowder and de-
signers.—The leaves are dried in some countries
as winter food for sheep and goats. Cows eat
them in the autumn; but they give a bad taste
to the milk. The bark macerated in water
may be made into ropes and fishing nets. The
flowers are fragrant, and afford the best honey
for bees. The sap inspissated affords a quantity
of sugar. Dr. Withering.

Cistus helianthemum. Dwarf Cistus.
Middleton dale. Mr. Coke.—Matlock rocks.
Dr. Johnson.—Ashover and Clown.

Trent and Wingerworth ponds. Mr. Coke.
In deep pits of water near Swarkestone bridge.
Swine eat it. Goats are not fond of it.
Cows, sheep, and horses refuse it. Linn.—An
infusion of a pound of the fresh root to a gallon
of
Native plants. 415

of water, taken in the dose of a pint, night and morning, cured a leprous eruption of the arm. Dr. Withering.

**Nymphaea alba. White Water Lily.**

Hardwick and Wingfield ponds. Mr. Coke. In a piece of water near Weston cliff. P. July.

This plant raises itself every morning out of the water, and opens its flowers, so that by noon at least three inches of its flowerstalk may be seen above the surface. In the evening it is closely shut up and withdrawn again; for about four o'clock in the afternoon the flower closes and remains all night under water. Linn.—The roots are used in Ireland and in the island of Jura, to dye a dark brown.—Swine eat it. Goats are not fond of it. Cows and horses refuse it.

**Order V.**

**Pentagynia. V. Pointals.**

**Aquilegia vulgaris. Common Columbine.**


On account of its beauty it has long had a place in our gardens.

Goats eat it, sheep are not fond of it. Cows, horses, and swine refuse it.
Native plants.

Order VII.

POLYGYNIA. MANY POINTALS.

Anemone nemorosa. Wood Anemone.
Frequent in woods and hedges. P. Apr. May.
The flowers fold up in a curious manner against rain. The whole plant is acrid. Dr. Withering says, when sheep, unaccustomed to it, eat it, it brings on a bloody flux.—Goats and sheep eat it. Horses, swine, and cows refuse it.

Thalictrum minus. Lesser Meadow-Rue.
Near the cave at Castleton. Mr. J. Martin. July.

Thalictrum flavum. Meadow-Rue.
Alfreton and Pleasley brooks. Mr. Coke.—Banks of the Derwent near Duffield church; and below Derby. P. June.
A cataplasm, made of the leaves, has been known to give relief in the Sciatica. The root dyes wool yellow.—Cows, horses, goats and sheep eat it. Swine are not fond of it.

A. June. July.
In the fields, but not very common. Dr. Johnson.

Ranun-
Moist situations. Pleasly, Duffield, and Derby.
It is very acrid. Applied externally it inflames, and blisters the skin.—Horses eat it. Cows, sheep, goats, and swine refuse it.
S. Normanton. Mr. Coke.
Meadows and pastures.
Cows and horses have a great aversion to it.
Not unfrequent near Derby.
Meadows and pastures.—Sheep and goats eat it. Cows, horses, and swine refuse it.—It is very acrid, and blisters the skin.
S. Normanton Common; by the side of the
London
Native plants.

London road, Derby; and near Mr. Bennet’s, Mackworth.

*Ranunculus aquatilis.* Water Crowfoot.
S. Normanton common. Siddals near Derby. Markeaton brook.—Cows, horses, goats, sheep, and swine eat it.

*Ficaria verna.* Lesser Celandine, or common Pilewort. P. April.

Very common in meadows and pastures.
The young leaves may be eaten in the spring along with other pot-herbs.—Goats and sheep eat it. Cows and horses refuse it.

*Caltha palustris.* Marsh Marigold.
*Meadow-bouts.* P. April. May.

Moist meadows and pastures.
The juice of the flower leaves, boiled with a little alum, stains paper yellow. Dr. Withering says, that the flowers gathered before they expand, and preserved in salted vinegar, are a good substitute for capers.—Goats and sheep eat it. Cows, horses, and swine refuse it.

*Helleborus fætidus.* Stinking Hellebore.
*Bearsfoot.* Setterwort. P. April.
Cromford Moor. Mr. Coke.—Dethick. Mr. Hallows.—The dried leaves are frequently given to children to destroy worms, but they must be used
Native plants.

used sparingly, being violent in their operation. Instances of their fatal effects are recorded. A decoction of one or two drams, either of this or of the following species, is a sharp purge. Dr. Withering.

**Helleborus viridis.** Green-flowered Hellebore.

Matlock. Codnor Castle. Mr. Cole.

**Clafs XIV.**

The plants in the first order of this class are oderiferous, cephalic, and resolvent. None of them are poisonous.

**DIDYNAMIA GYMNOSPERMIA.**

**II. CHIVES LONGER. SEEDS NAKED.**

*Teucrium scorodonia.* Wood Sage. P. July. Frequent in the northern part of the county. An infusion of this plant is a useful bitter. A tea cupfull drank cold, night and morning, is said to strengthen the stomach, and promote digestion.


C c 2
Pinxton, Allestry, and Horley Castle.

This plant was formerly much used in medicine, but it is in a great measure discarded from modern practice. The leaves powdered and snuffed up the nose, excite sneezing. This effect is said to be owing not to any stimulating quality of the herb, but to the rough hairs with which the leaves are covered. It is asserted by some writers, that betony affects those who gather it with a disorder, resembling drunkenness.—It is one of the ingredients in the British herb tobacco.—The root provokes vomiting.—Sheep eat it. Goats refuse it.

Verbena officinalis. Vervain. Simpler's Joy. Quarndon; Morley; Mackworth, near Mr. Bennet’s and the church. P. July.

It is slightly astringent. The root, worn at the pit of the stomach, an infusion, and an ointment prepared from the leaves, are said to produce good effects in scrofulous complaints; (Morley's essay on scrophula;) but Dr. Withering says this wants confirmation from the more rational and less enthusiastic practitioner. Miller says, it is never found more than a quarter of a mile from a house, which is the reason of the common English name mentioned above.—Sheep eat it. Cows and goats refuse it. Horses will sometimes eat it.
Native plants:


**Mentha piperita. Pepper Mint.** P. July. South Normanton.—The stem and leaves are beset with numbers of very minute glands, containing the essential oil, which rises plentifully in distillation. The pepper mint water is well known as a carminative and anti-spasmodic. Dr. Withering observes, Junipers essence of pepper mint is an elegant medicine, and possesses the most active properties of the plant.

**Mentha arvensis. Field Mint.** P. Aug. Not uncommon.—When eaten in large quantity by cows, from extreme hunger, it is said to prevent their milk from yielding curd.—Horses and goats eat it. Sheep are not fond of it. Cows and swine refuse it.


The leaves boiled, and the liquor made into a syrup with sugar, has given relief in very obstinate coughs. Dr. Withering thinks it no bad medicine in the hooping cough.—This plant
Native plants.

plant has considerable anti-spasmodic properties, and an infusion of it has been found useful in hysterical affections.

Glecoma hederaecea. Gill, Ground-Ivy, Robin run in the hedge. P, April. May. An infusion of it is said to be antiscorbutic. Dr. Withering says, that the expressed juice, mixed with a little wine, and applied morning and evening, destroys the white specks upon the eyes of horses.—Sheep eat it. Horses are not fond of it. Cows, goats, and swine refuse it.


Lamium purpureum. Red Dead Nettle. Goats, sheep, and horses eat it. Cows refuse it.—The young shoots are sometimes eaten with other pot herbs.


Native plants.

Sheep and goats eat it. Horses, cows, and swine refuse it.


In moist and shady places. Pinxton, Derby, Duffield, Park Hall.

*Stachys fylvatica*. Hedge Nettle. Frequent. Derby; Pinxton. P. July. Sheep and goats eat it. Horses, cows, and swine refuse it.—It will dye yellow.—The whole plant has a foetid smell.


*Stachys germanica*. German Stachys, or Base Horehound. Pinxton. Mr. Coke. P. July.

*Ballota nigra*. Stinking or Black Hore-bound. In hedges. Pinxton. P. July. It is said to be useful in hysterical cases.

*Marrubium vulgare*. White Horehound. Middleton dale. Derby. P. July. It is very bitter, and was a favourite medicine with the ancients in obstructions of the viscera. In large doses it is laxative. Dr. Withering says, that it is a principal ingredient in
in the Negro Caesar's remedy for vegetable poisons.—A young man, who had occasion to take mercurial medicines, was thrown into a salivation, which continued for more than a year. Every method, which was tried to remove it, rather increased the complaint. At length Linnaeus prescribed an infusion of this plant, and the patient got well in a short time.—Horses, cows, sheep and goats refuse it.

**Leonurus cardiaca.** *Motherwort, or Lyon's Tail.*

Handleby, Mr. Coke. Mackworth.

The leaves have a strong, but not an agreeable smell, and bitter taste.—Goats, sheep, and horses eat it. Cows are not fond of it. Swine refuse it.

**Clinopodium vulgare.** *Wild Basil.*

Pinxton; Glapwell; Bolsover; and Chaddesden turnpike.

