words ſeem feeble to deſcribe this awful mountain, raiſing its exalted creſt towards the ſkies, with all the powers and majeſty of nature; yet as it makes ſo capital a figure in the geography of Spain, we ſhall once more aſcend its jagged rock, and explore its wondrous form.

The firſt ſtage from Barcelona leads to the town of Martorel, at the conflux of the rivers Noya and Lobregat; here you are ſenſibly ſtruck with the tremendous appearance of this grand and ſolemn mountain, impreſſing on the mind the moſt exalted ideas, in viewing this wonderful effort of nature. You ſeem quite cloſe to it, but have ſtill three hours in the uſual method of travelling in Spain to approach its baſis, and as many more after to climb up to its ſummit. There is a famous bridge over the Lobregat at Martorel, with an arch at its foot; it has been lately repaired, as appears by the following modern inſcription placed on it.

POR LOS ANOS DE 533 DE LA FONDACION DE ROMA FUE CONSTRUIDO ESTE ADMIRABLE PUENTE POR EL GRANDE ANIBAL CAPITAN CARTAGINES Y HIZO EREGIR EL ARCO TRIUMFAL QUE AUN EXISTE A SU SALIDA EN HONOR DE SU PADRE AMILCAR. DESPUES DE 1985 ANOS DE DURACION SE HALLAVA ESTA FABRICA MUY MALTRATADA Y EN ESTADO DE ARRUINARSE ENTERAMENTE PERO AFIN DE CONSERVAR UN MONUMENTO DE TAN RARA ANTIGUEDAD LO MANDO-

REES-

REESTABLECER EN ESTE ANO DE MIL SIETE CIENTOS Y SECENTA OCHO, LA MAGESTAD DEL SENOR DON CARLOS REY DE ESPANA A SOLICITUD DEL EXMO SENOR DON IUAN MARTIN DE ZERMENO COMANDANTE GENERAL DEL CUERPO DE INGENIEROS, &c. &c.

In ENGLISH.

This admirable bridge was erected in the year 533 *of the building of Rome, by the great Hannibal, a Carthaginian captain, and he raiſed the triumphal arch which ſtill exiſts at its foot, in honour of his father Hamilcar. This fabric, after having ſtood* 1985 *years, was greatly damaged and in a ruinous ſtate, but his Majeſty Don Carlos King of Spain, in order to preſerve ſo rare a monument of antiquity, ordered it to be repaired in the year* 1768, *at the entreaty of his excellency Don John Martin de Zermeno, commandant general of engineers, &c. &c.*

Martorel is a large town, replete with induſtrious inhabitants, all employed and conſtantly at work; the women in making black lace, and the men in various uſeful and laborious occupations; a little farther on, at the village of Eſpalanguera there is a manufactory of cloth, which maintains numbers of families; the ſame ſpirit of labour and application is univerſal every where in Catalonia; but we now draw near to the lofty mountain of Montſerrat, the moſt ſingular perhaps in the world for its appearance, compoſition, and productions; as much the admiration of the naturaliſt, as revered by the natives in general, from the renown of its ſanctuary, famous for

for miracles and the extraordinary favours granted by our lady of Montſerrat to its numerous votaries.

The whole extent of this mountain may be about eight leagues in circumference, its chief materials conſiſting of round limeſtone, firmly conglutinated with a yellow calcareous earth and ſand, not unlike the *Brechia* or pudding-ſtone of Aleppo, only that the grain is coarſer and the ſtones larger than that of the Levant, with a further addition of round white quartz ſtreaked with red, as well as touchſtone, all firmly cemented together, forming one perfect ſolid maſs; and according as the natural bitumen which united all theſe together, has occaſionally given way in the courſe of fleeting years, various torrents of rain water have rolled down and waſhed away the earth, the reſult of their decompoſition, and have ſplit the mountain into an infinite variety of ſhapes and ſingular appearances, forming in ſome places the moſt amazing clefts and frightful precipices: in others huge pieces of blanched and bare rock ſhoot up into ſharp cones, pillars, and jagged forms, from twenty to a hundred feet high, exhibiting wonderful aſpects that ſtrike the eye with ſurprize and the mind with aſtoniſhment! its wildneſs increaſing in proportion as you advance higher, inſomuch that on reaching the ſummit of this enormous pile, human reaſon is loſt in conjecture; but the ſight is gratified with the moſt ſplen-

did proſpect, looking down on an extenſive kingdom beneath you as on a map, exhibiting a fertile country to the South, ſtudded with villages and watered with rivers; the eye ſtretching out further over the Mediterranean, the landſcape is rendered ſtill more ſtriking from the contraſt on the North and Eaſt, bounded by the bare and dark mountains of the Rouſſillon, and the ſnowy tops of the Pyrenees. On theſe inhoſpitable cliffs of Montſerrat, amidſt the conſtant inclemency of jarring elements, dwells the pale hermit, with hairy gown, wrapt up in ſilent contemplation. Here he has hewn a ſolitary dwelling and offers up his fervent prayer, and takes his lonely walk, lifting up his eyes, muſing

> Of every ſtar that heav'n doth ſhew,
> And every herb that ſips the dew.

But though the elements have wreaked their fury upon theſe elevated peaks, the indulgent hand of nature has not been ſparing in her gifts to this ſurpriſing mountain, as numberleſs evergreens and deciduous plants ſerve to adorn the various gaps and breaks which its ſingular ſhape admits of, rendering it a curious repoſitory of the vegetative kingdom. The lower part of the mountain has decompoſed much ſooner than the upper parts and turned into ſoil, productive of corn, vineyard and olive, while the ſhelving rocks facilitate a paſſage to the ſummit, and exhibit

exhibit to the botaniſt a view of above two hundred ſorts of trees, ſhrubs, and plants, that ſhoot up ſpontaneouſly, gracing this hoary and venerable pile; amongſt others the ſcarlet oak, three different kinds of juniper, baſtard alaternus, mock privet, the lote or nettle tree, the ſcorpion ſena, the perennial ſtrawberry tree, roſemary, gorze, thyme, fern, and towards the top the ſtinking trefoil of the ſea ſhore of Valencia, and the rough bind weed of Andaluſia and Biſcay, proving that theſe plants grow equally in cold and warm climates.

Here we find the touchſtone, or *lapis lydius*, known to Theophraſtus the diſciple of Ariſtotle, who ſays it was found in the river Tmolus in Lydia, and that the upper part was better for eſſaying gold than the lower, adding, that theſe ſtones appeared to be pebbles, and as they were not round, it was inferred they were fixed in the earth, and were never waſhed away by the rivers. The moderns make uſe of acids with greater advantage for the eſſaying of gold, by comparing a line drawn on the ſtone with gold of a known ſtandard, to another line which they want to eſſay, for as aqua fortis has the property of diſſolving all metals except gold, the colour and diminution of the lines compared together, will ſhew what allay they have, with little danger of error. From hence it is plain the touchſtone is not limy, otherwiſe it would diſſolve in the acid, and the only quality required is to receive the

line drawn on it, and not diſſolve in aqua fortis, nor is its colour of conſequence, though the blacker is preferable, as ſhewing the gold better. This is the colour of that found in the Tmolus, the Baſaltes or cryſtalized rocks, in many parts of Saxony, in the mountain of Uſſon in Auvergne, the Giants cauſeway in Ireland, and theſe of Montſerrat. They are all indiſſoluble in acids, and of a different nature from marble, which being limy would not anſwer the purpoſe, as the aqua fortis would carry away the ſtone jointly with the metal it diſſolved; thus true touchſtone being of a very hard nature, all vapour and moiſture condenſe on its ſurface; it muſt therefore be carefully rubbed and wiped dry before it is uſed, that the adheſion of gold may be perfect. Theophraſtus, though a great man, reaſoned according to the philoſophy of his age, which made him imagine that marble would ſweat, when the dampneſs proceeded from the ſmooth texture and coldneſs of it, condenſing, and rendering viſible the moiſture diſſolved in the air.

