JOURNEY
IN
SPAIN.

TOWNSEND.

VOL. I.

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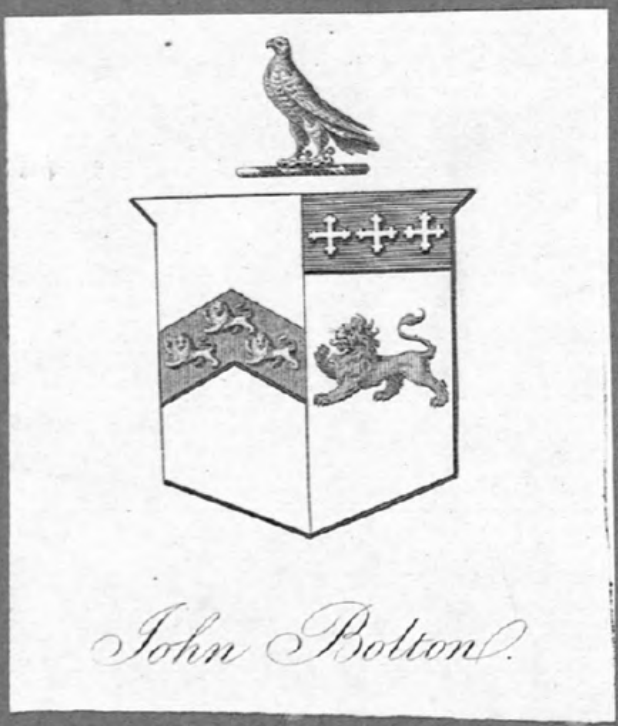
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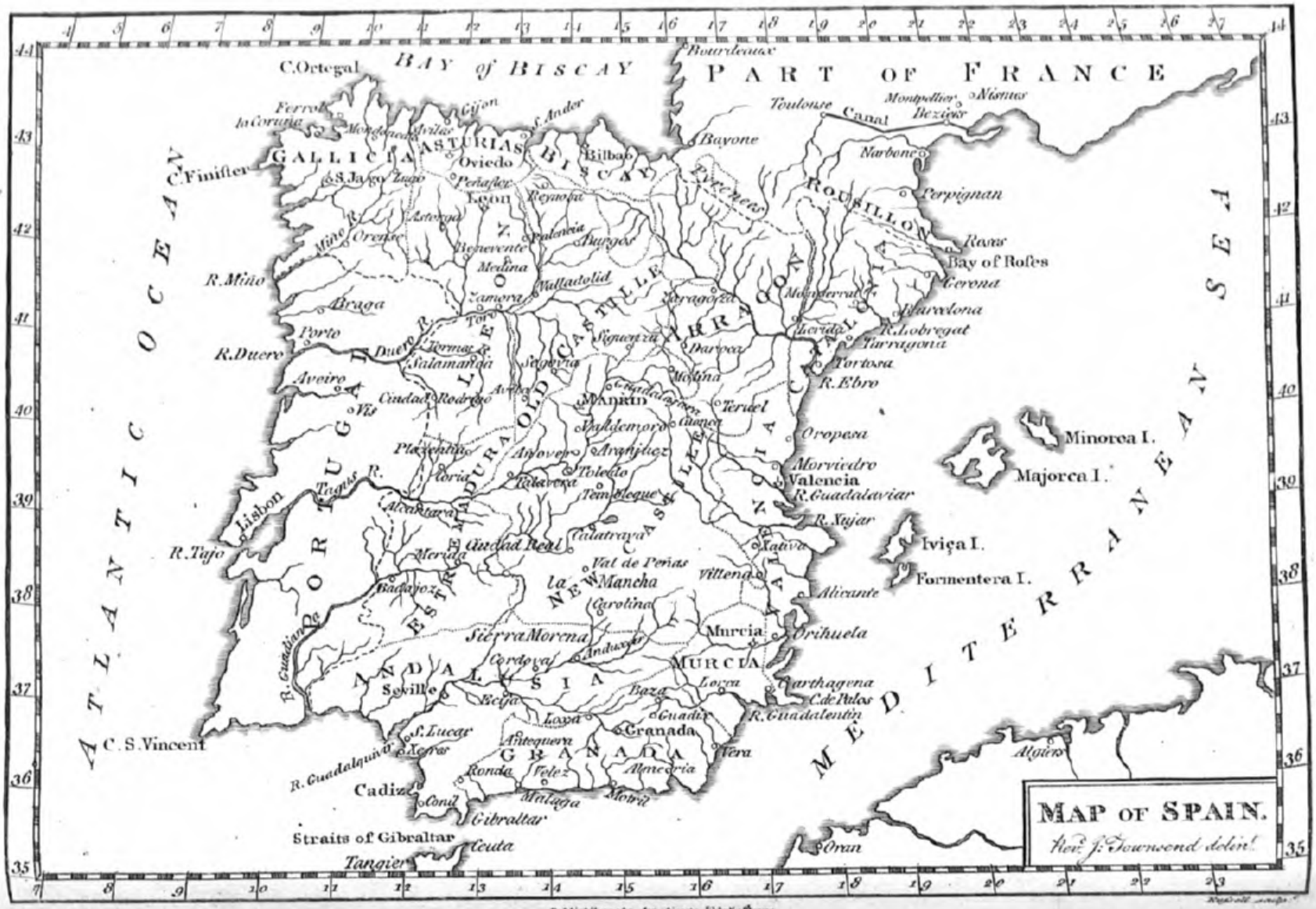
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Xeres
Vera
Ronda
Velez
Almeria
Cadiz
Conil
Malaga
Motril
Oran

A

JOURNEY

THROUGH

SPAIN

IN THE YEARS 1786 AND 1787;

WITH PARTICULAR ATTENTION

TO THE

AGRICULTURE, MANUFACTURES, COMMERCE, POPULATION, TAXES, AND REVENUE

OF THAT COUNTRY;

AND

REMARKS

IN PASSING THROUGH

A PART OF FRANCE.

By JOSEPH TOWNSEND, A. M.

RECTOR OF PEWSEY, WILTS;

AND LATE OF CLARE-HALL, CAMBRIDGE.

IN THREE VOLUMES. — VOL. I.

THE SECOND EDITION, with ADDITIONS and CORRECTIONS.

LONDON:

PRINTED FOR C. DILLY, IN THE POULTRY.

M. DCC. XCII.

TO THE

EARL of WYCOMBE,

AS MOST COMPETENT

TO JUDGE OF THEIR MERIT,

THESE SHEETS ARE DEDICATED

IN TOKEN OF

ESTEEM AND GRATITUDE,

BY HIS

LORDSHIP'S

SINCERE FRIEND AND DEVOTED SERVANT,

JOSEPH TOWNSEND.

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DIRECTIONS

DIRECTIONS

TO THE

ITINERANT IN SPAIN.

TO travel commodiouſly in Spain, a man ſhould have a good conſtitution, two good ſervants, letters of credit for the principal cities, and a proper introduction to the beſt families, both of the native inhabitants and of ſtrangers ſettled in the country.

The language will be eaſily acquired.

His ſervants ſhould be a Spaniard and a Swiſs, of which one ſhould be ſufficiently acquainted with the art of cooking, and with the ſuperior art of providing for the journey; which implies a perfect knowledge of the country through which he is to paſs, that he may ſecure a ſtock of wine, bread, and meat, in places where theſe excel, and

ſuch a ſtock as may be ſufficient to carry him through the diſtricts, in which theſe are not to be obtained. For himſelf, his ſervants, and his baggage, he ſhould purchaſe three ſtrong mules, able to ſupport the load which is to be put upon them. In his baggage he ſhould have ſheets, a mattreſs, a blanket and a quilt, a table-cloth, knives, forks, and ſpoons, with a copper veſſel ſufficiently capacious to boil his meat. This ſhould be furniſhed with a cover and a lock. Each of the ſervants ſhould have a gun ſlung by the ſide of his mule.

To travel as an œconomiſt in Spain, a man muſt be contented to take his chance for conveyance, and either go by the poſt, wherever it is eſtabliſhed; or join with officers, going to their various ſtations; to hire a coach, or quietly reſign himſelf to a calaſh, a calaſine, a horſe, a mule, or a *Borrico*. Theſe laſt are the moſt convenient for the purpoſe of croſſing the country, or of wandering among the mountains. If he is to traverſe any diſtrict infeſted by banditti, it will be ſafe for him to go by the common carriers, in which caſe he will be mounted on a good mule,

and take the place, which would have been occupied by ſome bale of goods. Any one, who is fond of botany, for ſhort excurſions, will make choice of a *Borrico*. Theſe are always to be had, when, as in ſome villages, neither horſe nor mule are to be obtained. I have uſed this honourable appellation for the moſt patient of all animals, becauſe I would not ſhock the delicacy of a young traveller, by telling him, at his firſt ſetting out, that he may ſometimes find himſelf under the neceſſity of riding upon an aſs. He muſt, however, know, for his conſolation, that an aſs does not appear ſo contemptible in Spain as in the colder regions of the north.