**Origanum vulgare.** *Wild or Field Marjoram.*

Matlock; Crich; Mr. Coke. Dovedale; Dr. Johnson. And near Clown.—The whole plant is a warm aromatic. Infusions of the leaves and flowering tops are sometimes drank in tea, in weakness of the stomach, disorders of
of the breast, for promoting perspiration, and the fluid secretions in general.

Marjoram is so acrid, that it may be considered as a caustic, and is much used by the farriers with that intention. A little cotton wool moistened with it, and put into the hollow of an aching tooth frequently relieves the pain.—Dr. Withering says, the country people use the tops to dye purple.—Goats and sheep eat it. Horses are not fond of it. Cows refuse it.

**Origanum onites. Winter or Pot Marjoram.** Glapwell, Mr. Coke. P. Aug.

Dr. Stokes thinks it extremely doubtful, whether this is an English plant.


Matlock; Peak forest; Buxton; Littleover; and Radbourn Common.

It generally, if not always grows in a calcareous soil. I have observed, that in the peak, wherever the limestone ceases, it disappears. This is particularly the case on the west side of Peak forest, and at Buxton.

The whole plant is in some degree fragrant, and yields an essential oil, which is very heating, and pungent. Dr. Withering observes, that an infusion of the leaves removes the head-
ach, occasioned by the debauch of the proceeding evening. A general opinion prevails, that the flesh of sheep which feed upon aromatic plants, particularly upon thyme, is much superior in flavour to common mutton; but Mr. Bowles, the ingenious author of the account of the sheep walks in Spain (Gent. Mag. 1764) considers this as a vulgar error. He says, that sheep are not fond of aromatic plants, that they will carefully push aside the thyme to get at the grass, growing beneath it; and that they never touch it, unless when walking apace, and then they will catch at any thing. The attachment of bees to this and other aromatic plants is well known.—Sheep and goats eat it. Swine refuse it.

**Thymus acinos.** Corn Thyme or Wild Basil. Glapwell. Mr. Coke. A. August. Horses eat it. Cows are not fond of it. Sheep and goats refuse it.


**Scutellaria galericulata.** Common Skull-cap or hooded willow herb. P. August. In moist situations; Pinxton.

**Scutellaria minor.** Lesser Skull-cap. Pinxton. P. July. Aug. Pru-
Native plants.

Common in meadows and pastures.

Order II.

Angiospermia. Seeds Covered.

Rhinanthus crista galli. Yellow Rattle or Coxcomb. Frequent in meadows. A. July.

Pinxton; S. Normanton; Matlock; Rough Heanor; and Wirksworth moor.
It is a weak astringent, and was formerly in repute as a remedy for impaired sight.
Cows, horses, goats, and sheep eat it. Swine refuse it.


Melampyrum sylvaticum. Yellow Cow-grass or Wheat. A. August.
Crich; Matlock. Mr. Coke.
Cows, sheep, and goats eat it, and with a plentiful supply of it soon grow fat.

Lathraea squamarria. Great Toothwort or Lungwort. P. April.
Pleasly park. Mr. Hallows.

It
Native plants.

It grows only in shady places, which the
sun's rays can scarcely penetrate, it being almost
defSTITUTE of leaves; and such plants alone can
live without the light of the sun. Linn.

Goats, sheep, and swine eat it. Cows and
horses refuse it.

**Pedicularis palustris**: Marsh Lousewort.
Pleasly; and Mackworth. P. July.
Goats eat it, but it is very disagreeable to
cattle. Swine are not fond of it.

**Pedicularis sylvatica**: Common Lousewort.
On Quarndon common; Pinxton. P. June.
The expressed juice, or a decoction of this
plant, has been used with advantage as an in-
jection for sinuous ulcers. If the healthiest
flock of sheep be fed with it, they become
scabby and scurfy in a short time; the wool
gets loose, and they will be over-run with ver-
min. Dr. Withering.—Cows and swine re-
fuse it.

**Antirrhinum cymbalaria**: Ivy-leaved Snap-
dragon, or Toad-flax. P. July.—Oct.
Wingerworth; Glapwell; S. Normanton;
Pleasly; Mr. Coke. And on the garden wall
at Wingerworth hall.

**Antirrhinum elatine**: Sharp-pointed Flü-
ellin. A. July.—Oct.
Pinx-
Pinxton; and Boozwood, near Holbrooke.
This is considerably more bitter than the other species; and is said to have been used successfully in cases of foul ulcers and in cutaneous eruptions.

**Antirrhinum linaria. Common Toad-flax.**
P. July.—Sept.
Pinxton; and Derwent Banks, near Derby.
An infusion of the leaves is diuretic and purgative. An ointment prepared from them gives relief in the piles. The expressed juice, mixed with milk, is a poison to flies, as is likewise the smell of the flowers. Dr. Withering.—Cows and swine refuse it. Sheep, goats, and horses are not fond of it.

**Antirrhinum majus. Greater Toad-flax; or Snapdragon.** Matlock. Mr. Coke. July.
**Antirrhinum minus. Lesser Toad-flax.**
Pinxton. Mr. Coke. A. July.
Cows and sheep eat it. Swine are not fond of it. Horses and goats refuse it.

**Scrophularia nodosa. Knobby-rooted Figwort.**
August.
Boilsover castle; near the brook at Markeaton.
This plant is scarcely known in modern practice; but the rank smell, and bitter taste of the leaves, seem to indicate some active properties.—Swine, which have the scab, are cured
Native plants.

cured by washing them with a decoction of the leaves. Wasps resort greatly to the flowers.
Goats eat it. Cows, horses, sheep, and swine refuse it.


A dram of it, taken inwardly, excites violent vomiting. It has been found very useful in dropsical cases. Those, who wish to be more fully acquainted with its nature and efficacy, may be gratified by consulting Withering on the Foxglove. Med. Trans. iii. and Lond. Medic. Journal.


Class XV.

Tetradyramia siliculosa.

IV. Chives Longer. Seed-Vessel a Pouch.

Myagrum sativum. Gold of Pleasure.
Normanton. Mr. Coke. A. June.

It
It is cultivated in Germany for the sake of the expressed oil of the seeds, which the inhabitants use for medicinal, culinary, and economical purposes.—The seeds are a favourite food with geese.—Horses, cows, goats, and sheep eat it.

**Draba muralis. Common Whitlow-grass.**

Pinxton; Normanton; Derby. April.

One of our earliest flowering plants. It is good as a salad.—Goats, sheep, and horses eat it. Cows are not fond of it. Swine refuse it.

**Draba muralis. Speedwell-leaved Whitlow-grass.** A. May.

Fissures of rocks, mountainous and stony pastures, especially in a calcareous soil in Derbyshire. Dr. Withering.

**Thalaspi bursa pastoris. Shepherds Purse.**

Frequent. Derby. A. March.—Sept.

**Cochlearia officinalis. Garden Scurvy-grass.** Near the castle at Castleton. Mr. Coke. J. Martin, Dr. Stokes, and Dr. Leigh.

It possesses a considerable degree of acrimony, and this acrimony seems to reside in a very subtile essential oil. Its effects as an anti-scorbutic are universally known; and it is a powerful remedy in the pituitous asthma, and in what Sydenham
Sydenham calls the scorbutic rheumatism. A distilled water, and a conserve, are prepared from the leaves, and its juice is prescribed along with that of oranges, by the name of anti-scorbutic juices. It may be eaten as a fallad.—Cows eat it. Horses, goats, and sheep refuse it.

*Order II.*

**SILIQUEO. SEED-VESSSEL A POD.**


It is warm and acrid to the taste, and when cultivated is used as a spring pot-herb. Birds are fond of the seed.—Goats and sheep eat it. Cows, horses, and swine refuse it.

By means of this herb a hoarseness, occasioned by loud speaking, was cured in three days, by Rondeletius. Linn.—"Juice of "hedge mustard is beyond any thing in ulcers "of the throats. This was found by experi-"ence by the hon. Harry Gray, esq; when all "advice of doctors and surgeons availed no-"thing. This from his own mouth." Manuscrip"t note in a copy of Parkinson, which for"merly belonged to Mr. Saunders, surgeon, at Stourbridge.
Alfreton, Normanton, Duffield, and Holmes near Derby.—The leaves are eaten in salad.—Cows eat it. Horses and swine refuse it. Goats and sheep are not fond of it.

Common in hedges. P. May.—July.
When it grows in poultry yards, the fowls eat it, and it gives an intolerable rank taste to the flesh. Dr. Withering.—Cows and goats eat it. Horses, sheep, and swine refuse it.

The country people give the seeds to destroy worms, and with good effect.—Horses, cows, sheep, goats, and swine eat it.


Turritis glabra. Tower Mustard. Between Ashbourn and Okeover. Dr. Stokes.

Brassica rapa. Turneps. B. May.
Corn fields.—They relax the bowels, and are supposed to sweeten the blood. They are hurtful.
hurtful to pregnant or hysterical women, and to those who are subject to flatulencies. The juice, well fermented, affords, by distillation, an ardent spirit. The rind is acrimonious. The most important use of turneps is for cattle during the winter season.


Frequent in corn fields and ditch banks.