The direction of this great mountain is from eaſt to weſt, with a viſible inclination to the weſt. Thoſe who adopt the ſyſtem of the formation of mountains, from a ſucceſſive depoſit of ſediment from the ſea, will find it difficult to reconcile their hypotheſis with the ſtructure of the mountain of Montſerrat, as it is no eaſy matter to diſcover how the ſea could give a round ſhape to the ſtone,

or

or how quartz, ſandſtone, or touchſtone, could congluti-nate ſo firmly together; but this muſt be left to more able pens to diſcuſs: I ſhall only add, that it is impoſſible to view this amazing mountain without the utmoſt admiration; its name has been extended to one of the Britiſh iſlands in the Weſt Indies, and its fame is univerſal: its prodigious clefts impreſs the mind with ſuch wonder, that it has given riſe to the opinion in common with Gaeta in Italy (*a*), that theſe tremendous rocks were ſuddenly rent in this manner when our Saviour gave up the ghoſt on the croſs, when "*The earth did quake, and the rocks rent.*" *St. Matt. c.* 27, *v.* 51.

(*a*) The ſingular rock of Gaeta in the kingdom of Naples, has an amazing cleft from the top to bottom, and is totally rent aſunder, which they tell you happened at the death of our Saviour; a large block of marble has fallen in between, on which they have built a little chapel, dedicated to the Trinity, and ſhips paſſing near ſalute it; this place is held in great veneration, particularly in Spain; during the wars in Italy, *La Santiſſima Trinidad de Gaeta* was greatly reſorted to, and a conſtant invocation. There is a good plate of this rock in the "remarks on ſeveral parts of Europe by John Breval, Eſq; author of the former remarks. London, 1738."

LETTER

LETTER XIX.

Singular mountain of foſſil ſalt, near the town of Cardona, in Catalonia, as deſcribed by Don Guillermo Bowles.

THE town of Cardona is ſixteen leagues from Barcelona, at no great diſtance from Montſerrat, and near the Pyrenees. It ſtands at the foot of a rock of ſalt, which on the ſide of the river Cardonero appears cut perpendicularly, forming a maſs of ſolid ſalt between four and five hundred feet high, without the leaſt crevice, fiſſure, or ſtrata, nor is any gypſum to be found in the neighbourhood. This amazing rock is about a league in circumference, and much about the ſame height as the adjacent mountains, but its depth being unknown, it cannot be aſcertained on what baſis it reſts. The ſalt is commonly white from the bottom to the top, though in ſome parts it is red, which the people of the country cut into pieces like bricks, and think it of uſe for pains in the ſide, by applying it to the part after being moderately warmed; ſometimes it is of a light blue, but theſe colours are of no importance, as they diſappear in grinding, the ſalt remaining white, and being eatable, having no flavour or taſte either of earth or vapour.

This

This prodigious mountain of ſalt, diveſted of any other ſubſtance, is unparalleled in Europe; philoſophers have an ample field to ſtudy its formation; it will not be ſufficient to ſay, it proceeds from an evaporation of the ſea, as this will not be deemed ſatisfactory.

In the ſhop of a ſculptor at Cardona, I purchaſed ſeveral figures, candleſticks, caſkets, and other toys cut out of this ſalt, as tranſparent as cryſtal: when one of the workmen was carving a candleſtick, I obſerved he wet it with water, then rubbed it dry with a towel, and wiped off the white powder which enſued on the working of it, and gave it a greater tranſparency. The ſalt is ſo hard and compact that water will not diſſolve it if it is ſoon rubbed dry again.

This mountain has a conſiderable ſurface, nevertheleſs the rain does not diminiſh the ſalt(*a*). The river which runs at its foot is briny, and when it rains the ſaltneſs of the water increaſes, and kills the fiſh; but this effect does not extend above three leagues, beyond which fiſh live as uſual.

After many experiments which I made with the water of this river by evaporation, diſtillation, and various

(*a*) Perhaps not ſenſibly; but how ſhall we otherwiſe account for the addition of ſalt to the water mentioned in the next ſentence.

different

different proceſſes, I never could diſcover in it, the leaſt grain of ſalt, which perſuaded me that the ſalt was entirely decompoſed by motion, and diſſolved into earth and water. The water of the Tagus, which paſſes between hills of gypſum and ſal gem, at Aranjuez, is bad in that ſpot, but at Toledo it is good; ſoap eaſily diſſolves in it, and a little lower down, if it is diſtilled, not the leaſt particle of gypſum or ſalt is to be found (*a*). If we burn ſulphur, arſenic, pitch, or other combuſtible matters at the foot of a tower, none of thoſe that are near it can bear the ſtench, while thoſe above will not perceive it; becauſe it entirely decompoſes into water and earth before it reaches them, and the inflammable principle which is inodorous riſes anew to form freſh combinations, and occaſion thunder and lightning. I ſhould think the emanations of malignant fevers, and of the plague, follow the ſame laws.

It is commonly ſaid, that of the three acids of nature, the nitrous, which is the ſecond in ſtrength, ejects the marine, which is the third and the weakeſt, but experience is contrary to this doctrine, ſince in Spain the ſal gem ejects the nitrous acid from its baſis: grind twenty-four ounces of this ſalt with twelve of ſalt-petre, let them be diſtilled in the uſual manner, and the reſult will be a

(*a*) Theſe curious facts merit a further examination, as the preſent illuſtration is by no means ſatisfactory.

very

very good aquafortis, which will readily diſſolve ſilver, and have no effect upon gold. The ſilverſmiths of Madrid uſe no other. To clear up more fully this ſingular phenomenon, and ſee whether the chemiſts are miſtaken or not, nothing is left but to aſcertain whether this ſal gem contains a vitriolic acid, becauſe in ſuch caſe it would not be the marine acid that was more powerful than the nitrous, but the vitriolic: however as it has not been demonſtrated, or known, that any ſuch vitriolic acid exiſts in common ſalt, the difficulty ſtill remains. This ſingularity of the Spaniſh ſal gem merits the attention of chemiſts and repeated experiments; as this ſyſtem ſeems to militate againſt the received opinions concerning the nature of the three acids, the maſter-key of chemiſtry, and overturns the theories now in vogue (*a*).

What rhapſodies have been publiſhed with reſpect to the phyſical cauſes of the ſaltneſs of the ſea, ſome ſaying that immenſe beds of ſalt exiſted at its bottom; others, finding this argument deſtroyed itſelf, had recourſe to the idea of rivers bringing down ſalt enough to the ſea to impregnate its waters, which ſuppoſition is as falſe as the former, as we are poſitive that ſea water is at preſent as briny as it was in ancient times in proportion to its ſitua-

(*a*) Mr. Bowles ſeems to have drawn his concluſions rather too haſtily, without reflecting that nitre when divided to a certain degree and kept divided, may by the force of heat alone be deprived of its acid; whilſt common ſalt can ſuſtain a much greater degree of heat without any decompoſition.

tion, temperature, evaporation, or quantity of freſh water running into it; beſides this, I have made ſeveral experiments, but never found ſalt at the mouth of rivers, where they diſembogue into the ſea. It is true, that ſometimes after diſtillation and evaporation I have found a thouſandth part of common ſalt, and I once diſcovered as a *reſiduum*, a little nitre; but this proves nothing, and with reſpect to the nitre, I conſider it to be a *reſiduum* of common ſalt, being perſuaded that this may change its acid and alkaline baſis, and become nitre with motion and ebullition, and reciprocally nitrous, and the alkaline baſis change into common ſalt (*a*).