The beſt time for him to begin this expedition is in autumn, when he may go by Bayonne, Burgos, Valladolid, and Segovia, haſtening to the court at St. Ildefonſo. Here he is to procure letters for the chief cities in Spain. On theſe will depend the whole pleaſure of his excurſion. During the winter he may ſee all the ſouth of Spain, Toledo, Cordova, Seville, Cadiz, Gibraltar, Malaga, Granada, Carthagena,

Murcia, Alicant, Valencia, and Barcelona. Returning by Zaragoza to Aranjuez in the ſpring, he may follow the Merino flock to the mountains of the north, whilſt the country, on which he has turned his back, is rendered unfit for travelling, by the diſſolving heats, by want of proviſions, and by malignant fevers. This ſeaſon will be beſt employed in Gallicia, the Aſturias, and the provinces of Biſcay, taking Salamanca and Leon in the way.

Had I received ſuch directions previous to my Spaniſh journey, I ſhould have eſcaped a ſevere fit of illneſs, which was occaſioned by the intenſity of the ſummer's heat. In England, intermittents are commonly aſcribed to marſh miaſma, but in Spain their origin is attributed to the ſtroke of the mid-day ſun; and I am inclined to think this may often be the genuine cauſe.

JOURNEY

FROM

LONDON TO PARIS.

I SET out from London January 30th, 1786, and croſſing the channel in the night, landed the next day at Calais, from whence, proceeding in the diligence, I arrived early on the 3d of February at the hotel de Meſſageries at Paris. From Calais to the vicinity of Paris is hilly all the way. The diſtance is one hundred and ſeventy-ſeven miles. The country is open, moſtly in tillage, and not well wooded; the ſoil is chiefly ſand. Calais itſelf is in a plain, which is covered with pebbles. In the vicinity of Calais, the ſand is light and apt to drive, but as you advance it becomes more firm, yet with hard rain it binds, and muſt be therefore uncertain in its produce. As you leave Boulogne, the ſoil improves in

ſtiffneſs, till about Amiens, and nearer Paris, it becomes ſtrong clay with little ſand.

All the way through Picardy the rock is chalk, hard enough for building. As you advance into the Iſle of France, this chalk meets with the vitriolic acid, and becomes a ſolid gypſum. Of this they burn great quantities; now for their own conſumption, but formerly for exportation. Paris has had the honour of giving its name to this uſeful kind of cement, as being the place from which we originally imported it.

The courſe of huſbandry, through Picardy, is for the firſt year, wheat; the ſecond, barley, or oats, followed by a fallow. They manure with chalk, with dung from the farm-yard, and with the fold. During the ſix months of ſummer they pen their ſheep with hurdles on the fallows; but during the ſix winter months the flocks are confined all night, both for ſhelter and for ſafety, in cloſe pens, where they make a quantity of good manure. The ſheep are ſmall. The ſhepherd goes before them. Together they make a beautiful appearance. The produce of

Picardy,

Picardy, in wool, is ſix hundred thouſand pounds weight.

Their ploughs are excellent; in form ſimilar to the Norfolk and Rotheram combined; with little iron except the coulter and the ſhare. They have no chain nor drail, but only a wooden bar to ſerve the purpoſe of the latter, with a wooden collar to bring down the beam. The wheels are high, the beam is ſhort, and the whole is both compact and light. They uſe two horſes in the ſand, three in the clay, and manage well without a driver. The harrows are triangular, and have wooden teeth, which is a ſufficient index of the lightneſs of their ſoil. The ſhovel which they uſe, is like the Corniſh. For want of ſtreams their corn is ground by wind-mills. At Calais you have near twenty in full view, and near Paris you may ſee thirty-ſix between the city and S. Denis. In Picardy there are many extenſive meadows, which might be watered, but they do not appear to have adopted this improvement.

Abbeville and Amiens are manufacturing towns. In the former is made good

damaſk, and the latter is famous for its woollen goods and camelots.

The cathedral church at Amiens is highly worthy of attention. The front of this edifice is ſingular. The foundation was laid in 1220, and the whole was finiſhed in 1288. The length is four hundred and fifteen Pariſian feet, the breadth of the croſs is one hundred and eighty-two, the height four hundred and two.

Montreuil is pleaſantly ſituated on a hill, and almoſt ſurrounded by an extenſive meadow. It is a diſmal town, as are moſt of the villages in Picardy. The houſes are low; the ſhops are ſmall, dirty, and ill furniſhed, which is a certain mark of prevailing poverty.

Soon after my arrival at Paris, I breakfaſted with the Abbé Morellet. His library, conſiſting of eight thouſand volumes, all well choſen, is a model of philoſophical arrangement, founded on the three leading faculties of the human mind; the judgment, the memory, and the imagination. His reading deſk is of a ſingular conſtruction, but the moſt commodious of any I have met with. He ſits in a large eaſy chair,

chair, the arms of which are ſtreight, to ſupport a light deſk faſtened on a board of about three feet in length. The deſk has two flaps, the one upon the other, of which the uppermoſt will ſerve for writing, or, being lifted up and ſuffered to fall back ſufficiently to make an angle of 45° with the horizon, ſerves at once to form a ſkreen, when he ſits before the fire, and to ſupport any book, from which he wiſhes to take an extract. On his right hand he has a light table on caſtors, to receive this little deſk, when he wiſhes to quit the chair; and on his left is a large deſk for ſuch books or papers as it may be needful to conſult.

In the evening he preſented me with a ticket of admiſſion for three months, to a moſt agreeable ſociety, conſiſting of four hundred members, which aſſembles in the *Sallon des Arts*, at the Palais Royal. They have a large hall for converſation; a commodious chamber for reading, well provided with public prints and modern publications; and a third room for muſic, with a gallery for cheſs. Under this ſuit of apartments is a coffee-houſe, from which

which any kind of refreſhment can be procured.

The day following he carried me to the French academy, to hear M. de Guibert pronounce an oration in praiſe of his predeceſſor, M. Thomas. The room was crowded with the firſt nobility of France, who attended not merely out of curioſity, but as a compliment to the new academician. I was happy in being preſent on ſuch an occaſion, and was much pleaſed with the diſcourſe, in which not one fine image eſcaped unnoticed by the auditors. It was compoſed of that florid kind of eloquence, which is peculiar to the French, and ſuited to their language. Deſcribing his reluctance to ſucceed ſo diſtinguiſhed a member as M. Thomas, he ſaid, "When "a ſtation has been occupied by uncom- "mon talents, when the public hath been "long accuſtomed to behold the luſtre of "ſuperior merit; the ſucceſſor muſt ex- "pect to meet with no indulgence; the "object of their devotion is no more; the "revered image hath vaniſhed from their "ſight; but the pedeſtal remains, and the "height of this will be a ſtandard, by

"which

" which to form an eſtimate of him, who " ſhall preſume to place himſelf upon it." A general plaudit interrupted his diſcourſe. When he proceeded to give the character of M. Thomas, he ſaid, " His natural " imperfections ſerved only to make him " cultivate the qualities oppoſite to them; " inſomuch that I never could diſcover " what would have been his failings, but " by the virtues in which he moſt ex- " celled." Here the applauſe re-echoed from every part of the aſſembly.

When a man has once eſtabliſhed his reputation, he is apt to gain more credit than is due to him; and, whatever be his fort, whether wit, pleaſantry, or eloquence, if, by often moving us, he has prepared us to be moved, he may command us at his will; and, keeping our expectation on the wing, he may excite our laughter or applauſe on the moſt trifling occaſion. This, in ſome few inſtances, was the caſe with M. de Guibert, who gained moſt applauſe, when, in my opinion, he deſerved it leaſt. Thus, lamenting the untimely death of his predeceſſor, he began, " When a tree, after " having bloſſomed for a hundred ſprings,

" and

" and ſcattered its fruit upon the earth for
" as many autumns, ſmitten with barren-
" neſs by time, falls and appears no more;
" it has fulfilled its deſtiny, and in its due
" time ſubmits to the irrevocable law: but
" for a tree in perfect vigour, flowing with
" ſap, yearly puſhing forth new roots, and
" promiſing by its fruits and verdure to be
" the wealth and glory of the ſurrounding
" plains; let this be ſtruck with thunder
" and be ſuddenly deſtroyed; fawns, ſhep-
" herds, ſwains, all run to it, all lament it,
" and the mutilated trunk, now ſacred, is
" for a length of time covered with liba-
" tions, and watered with their tears."
Here their plaudits burſt forth with reite-
rated violence, and for a conſiderable time
interrupted his diſcourſe. The French are
certainly more lively in imagination than
the Engliſh, more fond of painting; but
not ſo much accuſtomed to the coldneſs
of mathematical preciſion. Provided the
imagery be rich and bold, they expreſs
their admiration, without ſtaying to con-
ſider if it be accurately juſt. In all their
aſſemblies they diſcover the quickeſt ſenſi-
bility. Fond of the brilliant, not one fine

ſentiment,

ſentiment, not one ſtriking image, not one harmonious period, is ever loſt or fails of its effect on them.

The French academy hold their meetings at the Louvre. Three hundred and twenty tickets were delivered out; but I imagine there muſt have been near four hundred in the room.

The days following I employed in viſiting the cabinets of natural hiſtory in Paris.

The royal cabinet is delightfully ſituated at the entrance of the botanical garden. The Count de Buffon being exceedingly infirm, I ſaw this cabinet with Monſieur Daubenton, who ſhewed me every poſſible attention. From the animal kingdom, as I imagine, no collection is equal to this. In this part of natural hiſtory M. de Buffon certainly excelled. The minerals are very numerous, but much inferior to thoſe which are in private cabinets. There are, indeed, large maſſes of gold and ſilver, but I cannot ſay that they appear to me well choſen.