The roots of the cultivated variety may be eaten like the turnep, but they have a stronger taste, and its seeds, which are called Cole-seed, afford a large quantity of expressed oil, called rape oil. What remains after the expressing of the oil is called oil cake, and is used for fattening oxen. In Norfolk the cakes are broken to pieces and strewed on the land as a manure. It is thought to be a very efficacious one, and is sold from 4l. to 6l. per ton. About half a ton is laid on an acre. Mr. Woodward.—Cows, goats, and swine eat it.


**Cardamine pratensis. Common Ladies-smock, or Cuckow Flower.** P. Apr. May.

Frequent in meadows and moist pastures.

The virtue of the flowers in hysteric and epileptic cases was first mentioned by Ray, in his
his letters, published by himself; and since then by Dr. Baker in the Medical Trans. v. i. p. 442. The dose is from 20 to 90 grains twice a day. Dr. Withering says, do they not act like the treacle worm-seed in the epilepsies of children, and cure the disease by destroying the worms in the stomach and intestines, which were the cause of the fits? I have accounts of their success in young epileptics, from good authority; but have never been fortunate enough to see them of much use in hysterical cases.—Goats and sheep eat it. Horses and swine refuse it. Cows are not fond of it.


**Cardamine parviflora. Small flowered Ladies-smock.** A. April.

South Normanton. Mr. Coke.

**Cardamine birsuta. Hairy Ladies-smock.** S. Normanton. Glapwell. Mr. Coke.* June. It is pretty warm in the mouth, much resembling water cress in taste. Dr. Stokes.

Native plants:


June.
Frequent near springs and brooks.
This is universally used as an early and wholesome spring salad. It is an excellent anti-scorbutic and stomachic, with less acrimony than the scurvy-grass. It is an ingredient in the anti-scorbutic juices.

Markeaton hill, on the road to Ashbourn, near Derby.

Sisymbrium irio. Broad-leaved Watercress, or Hedged Mustard.
Wingfield manor. A. June.

Ditch banks and road sides. Pinxton.
The seeds, taken inwardly, in the quantity of a meat spoonful or more, gently loosen the bowels, and are of service in the asthma, chronic rheumatism, and palsy. Cataplasms, formed with crumb of bread, vinegar, and powdered mustard seed, are very commonly applied to the soles of the feet, as stimulants, in fevers, which require such treatment; they are used with
with advantage, topically applied, in fixed rheumatism and sciatic pains. Upon the whole, whenever we want a strong stimulus, which acts upon the nervous system, without exciting much heat, we know none preferable to mustard seed. Its acrimony consists in an essential oil.


The young and tender tops are sometimes boiled and eaten as cabbage in Derbyshire.

Cows, goats, and swine eat it. Sheep are very fond of it. Horses generally refuse it.

*Class XVI.*

**Monadelphia Decandria.**

*Threads United.* X. Chives.


Horses, cows, sheep, goats, and swine eat it. D d 3
Native plants.

**Geranium molle. Doves-foot.**
Frequent in dry situations. A. Apr.—Oct.

Frequent on walls, and in hedges.

A decoction of this plant has been known to give relief in calculous cases. It is considerably astringent, and is given to cattle when they make bloody water, or have the bloody flux.

Horses and goats eat it. Sheep and swine refuse it,

**Geranium lucidum. Shining Cranes-bill.**

**Geranium columbinum. Long-stalked Cranes-bill.** A. June.—Aug.
Middleton dale, Mr. Coke. Dovedale.
Sheep and goats eat it. Swine refuse it.

**Geranium dissectum. Jagged Cranes-bill.**

Horses and sheep eat it. Cows and swine refuse it.


Order
Order VI.

POLYANDRIA. MANY CHIVES.

MALVA sylvestris. Common Mallow.  
Month: June, July.

Frequent in hedges, and amongst rubbish. In France paper is manufactured from this plant. It is said to be best adapted to making that which is used for hanging rooms.


I do not know, whether I ought to insert Malva alcea, Vervain mallow, as a native plant of Derbyshire. I find it in three different catalogues of plants with which I have been favoured. From them it appears to grow at South Normanton, between Holbrooke and Alfreton, and near Derby; and I should not have hesitated to put it down as an English plant, had not so much been said against this opinion in the botanical Arrangement of British plants by Dr. Withering, p. 740. note.
Native plants.

Class XVII.

The seeds of this class furnish food for men, and other animals: they are farinaceous and flatulent. The leaves are food for cattle. None of them are poisonous.

Dr. Pultney, in a note added to his translation of the Pan Suecicus, says, "A general view of this class shews at once how very acceptable its plants are to almost all cattle. Cows and sheep refused none, and horses not more than three, out of the whole number with which they were tried."

DIADELMIA HEXANDRIA.

THREADS in 2 SETS. VI. CHIVES.

Order II.

Fumaria officinalis. Common Fumitory.

Not uncommon in corn fields and gardens. Cows and sheep eat it. Goats are not fond of it. Horses refuse it.

The leaves are succulent, saline, and bitter. The expressed juice, in doses of two or three ounces, is useful in hypochondriacal and scurvytic disorders. It corrects acidity, and strengthens the tone of the stomach. Hoffmann prefers it to
to all other medicines as a sweetener of the blood. Its utility in obstructions of the viscera and the diseases arising from hence will scarcely admit of a doubt.—An infusion of the leaves is used as a cosmetic to remove freckles and clear the skin. Mr. Woodward.

**Fumaria claviculata.** Climbing Fumitory. Dethick. Mr. Coke. A. June.

**Order III.**

**Octandria. VIII. Chives.**


Linnæus found it to possess the properties of the Senega rattle-snake root, but in an inferior degree. Duhamel used it in pleuretic cases with the desired success. *Mem. de Paris, 1740.*—The powdered root may be given in doses of half a dram,—Cows, goats, and sheep eat it. Swine refuse it.

**Order IV.**

**Decandria. X. Chives.**

**Spartium scoparium.** Broom. S. June.

Pinxton, Makeney, and Horsley castle.

A decoction of the green tops, or an infusion of the seeds, has been used with success in dropsical
Native plants.

dropsical complaints.—The plant, when in full blossom, has a beautiful appearance.


A yellow colour may be obtained from the flowers; but its principal excellence is that of dying wool green. A dram and half of the powdered seeds operates as a mild purgative. A decoction of the plant has been used with advantage in the dropsy.—Horses, cows, goats, and sheep eat it.


Goats, cows, sheep, horses, and asses eat it.

Ononis spinosa. Common Rest-barrow.

Basslow. Plessey. Derby.—A decoction of the roots is bitterish and diuretic, and has been recommended in cases of stone and jaundice. The cortical part of the root, reduced to powder, has been given in doses of a dram with the same intention.—Cows and goats eat it. Sheep are very fond of it. Horses and swine refuse it.
Native plants: 443

Pleasly. Mr. Coke.

Anthyllis vulneraria. Ladies-finger.
It makes an excellent pasturage for sheep.
—But the separate cultivation of it will not succeed, excepting in chalky grounds. Dr. Pulthay.

Lathyrus aphaca. Yellow Vetchling.
Pinxtton; Derby; A. June—Sept.
The seed of this and all the other species is nutritious, either eaten in broth or made into bread.

Lathyrus nissolia. Crimson Grass Vetch.
Carnfield, near Alfreton; Dr. Johnson. Betwixt Breason and Risley. A. June.
It is sometimes introduced into gardens.

S. Normanton. Mr. Coke.

Lathyrus palustris. March Vetching.
Pinxtton. Mr. Coke. P. July.


Vicia sativa. Common Vetch. A. April.
Native plants.

Common in meadows and pastures.

In Gloucestershire and Worcestershire they sow it as pasturage for horses, and eat it off early enough to allow of Turneps being sown the same year. The seeds are excellent food for pigeons:

Vicia lutea. Yellow Vetch.

Puxton, and Derby.


Mackworth.

This plant is not only a perennial, but an evergreen; it shoots up early in the spring, vegetates late in autumn, and continues green throughout the winter, though the weather be severe. Add to this, that cattle are remarkably fond of it. These peculiarities, it should seem, would make it particularly valuable to the farmer as a green food for his sheep in the winter and spring, when food of that denomination is exceedingly scarce. Perhaps one chief reason why it has not come into general cultivation is, the difficulty of collecting good seed. The pods do not ripen all together, and burst with great elasticity. When the seed is procured, scarcely one third of them will vegetate. This is owing to an internal defect, which is occasioned by certain insects making them the nest and food of their young. However on account of the uncommon produce of the good seed
Native plants.

seed, it seems to be highly worthy of attention. Mr. Swaine, who has made the foregoing observations, had three crops from this plant in the course of one year. He calculates, that an acre sown with the bush vetch would yield 24 tons, 11 cwt. 3 qrs. 3 lb. of green fodder, or 4 tons, 9 cwt. 3 qrs. 15 lb. of dry fodder.—
(Bath papers, vol. iii. page 71.)

ERVUM birsutum. Wild Tare.
Pinxton; Langley field.
In wet seasons whole fields of corn have been over-powered and wholly destroyed by it.

ORNITHOPUS perpusillus. Bird’s Foot.
Dethick; Mr. Coke. Quarndon common.

TRIFOLIUM repens. Dutch Clover.
This plant indicates a good soil; and with other grasses makes excellent pasturage.

TRIFOLIUM pratense. Purple Trefoil or Clover.
B. May.—Sept.
Meadows and pastures.—The cultivation of it forms an important part of good husbandry.