(*a*) It would have been acceptable to the chemical readers, if Mr. Bowles had favoured us with any ſufficient reaſon to ſupport this belief.

LETTER

LETTER XX.

Obſervations made by Don Guillermo Bowles, on the roundneſs of pebbles in the beds of rivers.

THE pebbles of which I am now going to ſpeak, are thoſe which are commonly found in moſt places without angles, or points, and though not perfectly round, have yet more or leſs that form, with a ſmooth ſurface. They are compoſed of various matter, and the firſt idea which occurs of their having acquired this ſmoothneſs, is from their rubbing againſt each other, or ſome harder body; this being the method we uſe in order to give ſuch a poliſh to any ſubſtance, and as theſe ſtones are frequently found in large quantities in the beds of great rivers, it is very eaſy to ſay they have been brought down by the waters, and become ſmooth by their conſtant friction. For my part, I was always of this opinion till my arrival at Aranjuez, where I diſcovered the fallacy of this reaſoning, for I clearly perceived that the ſtones in the bed of the Tagus never moved from their places. This of courſe ſtaggered my former belief; I was confirmed in my new principles by a variety of obſervations, but to avoid being prolix I ſhall only

offer a few of them, which have all the appearance of being deciſive in favour of my ſyſtem (*a*).

There are no pebbles more ſingular than thoſe cryſtalline ones found in the bed of the river Henares, near San Fernando; now if theſe pebbles had any progreſſive motion, let it be ever ſo ſmall, they ought certainly by this time, after ſo many ages, to have reached the bed of the Tagus ſo near them, yet none are to be found there.

The Tagus is full of calcareous ſtone at Sacedon; a little lower, at Aranjuez, not one of theſe is to be found in its bed.

In the kingdom of Jaen near Linares, there is a hill chiefly compoſed of round ſmooth ſtones, about the ſize of an egg; the ſmooth poliſh of theſe and their roundneſs cannot be attributed to rains, becauſe they are not expoſed to them, nor diſperſed on the ſurface of the hill, but buried underneath at a conſiderable diſtance: nor much leſs can it be attributed to any river, for I do not know from what ſyſtem, or by what chronology, it may be conjectured that any river ever run over that eminence.

(*a*) Mr. Bowles tells us, he looks upon this as one of the happieſt diſcoveries he ever made, as ſtriking him in a forcible light, and ſerving as a key tending to illuſtrate the true phyſical theory of the earth; but in what manner it had this effect he has not informed us.

In

In the village of Maria, three leagues above Zaragoſſa, there is a broad gully full of quartz, ſandſtone and limeſtone, and gypſum of a perfect white, yet at Zaragoſſa the Ebro contains none of theſe ſorts.

I believe no body has ever ſeen in the bed of the Ebro large or ſmall round granite ſtone, nor blueiſh ſtone veined with white, but the Cinca before it empties itſelf into that river is full of them: in ſo much that it carries no other ſand but theſe ſtones reduced very ſmall, near San Juan in the valley of Giſtau.

The river Naxera is full of ſmall ſandy ſtone, and of white quartz reſembling little almonds, mixed with others of a red colour. This river runs into the Ebro, in whoſe bed when it paſſes by Zaragoſſa, none of theſe ſorts of ſtones are to be ſeen.

The bed of the Guadiana has in its different parts the ſame kind of pebbles as are found on its banks, and on the adjacent hills, without being mixed with thoſe that are found a league higher or lower; and at Badajoz, where the country is without any ſtone, none are to be found in the bed of the river.

This holds good not only in Spain, for I have taken notice of the ſame in other countries; not to multi-

ply

ply examples, I ſhall only offer what has fallen under my obſervation in France; the river Alier at its ſource, about half a league from Varenne, contains a great variety of pebbles, of red and yellow quartz, of the ſame nature as thoſe in the fields in its neighbourhood; but I could not diſcover one of theſe pebbles in this river, when it paſſes by Moulins, where nothing is ſeen but coarſe ſand.

The Loire at its ſource runs over an immenſe quantity of ſmall pebbles, lower down, none are to be ſeen when it paſſes by Nevers, where the bed of the river conſiſts of ſand and large pebbles the ſame as the adjacent fields.

There is a great deal of pebble and flint in the river Jonne, before and after it paſſes by Sens, becauſe its banks are covered with it from Joigny. The Jonne enters into the Seine above Paris, and yet I do not believe any body has ever ſeen one of theſe pebbles go through the *Pont neuf*, and what is more, nobody has ever ſeen the Seine bring any ſort of limy pebble along with it in paſſing through Paris, either round or of any other ſhape.

What happens in the Rhone is ſtill more concluſive, and as ſeveral writers have ſpoken of it, and of the Lake of Geneva in a manner which is incomprehenſible to me,

I ſhall

I ſhall briefly relate what I have ſeen. A valley flanked on one ſide in part by the Alps, and on the other by Mount Jura, forms the Lake of Geneva, which is about eighteen French leagues in length: a ſmall river with a great many brooks falling from the mountains on its ſides fill the cavity of the valley, and the water which overflows, forms the river Rhone near the city; as its depth there, is leſs than in the centre, and the water extremely limpid and tranſparent, the pebble is ſeen at the bottom covered with moſs; the waters even with the higheſt winds never moving them from the firſt ſpot where they fell in. The Rhone after it has quitted the lake runs for ſome leagues over a bed of pebble, and then enters a narrow gorge formed by two rocks cut perpendicularly, then paſſes by the mountain of Credo, at whoſe foot the river diſappears, for reaſons very different from thoſe with reſpect to the Guadiana.

The Credo mountain is a compoſition of ſandy earth full of round ſtone, from its ſummit to a conſiderable depth. There is another ſimilar mountain oppoſite to it in Savoy, likewiſe full of ſandy, limy pebble, granite, and flint; the Rhone paſſes between theſe two mountains: as the baſis of the Credo conſiſts of ſtrata of limy rock of different degrees of hardneſs, the waters in courſe of time have eaten their way through ſuch beds as happened to be of a ſofter nature than thoſe above and below,

low, and made themſelves a paſſage between them. I croſſed the upper rock, which penetrates the baſis of the two mountains, and over the river, went from France to Savoy in leſs than a minute, as it is not forty paces from one ſhore to the other. This ſingular vault is pierced in ſome places, and the water guſhes out at the apertures, foaming like boiling water amongſt thoſe enormous pieces of broken rock. This is what is commonly called *La Perte du Rhone*, and may be about ſixty paces in length. At another place it is leſs, about a muſket ſhot higher up, from a ſimilar cauſe, of the river meeting with a ſtrata of leſs reſiſtance, where it has formed a paſſage which it enters with no inconſiderable violence.

This phenomenon being explained, I reaſon in this manner: If ſtones were carried forward by the motion of the rivers, theſe cavities through which the Rhone paſſes ſhould be full of them, for though the ſtrength of the current would hurry them forward, there are ſo many holes at the bottom, and ſo many detached pieces of rock to ſtop them, that ſome would inavoidably be interrupted in their paſſage, and many be found there, but I could not diſcover the leaſt appearance of ſuch, notwithſtanding that the bed of the river from Geneva to this place is in a manner crouded with them. I therefore conclude that theſe pebbles never move from their place; and what is ſtill more convincing, there is not a

ſingle

ſingle pebble in theſe vaulted places, excepting ſuch as are found on the banks of the river, in the long courſe of which there are many of all ſhapes and ſorts, at leaſt as far as Lyons; nevertheleſs I do not believe any one has perceived ſuch ſtones at its entrance into the ſea, nor in the gulph of Lyons, where this river loſes itſelf.