The cryſtallized diamonds are fine, more valuable to the naturaliſt than to the jeweller.

The aqua marine cryſtals are very large.

The emeralds from Peru are large and clear: ſome are ſingle cryſtals with hexaëdral priſms; others form a group or druſen.

Of tin, there is one large cryſtal from Bohemia; but few good ſpecimens beſides.

The ſpathous iron, with ſilver, from Begori, in Dauphine, is worthy of attention.

The ſpathous lead ore, in fine needles, from the Hartz, is truly elegant.

Of copper, the chief and moſt valuable ſpecimens are the malachites from Siberia; of which ſome ſpecimens are highly poliſhed.

The antimony, in long needles, with heavy ſpar, from Bohemia is ſuperb.

The ſulphur, in large octaëdral cryſtals, is ſaid to be from Catalonia, but, as I apprehend, it is from Conil mine, near Cadiz.

They have here, as in all the other cabinets of Paris, large dodecaëdral garnets, uniformly incruſted with green talc, from the duchy of Stiria. Theſe garnets, when the cruſt is taken off, appear to have been formed in the talc as in its proper matrix.

Among

Among the foſſils, the moſt ſtriking are,

A nautilus, near three feet diameter.

Elephant's teeth, from Siberia, with an elephant's thigh-bone, from the vicinity of the Ohio, in Canada.

I remember to have ſeen, in Mr. Catcot's cabinet, in Briſtol, part of an elephant and a monkey, both found in the ſtone quarries near Bath, and at the depth of more than fourſcore feet.

The ferns, which are found on the coal mines in Wales, with the corals of St. Vincent's Rock, near Briſtol, are, like the monkies and the elephants, the natural produce of the Eaſt Indies, or of the torrid zone.

Various are the ſolutions of this phænomenon, given to the world by Catcot, Buffon, De Luc, Whitehurſt, Hutton, and Sauſſure; beſide many others, prior to theſe, not worthy to be named; but none of theſe are perfectly agreeable to truth, and to the appearances in nature, although every one of them ſtates ſome valuable facts, more eſpecially De Luc, who leaves all the others far behind him.

If ever a conſiſtent hiſtory of the earth and of its mutations ſees the light, we ſhall probably be indebted for it to a gentleman, who has been, with peculiar advantages, ſtudying the ſubject more than thirty years, and from whom, indeed, have been derived moſt of the uſeful hints, on which our beſt modern authors have built their ſyſtems. His account of ancient caſtles has been juſtly admired by all men of learning; but, ſhould he live to indulge the world with the true hiſtory of the earth, and of the changes which it has undergone, this will eclipſe all his other works, and convince the moſt incredulous, at leaſt as far as he enters on the ſubject, that nature and revelation perfectly agree.

After having viſited the king's cabinet, I went round to the other principal cabinets in Paris:

M. d' Orcy, a farmer general, in the Place Vendome, has two apartments, one for reptiles, the other for minerals.

His minerals are numerous, large, and elegant.

Of gold he has only two fine ſpecimens. Of the other metals the principal are, copper in blue cryſtals, with copper bloſſom and green feathered ore:

Tin cryſtals from Wheal Trevaunance, in Cornwall, and one large cryſtal from Bohemia:

Lead ore, white, green, and white mixed with copper blue, from the Bannat of Temeſwar:

Iron hæmatites in all its forms, a rich variety:

Blend with bright yellow pellucid cryſtals, elegant and rare:

Antimony in long coloured needles, permeating rhomboidal cryſtals of heavy ſpar.

The cabinet of *Monſieur de Romè de l'Iſle*, Rue des Bons Garçons, preſents a moſt intereſting ſyſtem of cryſtallization. With aſtoniſhing patience and acuteneſs, he traces the cryſtals of ſalts, earths, metallic ſubſtances, and gems, through an almoſt infinite variety, in beautiful ſucceſſion, each to its elementary and characteriſtic form, and ſhews clearly by what laws they have departed from it. In the pro-

ſecution of his ſubject, he has clearly aſcertained a fact of great importance to the natural hiſtorian, which is, that minerals may be infallibly diſtinguiſhed by the form, the hardneſs, and the ſpecific gravity of their cryſtals. Thus, by the ſenſible qualities of the mineral itſelf, if cryſtallized, we may inſtantly reduce it to its proper claſs, and judge of its contents, without the aſſiſtance of the fire. We began with examining his calcareous ſpars, than which none is more varied in its forms. Theſe, even our dog-tooth ſpar of Derbyſhire, he traced back to the rhomboidal parallelopiped, of preciſely the ſame angles with the Iceland cryſtal, or double refracting ſpar; proving them to be only an aggregate of rhombs, regularly contracting from the baſe to the apex.

This inveſtigator of nature's moſt ſecret path has almoſt reduced himſelf to blindneſs by his nocturnal ſtudies.

A friend of his related to me a curious anecdote, which does much honour to his heart. In his youth he received a good education, and in his advancing years found all his wants ſupplied, without

ever

ever being able to diſcover to whom he was indebted, either for this bounty, or for his birth. That he might know the one, he laboured to find out the other. His firſt attempts were checked with a caution to forbear; and for a time he continued quiet, if not contented to remain in ignorance; but in the end, growing weary, and impatient to diſcover a ſecret, which was ſo diligently concealed from him, he gave way to his curioſity. Receiving no farther hints to reſtrain him, he grew more bold in his inquiries, till ſuddenly he found the ſtream cut off, before he had traced it to the fountain from which it flowed. Thus, at once diſappointed and deſerted, he had no reſource but in himſelf. The ſtraitneſs of his circumſtances brought him acquainted with Mr. Foſter, who employed him in making out, from time to time, his catalogues of minerals for ſale at Paris. In this employment he acquired a taſte for natural hiſtory, and an intimate acquaintance with mineralogy.

After ſome years, the marquis de Romè died, and by his will not only acknow-

ledged him for his ſon, but left him every thing, which was in his power to bequeath.

The widow of the marquis, with her three daughters, caſt themſelves on the generoſity of de Romè de l'Iſle, who told her, "You have been accuſtomed to affluence, "and your daughters have been trained up "to high expectations: I have learned to "live upon a little; I ſhall take only a "ſmall penſion for myſelf; you and your "daughters may enjoy the reſt."

Monſieur Sage, from whom I had the chief of this relation, took an opportunity of repreſenting this act of generoſity to the preſent king, who has made ſome decent addition to his income; and he is now in affluence, loved and reſpected by his friends, and admired by all men of ſcience.

M. de la Bove, Rue des Champs Elizés, who is intendant of Dauphinè, has a collection of minerals ſomewhat ſimilar to that of M. d' Orcy, but choſen with more taſte, and conſiſting of ſmaller ſpecimens. He excels in the productions of his own province, more eſpecially in Schoerl, violet, green, and white, all cryſtallized and

blended together in the ſame ſtone with aſbeſtos.

M. Aubert, coachmaker to the king, in the Fauxbourgh S. Denis, has a collection of minerals more beautiful, and in higher preſervation than any of the former; for which, if I miſtake not, he has been much indebted to Mr. Foſter of Covent Garden, London, through whoſe hands have paſſed a great proportion of the fineſt ſpecimens of minerals in Europe.

M. de Joubert, treaſurer of Languedoc, Place Vendome, has a well digeſted cabinet of minerals and foſſils, arranged by M. Sage. The ſpecimens are good, many elegant; but their peculiar reference is to the ſciences.

The *Duke de la Rochefoucault* has two ſpacious apartments, beſide two little chambers, filled with minerals, arranged, not according to their genera and ſpecies, but according to the countries from which they came. Of theſe, multitudes are duplicates; ſome good, ſome bad, ſome whole, ſome miſerably broken, but all covered with duſt. The moſt diſtinguiſhed ſpecimens are a large maſs of ſulphur with

octaëdral cryſtals from Conil, in Spain; a beautiful ſpecimen of Malachites, of a conſiderable ſize, and highly poliſhed; with antimony in large cryſtals. But that which is ſingular to this collection is, a clear rock cryſtal, with a beautiful ſprig of Quartz, white like enamel, ſhooting in the midſt of it.

The duke has few varieties of tin or copper.

His calcedony and agate, from Auvergne, are moſt intereſting, as being the productions of volcanos, long ſince extinguiſhed in that province.

The *Abbé Hauy*, of the royal academy, has a collection of cryſtals which is worthy of attention. He demonſtrates that all cryſtals, of whatever ſize or form, are compoſed of primitive, minute, and elementary cryſtals, and that moſt of them, by proper fractures, may be reduced from the complex to the ſimple and elementary form. In the courſe of my viſit, I ſaw him with a blunt knife reduce a miſhapen maſs of fluor to an octaëdral cryſtal, nor would it readily aſſume any other form. This diſcovery he made by accident; for, obſerving that the

angle

angle of a fractured hexagonal priſm of calcarious ſpar was the ſame as of the rhomboidal, he was led to try the other parts of the cryſtal. By theſe means he found that the whole was in lamellæ of perfect rhombs, breaking eaſily and only on their proper ſurfaces, and yielding rhomboidal cryſtals. He is now purſuing this diſcovery on the other cryſtallized ſubſtances, obtaining the primitive or elementary form ſometimes by heating and quenching them in water, at other times by breaking the rude maſs, or compound cryſtal, with a hammer, varying his operations according to the nature of the ſubſtance. He is deeply verſed in the mathematics, of which he has availed himſelf in this reſearch. The ſimplicity of his manners is moſt engaging. This diſcovery beautifully illuſtrates the ingenious obſervations of de Romè de l'Iſle on the elementary and compound forms of cryſtals, and throws much light on this branch of natural hiſtory.