TRIFOLIUM agrarium. Hop Trefoil.
Pastures.
A. June.—July.

TRIFOLIUM procumbens. Procumbent Trefoil.
A. May.
Meadows and pastures, Crich.
Native plants.

**Trifolium filiforme.** Small Trefoil.  
Crich; Bolsover Castle. A. May.—Aug.  
**Trifolium arvense.** Hares-foot Trefoil.  
Langley. A. July.—Aug.

The flowers of all the species, dried and powdered, may be made into bread, which in times of scarcity, has preserved the inhabitants of Scotland from perishing. The leaves of all the species fold up before rain.


**Class XVIII.**

**Polyadelphia Polyanthria.**

Thread in many sets. Many chives.

**Hypericum perforatum.** Common St. John's Wort. P. July.

Frequent in woods and hedges. This plant has been recommended in hysterical and hypochondriacal disorders. The leaves given in substance are said to destroy worms.

Cows, goats, and sheep eat it. Horses and swine refuse it.
Native plants.


Hypericum pulchrum. Upright St. John's Wort.

Both species found at Pinxton, and Gorsey-close near Coxbench; the latter also at Alleysty.

Hypericum quadrangulare. Quadrangular St. John's Wort, or St. Peter's Wort. Derby; Markeaton.


Class XIX.

Syngenesia. Polygamia æqualis.


Tragopogon pratense. Yellow Goats-beard. Go to bed at noon. B. June.

Pinxton; Derby. — The young shoots in the spring, boiled like asparagus, have the same flavour, and are nearly as nutritious. — Cows, sheep, and horses eat it. Swine devour it greedily. Goats are not fond of it.


Sonchus oleraceus. Common Sowthistle. July
Native plants.

Lactuca scariola. Prickly or mild-scented Lettuce. About the entrance into Peak’s hole. Mr. J. Martin. B. Aug.


The juice, which is milky, acid, and bitter, has the scent, and partakes of the properties of opium. Dr. Collin relates 24 cases of dropsy, out of which 23 were cured by taking the extract prepared from the expressed juice, in doses from 18 grains to 3 drams in 24 hours. It commonly proves laxative, promotes urine, and gentle sweats, and removes the thirst. It must be prepared when the plant is in flower.


It is sometimes eaten in ballads. It is diuretic, and on account of this property, has acquired one of the names by which it is vulgarly distinguished.—When a swarm of locusts had destroyed the harvest in the island of Minorca, many of the inhabitants subsisted upon this plant. In the late siege of Gibraltar, (Drinkwater’s history of it, page 81.) dandelion, thistles, and wild leeks, &c. were for some time the daily nourishment of numbers.—The expressed juice has been given, to the quantity of 4 ounces, 3 or 4 times a day; and Boerhaave had
had a great opinion of this and other lactescent plants in visceral obstructions.—Goats eat it. Swine devour it greedily. Sheep and cows are not fond of it. Horses refuse it. Small birds are fond of the seeds.


_Hieracium pilosella._ Creeping Mouse-Ear or Mouse-eared Hawkweed. P. May. Sept. S. Normanton; Derby; Mackworth.

Goats eat it. Sheep are not fond of it. Horses and cows refuse it.


Horses, cows, goats, sheep, and swine eat it.


Native plants.


The leaves, when blanched, are eaten early in the spring in ballads. They lose their bitterness by cultivation.—Sheep, goats, and swine eat it. Cows and horses refuse it.


A decoction of the roots is esteemed by some very sensible physicians, as equal, if not superior to that of farfaparilla.—Cows and goats eat it. Sheep and horses refuse it. Swine are not fond of it.


This is very much used by the dyers to give a yellow, but is inferior to the Yellow-weed. Its use, therefore, is confined to the coarser woollen cloths.—Goats eat it. Horses are not fond of it. Sheep, swine, and cows refuse it.

Carduus lanceolatus. Spear Thistle.

On rubbish and road sides. B. August.

The flowers, like those of the artichoke, have the property of curdling milk.—Sheep and swine refuse it; neither horses, cows, or goats are fond of it.

Car-
Native plants:

**Carduus nutans.** Musk Thistle. P. July.
**Carduus crispus.** Curled Thistle. A. July.
**Carduus palustris.** Marsh Thistle. P. Aug.
Not unfrequent.—Swine eat the last. Horses are very fond of it. Cows refuse it.

**Carlina vulgaris.** Wild Carline Thistle. Middleton dale.—Goats eat it. Cows refuse it.

It dyes a tolerably good yellow.—Cows and sheep eat it. Horses, swine, and goats refuse it.

**Bidens cernua.** Nodding Double-tooth.
Pinxton. Brook at Little Eaton.—Goats eat it. Horses refuse it.

Goats eat it; but other animals refuse it.

Order II.

POLYGAMIA SUPERFLUA.
SUPERFLUOUS POINTALS.

**Tanacetum vulgare.** Common Tansy.
Pinxton; Horsley castle; Mackworth; on the banks of the Derwent, and the neighbour-
Native plants.

ing meadows for many miles above and below Derby. P. July.

This is a warm deobstruent bitter. The juice of the tender leaves are sometimes used to give a flavour to puddings. If a dead animal substance is rubbed with this plant, the flesh fly will not attack it. The Finlanders obtain a green dye from it.—Cows and sheep eat it. Horses, goats, and swine refuse it.

**Artemisia absinthium. Wormwood.**


The leaves and flowers are very bitter; the roots are warm and aromatic. A considerable quantity of essential oil rises from it in distillation. This oil is used both externally and internally to destroy worms.—The leaves, put into four beer soon destroy the acelscency.—They resist putrefaction, and are therefore a principal ingredient in antiseptic fomentations. An infusion of them is a good stomachic, and with the addition of fixed alkaline salt, a powerful diuretic in some dropical cases.—In the Amæn. Acad. vol. ii. p. 160, Linnaeus mentions two cases, wherein an essence prepared from this plant, and taken for a considerable time, prevented the formation of stones in the kidneys or bladder; the patients forbearing the use
use of wine and acids. It will, like all other bitters, weaken the action of the nervous system, but in these instances no such effect took place. Dr. Withering.—Horses and goats are not fond of it. Cows and swine refuse it. Turkeys are fond of it.—The plant steeped in boiling water, and repeatedly applied to a bruise, will remove the pain in a short time, and prevent the swelling and discoloration of the part. Dr. Stokes.


Not uncommon on roadsides.—The Chinese make use of it in healing wounds, applying the fresh plant bruised. Osbeck i. p. 394.—A decoction of it is taken by the common people to cure the ague.—A dram of the leaves powdered was given, four times a day, by Dr. Home, to a woman who had been affected with hysterical fits for many years. The fits ceased in a few days. In this patient assimilatio and aether had been given to no purpose.

Sheep and swine refuse it. Neither horses, cows, or goats are fond of it.


Roads about Coxbench. Betwixt Derby and Osmafton.—It is given to cattle, which have
have the bloody flux, and has been tried with
success in similar complaints of the human body.

**Gnaphalium uliginosum.** Black-headed
Cows and goats refuse it.

**Gnaphalium gallicum.** Grass-leaved
Cudweed. Heaths. Mr. Woodward.

**Tussilago farfara.** Common Colt's-foot.
Frequent.
P. March. April.
The leaves are the principal ingredient in
the British herb tobacco. They were formerly
much used in coughs and consumptive com-
plaints; and perhaps not without reason, for
Dr. Cullen has found them to do considerable
service in scrophulous cases; he gives a de-
coction of the dried leaves, and finds it succeed
where sea-water has failed. *Cullen's Mat. Med.*
p. 458.—And Fuller relates a case of a girl,
with twelve scrophulous sores, who was cured
by drinking daily as much as she could, for
above four months, of a decoction of the leaves,
made so strong, as to be sweetish and glutinous.
*Med. Gymn.* p. 91.—Goats and sheep eat it.
Cows are fond of it. Horses and swine refuse it.

**Tussilago petasites.** Butterbur. Pesti-
lent-wort.
P. March. April.
Upon the banks of the Derwent at Matlock,
Duffield, and Derby.—Its leaves are the largest
of any of our native plants. Horses, cows, goats, and sheep eat it.—The roots abound with a resinous matter. They have a strong smell and a bitterish acrid taste.

_Seneceio vulgaris._ Groundsel. Simson.  
Frequent. A. April.—Sept.  
A strong infusion of the plant vomits.—The bruised leaves are a good application to boils. —Cows are not fond of it. Goats and swine eat it. Horses and sheep refuse it.

If woollen cloth is boiled in alum-water, and then in a decoction of the flowers, it takes a beautiful deep yellow.

_Seneceio erucifolius._ Hoary Groundsel.  
_Seneceio aquaticus._ Water Groundsel, or Ragwort. Derby; Pinxton; P. Aug.

Dethick; Dale Abbey.
This plant is diuretic, and in the north of England is much esteemed for giving relief to those, who are afflicted with the stone or gravel. An instance of its powerful efficacy in these complaints is mentioned in the gentleman’s magazine, Feb. 1788, page 103. A boy...
at Shotton, in the county of Durham, for two or three years had been frequently troubled with a suppression of urine, accompanied with symptoms of the gravel and stone. For some months he took, occasionally, the decoction or the tea of golden rod. At length he began to discharge a great quantity of gravel, with many stones along with it. For some time the stones increased in size and quantity. He parted with more than 60, some of which weighed 1½ ounce. To the medicine above mentioned is generally attributed this extraordinary consequence. We cannot therefore wonder, that golden rod should be a plant, very much valued and cultivated in the north, when it is capable of producing so important and salutary an effect.