I will add one obſervation more, though perhaps I have given too many already. A few paces from the occultation of the Rhone you croſs the river Valſeline, which has its ſource near Nantua, in the high Bugey. The bed of this river is full of pebble, becauſe the hills and plains through which it paſſes are equally ſo. There is a place where it forms a cataract with great violence, when the water runs into a cavity; now if it brought any pebbles along with it, they would certainly be found in this cavity, but it is a fact that none are to be found there. When I went to Geneva I threw ſome remarkable ſtones into the river above this gap, and at my return I found them in the very identical ſpot without having been moved in the leaſt.

If I am aſked how all theſe pebbles come to be ſo round and ſmooth, and to have loſt their ſharp points, I ſhall freely acknowledge that I do not know the reaſon, that I have ideas of my own concerning them, but do not venture to inſiſt on them. Any hypotheſis would have more weight with me than the common one, that the

motion of waters or rivers has been the cauſe of the roundneſs of ſtones, for who can have reſolution to embrace a ſyſtem which would engage him to hold that the Rhone for inſtance had traverſed the ſummit of the mountain of Credo, one of the higheſt in the world, all compoſed of ſuch pebble; and the ſame reaſoning muſt be allowed to many other mountains with ſimilar appearances in different parts of the world.

Sometimes, it is true, ſtones and pieces of rock are hurried forward in rivers, and brought down by torrents after ſtorms; the ſame may happen in ſtreets and cities, but this is not extraordinary, when the declivity of the ſituation is conſidered, which gives additional power and force to the water, occaſioning a natural effect, which ceaſes when ſuch bodies come to a place where they will be at reſt. This will account for ſuch ſtones as have been rolled down into the beds of rivers by their natural weight, when the earth which ſupported them has given way.

Suppoſing then this notion to be exploded, the difficulty ſtill remains to account for their ſmoothneſs and roundneſs, which is no eaſy matter to explain, being involved with many perplexing circumſtances, which I ſhall leave to be elucidated by others more intelligent than myſelf. It is certain that water and time are two power-

ful

ful agents that can bring about ſurpriſing effects. The world is full of theſe round ſtones of various ſizes and appearances, they are found in vallies, on hills, and at a conſiderable depth in the earth, as well as on the ſummit of the higheſt mountains. I have ſeen round diamonds covered with a light ſcurf, ſapphires and oriental topazes round like cornelians. The cryſtal of the Rhine never becomes round, becauſe in its natural ſtate it is not angular, and forms a maſs already round, the reverſe of common rock cryſtal, compoſed of *laminæ* of a regular ſhape. Many of the learned have been deceived by theſe cryſtals of the Rhine, thinking, becauſe they found them at two leagues diſtance from Straſburg, in the midſt of the fields, that the river has altered its bed, entertaining that fond notion, of the waters carrying them along; at the ſame time, they did not conſider that they are not to be found a few leagues above Dieux Briſac, nor any where below Straſburg. Therefore if theſe rivers carried ſuch pebbles in their courſe, they would have them at their mouth, where they enter the ſea, and there would be no ſand banks at theſe places, for the ſtones would fill up the cavities, and the waters would roll over them, which certainly is not the caſe. The very bottom of the ſea would ſuffer ſome change from the great quantities of ſtones brought down by ſo many rivers, and forced into its bed, from whence it would follow, that the

obſervations of the ſounding line would no longer be of uſe to the mariner, who always finds the ſame bottom when he heaves the lead at one time as at another (*a*).

(*a*) True with reſpect to the Britiſh Channel, and of which I have been often an eye witneſs, and ſeen the ſame kind of ſand, ſmall ſhells, and pebbles, brought up at the bottom of the lead as were deſcribed in charts publiſhed many years ago, by which the mariner on entering the channel in a dark winter night can know in what part he is in; but this is not the general uſe of the ſounding line, which is thrown out occaſionally, to know the depth of water, and number of fathoms, when approaching the coaſt, or amidſt ſhoals, and in every ſituation of danger. Will Mr. Bowles perſuade us, contrary to ocular conviction, that great quantities of pebble are not daily thrown up upon the beach by the waves, and choak up the mouth of harbours, while others are brought down by rivers with ſimilar inconvenience?

LETTER

LETTER XXI.

Deſcribing the hot wells at Caldas in Catalonia, and thoſe of Caldetas, near the city of Mataro.

AS I had not an opportunity of viſiting the hot wells and baths of *Caldas* in Catalonia I was favoured with the following account of their ſituation and preſent ſtate, by my worthy friend William Gregory, Eſq; his majeſty's conſul at Barcelona.

" There are ſeveral hot wells in the neighbourhood of Barcelona, but the principal ſpring is at Caldas de Monbuy, about five leagues North of Barcelona. The town takes its name from the waters, but at preſent is much decayed and dwindled into a very inconſiderable place, with a few priviledges to ſupport its rank as a town, though it was once the capital of a diſtrict inhabited by a people known in the earlieſt periods of the annals of Catalonia, under the denomination of *Aquicaldenſes*, of whom frequent mention is made during the conteſt between Rome and Carthage for the dominion of that part of Spain, ſometimes taking part with one ſide, ſometimes with the other. The greateſt part of a ſlight

antient

antient wall remains, as alſo its four gates, which are ſtill kept in repair; but the caſtle of the lord of the manor, though of a late date in compariſon with the reſt, ſeems to have been abandoned for ſome years, and is in a moſt ruinous condition. Caldas is ſituated in a very romantic part of the country, which riſes into abrupt hills all round, and in a manner encircle it. Theſe hills, or rather mountains, are for the moſt part covered with olive groves, which yield a conſiderable quantity of oil, for the extraction of which the hot water that flows ſo plentifully in the town is of infinite uſe. As this place is at preſent in no wiſe recommendable, either for its elegance or accommodations, you may well imagine that the baths are not much frequented with a view of diſſipation or pleaſure, but numberleſs are the votaries of health that viſit it from all parts of the country in ſpring and autumn, and they are accommodated in the beſt manner that a Spaniſh country town can afford. Some of the apothecaries, and many of the private houſes at Caldas have neat baths for thoſe that chooſe to hire them; and there is an hoſpital where the poor are admitted gratis. Various are the virtues that this water is ſaid to poſſeſs, and many the cures that it daily performs, in ſcorbutic, ſcrophulous, as well as rheumatic complaints, ſtiffneſs in the joints proceeding from old wounds, &c. I cannot however pretend to deſcribe to you any of its particular qualities, ſuch as what mineral it is chiefly impregnated with,

with, or the cauſe of its extraordinary heat, or any part of its analyſis, having had but little time during my reſidence in that country for the inveſtigation of things of that ſort, and I never found any of the inhabitants that could give me any ſatisfactory account about the matter, all that I know of from my own obſervation, is that it riſes much hotter that either the ſpring near Aix la Chapelle, or thoſe of Bath or Briſtol; it is boiling hot, and the people of the town come conſtantly there to boil their eggs, cabbage, and all ſorts of vegetables, by ſimply ſuſpending them under the ſpout of the fountain in a baſket, and yet make uſe of no other water, when ſufficiently cooled, for drinking either alone, mixed with wine, or cooled with ſnow in orgeats, ſherbets, &c. Some years ago there was a ſhort treatiſe written on the qualities of theſe waters, by ſome well-diſpoſed and intelligent perſon; a few detached ſheets of this work once fell into my hands, when I was at Caldas, but the whole edition has now ſome how or other diſappeared. The general opinion is, and I believe not without foundation, that ſome invidious perſons after the deceaſe of the author, made a point of buying up the work, and have ſecreted or deſtroyed every page of it, except here and there a few copies that fell into the hands of ignorant people who tore them to pieces without conſideration.