M. Haſſenfratz, engineer of the royal mines, and profeſſor in the newly inſtituted academy of mining, has a few well choſen minerals, which are chiefly valuable, as be-

ing of his own collecting in the way of his profeſſion. It is difficult to ſay whether he moſt excels in chemiſtry or mineralogy; for he is eminent in both.

He carried me, in our walks, to ſee a M. Stoutz, a German, diſtinguiſhed for his ſuperior knowledge in minerals and mining, who was employed on the part of the French government to viſit the mines of Hungary, Bohemia, Saxony, and other parts of Germany. I found him perfectly acquainted with the nature of all mountains in which mines are formed. His collection is made upon a peculiar plan: every ſpecimen of mineral ſubſtances in his cabinet, is connected with others from the ſame mine, forming a little collection by itſelf; and conſiſting of the metal in its ore, with all the intermediate ſtrata or changes in the rock, from the ſurface downwards, each with references to the various depths from which they came, and obſervations on the mountains in which the mineral is found. Since I left Paris, I hear that count d'Aranda has ſent him into Spain, to which country, with his ſuperior talents, he will be a valuable acquiſition.

M. Beſſon,

M. Beſſon, Rue S. Honorè, has the moſt elegant and moſt ſyſtematical collection of minerals I ever ſaw, beautiful as Mr. Foſter's, and claſſed nearly upon the ſame plan with the honorable M. Charles Greville's. In his collection of flints, you have the whole hiſtory of flint, from its moſt rude appearance to what, for beauty, we ſhould call its moſt perfect ſpecies; with all the varieties, in the moſt natural and methodical arrangement. The ſame outline he purſues in all mineral and metallic ſubſtances, tracing them through all their appearances and forms, from thoſe that are elementary to thoſe which are moſt compounded, and ſhewing the mineral, not merely in all its matrices, but in all its combinations. In no cabinet did I ever ſee beauty and ſcience ſo happily united. Part of this wonderful collection is not yet arranged for want of room, but chiefly for want of money to purchaſe cabinets. It is much to be lamented that a man of his abilities, who has diſcovered ſuch zeal, ſuch indefatigable induſtry, in traverſing the mountains, viſiting the chief mines of Europe, and exploring their contents, ſhould be diſ-

treſſed

treſſed and ſtraitened in his purſuit of ſcience. But more is it to be admired, that a man of his extenſive knowledge ſhould be hid, and among all the monarchs of Europe, among all the great, among all the patrons of ſcience, ſhould find no protector.

M. Sage is director of the mint, and principal of the royal academy for miners.

When a man of ſcience enters the ſpacious hall in which the minerals are kept, if he be not altogether deſtitute of taſte, he will be at a loſs which to admire moſt, the building itſelf, or its contents. The elegant ſimplicity of the painted dome, the ſurrounding gallery with its pillars and pilaſters, the whole covered with Italian ſtucco, the harmony and juſt proportion which every where prevail, and the diſpoſition of the minerals, excite the moſt pleaſing ſenſations of delight. In this beautiful apartment, with much ſimplicity and taſte, a receſs is formed for the laboratory, where M. Sage exhibits his experiments when he is delivering his lectures to his pupils. In the centre of the hall, an

area

area is incloſed for them by a ſkreen, which forms his cabinet for the reception of his minerals. In his collection, his principal attention has been to ſcience; and for that reaſon he has choſen ſpecimens beſt ſuited to exhibit the metal, the matrix, its various combinations, and the acids by which it is mineralized, whether the ſulphureous, the arſenical, or the phoſphoric. Beſides this claſſical collection, he has a provincial one in the gallery, where he has arranged the minerals according to the country from which they come. His method is both pleaſing and improving. To complete the whole, he has depoſited in a cabinet by themſelves the produce of all the various minerals in his collection, the reſult of his moſt accurate aſſays.

This ineſtimable treaſure is deſigned for the uſe of ſtudents in the newly eſtabliſhed academy for miners; an academy which, without diſtinction of nation or religious creed, is open to all the world. In this inſtitution, as in all other eſtabliſhments for extending the bounds of ſcience, and diffuſing knowledge freely and without expence among all ranks of people, we muſt

admire

admire the liberality of ſentiment, the high ſpirit, and ſenſe of dignity, which has diſtinguiſhed the ſovereigns of France.

M. Sage is the principal and father of this royal academy, and at the ſame time the chemical profeſſor. Beſides himſelf, there are four principal profeſſors, whoſe ſtipend is two thouſand four hundred livres each (or one hundred pounds ſterling) per annum. There are five inſpectors, each at three thouſand livres penſion, fifteen hundred for travelling expences, and three hundred by way of gratuity, if their diligence deſerves it; ſix engineers, at ſix hundred livres penſion, four hundred for journies, and two hundred gratuitous; twelve ſcholars, at ſix hundred livres penſion, and two hundred for gratuity. Of theſe, two are conſtantly travelling in Germany, with three thouſand ſix hundred livres each for their expences.

There are beſides, twenty ſupernumeraries, or expectants, without any penſion.

The inſpectors and the engineers viſit all the mines of France, and make a report to government, not merely of the produce, but of the management, together with

ſuch

ſuch obſervations as they may think needful to communicate. They are likewiſe to be ſent occaſionally into foreign countries, to examine the improvements which are made in ſearching for and working mines. From this academy the mines of France will be ſupplied with ſkilful engineers and managers. All the members have a blue uniform with M. R. on their buttons.

I was much ſurpriſed to ſee in moſt of the cabinets, and in all the printed catalogues at Paris, a ſubſtance which perhaps does not exiſt in nature; it is native tin. What they produce for ſuch, appears dull and brittle, and is in fact nothing but tin returning to a calx. Whilſt we ſmile at their credulity, we muſt lament that men of ſcience ſhould have been ſo eaſily deceived themſelves, and, without intending to propagate a falſehood, ſhould have deceived all thoſe, who have any dependance on their knowledge and veracity. For me it was by no means difficult to detect the miſtake; becauſe every ſpecimen of this ſuppoſed native tin came from my own cabinet, and went out from thence under the

deno-

denomination of dephlogiſticated tin. Of this, large fragments, and even blocks, have been found in the moors near St. Auſtle, but never at any conſiderable depth, nor far diſtant from ſome old furnace or habitation, of which the tradition is, that they were, in ſome remote period, occupied by Jews. In the ſame places copper implements have been likewiſe found returning to a calx, ſome friable and red, others ſaturated with the baſis of vital air, and therefore covered with malachites. This tranſmutation throws light on the red copper ore, with its octaëdral cryſtals found among the branchings of native copper in deep mines. The circumſtances are different, but the operation of nature is the ſame in both.

Having viewed all the cabinets of natural hiſtory in Paris, I determined next to ſurvey its environs.

The moſt ſtriking feature in this vicinity is Montmartre, a mountain of Gypſum, at the head of the ſtreet Montmartre. The ſtrata are horizontal. Sixteen of theſe have been laid open to the depth of more than one hundred and forty feet,

and

and are ſeen in the following order. The ſoil is ſandy, covering chalk rubble, in which is flint. Under theſe, clay; foſſil ſhells; cryſtals of ſelenite; gypſum rock; calcarious earth; clay; gypſum rock; clay; gypſum rock; clay; gypſum rock; marly clay; lenticular cryſtals of ſelenite moſtly in pairs, united face to face, of which the ſpears are only fragments; fuller's earth, perfectly free from impurities, in a ſtratum of about eighteen inches; gypſum rock, ſeparated into laminæ by ſtrata of ſelenitical cryſtals, and charged with foſſil bones. The quarries and excavations are immenſe, to ſupply the numerous kilns conſtantly at work. The gypſum rock conſiſts of ſelenite and chalk, which, being burnt, the former loſing its water of cryſtallization, and the latter its fixed air or cretaceous acid, becomes plaiſter of Paris: when this is made into mortar, the ſelenite ſeizes the water, and cryſtallizing, becomes inſtantly hard.

At Belmont, which is diſtant about half a mile from hence, the ſame ſtrata have been diſcovered.

Before I left London, I had purchaſed lenticular cryſtals of quartz; and as this

form is peculiar to the calcarious genus, I was deſirous of ſeeing the ſpot from whence they came. With this view I viſited the lime-ſtone quarries in the vicinity of Paſſy, where I gained the moſt perfect ſatisfaction, and ſaw clearly that the quartz had occupied the ſpaces left empty by decompoſed ſelenite, which, as I have before obſerved, is calcarious earth ſaturated with the vitriolic acid. The lime-ſtone rock is here charged with turbinæ and bivalve ſhells. The ſtrata appear to be horizontal. From theſe quarries they get building ſtone for Paris. Many of theſe extend more than one hundred yards under ground, with a roof ſupported by large pillars. Nearer to the city they ſink pits about eighty feet, then drive and raiſe the ſtones by engines.