Horses, cows, sheep, goats and swine eat it.

**Inula dysenterica. Middle Eclecampe, or Flea-bane.** Derby; Pinxton. P. July, Aug.

The Russian soldiers in the Persian expedition under General Keit, were much troubled with the bloody flux, which was cured by the use of this plant.—Cows are not fond of it. Goats and sheep refuse it.

**Bellis perennis. Common Daisy.** P. May.

Not uncommon in meadows and pastures.—Horses, sheep, and cows refuse it. Linn.
Native plants.

Chrysanthemum leucanthemum. Ox-eye, or greater Daisy. May.
Derby; Little Eaton; Middleton dale.
Horses, sheep, and goats eat it. Cows and swine refuse it.

S. Normanton. Allestry.
Cut, when it is in flower, and dried, it is eaten by horses.


Middleton dale; Mackworth; Derby.—The whole plant has a strong smell, and a bitter taste; and yields an essential oil by distillation.

Its properties resemble those of the sweet-scented camomile. The Finlanders use an infusion of it in consumptive cases.—Cows, goats, and sheep eat it. Horses are not fond of it. Swine refuse it.

Goats, sheep, and horses eat it. Swine refuse it.
Native plants.

In high roads not uncommon. Dr. Johnson.
Anthemis cotula. Stinking Chamomile, or May-weed. A. May.—Aug.
Toads are said to be fond of this plant. It is very ungrateful and displeasing to bees.
Goats and sheep are not fond of it. Horses, cows, and swine refuse it.—It frequently blisters the skin of reapers, and of children, who happen to gather it. The heads rubbed between the fingers, smell intolerably disagreeable.

In a moist close by Radbourn Common.
Between Duffield and Coxbench.

Achillea millefolium. Yarrow. Milfoil.
Frequent. A. June.—Aug.
Sheep and swine eat it. Horses, cows, and goats are not fond of it.

Order III.

Polygamaia frustanea;
Barren florets.

Common in meadows and pastures.
Native plants.


Mr. Boyle says, the juice of the central florets, with the addition of a very small quantity of alum, makes a lasting transparent blue not inferior to ultramarine. Gent. Mag. 1748.

Cows, goats, and sheep eat it. Horses and swine refuse it.


Horses, sheep, goats, and swine eat it. Cows refuse it.

Centaurea jacea. Black Centaury, or Knapweed. Pinxton. Mr. Coke.

Order VI.

Monogamia; Flowers Simple.


Viola odorata. Sweet-scented Violet.

Frequent in hedges. P. March. April.

A syrup, obtained from the flowers, has been much employed by chemists to detect acids and alkalis, the former changing it to a red colour, and the latter to a green. Professor Bergman has expressed his doubts concerning
cerning the accuracy of this text. But M. Morveau and other chemists think them not sufficiently well founded.

**Viola canina. Dog’s Violet. P. Apr.—June.**

Cows, sheep, goats, and swine eat it. Horses refuse it.—30 or 40 grains of the root in powder act as an emetic.—Both of these species have sometimes white blossoms.

**Viola tricolor. Pansies. Three faces under a hood.**

A. May.—Sept.

Not uncommon in the Peak.—Dr. Strack says, that it infallibly cures the scabby complaints in young children, called crusta lactea. He boils a handful of the fresh, or half a dram of the dried leaves in half a pint of milk, and gives this milk morning and evening for some weeks. *Med. Journ. v. ii. p. 188.*

**Viola lutea. Yellow Pansies. P. Apr.—Sept.**

Lea; Wirksworth; Dovedale; Chapel le frith; Tideswell moor; Chatsworth.

---

**Class XX.**

**Gynandria Diandria.**

CHIVES on the POINTALS. **II. CHIVES.**

**Orchis mascula. Male Fool-stones. May.**

Not uncommon. Crich; Rough Heanor; Horsley.
Native plants.

Horsley.—Mr. Moult, in a letter to Dr. Percival, inserted in the Phil. Trans. vol. 59. p. 1, describes his method of making salep from this plant. The best time for gathering the roots, he observes, is when the seed is formed, and the stalk going to fall; for then the new bulb, of which salep is made, is arrived at its full size. The new roots being separated from the stalk, are to be washed in water, and the outer thin skin taken off. They are then to be set in a tin plate in an oven heated to the degree of a bread oven. In 6, 8, or 10 minutes, they will have acquired a transparency like horn, without being diminished in size. They are then to be removed into another room to dry and harden, which will be done in a few days; or they may be finished in a very slow heat in a few hours.—Salep thus prepared, may be sold for less than a shilling a pound, and affords a mild nutriment, which, in times of scarcity, in cases of dysentery and strangury, and on ship-board, may be extremely useful. See Percival’s essays, part ii. p. 37.—Mr. Moult made his experiments upon the roots of this species only. The following species is doubtless equally proper for the purpose, and it is highly probable that every species of orchis may be used indiscriminately.

Salep
Native plants.

Salep has been hitherto imported from Turkey at a considerable price; let us hope we shall not be supplied from foreign markets with an article, which our own country furnishes in almost any quantity. If ever plantations of it are made, the plants must be propagated by roots; for the seeds seldom come to perfection. Dr. Percival says, that he got some seeds to all appearance perfect, but yet they would not vegetate.

**Orchis morio. Female or Meadow Orchis.**
Meadows and pastures, Crich. P. May.

**Orchis pyramidalis. Pyramidal, or late-flowering Orchis.**
P. June.—July.
Newton wood. Mr. Coke.

**Orchis ustulata. Dwarf Orchis.**
Alfreton; S. Normanton. P. May.—June.

**Orchis latifolia. Broad-leaved or Male-banded Orchis.**
P. May.—June.
Pleasley. Mr. Coke.—Cows eat it. Horses refuse it.

**Orchis maculata. Spotted or Female-banded Orchis.**
P. June.
Pleasley. Duffield.—Sheep eat it. Goats and horses refuse it. Cows are not fond of it.

**Orchis conopsea. Red-banded or Sweet Orchis.**
Pleasley. Mr. Coke. P. June:
Goats and cows eat it. Horses refuse it.
Native plants.

**Satyrion bircinum.** Lizard Satyrion, or Lizard Flower. P. June.—July. Crich. Mr. Coke.

**Ophrys ovata.** Common Ophrys, or Tway-blade. P. May.—June. Newton wood; and near Mr. Eames's, Mackworth.


**Ophrys cordata.** Least Ophrys, or Tway-blade. P. June.—July. On the high moor between Chatsworth and Sheffield. Dr. Smith.


**Serapias longifolia.** White Helleborine. Newton wood. Mr. Coke. P. Aug. This is the serapias grandiflora of Dr. Withering.
Class XXI.

Monoecia Monandria.

Chives and Points Separate. I. Chive.

Common in hedges.
The root dried and powdered is used by the French to wash their skin with, and is sold at a high price, under the name of Cypress powder. It is undoubtedly a good and innocent cosmetic. Dr. Withering.

Common on banks of rivers; Makeney.—Horses and goats eat it. Swine refuse it.
Carex canescens. Grey Sedge.
Chee-torr. Mr. Coke. P. June.
Carex flava. Yellow Seg.
In marshes about Duffield. P. June.
Carex panicea. Pink Seg.
Breadfall. Mr. Hadley. P. June.
Carex sylvatica. Wood Seg. P. May.
Common in marshy woods.
Carex paniculata Paniced Seg. P. June.
Order
Order IV.

**TETRANORIA. IV. CHIVES.**

**Betula alba. Common Birch tree. T. May.**

Very common in the woods of the Peak.—The twigs are very much used for making besoms. The wood is firm, tough, and white. By boring it in the spring a sweet liquor may be obtained, which with the addition of sugar makes a pleasant wine.

**Betula alnus. Alder. Ouler. T. March.**

Frequent in moist places.—The wood endures a long time under water, and therefore is used for pipes. Wooden clogs, and shoe-heels are also made of it.—Horses, cows, goats, and sheep eat it. Swine refuse it.

**Urtica urens. Lesser Nettle. July. Sep.**

Cows, horses, sheep, goats, and swine refuse it.

**Urtica dioica. Common Nettle. P. July.**

Ditch banks, and amongst rubbish.

The stings are very curious microscopic objects. They consist of an exceedingly fine pointed, tapering, hollow substance, with a perforation at the point, and a bag at the base. When the sting is pressed upon, it readily punctures the skin, and the same pressure forces up an acrimonious fluid from the bag, which...
Native plants.

instantly squirts into the wound, and produces an effect which most persons have experienced. —A leaf put upon the tongue, and then pressed against the roof of the mouth, is pretty efficacious in stopping a bleeding at the nose.—Paralytic limbs have been recovered by stinging them with nettles.—Asses are fond of the leaves, and cows eat them in hay; but horses, sheep, goats, and swine refuse them.

Order VIII.