Another

Another hot ſpring flows in the village of *Caldetas*, which likewiſe takes its name from the waters, like the former, though expreſſive of a leſs degree of heat in the water, as well as the inferiority of the place in reſpect to the other. This village is about two miles from the city of Mataro, near the ſea ſide, and is alſo frequented by perſons afflicted with the above-mentioned complaints in a ſlight degree, for the water being only tepid, it has not the efficacy of the hot water at *Caldas*. Thoſe of Caldetas are alſo taken as a purgative, and are not fit for any culinary purpoſe. You will eaſily conceive that thoſe watering places differ widely from what are ſo called in other countries, being ſolely frequented by the infirm out of *pura neceſidad*, and are therefore indifferently ſupported; was the beneficial improvement of England to take place, it would in a ſhort time extend the reputation of theſe ſalutary waters, and make them rival, if not out-do Spa, Aix la Chapelle, Bareges, and moſt of the noted places on the continent, over all which the famous baths of Caldas have ſuch an undoubted ſuperiority in point of climate and ſituation.

LETTER

LETTER XXII.

Remains of ancient volcanos in Spain.

IT is not my intention to advance or add any new hypothetical theories to the many that of late years have been offered relative to the grand ſubject of volcanos, and how far in conjunction with earthquakes they have been the powerful cauſes of the great inequalities and ſhattered condition of the ſurface of the earth. Varieties of ſpecimens of rock, ſtones, and earths, bearing evident marks of a former fuſion or calcination, have been collected, though found in places where no volcanos at preſent exiſt, yet leaving no doubt of their having formerly exiſted, and that ages have elapſed ſince their extinction: this ſubject of late years has more particularly engaged the attention of curious travellers, and ingenious writers of different nations. Sir William Hamilton, his majeſty's envoy at the court of Naples, has not only given a more perfect account of the eruptions of Veſuvius, but has conſiderably enlarged the field, and brought to light new and important diſcoveries, with reſpect to the volcanic eruptions of Italy. Thoſe of France and different parts of Germany have been likewiſe laid before the public, but thoſe of Spain remain ſtill un-

obſerved, and Mr. Bowles appears undoubtedly to be the firſt who has diſcovered any remains of volcanos in that kingdom, which is the more remarkable, in a country where they have ſo many individuals that muſt have ſeen thoſe famous ones of Pinchina, Cotopaxi and Chimboraſo in Peru, the moſt extraordinary and amazing volcanos in the world; with reſpect therefore to the Spaniſh volcanos, I ſhall confine myſelf to ſuch facts regarding their appearance as are ſtated by Mr. Bowles, and for the conſequences to be drawn from them, muſt refer to what has been already ſaid on this ſubject, and to the great book of nature that lies open before us. "I have ſeen, ſays Mr. Bowles, many mountains in Spain with evident ſigns of volcanic conflagrations, no account of which is handed down by record, or even any tradition remaining: between Almagro and Corral in La Mancha, near the river Javalon, on the road to Almaden, pieces of rock may be ſeen with evident marks of fire, and many ſtones rather weighty may be ſeen lying in the fields of a ſooty colour inwardly and outwardly, with all the appearance of having once been in a ſtate of fuſion.

There is a great mountain near the ſea, between Carthagena and Murcia, where there has been a volcano, the aperture of which ſtill remains, and is looked upon by the country people as an inchanted cave; there are five ſimilar ones in the territory of Murcia, there is one near Carthagena, with viſible remains of an alum mine, having

having this additional circumſtance for the more readily finding it, that there are four ſprings of hot water near it. The red earth, of Almazarron uſed in the glaſs-houſe at St. Ildefonſo, as well as the other ſpecies of red earth in various parts of Spain, employed for different purpoſes, are undoubtedly produced by volcanos. At the entrance of Cape de Gat there is a mountain towards the ſea, on the ſide next Almeria, conſiſting chiefly, in one part, of ſtone larger than ones arm, cryſtalized in equal layers, delicately fixed to a certain height, of a cinereous colour, as iron was wanting to give them another hue in the fuſion, for their ſhape evinces the effect of having cooled by degrees, according to the laws of cryſtalization; it is true nevertheleſs, that there are ores of a pale colour, with cryſtalized bodies of a perfect white, which are of the claſs of vitreſcents; I have not ſeen them, but Mr. Godin informed me, that he had obſerved ſuch not well cryſtalized, in the high and ſtupendous mountain near Quito, covered conſtantly with ſnow and its bowels in combuſtion, the reſult of a horrible volcano. In Catalonia, between Gerona and Figueras, near the ſea, there are two pyramidical mountains of equal height, whoſe baſes touch, having every appearance of a former volcano; and though at their baſes impreſſions of ſhells are frequently ſeen, they are of a later date than the volcano; when theſe petrefactions are found near volcanos they are proofs of their antiquity.

Theſe revolutions in our globe are no where more plainly ſeen than in the mountain of Montſerrat. The ſmall touchſtones ſeen there, in a mountain of a calcareous nature and amidſt thoſe elevated and conglutinated pyramids, being of a black colour and of the ſame grain as the others found in Catalonia, are all from the effects of fire, and have the ſame ferrugineous nature, as the high columns of the extraordinary mountain of Uſſon in Auvergne. Theſe pillars of baſaltes were probably in a ſtate of fuſion with the iron, when they mixed with it, and their irregular ſhape proceeds from having cooled by degrees, like the white baſaltes, if I may be permitted the expreſſion, of Cape de Gat. The ſmall round grains, blue and green, found in the fields near the mountain of Uſſon have been iron. I have ſeen ſome that were metal within, and were formerly like iron ſhot. Their ſhape may be explained from the practice obſerved in iron forges, when the workmen throw a ladle full of fuſed metal on the ground, which runs into a globular ſhape, and is purchaſed by ſportſmen inſtead of ſhot.

The globular iron ore is therefore the product of volcanos as thoſe certainly are near to Ronda and Befort in France, both are, as well as thoſe of Germany, with a ſuperficial coat, and give a very ſoft iron. Touchſtones might be made of the pillars of Uſſon, as the Germans do with the baſaltes in different parts of Heſſe and Saxony,

Saxony, whoſe forms are more irregular than the pillars of Uſſon. The Giant's cauſeway and other places in Ireland have innumerable pillars of irregular baſaltes, ſimilar in colour and form to thoſe of Uſſon, which ſerve alſo for touch-ſtones; the black ſoft flaty ſtones, found in the Pyrenees of Catalonia, and commonly called *lapiz*, are likewiſe the reſult of volcanos long ſince extinguiſhed.

I think I perceived the remains of a volcano on the mountain of *Serrantes*, near Bilbao, adjacent to the ſea at the entrance of the river of Bilbao; its figure is like a ſugar-loaf, and it has been miſtaken for the mine of Somorroſtro, which is a low uneven hill, at ſome diſtance from this pyramid. Pliny fell into this error, perhaps from not having ſeen it, or from the reports of ſome mariners who traded in Andaluſia, where Pliny was writing his hiſtory.

I never perhaps ſhould have known that the quartz of many mountains of Spain had been calcined, if previouſly, at Gingenbach, in the Black Foreſt in Germany, I had not ſeen them calcine the *Kieſſelſtein* to ſoften and mix it with cobalt, and make zaffre; this *Kieſſelſtein* is a true white quartz of the antient volcanos of Spain, but to know and underſtand theſe matters clearly definitions are not ſufficient, they muſt be ſeen."

LETTER

LETTER XXIII.

Return to Valencia and Caſtile. Mine of ſal gem at Mingranilla. Source of the river Guadiana. Mine of antimony near Santa Cruz de Mudela in La Mancha.