There is not the leaſt appearance of primitive mountains in the vicinity of Paris. All has been tranſported, and all ſeems to be horizontal.

Near Fontainbleau, they find a grit-ſtone, or compoſition of ſand, with a calcarious cement. In the cryſtal the calx prevails, and takes the rhomboidal form, although

although the ſilicious matter appears both to the eye and to the touch to be predominant in quantity.

From the abundance of ſelenite in the immediate neighbourhood of Paris, the water of their wells is unfit for uſe.

Having heard much of Pont de Neuilly, I wiſhed to ſee it. Taking advantage, therefore, of the open weather, with a bright ſun, in the month of February, I took my morning walk that way, through the garden of the Thuilleries, and the Elyſian Fields. From thence, there is a wide avenue of trees, with a good pavement in the middle all the way for near four miles.

This part of the country is flat, ſkirted by diſtant hills. The ſoil is a hungry ſand, all arable; but too poor and too light for wheat, and all open *common-field*, divided, as in England, and all over Europe, excepting Ireland, in ſmall ſcattered lots.

This kind of tenure, with this minute diviſion, mark the ſlow progreſs of the plough at more ancient periods; when, from time to time, as increaſing population

urged them, they ſevered a new portion from the common paſture, and divided it, as far as related to the tillage, among the numerous tenants of each manor. In England, the rapid progreſs of agriculture, in modern times, is ſtrongly indicated by the ſtraightneſs of the hedges, becauſe all ancient bounds are crooked.

Between Paris and the Pont de Neuilly, their crops are barley, oats, and rye, for which they plough with two horſes, guided with check reins, without a boy.

Within two miles of Paris, on the left hand, is the wood of Boulogne, from which the country is ſo plentifully ſtocked with game, that between that wood and Paris, in the compaſs of two hundred acres, I ſaw more than fifty brace of hares, and at leaſt one hundred brace of partridges: a wonderful phænomenon ſo near to the metropolis, ariſing, not merely from the conſtitution of their government, but from the ſtrict execution of their laws. In this we are to look for the ſecurity of perſon and of property in France; where at the ſame time few are puniſhed, becauſe few venture to tranſgreſs.

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The Bridge of Neuilly is perfectly horizontal, and remarkable for its elegant ſimplicity.

On my return, I viſited the Hotel Dieu, where the ſick are in number two thouſand five hundred and ſeventy-four, beſides five hundred and ſeventy-one officers or attendants. In all, they make three thouſand one hundred forty-five perſons to be lodged and fed. I obſerved four in a bed, but they have had ſix or ſeven, and among theſe the dying with the dead. The ſick, although ſo miſerably provided for, coſt the public thirty ſols, that is, fifteen pence each per day. They have one ward in the winter, containing about four hundred perſons, ſet apart for thoſe who pretend diſeaſe. The practice of ſtowing ſo many miſerable creatures in one bed is to be aboliſhed, and ſurely upon the beſt of principles, for no man, who reaſons for a moment, can heſitate to ſay which is preferable, to make a few happy, or to render many completely wretched. But the misfortune is, that benevolence is often blind.

This change in the ſyſtem of the Hotel Dieu has been promoted, if not ſuggeſted, by M. Necker, who, in the hoſpital of S. Sulpice, has ſet an example worthy to be followed, as reflecting the higheſt honour both on the underſtanding and humanity of that moſt accompliſhed woman. She has provided each patient with a ſeparate bed, with the beſt attendance, and with every thing, which can adminiſter to his comfort. Yet all this, by a due attention to œconomy, ſhe does for ſeventeen ſols and ſix deniers each per day, being little more than half what they coſt at the Hotel Dieu.

The next day in the morning I viſited the hoſpital called La Salpetriére, in which are maintained more than ſeven thouſand foundling girls, with a few aged paupers, and about nine hundred proſtitutes. This number is conſiderable, but theſe are only ſuch as were guilty of other miſdemeanors. On the liſt of the police are more than twenty-eight thouſand of thoſe abandoned and miſerable women, who, in the duſk of the evening, ſwarm

in every ſtreet. In this hoſpital they have eight hundred children employed in needle-work and ſpinning, of which number many excel in moſt beautiful embroidery. When one of the old women dies, her huſband leaves the hoſpital. The government is by a matron, fourteen prieſts, thirty-two ſiſters of a ſuperior order, with fifty more, who are ſubordinate to theſe.

February the 20th, I was preſent at a ſolemn ſervice, celebrated in the church of S. Euſtache, for the repoſe of the ſoul of the Duke of Orleans. The whole was conducted with the greateſt magnificence and taſte. The ſtreet leading to the church was lined with ſoldiers, horſe and foot, ſtationed at convenient diſtances, beſides ſome who were patroling. The front of the church was covered, and all the choir was lined with black. At the bottom of the choir was a coffin raiſed upon a catafalque, or bier, which was about thirty feet high, twenty-four feet long, and eighteen wide, all covered either with mantles and eſcutcheons, or with hiſtorical pictures, and forming a well-proportioned pyramid. On the pedeſtal, at the four corners, were

four urns, ſupported by columns, and filled with ſpirits, from which proceeded a blue and lambent flame, the kind of light beſt ſuited to the melancholy ſcene. This lofty catafalque had over it a canopy, which hung from the roof, about forty feet above the coffin. Over the altar was a ſilver crucifix, large as life, covered likewiſe with a rich canopy, adorned with plumes, and lighted by twenty-four large wax tapers in golden candleſticks. Guards were ſtationed round the ſuppoſed body to keep off the multitude; I ſay the ſuppoſed body, for his body had been previouſly interred with the ſame pomp and ceremony at Vale de Grace, and his heart had been depoſited in the country. The chief mourners upon this occaſion were the Duke of Orleans, his ſon, and the Duke of Bourbon, attended by all their neareſt relations and their friends. The funeral oration was pronounced by the Abbé Fauchet, who, like all the good French writers, with their peculiar kind of eloquence, roſe ſometimes to the true ſublime.

To the Duke of Orleans belongs the Palais royal, which is now the favourite even-

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ing walk, being equally ſheltered from the ſun in ſummer, and from the rain in winter. The dimenſions of this quadrangle are nine hundred feet by three hundred and ſixty; and the walk is twelve feet wide, ſurrounded by coffee-houſes, traiteurs, and ſhops of every kind. The ſquare is planted, well gravelled, and well lighted in the evenings.

The pictures of this palace and of Verſailles, with thoſe which abound in many of the convents, have been ſo well deſcribed, that I ſhall obſerve the ſtricteſt ſilence on that ſubject, always remembering, that I am haſtening into Spain, and taking France only by the way. Such things, however, as others have not noticed, and are yet worthy of attention, I would ſlightly touch upon, that I may not leave too great a chaſm between Calais and Belgarde.

In the evening of February 28, being the laſt day of the carnival, when Catholics bid adieu to feſtivity and mirth for forty days, all Paris was in motion, and ſome thouſands were in maſks, men in the dreſs of women, and women in the dreſs

of men; all aſſuming characters, and many ſuſtaining thoſe characters with ſpirit. Popes, cardinals, monks, devils, courtiers, harlequins, and lawyers, all mingled in one promiſcuous crowd. In the ſtreet of S. Honoré alone were aſſembled more than one hundred thouſand ſouls. This ſtreet is two miles in length. With ſuch a multitude, although more than four hundred coaches were conſtantly parading on one ſide the ſtreet, and as many on the other, in oppoſite directions, ſuch were the precautions, that no accident either happened or could happen. To preſerve the moſt perfect order, foot ſoldiers were ſtationed at the mouth of every ſtreet where carriages could paſs; and in the middle of the ſtreets, horſe-guards and infantry were conſtantly patroling to keep coaches in their proper line. For this purpoſe they employed one hundred horſe, and twelve hundred of the foot guards.

I ſaw one elegant coach quietly taken into cuſtody for ſome indiſcretion of the coachman.

At the time of the king's marriage, they had neglected theſe precautions, and ſeveral hundreds

hundreds loſt their lives, either trampled under foot, or cruſhed to death.

Before I left Paris, I obtained a ticket of admiſſion to the Licée, near the Palais royal, where a numerous ſociety of gentlemen and ladies of the firſt faſhion meet to hear lectures on the ſciences, delivered by men of the higheſt rank in their profeſſion. The ſciences they cultivate are the mathematics, chemiſtry, natural hiſtory, experimental philoſophy, anatomy, civil hiſtory, polite literature, and all the languages of Europe. Their apparatus is magnificent, and all their mathematical inſtruments, the beſt which can be procured. They have a very elegant ſuit of apartments, one for reading and writing, another for converſation, and a third for the lectures. The ſubſcription is only four Louis per annum. I was much ſtruck with the fluency and elegance of language, with which the anatomical profeſſor ſpoke, and not a little ſo with the deep attention of his auditors. The French, with all their volatility, can be grave when it is proper to be ſo.