POLYANDRIA. MANY CHIVES.

The leaves and seeds are mildly astringent, and have been used in dysenteries and haemorrhages. Lewis.

*Quercus Robur.* Common Oak. T. April.
The finest and largest trees, which I have seen in Derbyshire, grow in Hardwick and Kedleston parks. In the latter there are several remarkable for their size and beauty. One of them in particular is esteemed the most perfect oak in this part of the kingdom. It is calculated to be about 80 feet in height of good timber. Mr. Haywood of Duffield, a considerable dealer in timber, by whom I have been fa-
favoured with this calculation, divides the tree into two lengths. The first he supposes to be 45 feet by 51 inches square, and to contain 812 cubic feet. The second length he estimates 35 feet by 29 inches square, and to contain 204 cubic feet. The whole tree, exclusive of the branches, therefore amounts to 25½ tons of timber measure, or 33 tons, 26 feet neat.—There are other oaks in England, which exceed this in circumference near the ground, and which perhaps contain the same quantity of timber, but I believe there are very few, if any, which rise to equal height with so much regularity. Its beauty has however been in a small degree injured by the wind, which has broken off one or two of its largest branches.—Mr. Haywood values this tree, if found, at 100l. and without ascertaining this point, he thinks it worth 80l.

Oak sawdust is the principal indigenous vegetable used in dyeing fustian. All the varieties of drabs, and different shades of brown, are made with oak sawdust, variously managed and compounded.—An infusion of the bark, with a small quantity of copperas, is used by the common people to dye woollen of a purplish blue: the colour, though not very bright, is durable. The bark, on account of its astringent property, is sometimes used in me-
dicine with very good effect.—Horses, cows, sheep, and goats eat the leaves. Swine and deer fatten on the acorns. Turkies and ducks eat them.

**Fagus castanea. Chesnut Tree. T. May.**

Woods and hedges, but not very common. The nuts are pleasant to eat, when roasted. They are used for whitening linen cloth, and for making starch. The wood is applicable to nearly the same purposes with oak.

**Fagus sylvatica. Beech Tree. T. March.**

It is very beautiful when standing single in parks or ornamental grounds. The nuts, when eaten, occasion giddiness and head-ach; but dried may be made into wholesome bread.

**Corylus avellana. Common Hazle-Nut Tree.**

T. March. April.

Frequent in woods and hedges.

Painters and engravers make use of charcoal prepared from the wood.—An expressed oil is procured from the nuts for the use of painters. Goats and horses eat the leaves, sheep and swine refuse them.
Native plants.

Class XXII.

DIOEGLA DIANDRIA.
CHIVES and POINTALS DISTINCT. II. CHIVES.

SALIX ALBA. Common Willow. T. April.
The bark of this tree has been found a very useful medicine in agues. Many persons have been cured by taking a dram of the powdered bark every 4 hours during the intermission. In a few obstinate cases it was found necessary to mix a fifth part of Peruvian bark. The bark should be gathered when it is full of sap, and dried by a gentle heat. Phil. Trans. v. liii. p. 195.

Order III.

TRIANDRIA. III. CHIVES.

The berries are ripe in August and September, and are eaten by grouse.—Goats are not fond of the plant. Cows, sheep and horses refuse it.
Native plants.
Order IV.
Tetrandra. IV. Chives.

Viscum album. White Mistletoe. S. May.
Pinxton, Allestrey, West-Hallam.
Sheep eat it very greedily, and it is frequently cut off the trees for them in hard weather. It is said to preserve them from the rot. Mr. Hollesear.—If the berries, when fully ripe, be rubbed on the smooth bark of almost any tree, they will adhere closely and produce plants the following winter.—Mistletoe was formerly in great repute as a remedy for convulsive and other complaints; but it is now very much disregarded, its medicinal powers being small, and its operation uncertain.

Myrica gale. Sweet Willow. T. May.
Common about Wingerworth. Mr. J. Martin.
Horses and goats eat it. Sheep and cows refuse it.—Gathered in the autumn it dyes wool yellow. Linn.—The Welsh make use of it for the same purpose. They also lay branches of it upon and under their beds to keep off the fleas and moths, and give it as a vermifuge in powder and infusion, and apply it also externally to the abdomen. Penn. Wales. v. ii. p. 177.
Native plants.

Order V.

PENTANDRIA. V. CHIVES.

In hedges. Pinxton; Duffield.
The young shoots are often eaten early in the spring as asparagus, and are sold under the name of hop-tops.—Strong cloth is made in Sweden from the stalks. For this purpose they must be gathered in autumn, soaked in water all winter; and in March, after being dried in a stove, they are dressed like flax.—Horses, cows, sheep, goats, and swine eat it.

Order VI.

HEXANDRIA. VI. CHIVES.

In hedges. Derby; S. Normanton.
The young shoots are said to be good eating when dressed like asparagus.—The root is acrid and stimulating.—Horses will not eat this plant.

Order VIII.

OCTANDRIA. VIII. CHIVES.

S. Normanton; Markeaton; Derby.
As its roots spread near the surface, it impoverishes the land, and prevents the grass from grow-
Native plants.

growing near it.—The wood is extremely light, white, smooth, woolly, soft, and durable in the air—Sheep and goats eat the plant. Horses and swine refuse it.

ENNEANDRIA. IX. CHIVES.

Mercurialis perennis. Dog’s Mercury, Pinxton; Coxbench; Mackworth. P. May. It is noxious to sheep, and deleterious to man. Sheep and goats eat it. Cows and horse refuse it.

Order XIII.

MONADELPHIA. THREADS UNITED.

Taxus baccata. Yew Tree. T. April. It grows, in accessible situations, on the rocks at Matlock and Dovedale, and in a scattered manner in other parts of the county. The largest I have seen growing wild are situated on Smalley Common.—The wood is hard, smooth, and beautifully veined with red.—The fresh leaves are fatal to the human species; but the berries may be eaten without injury.—Horses and cows have been killed by eating it. The bark is said to be equally noxious to sheep.
Native plants.

Order XIV.
SYNGENESIA. TIPS UNITED.

The root is purgative and acrid; a dram of it in substance, or half an ounce of it infused in wine is a full dose. A cold infusion of the root in water is used externally in sciatic pains. A cataplasm of it is a most powerful diuretic. —A decoction made with a pound of the fresh root is the best purge for horned cattle,—The degree of its activity in different states and forms being very variable, and less ascertained than that of other cathartics in general use, is one reason why it is rarely employed: but Dr. Withering thinks it deserving of more attention than has been hitherto bestowed upon it. —Goats eat it. Horses, cows, sheep and swine refuse it.


Class XXIII.
POLYGAMIA MONOEgia.
V ARIous DISPOSITIONS.

Pinxton. P. April.
Native plants.

**Parietaria officinalis.** Pellitory of the wall. Frequent on walls. Mackworth church; Swarkstone-bridge. P. May.—Sept.

This plant was formerly in repute as a medicine, but it does not seem to possess any remarkable qualities. It is said to contain a considerable quantity of nitre.

**Atriplex hastata.** Fat-hen. Lamb's Quarters. Common on rubbish. A. August.

Cows, goats, sheep and swine eat it, but do not seem very fond of it.

**Atriplex patula.** Spear Orache. Common on ditch banks. A. August.

**Acer pseudo-platanus.** Sycamore. T. June.

By boring a hole in the body of the tree in the spring, a sweet liquor may be obtained, which with the addition of water is sometimes made into wine.—The wood is soft and very white.

**Acer campestre.** Common Maple. T. June. Pinxton.—The wood is well adapted to the use of the turner.

**Fraxinus excelsior.** Common Ash. T. Apr.

An infusion of the leaves, from half an ounce to an ounce and half is a very good purge, and a decoction of two drams of the bark, or of six drams
drams of the leaves has been used to cure agues.
—Horses, cows, sheep and goats eat it, but it
spoils the milk of cows.—The wood is hard
and tough, and is much used to make the tools
in husbandry.

*Class XXIV.*

**CRYPTOGAMIA.**

FLOWERS INCONSPICUOUS.

*Equisetum fluviatile. River Horsetail.*
Newton wood.

*Ophioglossum vulgare. Common Adder's Tongue.* Dethick; Mr. Coke.

*Osmunda lunaria. Moonwort.*
Dethick; Mr. Coke.

*Felix mas. Male Fern.*
Common.—The Siberians boil it in their ale.
and like the flavour of it. The root dried, pow-
dered, and given in doses of half an ounce was
a secret to kill the tape worm, and is supposed
to be no less efficacious in destroying other
worms.—A tolerably pure alkali is obtained
from the ashes. The common people in many parts of England mix the ashes with water, and form them into balls; these balls are afterwards made hot in the fire, and used to make lye for scouring linen.

*FILIX FEMININA.* Female Polopody, or Fern, Common at Wingerworth.

*ASPLENIUM RUTAMURARIA.* White Maiden Hair. Dovedale; Matlock; Dr. Johnson, St. Peter’s church, Derby.

*ASPLENIUM TRICHOMANES.* Common Maiden Hair. Dovedale; Dr. Johnson. On a wall at Quarndon.

*ASPLENIUM VIRIDE.* Green Maiden Hair. Coxbench wood; Dr. Johnson. P.