IN going from Barcelona towards Valencia you croſs a fine bridge, lately built, over the Lobregat, at Molino del Rei (*a*); further on, another bridge over a deep valley has been attempted with a triple row of arches at an immenſe expence, the foundation has given way, and a long time muſt paſs before it is compleated. The new road was finiſhed in 1778, as far as Villa Franca de Panades. The country is hilly and affords a variety of rural proſpects. The antient city of Tarragona ſtands near the ſea, on an eminence that commands a fine proſpect over a beautiful vale. The city exhibits ſeveral remains of Roman antiquities and inſcriptions. The learned Don Antonio Auguſtin archbiſhop of Tarragona is buried in the cathedral (*b*); proceeding from Tarragona the next

(*a*) In the ſecond volume of the Spaniſh tranſlation of Muller's fortifications, there are views of the bridges of Molins, Martorel, Acantara, Almaraz, and Aranjuez.

(*b*) Don Antonio Auguſtin, archbiſhop of Tarragona, born in 1516, ſon of Don Antonio Auguſtin, vice-chancellor of the kingdom of Aragon, was famous for his writings on canon and civil law and antiquity. All the great men of his age were unanimous in their

town

town is Reus, a commercial place, which of late years has greatly increaſed in buildings and population. Here the merchants of Barcelona have their factors and warehouſes, and ſhip off their wines and brandies as the ſhips come to an anchor in the road of Salo, about three miles from Reus. Catalonia furniſhes annually thirty-five thouſand pipes of brandy, which require a hundred and forty thouſand pipes of wine to make them, beſides which near two thouſand pipes of wine are alſo annually exported: and of fruit about thirty thouſand bags of hazle nuts every year chiefly for England, and worth about twenty ſhillings a bag on the ſpot.

It is a few hours excurſion acroſs the country to the northward, through Monblanc to the royal convent of Poblet, founded by Alfonſo firſt king of Aragon, in the twelfth century, for monks of the Ciſtercian order; the abbot is a temporal baron and has an extenſive juriſdic-

praiſes of his learning and virtues. He came over to England with Cardinal Pole, and aſſiſted in ſuch regulations as were then drawn up for the purpoſe of eccleſiaſtical diſcipline. Of all his works, none were more eagerly ſought after than his dialogues on antient medals and inſcriptions, "Dialogos de medallas inſcriciones y otras antiguedades ex bibliotheca Ant. Auguſtini archiepiſcopi Tarracon, en Tarragona, por Felipe May, 1587, 4to. This edition is ſo ſcarce, that Padre Feijoo relates in his *Theatro critico*, that an Engliſh gentleman travelling through Spain offered thirty piſtoles to any one who would bring him a copy, which being complied with, he offered thirty piſtoles more for another. I ſaw this edition in the library of Don Gregorio Mayans at Valencia; there are only plates to the two firſt dialogues; it has been tranſlated into Latin and Italian; a new edition of it was printed at Madrid in 1744, in the ſame form as the Tarragona edition, and may be had for about five ſhillings. The life of this archbiſhop has been written by the learned Don Gregorio Mayans.

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tion, with a conſiderable revenue. Several of the kings and queens of Aragon are buried in the church with ſtately monuments, as well as ſome of the dukes of Medina, celi, and Cardona: on viewing theſe tombs the emotions are only to be felt by an Engliſhman, that occur when he perceives in an obſcure corner, on an humble ſtone, the name of an Engliſh Peer, Philip duke of Wharton an unhappy nobleman; at the pinnacle of glory in the dawn of life, but alas! whoſe evening was clouded with miſery and ſcorn. After leaving his native country, he meanly crouched to the pretender, aſſumed the inſignia of the order of the garter, bore arms againſt his country: abandoned and deſpiſed by all, he was kindly received in the laſt moments of his wretchedneſs, and was interred by the hoſpitable abbot of Poblet. Thus ended Wharton, an exile and an outcaſt, ſhewing how little availed the higheſt dignities, fortune and talents, without virtue and love for his country. His line is extinct, and the faint inſcription on his tomb, at preſent nearly effaced, will ſoon be totally obliterated, while the energetic lines of Pope, ſo deſcriptive of his character, willh and down his failings as an example to poſterity (*a*).

(*a*) The inſcription on his tomb in the church of Poblet is as follows, and ſaid to be of the duke's compoſition.

Hic jacet Exs. Dom Philipus Warton, Anglus, Dux, Marchio et Comes de Warton, Marchio Marburſiæ et Carlogh Comes Rathcaſrem, vicecomes de Wincheſter Baro de Tramlon Eques Stⁱ. Georgii alias de la Geratera, obitt in fide Eccleſiæ Catholicæ Romanæ Povuleti, die 31. Maii, 1731.

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It is a tedious journey from Reus to Tortoſa, on the banks of the Ebro, where there is a bridge of boats that is croſſed in paſſing to Valencia. I ſhall now reſume the itinerary in going from Valencia towards Caſtile; the ground continues to riſe gradually as far as the chain of hills that divide that kingdom from La Mancha, with a very ſteep aſcent at the *Puerto de Bunol*. Near Utiel the country is covered with dwarf furze called *Erizo* by the Spaniards, from its ſimilitude to the prickles of a hedge-hog: it is a beautiful plant, and at the proper ſeaſon of the year is covered with blue flowers, which give it the appearance of a prodigious amethyſt, forming a cup of three feet diameter, ſo cloſe and firm withal, that a man might ſtand upon it. Cluſius was the firſt who deſcribed and gave a plate of it. It is the *Anthyllis erinacea* of Linnæus.

The aſcent ſtill continues to Villagorda, through a rugged country, broke up every where by gullies occaſioned by torrents that guſh from the mountains. On the higheſt of them there is a quarry of grey marble, veined with red; the river Cabral runs at its foot. At its ſummit there is a briny ſpring, where they make ſalt with a boiling heat. It is a conſtant deſcent from theſe hills to the village of Mingranilla: half a league from the village, there is a diſtrict of limy ſoil, with ſome hil-

locks about half a league in circumference, having below this bed of lime, a ſolid mine of ſal gem, equal to the ſuperincumbent ſtratum; its depth is not known, for when the excavations exceed three hundred feet, it becomes very expenſive to extract the ſalt; the mine frequently gives way and fills with water, which obliges them to abandon the ſhaft and work another near it, the whole country being an enormous body of ſalt, ſometimes mixed with a limy ſubſtance, and at others pure or reddiſh, moſtly cryſtaline. Thoſe who have ſeen no other mine might be inclined to think that the limeſtone forms the foſſil ſalt of Spain, but this will not be the caſe, if it is found to be free from lime at Cardona, yet cryſtaline enough to be carved into figures, being much harder than that of Mingranilla, which is brittle like ſpar (*a*).

The ground has been perceptibly carried away by torrents that have diſcovered the mine, for pebbles and hyacinths are diſperſed in the gullies which are now ſeen firmly conglutinated in the lime, forming hard rock, yet leaving no doubt of their having fallen, at ſome pe-

(*a*) Mr. Bowles ſays, that as the foſſil ſalt of Mingranilla has leſs watery particles in its cryſtalization, it therefore attracts little of the moiſture of the air, and does not diſſolve in a humid atmoſphere like that of ſprings, but this cauſe is hardly admiſſible: ſalt that is cryſtalized with a boiling heat undergoes more or leſs of a decompoſition, is therefore leſs perfect and more diſpoſed to diliqueſce, than that which is formed in circumſtances more favourable to its cryſtalization.

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riod, from the hills, by what may be obſerved on their ſummit.

From hence an eaſy deſcent for about four hours, leads into the extenſive plains of La Mancha, thoſe regions of fancy which Cervantes has rendered immortal. They have plentiful crops of ſaffron at San Clemente, and the beſt that grows in La Mancha. The onion remains four or five years in the ground, producing annually flowers; then the roots are taken up and tranſplanted, and the ſoil becomes excellent for corn, but twenty years muſt paſs before any ſaffron is cultivated again. Caſtile alſo abounds with the deadly carrot, the *Thapſia villoſa* of Linnæus, which according to Cluſius is in great requeſt amongſt old women at Salamanca (*a*).