After this pleaſing entertainment, I call-

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ed to take leave of M. Haſſenfratz, whom I found verifying an experiment which has been made in France, and which may be of the higheſt import to the bleachers of linen. This proceſs they accompliſh in twelve hours; and at the expence of one penny Engliſh they can bleach ſix ells of linen. For this purpoſe they begin with dephlogiſticating a quantity of marine acid, by means of manganeſe, after which, having previouſly diluted it with water, they ſaturate the acid with an alkali, and thereby leave the dephlogiſticated air at liberty to act on all colouring ingredients which are found in the materials to be bleached. In the ſame manner the green wax from America may be rendered white and fit for uſe. The ſame ſolution will likewiſe ſerve for a teſt, by which to try the durability of colours in cloth, becauſe when they fade, it is only by the action of dephlogiſticated air diffuſed in the atmoſphere. This operation explains the effect of manganeſe in making glaſs pellucid.

Previous to my leaving Paris, I inquired the price of proviſions in the market, which I found to be as follows:

Chickens

Chickens and ducks, fifty-five ſols each.

A ſmall turkey, five livres.

Butcher's meat, ten ſols per pound all the year.

Pork and veal, at this time ſixteen ſols per pound.

Butter, thirty-ſix ſols.

Wine in the city, twelve ſols, and out of the city, eight ſols per bottle.

It is the policy of the French government to make all theſe articles dear in Paris.

JOURNEY

FROM

PARIS TO BELGARDE.

HAVING accompliſhed the purpoſe for which I came to Paris, in obtaining letters of recommendation to Madrid, and the weather proving more favourable for travelling than it had been in the beginning of the month; on the fourteenth of March I ſet out with an agreeable party in the diligence for Lyons. To thoſe who can riſe at two in the morning, and have an appetite for dinner before nine, this mode of travelling is not unpleaſant.

The firſt day we dined at Melun, and lay at Villeneuve la Guiarre. The next day, paſſing through Sens, where the Dauphin's monument

monument is much admired, we dined at Villeneuve le Roi, and lay at Auxerre. To this city there goes a large paſſage-boat from Paris, which, aſcending the rivers Seine and Yonne, performs its voyage in three days, including the intermediate nights, during which it is unremittingly, yet ſlowly, moving on. This boat is much uſed in ſummer, and, during the day, is very pleaſant, paſſing through the richeſt and moſt beautifully varied country. The paſſengers carry their own beds, and ſpread them in a ſpacious cabin.

All the way from Paris to Auxerre the prevailing ſoil is ſand, being a continuation of that vaſt tract of ſandy country which ſtretches from Dieppe by Rouen and Orleans to Bourges, yet under the ſand on the hills, chalk appears. The fields are open, and the country abounds with corn and wine.

Auxerre is a rich city, conveniently ſituated for trade. The cathedral is a fine old ſtructure, and worthy of attention. It is much to be lamented, that the chapter has never yet eſtabliſhed an accumulating fund, to perfect what has been left unfiniſhed

niſhed of this noble edifice, and to complete the tower, which daily reproaches them for their want of zeal.

Having paſſed Auxerre, we loſe ſight of the chalk, and in its place we find either a calcareous freeſtone, or a limeſtone rock, apparently in horizontal ſtrata; but both the limeſtone and the chalk abound with marine productions. The face of the country, as far as relates to ſoil, rock, culture, and produce, bears a ſtrong reſemblance to that between Bath and Atford, with this peculiarity, that all the hills are here upon one level, being evidently poſtdiluvian, formed by torrents, and interſected by deep ravins. Nature here hath not perfected her work. Neither hills nor vallies have yet aſſumed their proper form and character; all is confuſion, ruin, devaſtation. But when the heavy rains and torrents ſhall have ſunk the ravins, widened the vallies, and, wearing away the angles from the craggy mountains, ſhall have reduced them to gentle declivities, or to eaſy ſwells, the rains will ceaſe to be deſtructive, the raging torrents will become gentle ſtreams, and the ſurface of theſe hills, clothed

with

with verdure, will be protected from future devaſtation.

When we came to Vermanton, we began to find blocks of granite, brought down by the torrents from the mountains; and, arriving at Rouvray, we ſaw the granite rock itſelf. From this circumſtance, without having recourſe to the barometer, we have reaſon to conclude that we have aſcended to the higheſt level in this part of France; and, upon examination, we ſhall find in this vicinity the ſources of many rivers, which running to the eaſt, to the north, to the weſt, and to the ſouth, empty themſelves into the Seine, the Loire, and the Saone.

Not that we are to conclude from hence, that granite is the upper ſtratum of the earth, covering the limeſtone and the chalk, becauſe the reverſe of this we find to be the fact; but where chains of rugged granite mountains are ſeen, experience teaches us to look for nothing higher. Thus we ſhall find it on the moſt lofty ſummits of the Alps.

About Rouvray the ſoil is decompoſed granite, of which the quartz and ſilicious

ſand remain upon the hills, whilſt the clay and mica are waſhed into the vallies.

All here is arable incloſed. They uſe five horſes in their ploughs.

The cathedral of Autun ſhews great antiquity. In aſcending the marble ſteps which lead to it, I was ſtruck with the number of gryphites in this blue marble without the leaſt veſtige of any other ſhell.

As we had been deſcending a conſiderable time by the ſide of the Arroux, a little river which flows into the Loire, and were come to a much lower level, I was not ſurpriſed to meet with marble.

When we came within five leagues of Challon, and began to fall down towards the Saone, loſing ſight of the granite, we found only limeſtone, charged with gryphites, and covered with ſand, which appeared to have been waſhed from a ſuperior level.

Challon carries on much trade in corn and wine. The waters being out, we could not go down the Saone, as was intended. I was not ſorry for this, becauſe, although the country bordering on the river, as you approach Lyons, is moſt enchanting, I had

ſeen

ſeen it, and retained a lively impreſſion of its beauty.

Between Challon and Macon is rich, and moſtly flat, but before we came to Lyons, we met with hills and granite, and indeed where the Saone enters the city it has made a paſſage for itſelf through the granite rock, which it has fretted away to the depth of about one hundred feet, leaving it on one ſide perpendicular like a wall.

All through Burgundy they uſe oxen on the road, yoked by the horns, which is certainly the beſt way of working them. The reaſon will be obvious, if we conſider that by this mode of proceeding there is no ſtrain upon any of the ſmaller muſcles of the neck. Though the preſſure be great, the vertebræ are only in the ſame proportion locked cloſe into each other, preciſely in the ſame manner as are the bones of the leg and thigh of him who uſes Sampſon's girdle. This girdle, as it is known, a man puts round his loins, whilſt he ſits on a bench with his heels againſt any immoveable object; thus ſituated, and keeping his legs directly in the line of draft, he may ſuffer ten, or even twenty men, to pull at

the girdle without moving him; but a ſtrong man, who was trying this experiment, exulting in his ſtrength, took hold of the rope which was faſtened to the girdle, and thereby elevating the line of draft, and having nothing to depend upon but his muſcular exertion, he was raiſed in a moment, and thrown upon his face. Setting aſide, however, all reaſoning upon this ſubject, the fact ſpeaks for itſelf, and all who have obſerved the loads which two oxen on the continent will draw, muſt give the preference to their manner of yoking them.

The deſcription of Lyons, as to its public edifices, I ſhall leave to others, and ſhall conſider it only with regard to manufacture. Enjoying a delightful climate, and ſituated at the conflux of the Saone and of the Rhone, it muſt very ſoon have riſen to importance. Its inhabitants have in all periods been diſtinguiſhed for induſtry, for arts, and for love of freedom. Under the Romans, as a municipium, it poſſeſſed valuable immunities; and when it became a colony, as ſuch it was cheriſhed and protected. Under the ſove-

reigns

reigns of France it has enjoyed peculiar privileges, being governed by its own magiſtrates, and guarded by its own militia. Four annual fairs, each of fifteen days, inſtituted in the reign of Lewis XI. have much contributed to the advancement of its traffic.

Its good government naturally attracted citizens, whilſt the troubles excited at various periods in the neighbouring ſtates, more eſpecially about the year 1290, between the contending factions of the Gwelps and Gibelines, occaſioned many from Italy and Florence to ſeek refuge in a city, where they could live in ſecurity and peace.

The principle dependance, and the ſource of wealth to Lyons, is her manufacture of ſilk in all its branches.

The firſt who introduced this into France was Charles IX. but the chief encouragement it received was in the watchful attention of Henry IV. who in the year 1602 made a contract with ſome merchants to deliver four hundred thouſand mulberry-trees, five hundred pounds of ſeed, and the eggs of ſilk-worms to the

amount of one hundred and twenty and five pounds, with ſix thouſand copies of a work containing all proper directions for managing the plants, the worms, and the ſilk produced by them. Theſe were to be diſtributed in the generalities of Paris, Tours, Orleans, and Lyons, at the rate of a hundred trees, and half an ounce of eggs to every pariſh. The eccleſiaſtics, as well regular as ſecular, aſſiſted in this work, both by their precepts and example. But owing to the civil wars, by which France was diſtracted during two ſucceeding minorities, little was done effectually to animate this profitable commerce, till Lewis XIV. aſſumed the reins of government: from that period its advancement has been rapid.

In the year 1667 there were two thouſand looms at work, but in 1768, more than eleven thouſand; and ſuch is the progreſs of the manufacturers, that the grower of ſilk is not able to keep pace with them; for at the preſent time they are obliged to purchaſe from foreigners more than twenty millions of pounds weight to ſupply the market.