*ASPLENIUM SCADOPENDRIUM.* Harts-tongue. Matlock; Littleover.

*POLYPODIUM VULGARE.* Common Polypody. Frequent on oak trees, and walls.

*Order II.*

*MUSCI MOSSES.*

*Lycopodium alpinum.* Mountain Club-Moss. On the mountains near the Derwent; Mr. J. Martin.
Native plants.

Selago abietis. Fir Club Moss. On the mountains near the Derwent; Mr. J. Martin.

Bryum bryoides. Hoary Bryum.
On the mountains; Mr. J. Martin.

Order III.

Algae. Flags or Thongs.

Lichen saxatilis. Stone Liverwort, or Cupthong. Frequent on rocks.—It is used to dye purple.

Lichen caperatus. Rose-leaved Liverwort. Coxbench; Dr. Johnson.—It is used to dye woollens of an orange colour.

Lichen corallinus. Frequent; Coxbench.

Lichen parietinus. Common Liverwort. Frequent on walls and trees.

Lichen stellaris. Starry Cupthong.
On trees near Coxbench.

Lichen floridus. Flowering Cupthong. Not very common; on a wall betwixt Derby and Coxbench. Dr. Johnson.

Lichen lacteus. Frequent.


Lichen corniculatus. Horned Liverwort.


Li-
Lichen rangiferinus. Reindeer Liverwort.
The Laplanders could not exist without this plant. It is the food of the rein-deer; and the rein-deer supplies every necessary of life for the contented people of that inhospitable climate.
The four last were found on Breadal moor by Dr. Johnson.

Lichen candelarius. Yellow Liverwort.
On a wall betwixt Holbrooke & Coxbench. Dr. Johnson.—It gives a yellow colour.

Lichen caerul.-nigrescens.

Lichen violaceus.

Lichen caninus. Ash-coloured ground Liverwort.—This is the basis of the famous powder recommended by Dr. Mead to prevent madness after the bite of a mad dog, and inserted in the London Pharmacopæia. But Dr. Lewis observes, the success depends more upon the use of the cold bath, which is prescribed along with it, than the efficacy of this plant.

Lichen miniatus. Cloudy Liverwort.
The four last found at Dovedale by Dr. Johnson.

Lichen verrucosus. Black worted Liverwort.
Derbyshire; Dillen.

Lichen tartareus. Welch Liverwort.
On rocks, common.—It is gathered for dyers, and gives a purple colour.
Native plants:  

Lichen petraeus, purpureus. Purple Liverwort. On rocks.—It dyes wool of a dull but durable crimson, or purple colour.—It has been used as a stiptic.

Lichen corneus. Hairy Cupthong.
Derbyshire; Dillen.

Order IV.

Fungi. Mushrooms.

Agaricus campestris. Common Mushroom.
Frequent.

Clavaria corraloides. Yellow Clubtop.
Dry pastures; Quarndon.

Plants Omitted.

Class IX.—Order III.

Butomus umbellatus. Flowering Rush.

Water Gladiole.  
Banks of the Trent.

Class XII.—Order V.

Woods and hedges; Derby; Mackworth.

C H A P.
ORNITHOLOGY, like other branches of natural history, has met with considerable attention in this kingdom as well as in other parts of Europe. Messrs. Willughby, Ray, Edwards, Latham, and Pennant in particular have applied to the study of it with peculiar diligence and success. The last-mentioned gentleman more especially has given so ample and accurate a description of the birds found in Great Britain, that very little additional light can be thrown upon the subject by the history of those, which are met with in any particular district of the kingdom. However it may not be entirely useless to give a catalogue of such, as have been observed in Derbyshire. By this means the place of abode of each bird will be more clearly ascertained, and this part of their history better illustrated, than it has hitherto been. It is not my intention to give a full description of any bird, but to mark only the character, in which they differ from those, given by other writers. Nor shall I be solicitous
given by other writers. Nor shall I be solicitous about the accuracy of the arrangement, referring those who wish to be more fully informed in respect to this point, to Mr. Pennant's valuable work, entitled British Zoology.

We have no certain evidence, that any species of eagle besides the black or ring tailed has ever been seen in Derbyshire. Mr. Wilmot says, that in the year 1668 in the woodlands near the river Derwent in the Peak of Derbyshire was found an eagle's nest made of great sticks resting one end on the edge of a rock, the other on two birch trees, upon which was a layer of rushes, and over them a layer of heath, and upon the heath rushes again, upon which lay one young one, and an addle egg, and by them a lamb, a hare, and three heath poults. The nest was about two yards square, and had no hollow in it. The young eagle was black as a hobby, of the shape of a goshawk, of almost the weight of a goose, rough footed or feathered down to the foot, having a white ring about the tail.

Though the eagle has been seen at a later period, it cannot be considered in any other light than as an occasional visitor in this county. About the year 1720 one was taken up in the parish of Glossop, upon the high mountain called
called Kinder scout. It was found in a very feeble state. This was thought to have been occasioned by the inclemency of the weather, as it afterwards recovered, and was carried about the country and shewn as a natural curiosity.

About 30 years ago another eagle was seen in Hardwick park. This, I believe, is the last, which has been observed in Derbyshire. But I have been informed, that in the year 1782 two eagles were seen in Shirewood forest in Nottinghamshire, which is only a few miles distant from Hardwick.

Happy is it, that the eagle is become so scarce a bird in this part of the kingdom. For I have been credibly informed, that in the mountainous part of Westmoreland, in which it still makes its appearance, the shepherd generally loses, in the spring and summer seasons, a lamb every week. Mr. Pennant says, that it is frequent in Scotland, and that it is very destructive to deer. It seizes them between the horns, and by incessantly beating them about the eyes with its wings soon makes a prey of the harassed animal. He adds, that the eagles in the island of Rum have nearly extirpated the stags, which used to abound there.

The
The osprey is ranked by Mr. Pennant with the eagles. It has been twice seen in Derbyshire. —— On the 28th of May, 1779, one was shot at Stavely, near Chesterfield. By an attention to the following particulars it will be found, that it varies a little from Mr. Pennant's description of this bird. It was in good condition, had an empty stomach, and weighed 59 ounces. The wings extended measured from tip to tip five feet 6 inches and a half. The legs short, but the thighs pretty long. The talons semicircular and nearly of equal length. The tender sides of the feet and toes remarkably covered with horny points for the better security of its prey. The outer toes so moveable, as to form a second kind of toe, or a third forwards, as in owls. Not the least appearance of the left foot being subpalmated as mentioned by Linnaeus. The feathers on the thighs white, not long, and reaching very little below the knees. The wings and talons remarkably strong and long.

The above bird was presented to Sir Ashton Lever.

The other osprey was shot October 1785, at Melbourn. It agrees so much with the bird killed at Stavely, as to render it unnecessary to take more particular notice of it.
Perhaps there is a greater variety of falcons found in Derbyshire, than in the same extent of country in any other part of England. Besides the kite, common buzzard, kestril, and sparrow hawk, the following seem to be more particularly deserving of notice.

The merlin has been shot at Stavely. It is one of the smallest of the hawks. It weighs only five ounces and a half. It does not breed in England but emigrates hither in October.

The honey buzzard shot at Afton. I have not seen or heard of more than one bird of this species. It had no ash colour on the head. Mr. Willoughby gave it this name, because he found the combs of wasps in its nest.

Moor buzzard at Catton in the parish of Croxal and at Foston.

The ring tail shot on the east moor and near Derby.

The hen harrier shot at the same places. Mr. Pennant observes, that the ring tail has been supposed to be the female of this species, but is himself of a different opinion. He says, that by the infallible rule of dissection males of the ring tail have been found. As a further confirmation of the justness of this remark, I would observe, that two ring tails, which I have seen, from their different size, and plumage, appeared to be a male and female. The
colour of the feathers in the larger bird was brighter and deeper than those in the other.

A spotted falcon was shot in the month of November at Spondon. Another bird of the same species was seen several months before in company with it.—The length was twenty-one inches, and breadth forty-seven. The crown and hind part of the neck white, spotted with dark brown. Back and scapulars of the same colour edged with white. Under side white, tinged with yellow. Twelve feathers in the tail. The upper side dusky and barred with dark brown. The middle feathers barred with white on the under side near the rump.

The above birds were observed to frequent much the banks of the river Derwent.

I have seen another species of falcon, which seems to be distinct from any of those, which have now been enumerated. It was rather larger than the common buzzard, and, excepting the tail and under side of the primary feathers, was entirely of a dark chocolate colour. The tail dusky brown marked with three blackish bars, (that near the end broader than the other two) and with a white spot close to the rump. The under side of the first feathers of the wing dirty white. The tail long, extending three inches beyond the ends
of the wings. The bill strong, and very much hooked at the end. The legs short and covered with feathers almost to the feet.—It was shot in the woods at Alderwashley.

Mr. Pennant in his account of the white owl does not mention the colour, size, and number of its eggs. The hen was found at Stavely sitting upon two long white eggs larger than those of a wood pigeon. The male weighs only thirteen ounces.

The long eared owl has been shot at Shardlow. It agrees with that described by Mr. Pennant, excepting that the breast is of a darker colour than the under side.

Short eared owl shot at Melbourn.