La Mancha produces great quantities of lavender cotton, ſaid to be the ſame with the famous *moxa* from China, imported conſtantly by the Engliſh and Dutch; while the Spaniards, if this is the ſame plant, have it at home and know nothing of the matter (*b*).

(*a*) Its uſes may be ſeen in Dr. James's Engliſh diſpenſatory.

(*b*) The *ſantolina chamæcypariſſus* of Linnæus. Mr. Bowles ſays it is an excellent ſpecific for the gout, by being burned, on the part. It would have been of ſervice if he had given us any further proof of its efficacy, for whatever they may tell us of the practice in India, and notwithſtanding the praiſes of Sir William Temple, it does not ſeem to be in uſe in England.

The greateſt part of La Mancha may be conſidered as one continued plain, as far as the eye can extend without a ſingle tree; as the villages are large, and the churches have lofty ſteeples, they make a good figure at a diſtance, but when you draw near, their mud walls with many houſes in ruins convey a quite different idea. The inhabitants, for want of wood, burn thyme, ſouthernwood and wormwood, and though they have few ſprings they conſole themſelves with drinking good wine: when one conſiders their manner of living in theſe ſilent villages, added to their natural ſimplicity, they ſeem to have loſt little of their original character. At Socuellanos they get water about two or three feet from the ſurface; but at Tomilloſo, four leagues further, the wells are a hundred feet deep. From hence it is an hour's journey to Lugar-nuevo on the banks of the famous Guadiana, and only three leagues from its ſource; there are many lakes hereabouts which communicate with each other, produced by ſprings whoſe waters form a river, which having run for ſome leagues diſappears in the meadows near Alcazar de San Juan. In ſummer this river is trifling, but in winter it is neceſſary to go over the bridge at Villarta. The river diſappearing there, ſhews itſelf again a few leagues off, in other lakes called *Ojos de Guadiana*, "The eyes of Guadiana;" from whence the proverbial

verbial expreſſion, *of a bridge where many herds of cattle are conſtantly grazing*. To form an idea of ſuch a phenomenon, we muſt ſuppoſe that all the ground in thoſe parts conſiſts of ſome looſe ſubſtance, replete with fiſſures and crevices, to a conſiderable depth, without any ſolid materials to reſiſt the preſſure of the water, by which means the river has leſs water at Lugar-nuevo than within a league of its ſource: after great rains it ſinks ſo much the deeper, and fills all the cellars of the village without any viſible cavity, or paſſage where it might penetrate. On that part, called *The Bridge*, they have ſunk wells for travellers and cattle, and always find water. When the Guadiana iſſues out of the lakes, it turns ſeveral mills, is a hundred feet broad, and about four in depth. It paſſes afterwards by Calatrava, Ciudad Real, Medellin, Merida, Badajoz, and Ayamonte, where it enters the ocean dividing Spain and Portugal. Its ſingular qualities are alluded to in the following epigram of Don Juan de Yriarte, whoſe poems were lately publiſhed at Madrid.

Ales et amnis Anas ſociant cum nomine mores:
Mergitur Ales aquâ, mergitur Amnis humo.

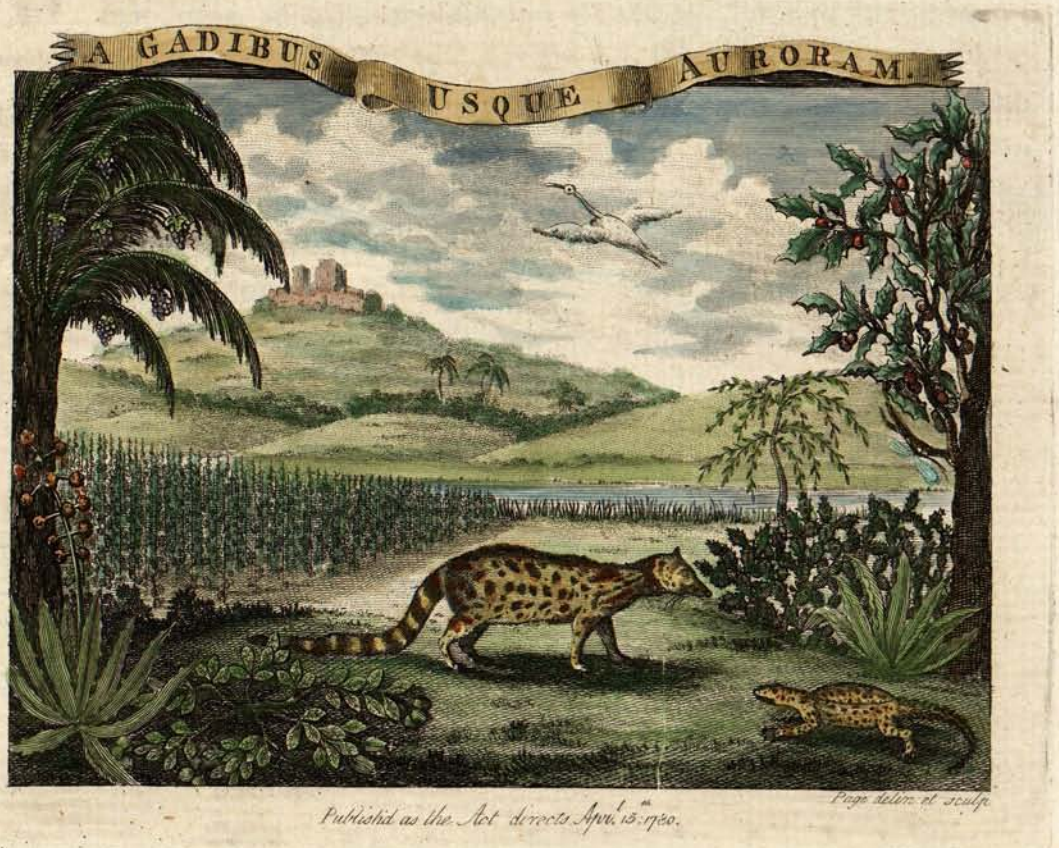
Before

Before I quit the territory of La Mancha, whoſe fame will never periſh as long as wit and humour remain, I muſt once more inveſtigate the bowels of the earth, and ſpeak of a mine of antimony near Santa Cruz de Mudela, at the foot of the *Sierra Morena*, which, ſince 1774, has been ſucceſsfully worked by Don Antonio Sancha, an eminent printer at Madrid, who, after having been at a conſiderable expence, now gets lumps of regulus of antimony of an enormous ſize, one weighing a hundred and fifty *arrobas*, and many of twenty or thirty, the ſmalleſt of four or five, for which he has a conſiderable demand: he has eſtabliſhed a manufacture of *regulus* of antimony, and has wrought up above ſix hundred *arrobas*, ſo white and chryſtaline, as to look like ſilver, being ſuperior to that of France and Hungary; it is a valuable article in different manufactures, particularly amongſt printers for making types, and is in great requeſt at Madrid, where the art of printing is now brought to a remarkable perfection: they are provided with good letter founders, and no foreign types were made uſe of in the elegant edition of Salluſt, tranſlated by the Infant Don Gabriel, his catholic majeſty's third ſon.

I now cloſe my labours, notwithſtanding their imperfections, relying on the indulgence of my readers, though much is omitted in compariſon to what the ſubject affords: moreover

moreover the kingdoms of Leon, Navarre, Galicia, and the principality of Aſturias, remain yet to be treated of, which perhaps may be brought forward hereafter, at a more favourable opportunity.

THE END.



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THE END.

APPENDIX.

PART I.

LETTER I.