The ſilk-weavers here have almoſt acquired a monopoly of taſte, and by this circumſtance have given an example to the world of what competition can do, when properly directed.

Taſte is not any where cultivated with ſuch attention as at Lyons. The manufacturers have at times employed more than a hundred pattern-drawers, whoſe invention is unremittingly upon the ſtretch, except when they obtain leave of abſence, which is ſometimes granted even for twelve months, that they may reſt their imagination, and acquire new ideas.

The firſt perſon noticed as having excelled in this profeſſion was *Revel*, the friend and companion of Lebrun, an artiſt whoſe talents were ſo far ſuperior to thoſe of his ſucceſſors, that they regard him as their Raphael. After him came *de la Salle*, equally famous for his birds, his landſcapes, his flowers, and his fruit. *Jean Robin*, anxious that the embroiderers might copy nature, and introduce into their works from her rich variety, planted a garden in the vicinity of Paris for the cultivation of exotic plants; and thus,

without intention, laid the foundation of the phyſic garden. It was here that the celebrated Pierre Vallet, of Orleans, embroiderer to Henry IV. and Lewis XIII. acquired his fame.

Although *Lyons* has enjoyed ſingular advantages, ſhe has likewiſe had to ſtruggle with difficulties. Theſe are admirably diſplayed by the Abbé Bertholon, in a work of his upon this ſubject, lately given to the public; and as every government in Europe is intereſted in his obſervations, I ſhall briefly ſtate them. The various obſtacles to the proſperity of trade have been and muſt be as long as they exiſt;

1. *War*, whether foreign or domeſtic, civil or religious; from factions in the ſtate, or from the deſire of freedom. Becauſe commerce is frighted at the appearance of the laurel, and flouriſhes only whilſt ſhaded by the peaceful olive.

2. *Perſecution*, and want of toleration; as in the revocation of the edict of Nantz, operating in the ſame manner as the expulſion of the Moors from Spain.

3. *Laws* indiſcreetly interfering, prying, med-

meddling, reſtraining, vexing the manufacturer or the merchant in his operations.

4. *Taxes*, ſuch as either directly or indirectly check the conſumption. It was not till 1743 that the manufactures of Lyons were exported duty free, and even now all proviſions entering the city pay a heavy tax, particularly wine. The conſequence is, the riſe of labour in the firſt inſtance, and as the weavers on feſtivals reſort with avidity to the neighbouring villages to indulge themſelves with wine, they acquire habits of intoxication.

5. *Feſtivals* multiplied raiſing the value of the remaining days, and leading to every ſpecies of exceſs.

6. *Prejudices* reſpecting *uſury*, tending to keep money out of circulation, and thereby to raiſe the intereſt on it, to the diſadvantage of thoſe who wiſh to borrow. In conſequence of this, money is at 6 per cent. in Lyons.

7. *Luxury* among the manufacturers, conſuming their capitals, and cramping their operations.

8. *Titles of Nobility* and rank granted to merchants, under the abſurd idea of promoting trade, but in truth diverting the

ſtreams by which commerce ſhould be watered. This miſtaken policy is not uncommon in the preſent day. How much wiſer was the conduct of Louis XI! he was a friend to commerce, and cheriſhed it by the moſt marked attentions, by wiſe regulations, and by admitting to his table thoſe who ſignalized themſelves in its advancement.

A merchant named Maitre Jean, flattered with this diſtinction, ſolicited a patent of nobility; the king granted his requeſt, but from that time never invited him to dinner. Mortified with being thus neglected, when he thought himſelf more worthy of attention, he ventured to expoſtulate, but was ſilenced by this reply: "Allez M. le Gentilhomme. Quand je "vous faiſois aſſeoir a ma table, je vous "regardois comme le premier de vo-"tre condition; aujourdhui que vous en "êtes le dernier, je ferois injure aux au-"tres, ſi je vous faiſois la même fa-"veur."

The learned Abbé, to whoſe work I am indebted for much information, recommends the white *female* mulberry as beſt for ſilk worms, and ſuggeſts an idea, that

if

if ſuffered to live on the trees in the open air, yet protected from the rain, they would become more hardy, more free from diſeaſes, and ſpin more perfect ſilk. He mentions a M. *Pernon*, who produces ſilk as white and beautiful as that of Nankin; and recommends for bleaching the Bengal ſilk, to ſoak it repeatedly in a mixture of ſpirit of wine and marine acid, in the proportion of thirty-two to one.

According to his account, no people either work longer or fare harder than the weavers of Lyons; riſing before the ſun, and continuing in their looms till a late hour in the night, to procure a ſcanty pittance for themſelves and for their children. He tells us, that no inſtance has been found of three ſucceſſive generations who have been weavers: the firſt is feeble, the ſecond is diſeaſed, and the third never comes to maturity, unleſs tranſplanted to a ſoil, and engaged in ſome occupation more conducive to health.

Emigrations have been the conſequence of theſe hardſhips; becauſe neither laws nor chains will keep the artificer from wan-

wandering, when he is a prey to hunger and deſpair. (V. Commerce de Lyon, par M. l'Abbé Bertholon, &c. &c.)

In Lyons, the principal merchants and manufacturers are ſaid to be proteſtants. This obſervation, if well founded, is worthy of attention, and the influence of religious opinions in reſtraining or promoting induſtry and emulation, as a political queſtion, is highly worthy of diſcuſſion; but I ſhall wave this for the preſent.

Having formerly ſeen every thing remarkable in Lyons, and being impatient to be gone, I watched with anxious expectation the riſing and falling of the river. The day after I came to Lyons, towards noon, we began to conceive hopes that the diligence might venture to depart.

The waters ran off with great rapidity, the river ſunk apace, and ſoon found its proper bed; the paſſengers haſtened to the quay, the boat took in its loading, and in leſs than two hours after mid-day we began to float down the ſtream.

This veſſel is very commodious for paſſengers, having a good deck to walk on when

when the weather is agreeable, and a warm cabin to which the genteeler paſſengers reſort when the atmoſphere is cold or rainy.

Paſſing between the high mountains of Dauphiné, in a winding courſe, and gliding along at the rate of ſix miles an hour, in about five hours we arrived at Condrieux, a little village not far diſtant from Vienne, famous for its wine. M. David, the aubergiſte, did juſtice by us, and credit to himſelf, by the ſpecimens which he produced. He ſells this wine at ſix louis a *piéce*; each piéce containing two hundred and fifty bottles, or one hogſhead nearly. It is a ſweet wine, exceedingly delicate in its flavour.

The next morning, March 21, we paſſed under Hermitage, where M. Larnage, the lord of Teint, annually makes about ſeven hundred hogſheads of the choiceſt wine, which M. Bourgoiſe, a merchant of Teint, in Dauphiné, vends on his account. The ſituation and the ſoil are certainly favourable for making wine, but its peculiar excellence depends on the choice and management

nagement of the vines, to which M. Larnage pays the moſt minute attention.

As we approach Valence, near which the Iſere falls into the Rhone, this river makes an angle to the right, as if diverted from its courſe, and, being loſt behind the hills, ſhews Valence to great advantage, ſeated on a riſing ground, in a plain of about ſix miles in width.

The mountains are here calcareous. That which is weſt of the river, and oppoſite to Valence, riſes perpendicularly, as if it had been cut aſunder, and does not retain the ſmalleſt veſtige of the half which it has loſt. The ſtrata are horizontal; the ſoil in the plain is ſand, but in many places it is full of pebbles to a conſiderable depth.

All the way as we paſs between the mountains, ſome near to the river, others more remote, we remark, either on their ſummits or their ſides, the ruins of ancient caſtles, each protecting its little village, and many of them carrying marks of the moſt remote antiquity.

This night we took up our quarters at Ancone, and the next morning paſſed by

Viviers,

Viviers, the capital of the Vivarez. This little city is moſt romantic, and, from a proper point of view, would make a pleaſing landſcape.

At noon we paſſed the Pont S. Eſprit, where leaving the marquis de Gras and ſome other officers, in whom I had found agreeable companions all the way from Paris, I began to travel alone.

From Lyons to Avignon, which is one hundred and fifty-two miles, you pay no more than twelve livres, or ten ſhillings ſterling for your conveyance.

The price of proviſions at S. Eſprit is fixed by the magiſtrate. Beef, five ſols; mutton, ſix, excepting in June and September, then ſeven ſols per pound; labour is twenty ſols a day in winter, but in the vintage, diet and ten ſols, or about five pence ſterling.

From Pont S. Eſprit to Montpellier, which is ſeventy miles, I took a return coach, and, without the leaſt difficulty, agreed with the driver for nine livres.

From the Rhone we aſcended for many leagues, and obſerved the limeſtone rock charged, yet ſparingly, with ſmall round gravel

gravel of white quartz. The country we paſſed through is rich, and the corn-fields are covered with mulberry trees, vines, figs, apricots, and peaches.

As we riſe towards the heights of Valignière, we paſs by Bagnols, a very ancient but wretched town, incloſed with high walls, and defended formerly by towers.

Near the ſummit of theſe mountains, we obſerve the craggy rocks of limeſtone waſted and laid bare by froſt, by winds, by rain, to whoſe rage and violence theſe elevated regions are conſtantly expoſed. Between theſe rocks the road meanders, preſenting at every ſtep the moſt enchanting views of rugged cliffs, interſperſed with the ilex, the juniper, the box, the cyprus, beſides thyme, lavender, and a pleaſing variety of flowers. Amidſt this rich profuſion, I was ſtruck however with the diminutive appearance of the cyprus and the juniper.