These two species are scarce, more especially the latter. It avoids inhabited places. It is a bird of passage; visiting this kingdom the beginning of October, and retiring early in the spring.—I have been informed, that the hawk headed owl has been shot at Stavely and Derby. But, not having seen the bird, I am not able to say whether it be distinct from those, which have been enumerated.

The white, the brown, and the tawny or screech owl are all common in Derbyshire. The female of the last species weighed only thirteen ounces.

The
The greater and smaller butcher bird or shrike shot at Derby. The male of the latter species weighed only an ounce. Whereas Mr. Pennant says it weighs two.—The raven, rook and carrion crow are common. The hooded or Royston crow is sometimes seen, but is not very common in Derbyshire.—Jackdaws frequent the rocks of the Peak.

The cuckow and wryneck visit this county at the same time they make their appearance in other parts of the kingdom.—Jays and magpies common. A magpie was lately shot at Markeaton, entirely white, excepting a few feathers in its tail.

The greater and smaller spotted woodpecker shot at Stavely and Melbourn. The green woodpecker is common.

Kingfisher not unfrequent. Nuthatch shot at Romely near Bolsover and at Melbourn. In shape it resembles the woodpecker, and lives upon insects and nuts.

The creeper at Derby. Excepting the golden crested wren, it is the smallest of British birds.
The black cock was shot a few years ago on Egginton heath. Formerly these birds appeared in great number in the Peak, but now are very seldom seen.

The red grouse found upon all the moors in Derbyshire.

Partridge common.

The quail is sometimes seen in Derbyshire. Mr. Pennant calls it a bird of passage. Some, he observes, entirely quit our island, and others only shift their quarters in the winter season.

The common pigeon or stock dove frequent.

The rock pigeon has been seen on the Chevin near to Duffield. It is said to be a bird of passage, and only to visit this kingdom during the winter months.

Stare or starling common.

Mistletoe thrush, and field fare not uncommon during the winter.—The thrushle regularly visits Derbyshire every spring.

I have seen a bird, which was shot at Thulstone in the parish of Elvaston, that in size and figure greatly resembled a thrushle. Its length eight inches; its legs very long and slender. Entirely white, excepting the feathers under the wings, which were tinged with redish
dish orange. This bird was shot in the beginning of Jan. 1786, and is the only one of the kind, which I have seen or heard of.

The water ouzel is frequently met with in the Peak, near small brooks and rivulets. The ring ouzel has been seen on the east moor and at Pinxton.

The rose coloured ouzel was shot in October 1784, by the Rev. Mr. Dawson at Weston, and is now in his possession. It agrees very nearly with that described by Mr. Pennant. I would only observe, that the rose colour is faint and dull, and that the crest is not so large, or raised so high, as in the drawing given by the above gentleman.—This bird is seldom seen in England, or any other part of Europe.

The Bohemian chatterer some years ago was shot at Glapwell in the parish of Bolsover. At a later time a flight of 14 birds was seen at Smalley and Melbourn; some of them were shot at both places. At Melbourn they were observed to eat the food, which had been given to some swine.

This bird is said to appear very seldom in England, but annually to visit the neighbourhood of Edinburgh, and feed upon the berries of the mountain ash. Its native country is Bohemia, from whence it wanders over Europe.
The haw grosbeak has been shot at Spondon Stavely, and Melbourne. This bird visits us only at uncertain times, and is not regularly migrant. In that, which I saw, I could not discover any shade of pink upon the head.

The cross bill has been seen at Stavely and Derby. About thirty years ago a large flight of these birds appeared in the orchards at the latter place. They were so tame, that a great number was taken with bird lime at the end of long poles. Some of them were kept in cages, and lived a year. During this time they were observed to change their colour.

I have lately seen a cross bill which in colour differs from those, which are mentioned by Mr. Pennant. The feathers upon the head dark brown, edged with a light grey. Scapulars, back, but more especially the rump, tinged with a whitish yellow. The feathers in the wing and tail dark brown, edged with the same light colour. The breast and belly of a pale ash colour, marked with small oblong spots. The tail consisted of twelve feathers, and was a little forked.

Birds of this species are regular inhabitants of Switzerland and Germany.

The bullfinch or alp, the brown bunting, the yellow hammer, and reed sparrow, are common.
The chaffinch and goldfinch are common.

Bramling shot at Stavely and Melbourn. Several have been seen at the latter place.

House and hedge sparrows are common. The brown and the red headed linnets not unfrequent.

The fly catcher has been observed at Stavely to build its nest upon the hanging of a garden gate, and at Derby in a vine for several years together. Its eggs greatly resemble those of the redbreast, but are rather more spotted, and about a third smaller. It appears in the spring, breeds with us, and retires in August.

The sky, the wood, and the tit lark common. The grey water wagtail common; but the yellow not so frequent.

The nightingale is sometimes seen on the north east borders of the county. It has been observed in the parish of Creswell in particular. It appears in the spring, and continues a few months.

The redbreast very common.

The redbreast, which is a bird of passage, is seen in the spring and summer seasons.

The petty chaps has been shot at Stavely.

The
The yellow or willow wren, common.

Golden crested wren at Romely wood near Bolsover, and at Melbourn. This is the smallest British bird. Mr. Pennant says it weighs only seventy-six grains.

The common wren frequent.

The white ear is seen upon stone walls throughout the hilly parts of Derbyshire, more especially in the high Peak.

The whin chat and stone chatter, or stone smich, are common in the same place with the preceding; but like it they quit the country in the winter season.

The white throat appears in the summer season in most parts of the county.

The house swallow, the swift, the martin, common during the spring and summer seasons.

The goat sucker has been shot at Shuttlewood, and Sinfin moor near Derby. Mr. Pennant says, it appears the latter end of May, and disappears in the northern parts of our island the latter end of August. But its stay in Derbyshire is later. For that shot on Sinfin moor was killed 18th of September, 1780.

The great blue, the cole, and the long tailed titmouse, not uncommon.
WATER FOWLS.

Common heron frequent.—Bittern not so common.

The curlew is sometimes, tho' not frequently seen in Derbyshire.

The woodcock is common in every part, but more especially in the north-west extremity of the county.

The godwit is not, I believe, often seen in Derbyshire. A few years ago, one was shot at Barlborough, and another on Sinfín moor. The red shank has been shot at Stavely.

Lapwing shot at Derby.

The grey sand piper has been shot at Tideswell, and on Sinfín moor. It is not a very common bird in England.

Ruff and Reeve; Sinfín moor.

Spotted sand piper, Stavely.

Ringed plover, Derby, Feb. 1786.

Golden plover at Sinfín moor.

Kittiwake, Chelaston and Bretby, Dec.

Sanderling at Stavely.

Dotterell, in the Peak. It appears in the spring, and stays about six or eight weeks.

Oyster
Oyster catcher or sea pie, Derby.
Water rail, Stavely.
Corn crake or land rail, common.
Moor hen not unfrequent.
The grey scollop toed sand piper at Stavely.
I believe this bird is not very common.
Coot, frequent.
Tippet grebe, Osmaston. It is a scarce bird.
Dusky grebe, Derby.
Lesser grebe or dipper, Stavely.
Puffin or fire eyed grebe has been shot near Derby. This bird is seldom seen in an inland part of the kingdom.
The great grey gull, Sinfin moor.
Black headed gull or pewit, the same place.
The greater and lesser tern, Sinfin moor.
The goosander does not often appear in Derbyshire. Two have been shot near the river Derwent, one at Twiford, and the other at Catton in the parish of Croxal.

Red headed smew at Stavely. I have seen two birds apparently of this species shot near Derby, which in their marks differed from that described by Mr. Pennant. The head slightly crested, and of a bright rust colour, without any white upon the cheek, or black spot from beyond the eyes to the bill.

Wild swans sometimes visit the rivers Trent and Derwent in severe seasons.

The
The white fronted goose in severe seasons is seen upon the Trent and Sinfin moor.

The bernacle is seldom seen in Derbyshire. I have heard of one, which was shot at Barlborough.

Pochard or dun bird at Melbourn. April.

I have been informed, that the Brent goose is sometimes shot upon Sinfin moor. The velvet duck, the golden eyed duck, and the shiel drake, are said to be occasionally met with at the same place.

I have been informed, that the long tailed duck has been shot upon Sinfin moor, but it is seldom seen in this part of the kingdom.

The white throated and Garganey ducks are said sometimes to visit Sinfin moor.

The cormorant is sometimes, though not frequently, seen in Derbyshire.

The following bird was shot in a severe frost near Stavely, but does not appear to be described by Mr. Pennant.

In plumage it bears the greatest resemblance to the golden eye of any of the species of ducks. But as Mr. Pennant says, the golden eye weighs 32 ounces, and this bird weighed only 22\frac{1}{4}, and as the length of the golden eye is said to be 19 and the breadth 3\frac{1}{4} inches, and the two correspondent proportions of the bird in quest-
tion were only 16 and 26, they seem to be of different species. Two of these birds have been shot near the same place. The latter weighed only 19 ounces. It was killed the sixth shot, having by its quickness of eye, and power of diving, eluded 4 or 5 fair shots on the surface of the water; for it would on no account be made to take wing: And probably it would not have been killed, had not a second person obliged it to go under water several times successively, and the shot struck it instantly on its emerging.

END OF THE FIRST VOLUME.