WHEN Spaniards ſpeak of a *peſo* only, they mean 15 reals vellon, or a current dollar, an imaginary coin, and not the *peſo fuerte*, or *duro* of 20 reals vellon, an effective coin both in gold and ſilver. This diſtinction however holds good, merely in Spain, for in America they know only the *peſo fuerte*. The doubloon, or piſtole, is alſo an imaginary coin of 60 reals vellon, or three hard dollars, but the *doblon de oro* is a gold piece, worth 75 reals vellon. In currency you find as much American coined money as Spaniſh, particularly ſilver and old gold. In Spaniſh America they have no copper money. Gold and ſilver is coined at Madrid and Seville, copper at Segovia. The new coinage conſiſts of

GOLD.	Reals vellon.
A Gold piece of four piſtoles worth - -	300
The half, or double *doblon* - - -	150
The *doblon de oro* - - - -	75
The gold crown - - - - -	20

SILVER.	
Madrid ſilver crown, or *peſo duro* - -	20
The half - - - - - -	10
Peſeta - - - - - -	4
Real de plata - - - - -	2
Realito or *real de vellon* - -	1

COPPER.

Piece of - - Two *quartos*
One *quarto*
One *ochavo*
One *maravedi*, the leaſt coin in Spain.

N. B. A *real de vellon* is worth 8 *quartos* 2 *maravedis*, or 17 *ochavos*.

According to the old coinage, the par of exchange between England and Spain was ſettled at 40 pence ſterling for a Spaniſh current dollar of 15 reals vellon, and this varies in proportion with the balance of trade between the two kingdoms. According to the new coinage, the par may perhaps be leſs. In ſpeaking of the hard dollar in the courſe of this work, I have followed the example of Dr. Robertſon, and fixed it at 4s. 6d. ſterling, which will anſwer every purpoſe of an hiſtorical enquiry.

LETTER V.

Since my return to England, an ingenious correſpondent in Spain has favoured me with the following obſervations relating to the ſalt given to the *Merino* ſheep. "I cannot think Mr. Bowles's account of the quantity of ſalt given to the ſheep exact, for I have two or three times met theſe flocks of *Merinos*, and always aſked the queſtion: ſometimes the anſwer was *Conforme* (a Spaniſh mode of ſpeech when a direct anſwer is not ready) but that meant only with reſpect to weather and the kind of ſoil the ſheep happened to be feeding in. I never found the quantity of ſalt any thing like what Bowles ſays; I underſtand that in the northern parts of Spain they give ſalt in ſmall quantities to their oxen, and ſometimes to their horſes."

LETTER VI.

The quantity of land neceſſary to ſow a *fanega* is called a *fanegada*. The fanega meaſure, beſides corn, is further uſed for cheſnuts, beans, acorns, various kinds of ſeeds, fruit, and ſalt. Half a *fanega* is called an *almud* in many parts of Caſtile. 12 *celemines* make one *fanega*, four *fanegas* one *caiz*. A *fanega* of good wheat weighs from 90 to 100 lb. A Spaniſh leaſe cannot exceed 9 ¾ years.

LETTER VII.

It is a difficult matter to aſcertain the exact population of Madrid; for its ſize it is populous, perhaps may contain about 150,000 ſouls, ſomething more or leſs.

The longitude of Madrid, according to Don Thomas Lopez, geographer to the king, is found by the moſt accurate modern obſervations to be 13°. 49′. 30″. reckoning

koning from the iſland of Ferro, or 12°. 47′. 30″. from the peak of Teneriffe, from whence Spaniſh navigators reckon their longitude. The Spaniſh aſtronomers who followed the Alfonſine tables, drew their firſt meridian at Toledo. Don Thomas Lopez juſtly cenſures L'Abbe Vallemont, a French writer, for ſaying in his *Elements de l'hiſtoire*, that the Spaniards drew their firſt meridian at Toledo, becauſe Adam was the firſt king of Spain, and that God placed the ſun over Toledo at the creation; when in fact they only imitated the example of other nations, in drawing their meridian from the place where the firſt obſervations were made, as Ptolomy did at Alexandria, and amongſt the moderns, the Engliſh at the obſervatory at Greenwich, and the French academy at their obſervatory near Paris.

When Mr. Bowles ſays, Madrid is ſupplied with proviſions at all hours, *a todas horas*, it ſeems rather an exaggeration: early in the morning, it is. Madrid is well lighted, but the lamps are not lighted on moon light nights. With reſpect to the invention of Joſeph Lucatelli, mentioned in the philoſophical tranſactions, his machine is called a *ſembrador*, or ſeed box, and at once ploughs, ſows, and harrows, whereby the ſower's labour is ſaved, and the grain falls in order, and in the bottom of the furrow, and remains at the ſame diſtance under ground. There is a plate of it in Mr. Duhamel de Monceau's treatiſe on huſbandry, but as it is liable to many exceptions, particularly in ſtoney countries, and that other improvements have ſince been made of more general utility, it is deemed needleſs to enlarge any further concerning it, as a full deſcription of it is given in the work above-mentioned. See "Practical treatiſe of huſbandry, by Mr. Duhamel de Monceau, tranſlated by John Mills, 1759."

Three or four years ago there was a *zebulo*, or *cibolo*, alive at Aranjuez. In the gardens there are two baſons of water, in one of which a ſmall elephant has water falling out of his trunk, in the other baſon there is a figure of the *zebulo*.

The following deſcription of the Creſted Falcon may be added to what has been already ſaid of that bird. "Falco Criſtatus.---Corpus magnitudine gallo-pavonis, caput criſta verticali ornatum, temporum genarumque pennis erectis cinereis, roſtrum aduncum, cera nigra, mandibula inferiore rectiuſcula, dorſum, alæ, gulaque nigræ, abdomen album, cauda faſciis quatuor cinereis tranſverſis: ob animalis ferociam rectrices numerare non licuit. Habitat in *Carracas*. Nulla hujus novæ ſpeciei mentio facta eſt a Cl. Linnæo."

LETTER VIII.

The expedition againſt the wild cats at Cuerva, about fourteen leagues from Aranjuez, beyond Toledo, is uſually made when the court is at Aranjuez, at a very great expence, perhaps little ſhort of £1000. a cat, as the Rev. Mr. Clarke has related. They are a large mountain cat, not very fierce, and do little more harm than deſtroying ſome game.

A few camels breed at Aranjuez, and many buffaloes, the camels carry burthens, and the buffaloes draw in the carts. The king has a ſtable for his ſtallions called *Caſa de Monte*. The famous jack aſſes called *Burros padres*, are kept at Villa Mayor, about three leagues from Aranjuez, on the road to Toledo.

There are 21 *depoſitos*, or magazines for corn, at Aranjuez; theſe are inverted cones under ground, the earth only cleared out, which will hold 1000 or 1500 *fanegas* each, and preſerve corn dry for ſeveral years.

Amongſt the many fine trees in the gardens of Aranjuez, the lote or nettle tree, the *Celtis* of Linnæus, is one of the moſt beautiful, and is a large tree which has a moſt pleaſing effect.

LETTER X.

St. Ildefonſo gardens, are ſaid to have coſt between ſeven and eight millions ſterling, a great deal of which was expended by the late king Ferdinand the 6th, to perfect the improvements of his royal father.

Amongſt the pictures of St. Ildefonſo, are two Claude's, the drawings of which are in the Duke of Devonſhire's collection, and have been lately publiſhed by Boydel.

Ice to be found in hot weather in moſt parts of Spain, very cheap at St. Ildefonſo, for a farthing a pound. Water ſellers are very numerous every where, always Frenchmen, from Beame, and Gaſcony, who drive aſſes about with barrels of water, the pooreſt Spaniard thinking it beneath him to follow ſo mean a livelihood; but if water is wanted in a glaſs for immediate refreſhment here, the Spaniard ſtretches out his hand, and helps you, and preſents a few carraways to give it a reliſh.