We lay at Valignière, a miſerable village anciently defended by a caſtle, the ruins of which remain to remind its inhabitants of their ſuperior happineſs, in no

longer needing the protection of thoſe walls.

In this country they have no other implements for cultivating their vineyards but ſuch as are uſed in Cornwal, the biddex and the ſhovel, both perhaps of Celtic origin. They have a light ſwing plough, without coulter, fin to the ſhare, or mould board; inſtead of which, they have two little wooden fins faſtened into the heel of the ſhare, one on each ſide, to turn the earth to the right and left, and thus form a rafter. The beam is long, and is faſtened immediately to the yoke. They plough with two oxen, yoked together by the horns, and guided by the ploughman. The ſoil is very light.

From Valignière we conſtantly deſcended to the famous Pont Du Garde, a Roman aqueduct which joins two high mountains. It is about one hundred and fifty feet high, and eight hundred long upon the top, but not more than five hundred at the bottom, near the water's edge. The loweſt tier has ſix arches, the middle has eleven, but the upper one has thirty-five; the whole being of the Tuſcan order, and conſtructed

with

with large ſtones, has the air of greatneſs and of ſimplicity moſt happily combined. It was built for the purpoſe of conveying water into Niſmes. To this edifice, about forty years ago, they added a bridge, much wanted over the Gardon, which is here about ſeventy feet wide.

At Remoulin, not far from the Pont du Garde, the limeſtone rock appears to be entirely compoſed of broken ſhells, united by a calcareous cement, and charged with ſmall round gravel of white quartz, preciſely the ſame as I had noticed in aſcending from Pont S. Eſprit.

March 23, at noon, I arrived at Niſmes, and began immediately to feaſt my eyes with a view of its venerable relics. An accurate account of theſe may be found in a variety of books, as having been deſcribed by travellers of every nation. At the preſent moment, my mind contemplates an object more venerable than theſe monuments of Roman greatneſs, and my attention is wholly occupied with the pleaſing image, the image of a ſhepherd, who lived only for his flock: this was M. de Becdelievre, late biſhop of Niſmes, a prelate equally

equally diſtinguiſhed for wiſdom, benevolence, and piety. Not contented with relieving from his purſe the diſtreſſes of the indigent, he increaſed the produce of labour in his dioceſe, by transferring to the Sundays many of the numerous holidays which encourage only idleneſs and vice. In the diſtribution of alms, his benevolence was guided by diſcretion. He was a ſtranger to that deſtructive ſpecies of liberality which originates in blind ſenſibility, and has no other foundation but undiſtinguiſhing compaſſion. He conſulted at once his head and heart, neither turning away his eyes from beholding miſery, nor relieving it merely and at all hazards, that he might avoid the painful ſight; but, giving ſuch aſſiſtance in the ſeaſon of diſtreſs, as both reaſon and religion muſt approve; and leaving the poor to feel preciſely that degree of want, which, as long as they retain their freedom, will be always needful to ſtimulate their induſtry. Thus, he reſembled the prudent gardener, who waters the drooping plant, and continues to water it, but only whilſt the heavens withhold their rain. Zealous for the peculiar

doctrines of his religion, he made no diſtinctions in his benevolence, not only tolerating, but doing good to thoſe, who could neither receive the creed, nor conform to the mode of worſhip eſtabliſhed by their country This ſingle prelate, by his wiſdom and beneficence, in the ſpace of five and forty years, much more than doubled the number of inhabitants of Niſmes; for, having found only twenty thouſand, he had the happineſs before his death of ſeeing fifty thouſand riſe up to call him bleſſed.

March 24, in the evening, we got to Montpellier; and the next day, after I had delivered my letters to the Count de Perigord, governor of the province, I began to explore the country.

The firſt object which attracted my attention was the aſparagus growing wild. Theſe are brought to table, but they are not ſo ſweet and agreeable as thoſe which have received cultivation, nor are they ſo large.

Wandering about beyond the Perou, I ſtumbled upon a beaked oyſter, (*oſtrea roſtrata*) and looking round, I ſoon diſcover-

ed the ſpot where the precious relick had been depoſited, when this elevated ſpot was under the ſurface of the ſea. There is a regular ſtratum of theſe oyſters of about eighteen inches thickneſs, without the admixture of any other ſpecies, or of any other ſubſtance, extending eaſt and weſt, as may be ſeen in every quarry which has been opened in thoſe directions, and hiding itſelf under the Perou. Some of thoſe ſhells are found in the ſuperincumbent rock, and a few ſtragglers in the ſand above it.

In the Fauxbourg Boutoné, the limeſtone contains the echinus, or ſea urchin, and the ſcallop with deep ribs.

Early in the month of April, the weather being moſt inviting for excurſions, I determined to extend my walks to ſome more diſtant objects. Of theſe, the only one which deſerved to be noticed is a volcanic mountain, called Montferrier, deſcribed by M. Jubert. In aſcending towards this, I met with a phænomenon which frequently occurs, but which has never been accounted for. At a few yards before me I ſaw a whirlwind taking up

a cloud of ſand, raiſing it obliquely in the air, and then carrying it before the wind as far as my eye could trace it. It has been ſaid, that the meeting of two winds, nearly in oppoſite directions, forms the whirlwind; and that the conſequence of this muſt be a vacuum in the middle, into which the air ruſhing with impetuoſity, carries even bodies which are ſpecifically heavier than itſelf. But to this ſolution there appears to be more than one objection; for, in the firſt place, as the ſand roſe with a rotatory motion, it ſhould have gone, like all other heavy bodies, not to the centre, but to the circumference. But, in the next place, taking this ſuppoſed vacuum for granted, bodies ſpecifically heavier than air ſhould deſcend and not riſe in it; unleſs, like the torricellian tube, it were open below, and hermetically ſealed above. To account for this effect by referring to the riſe of water-ſpouts at ſea, is only to explain one difficulty by another. When we ſhall know by what power in nature a cloud, containing many thouſand tons of water, is ſuſpended in the air, we ſhall be, perhaps, prepared to reaſon with a better

a better proſpect of ſucceſs upon the nature and the cauſe of whirlwinds.

In the way to Montferrier the rock is all calcareous. At a lower level it is pudding ſtone, hard and compact, with both the charge and the cement calcareous. At a higher level, it is a calcareous concretion, or petrifaction by incruſtation, light and porous, like a ſponge, yet not ſo ſoft, incloſing leaves, ſticks, and ſnails; a ſubſtance which the French call *tuf*. This goes to a conſiderable depth, and lies upon the limeſtone. As we approach the mountain, the pudding ſtone and tuf give place to the living rock.

Montferrier is ſo completely covered with houſes, that it would be in vain to ſeek a crater; but, conſidering its conical form, and the volcanic ſubſtances of which it is compoſed, I can readily conceive it to have been once a burning mountain.

In the vicinity of Montpellier, calcareous rocks, charged with marine ptoductions, univerſally prevail, and are uſually covered with either ſand or clay. The clay being ſometimes interſperſed with calcareous matter and pyrites, the latter decompoſes; in

conſequence of which, its acid uniting with the calcareous matter, forms a ſelenite, whilſt its iron gives a colour to the marle. If no calcareous matter is at hand, the acid ſet at liberty forms alum with the clay.

In the Cevennes, not far diſtant from Montpellier, mines and minerals abound, ſome rich in copper, others in lead and iron, but few which carry tin. One of theſe, a lode of about three feet thick, ſo poor as not to pay expences, produces iron, tin, and lead. In this mine, M. Chaptal, profeſſor of chemiſtry, and inſpector of the mines, tried an experiment which may be highly intereſting to the naturaliſt, if not to the adventurer in mines, by ſubmitting to a fiery trial many hundred weight, if not tons, of quartz and granite, taken contiguous to the walls of the lode. The iſſue was the production of tin, lead, and iron; although no eye could diſtinguiſhed the leaſt appearance of theſe metals, previous to their being committed to the furnace.

From this gentleman I obtained a ſubſtance, which had been lately diſcovered in

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all the auriferous ſtreams in France; a ſubſtance which has certainly a ſtrong affinity to iron, yet differs eſſentially from it. It is in the form of ſand, is attracted by the magnet, and makes Pruſſian blue; but it is more obſtinate in the fire than platina, having never yet been fuſed in the ſtrongeſt furnace. It is, moreover, inſoluble in acids without heat, gives no inflammable air, and has never yet been calcined by any acid; beſides which, its ſpecific gravity is to iron as eleven to nine. From all theſe properties, we may at leaſt venture to ſuſpect, that this newly diſcovered ſubſtance is a modification of iron.

To a man who is devoted to the ſciences, no reſidence can be more delightful than Montpellier. Is he fond of chemiſtry? in M. Chaptal he will find a ſagacious guide, well qualified to conduct him in his purſuits, and to aſſiſt him in following nature as far as the moſt knowing have been able to trace her ſteps. The Abbé Bertholon will explain to him the principles of natural philoſophy, with a clearneſs and elegance of expreſſion peculiar to himſelf; and with an apparatus, perhaps the